SCOPE OF SERVICES OVERVIEW

The Engineer shall furnish all labor, materials, equipment and supervision necessary to complete the wet weather monitoring requirements specified in the City's Municipal Separate Storm Sewer System National Pollution Discharge Elimination System Permit (MS4 Permit). Tasks associated with this project include outfall sampling, laboratory analysis, laboratory data evaluation, report generation, and project management. Part IV of the City's MS4 Permit specifies the sampling and analytical procedures that shall be used to perform the sampling and analytical tasks needed to successfully complete this project. Work under this project shall continue through all five (5) years of the City's 5-year MS4 Permit cycle.

The following scope of services presents the tasks the Engineer shall perform to meet the requirements of Part IV and Part V of the City's MS4 Permit and is supplemented by the Engineer's July 21, 2006 project proposal, incorporated by reference into this contract. In instances where task items described in the Engineer's July 21, 2006 project proposal conflict with the task descriptions presented in the written scope of services below, the task descriptions in the written scope of services below shall govern. All services performed under this Agreement shall be in accordance with the hourly rates shown in Exhibit C with no change or escalation for work performed during non-business hours.

DETAILED DESCRIPTION OF TASKS:

Task 1 – Quality Assurance Project Plan

Prior to any sampling work, the Engineer shall prepare a Quality Assurance Project Plan (QAPP) that describes the activities that will be performed to complete the sampling, analytical, monitoring, and reporting tasks under this project. The QAPP shall document the results of the project's technical planning process, provide a clear, concise, and complete plan for task performance, identify quality assurance/quality control objectives and procedures, and identify key project personnel that will be responsible for performing each task. At a minimum, the QAPP shall address and/or include each of the elements listed in the following table that are relevant to this project.

QAPP Elements[1]

Project Management	Data Generation and Acquisition	Assessment and Oversight	Data Validation and Usability
Title and Approval Sheet	Sampling Process Design (Experimental Design)	Assessments and Response Actions	Data Review, Verification, and Validation
Table of Contents	Sampling Methods	Reports to Management	Verification and Validation Methods
Distribution List	Sample Handling and Custody		Reconciliation with User Requirements
Project/Task Organization	Analytical Methods		
Problem Definition and Background	Quality Control		
Project/Task Description	Instrument/Equipment Testing, Inspection, and Maintenance		
Quality Objectives and Criteria	Instrument/Equipment Calibration and Frequency		
Special Training/ Certifications	Inspection/Acceptance of Supplies and Consumables		
Documentation and	Non-direct Measurements		

[1] Adapted from U.S. EPA Guidance for Quality Assurance Project Plans (EPA QA/G-5, 2002)

Project Management	Data Generation and Acquisition	Assessment and Oversight	Data Validation and Usability
Records			
	Data Management		

More information on these elements is provided in the U.S. EPA's Guidance for Quality Assurance Project Plans (EPA QA/G-5, 2002). Information pertaining to practices and procedures used by the City's Surveillance Laboratory is provided in Appendix G and shall be incorporated into the final QAPP for this project.

Procedures outlined in the QAPP shall be followed during the completion of each task and throughout the duration of the project. The City recognizes that there may be instances where procedures specified in the QAPP may need to be changed due to circumstances that were unknown at the beginning of the project. In instances where it is found that a procedure(s) specified the QAPP is impracticable, the QAPP shall be revised to incorporate an alternative procedure and justification of the change shall be provided. In no instance shall changes be made within the QAPP without prior approval by the City.

Task 2 – Permits and Maintenance of Traffic
The following tasks shall be performed to comply with City permitting requirements and to ensure the safety of the Engineer's sampling/monitoring crews and traveling public.

Task 2.1: The Engineer shall procure the necessary right-of-way permits from the City's Transportation Division where any dry weather or wet weather field screening or sampling tasks are to be performed within city right-of-way.

Task 2.2: The Engineer shall provide for the maintenance of vehicular and pedestrian traffic to ensure that any dry weather or wet weather field screening or sampling tasks are conducted safely where such tasks are to be performed in or around vehicular and pedestrian traffic.

Task 3 – Dry Weather Flow Characterization
The following tasks shall be performed to characterize the constituents present in dry weather discharges. The results of this characterization shall be used by the Engineer to adjust the amount of constituents that are reported for wet weather flows.

