

APPENDIX A
PSCWMC Joint Powers Agreement

Adopted July 29, 1993

JOINT POWERS AGREEMENT TO PROTECT AND MANAGE
THE PIONEER-SARAH CREEK WATERSHEDS

THIS AGREEMENT, made and entered into as of the date of execution, by and between the units of government within the Pioneer Creek and Sarah Creek Watersheds and having within them adjacent minor watersheds, supersedes and extinguishes the original Joint Powers Agreement relating to the subject matter of this Joint Powers Agreement that now exists between the parties hereto, except for the limited interim and express purposes enumerated below.

WITNESSETH:

WHEREAS, units of government, including but not limited to municipalities and townships within the Pioneer-Sarah Creek Watersheds, have authority, pursuant to Minn. Stat. § 471.59 and 103B.211, to jointly or cooperatively, by agreement, exercise any powers common to the contracting bodies; and

WHEREAS, the parties are desirous of jointly and cooperatively planning and acting to preserve and use natural water storage and retention systems in order to fulfill the purposes of the water management programs required by Minn. Stat. § 103B.201 to 103B.251 and secure the other benefits associated with the proper management of surface water and ground water, including but not limited to aesthetic values when owned by the public or constituting public resources, as defined in Minn. Stat. Chapter 116B.

NOW, THEREFORE, the parties to this Agreement do mutually agree as follows:

SECTION 1

GENERAL PURPOSE

1.1 It is the general purpose of the parties to this Agreement to jointly and cooperatively plan and act to 1) protect, preserve, and use natural surface and groundwater storage and retention systems; 2) minimize public capital expenditures needed to correct flooding and water quality

problems; 3) identify and plan for means to effectively protect and improve surface and groundwater quality; 4) establish more uniform local policies and official controls for surface and groundwater management; 5) prevent erosion of soil into surface water systems; 6) promote groundwater recharge; 7) protect and enhance fish and wildlife habitat and water recreational facilities; and 8) secure the other benefits associated with the proper management of surface and ground water, (Minn. Stat. 103B.201) including but not limited to aesthetic values when owned by the public or constituting public resources, as defined in Minn. Stat. Chapter 116B.

1.2 It is a further purpose of this Agreement that it constitute a contract for the performance of functions enumerated herein, such as but not limited to water quality monitoring and implementation of the capital improvements program, all as provided by Minn. Stat. 103B.201 to 103B.255 and under the general authority of the parties hereto to operate under the Joint Powers Act. In general the Commission shall have all the program responsibilities and deadlines set out for water management organizations by the Act as adopted in 1982 and as amended thereafter, including but not limited to the authority granted watershed management organizations under Minn. Stat. 103B.201 to 103B.255:

1.2.1 To prepare, adopt and amend a plan meeting the requirements;

1.2.2 To review and approve local water management plans; and

1.2.3 To regulate the use and development of land when one or more of the

following conditions exists:

1.2.3.1 The local government unit . . . does not have a local water management plan approved and adopted in accordance with the requirements of (Minn. Stat. 103B.211.1(a)(2) or has not adopted the implementation program described in the plan.

1.2.3.2 An application to the local government unit for a permit for the use and development of land requires an amendment to or variance from the adopted local water management plan or implementation program of the local unit.

1.2.3.3 The local government unit has authorized the organization to require permits for the use and development of land.

1.2.4 To manage all areas according to the same standards and in the same manner regardless of when they became part of the Pioneer-Sarah Creek Watershed.

1.2.5 Other powers necessary to exercise the authority under 1.2.3, including the power to enter into contracts for the performance of functions with government units or persons.

1.3 The general purposes of the Commission also retain the following provisions from its predecessor Agreements:

1.3.1 Provide a forum for exchanging information in the management of land use and land use techniques and control.

1.3.2 Provide a forum for resolution of intergovernmental disputes relating to management and protection of the Pioneer-Sarah Creek Watershed.

1.3.3 Cooperate on a united basis on behalf of all units of government within the Area with all other levels of government for the purpose of facilitating natural resource protection and management in the Area.