Task 3.1: The Engineer shall field screen each of the eight (8) sampling locations (5 city-wide and 3 in the Hellbranch Run watershed) shown on Appendix E and Appendix F for the presence of dry weather flow and report his/her findings to the City. Dry weather flows shall be defined as discharges from stormwater outfalls that are occurring 72-hours from the end of the last precipitation event. Dry weather screening shall be performed quarterly at each of the eight (8) monitoring locations during Year 1 of the Agreement.

Task 3.2: **If authorized**, the Engineer shall characterize the constituents present in dry weather flows where applicable. The Engineer shall collect at least one (1) dry weather sample per dry weather field screening visit from each outfall that was identified during field screening as having dry weather flow. The Engineer shall collect, maintain records of, and report on the amount of dry weather flow (if present) discharged from each outfall at the time when the dry weather samples were collected. Samples collected during dry weather flow events shall be analyzed for the constituents listed in Table 5.1 and Table 5.2. The Engineer shall evaluate the dry weather sampling data and prepare a summary report that characterizes the constituents that were observed in the dry weather samples. The Engineer shall use the findings of the dry weather characterization report to adjust sampling data that will be collected to represent wet weather events.

For budgeting purposes, the Engineer shall assume that tasks associated with dry weather flow characterization will be performed at each of the eight (8) monitoring locations for this project. The Engineer shall also assume that only one dry weather characterization report will be prepared to include all of the dry weather information for all eight (8) of the monitored outfalls. The Engineer shall assume that

an initial draft report will be prepared and submitted to the City and that two (2) separate revisions to the draft report will be made by the Engineer based on City review before the final report is accepted.

Work under this sub-task shall only be performed "if authorized" in writing by the City prior to any execution of work. Such work would be performed only upon the approval of a cost estimate for dry weather flow characterization services prepared by the Engineer (under the rates and costs established by the agreement) and subsequent written authorization by the City.

In instances where the Engineer observes the occurrence of an illicit dry weather discharge (e.g. visible oil sheen, odor, color, etc.) during field screening, the Engineer shall immediately report the discharge to the City's Stormwater and Regulatory Management Section at (614) 645-0362.

Task 3.3. **If authorized,** the Engineer shall assist the City, on an as-needed basis, in completing the dry weather outfall screening on the City's major stormwater outfalls as specified in Part III.D.4 the City's MS4 Permit. The Engineer shall provide field crew(s) to complete field screening of the outfalls for non-stormwater discharges, as follows:

1. Field screening shall consist of visual observations, floatables, color, turbidity, oil sheen, temperature, deposits, stains, odor, vegetation damage, damage to sewer and outfall structure, characteristics of discharge and/or receiving stream, and flow estimates. Field screening shall also include the collection and field sampling of dry weather flows. The Engineer shall analyze samples collected from dry weather flows for the following indicator pollutants and compare the results to the limits specified in the following Table.

Indicator Pollutant	Pollutant Concentration Limits
pH	6.5-9.0
Temperature	N/A
Copper	0.1 mg/L
Phenols	1.5 mg/L
Chlorine	1 mg/L
Ammonia	2.5 mg/L
Detergents	1 mg/L

   The Engineer complete and submit to the City a field screening evaluation sheet (to be supplied by the City) for each outfall where dry weather screening was conducted.

2. If field analysis identifies pollutant concentrations that are greater than those listed above for any of the indicator pollutants, the Engineer shall:
   a. Shall immediately report their findings to the City's Stormwater and Regulatory Management Section at (614) 645-0362, and
   b. Collect a grab sample and deliver the sample to the City Surveillance Laboratory for further analyses by the City.

For budgetary purposes, the Engineer has assumed that a total of 600 outfall locations at a productivity rate of 6 inspections per day over the 5-year term of the Agreement are included in this subtask. Screening kits will be provided to the Engineer by the City for use on this task.

Task 4 – Wet Weather Monitoring

The following tasks shall be performed to collect the necessary water quality samples, precipitation information, and flow information as required in the City's MS4 Permit. No additional compensation will be considered beyond the negotiated cost of services for after-hours sampling.

Task 4.1: The Engineer shall collect, maintain records of, and report on the following information for each wet weather event that is monitored at each of the eight (8) outfalls that are to be monitored as part of this project:

a. Date and duration (in hours) for all storm event(s) sampled. The Engineer may use City rainfall gages to acquire this information.
b. The rainfall measurements (in inches) of the storm event which generated each sampled runoff.
c. The duration (in hours) between the storm event sampled and the end of the previous measurable storm event for all storm events that are sampled. A written justification for the lag time between storms that was used must be provided in the summary report generated under Task 6.
d. Total runoff volumes (in gallons) of all discharges that are sampled.