SECTION 2

PIONEER-SARAH CREEK WATERSHED MANAGEMENT COMMISSION

2.1 Establishment. There is hereby established the "Pioneer-Sarah Creek Watershed Management Commission" whose membership shall be appointed in accordance with the provisions of this section and whose duties shall be to carry out the purposes contained herein. The Pioneer-Sarah Creek Watershed Management Commission, hereinafter referred to as the "Commission," shall be constituted as described in Section 2.2.

2.2 Membership: Appointment. The governing body of each party (member) to this Agreement shall appoint one representative and one alternate to serve on this Commission (from among its elected governing council or another qualified person). Concurrently an alternate representative shall also be appointed. Each dues paying member shall have one vote. Appointment of representatives to the Commission shall be evidenced by resolution of the

governing body of each member, filed with the Commission. The Commission shall notify the Board of Water and Soil Resources of the appointment and vacancies in member positions within 30 days.

2.3 Term. The representatives on the Commission shall serve at the pleasure of the governing body of the member appointing such representative to the Commission except as otherwise limited by the Commission's Rules.

2.4 Vacancies. A vacancy on the Commission shall be filled in accordance with the requirements of Chapter 103B.227 Subd 1 and 2 by the governing body of the party whose membership position on the Commission is vacant.

2.5 Compensation and Expenses. The Commission representatives shall not be entitled to compensation or reimbursement for expenses incurred in attending meetings, except to the extent that the governing body of a party might determine to compensate or reimburse the expenses of the member it appoints, in which case the obligation to make such payments shall be that of the member and not that of the Commission.

2.6 Officers. The Commission shall elect from its membership a chair, vice-chair, a secretary and a treasurer and such other officers as it deems necessary to reasonably carry out the purposes of this Agreement. All such officers shall hold office for a term of one year and until their successors have been elected by the Commission. An officer may serve only while a representative on the Commission and may be re-elected to an office. A vacancy in an office shall be filled from the membership of the Commission by election for the remainder of the unexpired term of such office.

2.7 Quorum. A majority of all voting representatives to the Commission shall constitute a quorum and shall be the maximum required for making Commission decisions. However, less than a quorum may adjourn a scheduled meeting.

2.8 Meetings. Regular meetings of the Commission shall be held at least bi-monthly on a uniform day and place selected by the Commission. Notice requirements shall be defined by the Commission's Rules. Special meetings may be held at the call of the chair or by any three (3)

members by giving not less than forty-eight (48) hours written notice of the time, place and purpose of such meeting delivered or mailed to the addresses designated by the Commission representatives. All meetings and notices of meetings of the Commission are subject to Minn. Stat. § 103B.201 to 103B.255.

2.9 Hennepin County Soil and Water Conservation District. The Hennepin County Soil and Water Conservation District, hereinafter referred to as "HCD," shall be a non-voting member of the Commission with no financial responsibilities. It shall serve as the office of this Commission and perform such other services as are agreed upon from time to time. All notices to the Commission shall be delivered or served at said office.

SECTION 3

COMMISSION POWERS AND DUTIES

3.1 The Commission has the power to and is obliged to develop a watershed management plan including a capital improvement program in conformance with Minn. Stat. 103B.231.

3.1.1 The Commission shall adopt the overall plan within 120 days after approval of the plan by the Minnesota Board of Water and Soil Resources. The Commission shall then implement the approved plan and approved capital improvement program by resolution of the Commission as hereinafter set forth. The adoption of said overall plan shall be only upon a favorable vote of a majority of all eligible votes of the voting members of the Commission. A copy of the adopted plan shall be filed with the clerk of each member governmental unit.

3.1.2 Upon request of any party, review and evaluate any dispute between the party and other units of government regarding land use and natural resources protection and management.

3.1.3 Retain all those powers and duties previously set forth in the prior agreement until superseded by the completed plan and its implementation.

3.2 Member Water Management Plan Coordination. The Commission shall have power and authority to review the members' local water management plans, capital improvement programs and official controls required by Minn. Stat. 103B.235 subd. 3. The overall plan (and capital improvement program) required for the entire watershed will consist of the local parts in the plan. Upon completion and approval of the watershed management plan, each member will be required to represent its local water management plan to the Commission as required by Minn. Stat. 103B.235.