The Engineer shall perform those necessary hydrologic and hydraulic analyses on the monitored storm sewer systems to accomplish this task and to demonstrate the water quantity and quality responses for each monitored storm sewer system. Such analyses may include, but is not limited to, the development of rating curves, land use analysis, and sewer system modeling.

Task 4.2: The Engineer shall collect wet weather samples from the five (5) City-owned outfalls that are located throughout the City of Columbus as shown in Appendix E. The sampling frequency at these outfalls shall be every quarter of the year to coincide with the winter, spring, summer, and fall seasons. In instances where the Engineer is unable to collect samples for seasonal characterization due to adverse climatic conditions, the Engineer shall submit a written submission of why samples could not be collected, including documentation of the event.

In instances where the Engineer observes the occurrence of an illicit wet weather discharge (e.g. visible oil sheen, odor, color, etc.) during sampling, the Engineer shall immediately report the discharge to the City's Stormwater and Regulatory Management Section at (614) 645-0362.

Task 4.3: The Engineer shall collect wet weather samples from the (3) City-owned outfalls located within the Hellbranch Run watershed as shown in Appendix F. Four (4) separate storm events from these outfalls shall be sampled within a 1-year period, weather permitting.

Task 4.4: **If authorized**, the Engineer shall relocate wet weather sampling locations. Conditions for which alternative sampling locations may be justified include:

a. The amount or depth of flow in the storm sewer system at the sampling point makes sample collection or flow monitoring impracticable,
b. Geometry of the structure at the sampling location makes installation of sampling or flow monitoring equipment impracticable,
c. Repeated vandalism of monitoring equipment at a sampling location,
d. The City and/or Ohio EPA identify an alternative monitoring location.

The Engineer shall provided written justification to relocate a sampling location in instances where the Engineer feels that an alternative sampling location is required. The written justification shall include an explanation for why the current sampling location is unfeasible, provide a recommended alternative sampling location, and provide justification for why the recommended sampling location was selected.

In addition to removing, transporting, and reinstalling monitoring equipment in an alternative location, work under this task shall also include the field screening and constituent characterization for dry weather flows (where present) as described in Task 3.

Work under this task shall only be performed "if authorized" in writing by the City prior to any execution of work. Such work would be performed only upon the approval of a cost estimate for sampling relocation services prepared by the Engineer (under the rates and costs established by the agreement) and subsequent written authorization by the City. For budgeting purposes, the Engineer shall assume that each of the five (5) city-wide sampling/monitoring locations will be relocated a minimum of three (3) times and that each

of the three (3) sampling/monitoring locations within the Hellbranch Run watershed will be relocated a minimum of two (2) times within the time frame of this project.

The Engineer shall also assume that the performance of dry weather characterization tasks prescribed under Task 3 and flow monitoring, precipitation monitoring, and hydrologic and hydraulic analysis prescribed under Task 4.1 will be required for each new outfall location. Costs associated with Task 3 and Task 4.1 on relocation sites, including revisions to the dry weather characterization report based on the new sampling/monitoring sites, shall be included under this subtask.

Task 4.5. **If authorized,** the following monitoring program shall be conducted by the Engineer to address the flow quantity and water quality of flows in the Hellbranch Run sub-watershed under wet weather conditions. Specifically the monitoring program is designed to determine the phosphorus loadings as well as the loadings of the following parameters of concern (based on the Big Darby TMDL): ammonia, nitrite, fecal coliform and E. coli during rain events.

Stream flow rates within the Clover-Groff Ditch and Hellbranch Run sub-watersheds shall be quantified at each of the sites specified below. Depending on stream geometry and accessibility, flow monitoring shall be done by using either hand held instruments or by using the stream gauging methodology at the time of wet weather events.

Stream sampling shall consist of collecting grab samples at Hrs 0.0, 0.5, 1.0, 2.0, 3.0, 6.0 and a composite sample to coincide with the quarterly wet weather sampling at the outfalls referenced in subtask 4.3.

Datasondes will be deployed at each sampling site to collect on-site physical measurement of D.O., pH, temperature and conductivity at specified time intervals.

Samples shall be collected at the following three (3) sites:

- upstream of the first outfall
- downstream of first outfall
- downstream of second outfall
- downstream of third outfall

Task 5 – Laboratory Analysis

The following tasks shall be performed to determine the amount of constituents that are present in the water quality samples collected in Task 4.