3.3 Employment. The Commission may contract for services, may utilize staff of the members, and may employ such other persons as it deems necessary. Where staff services of a party are utilized, such services shall not reduce the financial commitment of such member to the operating fund of the Commission unless utilization of staff services is substantial and the Commission so authorizes.

3.4 Rules. The Commission shall promulgate rules for conducting its business, including but not limited to the duties of the Commission's officers; establishment of a citizens' committee, technical advisory committee or other means of public participation; the detailing of meeting procedures and notice thereof, preparation of the annual work plan; preparation of minutes and other related staff functions; and it may provide rules to revoke voting rights and impose penalties for late dues payments.

3.5 Ratification. The Commission may, and where required by this Agreement shall, refer matters to the governing bodies of the parties for ratification. Within sixty (60) days the governing bodies of the members shall take action upon any matter referred for ratification.

3.6 Financial Matters.

3.6.1 Method of Operation. The Commission may collect and receive money and services subject to the provisions of this Agreement from the parties and from any other sources approved by the Commission and it may incur expenses and make expenditures and disbursements necessary and incidental to the effectuation of the purposes of this Agreement. Funds may be expended by the Commission in accordance with procedures established herein.

Orders, checks and drafts shall be signed by two officers. Other legal instruments shall be executed on behalf of the Commission by the chair or vice chair and the secretary.

3.6.2 Operating Funds. On or before July 15 of each year, the Commission shall prepare an operating budget for the following year for the purpose of providing funds to operate the Commission's business in accordance with its annual work plan. The budget shall not, however, be in an amount greater than the equivalent of 0.02418% of total market value on all real property within the Area. Each voting member shall bear 2% but not to exceed \$1,000 of the operating budget. The balance of the annual administrative expenses shall be budgeted and borne by each voting member in proportion to its tax capacity in the Area, compared to the tax capacity of all property in the Area. The budget shall be recommended to the members for ratification upon majority approval of all voting representatives of the Commission. After approval, the secretary shall certify the recommended budget to each member on or before August 1 of each year, together with a statement showing the amounts due from each member. Each member shall pay over to the Commission the amount owing in two (2) equal installments, the first on or before January 31 and the second on or before July 31, in accordance with the tax year for which the amount due is being paid.

3.6.3 Review Services. When the Commission is authorized or requested to undertake a review and submit recommendations to a party as provided in this Agreement, the Commission shall conduct such review, without charge, except as provided below. Where the project size and complexity of review are deemed by the Commission to be extraordinary and substantial, the Commission may charge a fee for such review services, the amount to be based upon direct and indirect costs attributable to that portion of review services determined by the Commission to be extraordinary and substantial.

Where the Commission determines that a fee will be charged for extraordinary and substantial review services, the member to be charged shall receive written notice from the Commission of the services to be performed and the fee therefor, prior to undertaking such review services. Unless the member to be charged objects within fifteen (15) days of receipt of such

written notice to the amount of the fee to be charged, such review services shall be performed and the member shall be responsible for the cost thereof. If the member to be charged objects to the proposed fees for such services within fifteen (15) days and the member and the Commission are unable to agree on a reasonable alternative amount for review services, such extraordinary and substantial review services shall not be undertaken by the Commission.

3.7 Audit, Annual Report, Newsletter. In conformance with Minn. Rules 8410.0150, the Commission shall cause to be made an annual audit of the books and accounts of itself and shall make and file an annual report to its members at least once each year including the following information:

3.7.1 The financial condition of the commission (the audit);

3.7.2 The status of all Commission projects and work within the watershed; and

3.7.3 The business transacted by the Commission and other matters which affect the interests of the Commission.

In addition, the Commission shall comply with Sec. 103B.227 subd. 4 by publishing and distributing to residents an annual newsletter, which shall explain its water management programs and list the officers and telephone numbers. Copies of said reports shall be transmitted to the clerk of each member. All of its books, reports and records shall be available for and open to examination by any member at all reasonable times.

3.8 Gifts, Grants, Loans. The Commission may, within the scope of this Agreement, accept gifts, apply for and use grants or loans of money or other property from the United States, the State of Minnesota, a unit of government or other governmental unit or organization, or any person or entity for the purposes described herein; may enter into any reasonable agreement required in connection thereto; and may hold, use and dispose of such money or property in accordance with the terms of the gift, grant, loan or agreement relating thereto.

3.9 Contracts. The Commission may make such contracts and enter into any such agreements as it deems necessary to make effective any power granted to it by this Agreement. As required by Sec. 103B.227 Subd. 5, before extending a services agreement of an attorney or

consultant from whom it receives services, the Commission shall first solicit interest proposals for legal, professional or technical consultant services and shall do so at least every two years. Every contract for the purchase or sale of merchandise, materials or equipment by the Commission shall be let in accordance with the Uniform Municipal Contracting Law, Minn. Stat. § 471.345 and the Joint Exercise of Power Statute, Minn. Stat. § 471.59. No member or employee of the Commission or officer or employee of any of the parties shall be directly or indirectly interested in any contract made by the Commission.

3.10 Review and Recommendations. Where the Commission is authorized or requested to review and make recommendations on any matter, the Commission shall act on such matter within forty (40) days of receipt of the matter referred. Failure of the Commission to act within forty (40) days shall constitute approval of the matter referred, unless the Commission requests and receives from the referring member an extension of time to act on the matter referred. Where the Commission makes recommendations on any matter to a member, the governing body of a member not acting in accordance with such recommendation shall submit a written statement of its reasons for doing otherwise to the Commission within ten (10) days of its decision to act contrary to the Commission's recommendation. The Commission shall review the written statement and if determined insufficient by the Commission, request written clarification within an additional ten (10) days. This section 3.10 shall expire upon implementation of the procedures and duties under the Act.

3.11 Legal Description of the Boundary of the Pioneer -Sarah Creek Watershed Management Commission Area. The Legal description is attached as Appendix "A" to this Agreement and is an integral part hereof. Any enlargement of the Area must be appended to or annotated on it, together with documentation showing compliance with Section 3.12 below.

3.12 Enlargement of the Pioneer-Sarah Creek Watershed Management Commission Area.

3.12.1 Proceedings for the enlargement of the Pioneer-Sarah Creek Watershed Management Commission shall be initiated (a) by a request from affected municipalities and/or

townships to the Chairman of the Commission or (b) as mandated by law. Such request shall state:

- 3.12.1.1 That the area to be added is contiguous to the existing Pioneer-Sarah Creek Joint Powers Watershed;
- 3.12.1.2 That it can be feasibly administered by representatives of the existing Pioneer-Sarah Creek Joint Powers Watershed;
- 3.12.1.3 The reasons why it would be conducive to the public health and welfare to add the proposed Area to the existing Pioneer-Sarah Creek Joint Powers Watershed; and
- 3.12.1.4 A map of the affected area.

3.12.2 Upon deliberation if it appears to the Commission that the enlargement of the Joint Powers Watershed as requested would be for the public welfare and public interest and the purpose of resource management would be served or that in fact the enlargement is mandated by law, the Commission shall by its findings and order enlarge the Pioneer-Sarah Creek Joint Powers Watershed and file a copy of said findings and order with the Minnesota Board of Water and Soil Resources and Secretary of State.

3.13 Subdistricts. It may define and designate drainage subdistricts within the watershed and shall have authority to separate the watershed into such different subdistricts and to allocate works of improvement costs to a subdistrict area if that district is the only area that materially benefits from the works of improvement.

3.14 Statutory Powers. It may exercise all other powers necessary and incidental to the implementation of the purposes and powers set forth herein and as outlined and authorized by Minn. Stat. 103B.205 to 103B.255.

3.15 Monitoring: Water Quality. The Commission will continue to monitor the water, to evaluate the success of its program to control non-point sources of pollution, and use the results of the water quality monitoring program to determine the progress towards these goals.

SECTION 4
CAPITAL IMPROVEMENT PROGRAM

In the event this Organization adds a Capital Improvement Program, which is defined by Minn. Stat. 103 B.205 Subd. 3, to its Watershed Plan, the procedures and funding for implementation shall be governed by Minn. Stat. 103 B.241, "Levies," and Minn. Stat. 103 B.251, "Capital Improvements by WMO's."