Task 5.1: Table 5.1 lists the constituents and minimum detection limits for which the Engineer shall deliver samples to the City's Surveillance Laboratory for analysis. While total phosphorus is the parameter of focus for samples collected within the Hellbranch watershed, each sample collected within the Hellbranch Run watershed shall be analyze for all of the wet weather sampling constituents listed under Task 5.1 and Task 5.2.

Table 5.1 – Constituents for City Surveillance Lab Analysis

Constituent Name	Detectible Limit
Alkalinity	1.2 mg/l
Hardness (as $CaCO_3$)	1.7 mg/l
Total Phosphorus	0.05 mg/l
Total suspended solids	1.0 mg/l
NH_3	0.02 mg/l
Oil and grease	1.0 mg/l
pH	0.1
Temperature (°C)	N/A
Dissolved Oxygen	1.0 mg/l
Copper	0.00075 mg/l
Chromium	0.005 mg/l
Cadmium	0.00011 mg/l
Lead	0.00034 mg/l
Nickel	0.00055 mg/l
Zinc	0.001 mg/l
Total cyanide	0.002 mg/l

Samples shall be prepared for analysis of the constituents listed in Table 5.1 and delivered to the following address by the Engineer:

City of Columbus
Surveillance Laboratory
1250 Fairwood Avenue
Columbus, Ohio 43206

Task 5.2: Table 5.2 lists the constituents and minimum detection limits for which the Engineer shall deliver samples to the Engineer's laboratory for analysis.

Table 5.2 - Constituents for Engineer's Lab Analysis

Constituent Name	Detectible Limit
Dissolved Phosphorus (dissolved ortho-phosphate, lab filtered)	0.05 mg/l
Fecal Coli form	1.0 (#/100 ml)
E. coli	1.0 (#/100ml)
5-day CBOD	2.0 mg/l
5-day BOD	1.0 mg/l
COD	1.0 mg/l

No additional compensation will be considered beyond the negotiated cost of services for after-hours laboratory analysis.

The Engineer shall supply the City of Columbus with the sampling results that were generated by the Engineer's laboratory for inclusion into the City LIMS system.

Task 6 – Laboratory and Flow Monitoring Data Evaluation and Report Preparation
The following tasks shall be performed to evaluate the data generated from Task 4 and Task 5 and to report the findings of the evaluation for incorporation into the City's annual report to the Ohio EPA.

Task 6.1: If applicable, the Engineer shall use the findings in the dry weather characterization report developed under Task 3 to adjust the data generated under Task 5 so that the constituent loadings for wet weather events are accurately represented. Once adjusted, the Engineer shall evaluate the wet weather monitoring data and characterize the seasonal quality of stormwater discharges. At a minimum, observed

data from each of the eight (8) outfalls shall be compared to respective values provided in the following studies/documents:

a. Appropriate Ohio Water Quality Standards, Ohio Revised Code
b. Results from the National Runoff Program Studies, US EPA
c. Total Maximum Daily Loads for the Big Darby Creek Watershed, Ohio EPA (Only applicable to sampling results from outfalls located within the Hellbranch Run watershed).

Task 6.2: The Engineer shall prepare and submit a report annually that summarizes the sampling, analysis, and evaluation of data collected at the five (5) city-wide outfalls shown in Appendix E. The summary reports shall be submitted for incorporation into the City's annual report to Ohio EPA and shall meet the requirements specified in Part II.C.4.a of the City's MS4 Permit. The report shall include a summary of long term and short term trend analyses as well as the results of the comparisons performed under Task 6.1. For budgeting purposes, the Engineer shall assume that an initial draft report for each reporting year of the MS4 Permit shall be prepared and submitted to the City. The Engineer shall assume that the initial draft report will require two (2) separate revisions by the Engineer based on City review before the final report is accepted.

Task 6.3: The Engineer shall prepare and submit a report that summarizes the sampling, analysis, and evaluation of data collected at the three (3) outfalls located within the Hellbranch Run watershed as shown on Appendix F. The report shall be prepared and submitted once the sampling results from the fourth and final storm event are known. The report shall include a summary of the comparisons performed under Task 6.1. The report will be included in the City's Year 1 annual report to Ohio EPA. For budgeting purposes, the Engineer shall assume that an initial draft report shall be prepared and submitted and that two (2) revisions to the draft report shall be made by the Engineer based on City review before the final report is accepted.