SECTION 5
MISCELLANEOUS PROVISIONS

5.1 The Commission shall not have the power of eminent domain and shall not own any interest in real property. All interests in lands shall be held in the name of the member wherein said lands are located.

5.2 The Commission shall not have the power to levy a special assessment upon any privately or publicly owned land. All such assessments shall be levied by the member wherein said lands are located. It shall have the power to require any member to contribute the costs allocated or assessed according to the other provisions of this agreement.

5.3 Each member agrees that it will not directly or indirectly collect or divert any surface water to or from Pioneer Creek or Sarah Creek or its tributaries without a permit from the Commission. Such permits may be granted by the Commission for a member to proceed with the construction or reconstruction of improvements within the individual corporate members' boundaries and at its sole cost upon a finding:

5.3.1 That there is an adequate outlet;

5.3.2 That said construction will not adversely affect other members of this Agreement.

5.4 Any member who is more than 60 days in default in contributing its share to the general fund shall have the vote of its representative suspended pending the payment of its share, and any member who is more than 60 days in default in contributing its share of the cost of any

improvement to the contracting member shall upon request of the contracting member have the vote of its representative suspended, pending the payment of its share.

SECTION 6

TERMINATION OF AGREEMENT

6.1 This Agreement may be terminated by approval of a majority vote of the governing bodies of each voting party hereto, provided all such approvals occur within a ninety (90) day period.

6.2 Withdrawal of any member may be accomplished by filing written notice with the Commission and the other parties sixty (60) days prior to the effective date of termination. No member may withdraw from this Agreement until the withdrawing member has met its full financial obligations for the year of withdrawal and prior years. In no event may this Agreement be terminated until all of the planning, plan adoption and local plan adoption provisions of the Act, which are required of a watershed management organization, have been completed.

SECTION 7

DISSOLUTION OF COMMISSION

7.1 The Commission shall be dissolved under any of the following conditions:

7.1.1 Upon termination of this Agreement; or

7.1.2 Upon unanimous agreement of all parties; and

7.1.3 After at least 90 days' notice of the intent to dissolve is given to the affected Counties and the Minnesota Board of Water and Soil Resources.

7.2 Upon dissolution, all personal property of the Commission shall be sold and the proceeds thereof, together with monies on hand after payment of all obligations, shall be distributed to the members. Such distribution of Commission assets shall be made in proportion to the total contributions to the Commission for such costs made by each member. All payments due and owing for operating costs under Section 3.6.2, or other unfulfilled financial obligations, shall

continue to be the lawful obligations of the members. In no event may this Agreement be terminated until all of the planning and plan implementation provisions of the Act, which are required of a watershed management organization, have been completed.

SECTION 8
AMENDMENT

The Commission may recommend changes in and amendments to this Agreement to the members. Amendments shall be acted upon by the members within ninety (90) days of referral. Amendments shall be evidenced by appropriate resolutions of the members filed with the Commission and shall, if no effective date is contained in the amendment, become effective as of the date all such filings have been completed.

SECTION 9
COUNTERPARTS

This Agreement and any amendment may be executed in several counterparts and all so executed shall constitute one Agreement or amendment, binding on all of the parties hereto notwithstanding that all of the parties are not signatory to the original or the same counterpart.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day of complete execution hereof by the parties.

City of Corcoran

By Steve Parkin
Mayor

Seal:
Dated:

Rhett T. De
3/24/94
City Clerk

ATTEST:

City of Greenfield

By Michael Sipe
Mayor

Seal:
Dated:

Paul Sipe
2.8.94
City Clerk

ATTEST:

City of Independence

By Mawin D Johnson
Mayor

Seal:
Dated:

Mary S. Smith
January 28, 1994
City Clerk

ATTEST:

City of Loretto

By

John Deusekora
Mayor

ATTEST:

Seal:
Dated:

Judy Thunberg
4-4-94
City Clerk

City of Maple Plain

By

Jeff D. Walker
Mayor

ATTEST:

Seal:
Dated:

Arnold Gulbrecht
3-18-94
City Clerk

City of Medina

By

Anne E. Theis
Mayor

ATTEST:

Seal:
Dated:

Jeffrey E. Karlen
2-9-94
City Clerk

City of Minnētrista

By *Scott Halpern*
Mayor

Seal:
Dated:

Christette Buschman
City Clerk

ATTEST:

Watertown Township

By *Vern Richter*
Chair of Town Board

Seal:
Dated:

Ken Riccaus
2-28-94
Township Clerk

ATTEST:

Hennepin Conservation District

By *Harold J. Jowers*
Chair of Board

Seal:
Dated:

4-21-94

And

APPENDIX B

Stormwater Pollution Prevention Program

CITY OF INDEPENDENCE

Stormwater Pollution Prevention Program (SWPPP)

May 2006

Amended to include TMDL requirements:

July 2008

I. INTRODUCTION

Purpose

The City of Independence is listed as a Mandatory Small Municipal Separate Storm Sewer System (MS4) under the Clean Water Act. This requires the submission of a General National Pollution Discharge Elimination System (NPDES)/State Disposal System (SDS) permit. The MS4 program is administered by the Minnesota Pollution Control Agency (MPCA).

The primary goal of this permit is “to restore and maintain the chemical, physical, and biological integrity of Waters of the State through management and treatment of urban stormwater runoff.” This is accomplished through management of MS4s through a Stormwater Pollution Prevention Program (SWPPP). The purpose of the SWPPP is to maintain water quality standards where there is compliance, and help bring waters that do not meet water quality standards into compliance by controlling stormwater runoff.

Existing Conditions and Issues

The City of Independence, MN is a city of approximately 3,600 people, located on the western edge of Hennepin County. It is a largely rural community, with farms and animal operations intermingled with more developed areas. The City’s existing storm sewer system consists of a limited amount of pipes and culverts, lift stations, and approximately 34 stormwater ponds implemented under the Nationwide Urban Runoff Program (NURP).

The community resides mostly within the jurisdiction of the Pioneer-Sarah Creek Watershed Management Commission, but part of the southeast portion of the City lies within the Minnehaha Creek Watershed District. Surface water bodies within the City include Lake Independence, Lake Sarah, Lake Robina, Lake Haughey, Fox Lake, Lake Irene, Pioneer Creek, Sarah Creek, and several tributaries.

The City is also in the midst of a Comprehensive Plan update, and has recently formed a Parks, Trails, and Open Spaces Task Force that will participate in the update process. In addition, there are a number of other community groups currently involved in stormwater/water quality projects, including the Independence Horse Owners Association, Lake Sarah and Lake Independence Citizens Associations, Lake Independence Stakeholders Group, Open Spaces Committee, among others. It is anticipated these groups will be valuable resources and participants in the implementation of the SWPPP.

Each of these issues and groups were taken into consideration in developing the SWPPP, and it is anticipated that future changes to the SWPPP will occur to reflect results of current and ongoing City activities.

Organization of the SWPPP

The SWPPP is formatted and organized utilizing the Best Management Practices (BMP) summary sheets that are required by the MPCA. The information included or referenced on the summary sheets is intended to meet all SWPPP requirements for each BMP, therefore no other narrative is provided as part of the SWPPP. The SWPPP covers six minimum control measures: Public Education and Outreach; Public Participation; Illicit Discharge, Detection and Elimination; Construction Site Runoff Control; Post-Construction Site Runoff Control; and Pollution Prevention/Good Housekeeping. The SWPPP is organized by minimum control measures in the order listed above. An overall index is presented to locate each minimum control measure section by page number. A sub-index is also available on the first page of each section, detailing unique BMP ID numbers and the specific permit reference.

Section II of the SWPPP details the incorporation of Total Maximum Daily Load (TMDL) requirements, and contains specific BMP summary sheets to support identified reductions.