Task 6.4. **If authorized,** identification and evaluating effectiveness of Stormwater BMPs – City Outfall – Billingsley Road Detention Basin.

Data Collection and Analysis
Engineer shall review and summarize pertinent data from the City's current BMP activities. City will provide to Engineer all available data associated with current stormwater BMP activities. Engineer shall compile and summarize available national stormwater quality data and BMP effectiveness data from public sources such as U.S. EPA, National Urban Runoff Program (NURP) and The National Stormwater Quality Database (NSQD).

Additional Sampling at Billingsley Road Wet Detention Basin
Engineer shall collect wet weather samples from the Billingsley Road Detention Basin at the Outfall of the basin in conjunction with the collection of samples at the inlet to the basin. Engineer shall collect the samples and perform the same quality analyses for these samples as outlined in the MS4 Permit and in Task 4.

Identify Appropriate BMPs
Engineer shall collect, summarize and analyze the results of the laboratory analysis and based upon this analysis, identify a list of possible BMPs that will be applicable for each basin of the 5 NPDES sites. Engineer shall perform basin inspections for each of the 5 basins to identify possible point sources of pollutants identified from the wet weather monitoring. Engineer shall assist the City with implementing a comprehensive program that addresses the recommendations.

Evaluate BMP Effectiveness
Engineer shall utilize the data collected in the wet-weather monitoring program in conjunction with other data provided by the City on the BMPs that were implemented and evaluate the effectiveness of each BMP.

BMP Program Update

Engineer shall utilize the monitoring results, plan recommendations and City BMP activities to develop recommendations on possible changes to the City's BMP program. If BMPs are found to be EFFECTIVE, then the Engineer shall suggest refinements to the City's implementation plan for that BMP. If the BMPs are found to be INEFFECTIVE, then alternative BMPs will be recommended to replace the ineffective BMPs and to maximize the effectiveness of the program.

Task 6.5. **If authorized,** identification and evaluating effectiveness of Stormwater BMPs – Hellbranch Outfall – to be selected

Data Collection and Analysis
Engineer shall review and summarize pertinent data from the City's current BMP activities. City will provide to Engineer all available data associated with current stormwater BMP activities. Engineer shall compile and summarize available national stormwater quality data and BMP effectiveness data from public sources such as U.S. EPA, National Urban Runoff Program (NURP) and The National Stormwater Quality Database (NSQD).

Identify Appropriate BMPs
Engineer shall collect, summarize and analyze the results of the laboratory analysis and based upon this analysis, identify a list of possible BMPs. A particular focus for reduction of phosphorus will be evaluated if the concentrations are found to be higher than other local or national average concentrations for the same type of land use. Engineer shall perform basin inspections for each of the 3 outfalls to identify possible point sources of pollutants identified from the wet weather monitoring. Engineer shall assist the City with implementing a comprehensive program that addresses the recommendations.

Evaluate BMP Effectiveness
Engineer shall utilize the data collected in the wet-weather monitoring program in conjunction with other data provided by the City on the BMPs that were implemented and evaluate the effectiveness of each BMP.

BMP Program Update
Engineer shall utilize the monitoring results, plan recommendations and City BMP activities to develop recommendations on possible changes to the City's BMP program. If BMPs are found to be EFFECTIVE, then Engineer shall suggest refinements to the City's implementation plan for that BMP. If the BMPs are found to be INEFFECTIVE, then alternative BMPs will be recommended to replace the ineffective BMPs and maximize the effectiveness of the program.

Task 7 – Project Management
The Engineer shall provide the necessary project management to schedule, coordinate, and manage the necessary equipment and personnel to perform the services required by the Scope of Services and the City's MS4 Permit. Project management services shall include, but are not limited to, scheduling, invoicing, and participating in quarterly progress meetings with the City. Within fourteen (14) days of contract award, the Engineer shall prepare and submit a schedule that includes all meeting and deliverable dates associated with this project. The Engineer shall participate in one kick-off meeting at the beginning of the project.

Task 8 – If Authorized Additional Services
If Authorized, the Engineer shall perform additional tasks associated with this project that are not included in the scope of services. Due to the uncertain nature of various work elements in this contract, it may be necessary to authorize additional work beyond the scope as written. Such work would be performed only upon the approval of a cost estimate for such services prepared by the Engineer (under the rates and costs established by the agreement) and subsequent written authorization by the City.