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Minimum Control Measure 1: PUBLIC EDUCATION AND OUTREACH

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
1a-1	Distribute Educational Materials	V.G.1.a
1b-1	Implement an Education Program	V.G.1.b
1c-1	Education Program: Public Education and Outreach	V.G.1.c
1c-2	Education Program: Public Participation	V.G.1.c
1c-3	Education Program: Illicit Discharge Detection and Elimination	V.G.1.c
1c-4	Education Program: Construction Site Run-off Control	V.G.1.c
1c-5	Education Program: Post-Construction Stormwater Management in New Development and Redevelopment	V.G.1.c
1c-6	Education Program: Pollution Prevention/Good Housekeeping for Municipal Operations	V.G.1.c
1d-1	Coordination of Education Program	V.G.1.d
1e-1	Annual Public Meeting	V.G.1.e

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 1-PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1a-1

***BMP Title:** Distribute Educational Materials

***BMP Description:**

The City of Independence will distribute materials on stormwater issues to the general public, business owners, and other interested or affected parties as necessary. The City will investigate and research other materials generated by the EPA, state, and others, and will utilize these materials and/or modify them as allowable to make them more applicable to local issues. Educational materials will focus on what individuals and households can do to reduce stormwater pollution, and how citizens can become involved in local stormwater activities and programs. The goal of distributing this information is to gain greater support for the stormwater program, and to help the public understand why the program is important.

Materials will be distributed through a number of means, but will most frequently utilize the City newsletter, which is currently published 3 times per year, and the City website. In addition, City staff will continue to display educational handouts and brochures at a specific area in City Hall. The City will continue to explore other opportunities for reaching more of the general population, and when specific needs are identified, fact sheets, brochures, or other materials will be developed and distributed.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of stormwater-related articles published in the City's newsletter per year.
Number of stormwater brochures, etc. collected from other entities and displayed in City Hall.
Number of fact sheets or brochures developed and distributed.

***Timeline/Implementation Schedule:**

Year 1) Research and collect various education materials from other agencies, jurisdictions, and non-profit groups, and provide a specific location in the public for these materials. Publicize the availability of this information.
Years 1-5) Stormwater articles published in the City's newsletter at least 2 times per year.
Year 2) Review collected materials and identify specific issues that have local relevance or importance. Select existing brochures that are applicable.
Years 3-5) Based on review of existing information, distribute existing materials locally, and/or develop and distribute additional materials to local residents and business owners.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Toni Hirsch
Department: Administration
Phone: 763-479-0527
E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1b-1

***BMP Title:** Implement an Education Program

***BMP Description:**

The City will develop and implement an education program that addresses the 6 minimum control measures as outlined in the permit:

- 1) public education and outreach
- 2) public participation
- 3) illicit discharge detection and elimination
- 4) construction site stormwater runoff control
- 5) post-construction stormwater management
- 6) pollution prevention/good housekeeping

The program will fully address each of these 6 measures, as specifically outlined in following elements 1c-1 through 1c-6. Public education will be achieved through distribution of materials as outlined in previous BMP 1a-1. The goal of this education program is to increase the awareness of stormwater issues within the general public, and to achieve greater understanding of the MS4 permitting process for City staff and the general public.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Specific measurements for each minimum control measure, as defined in following elements 1c-1 through 1c-6. Ability of City staff to field questions from the public on MS4 permit requirements.

***Timeline/Implementation Schedule:**

The education program will be ongoing and will continue for the life of the permit (Years 1-5).

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Toni Hirsch

Department: Administration

Phone: 763-479-0527

E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-1

***BMP Title:** Education Program: Public Education and Outreach

***Audience(s) Involved:**

General public and business owners.

***Educational Goals for Each Audience:**

Increase public awareness and understanding of stormwater issues within the community. Inform and educate the public about the impacts of stormwater runoff on water quality, and keep them aware of opportunities to participate in the overall program, or special events pertaining to water quality.

***Activities Used to Reach Educational Goals:**

- 1) Highlight stormwater issues through City sponsored community events and programs that focus on public participation, such as clean-up days and volunteer monitoring or planting programs.
- 2) Continue to advertise and participate in activities hosted by the County, watershed district, or other community groups.
- 3) Publish articles in the community newsletter that highlight seasonal stormwater issues and stormwater related community events and programs.
- 4) Post stormwater information on the City web site.
- 5) Stormwater educational materials provided at public places.
 - Stormwater information and educational materials displayed at City Hall.
 - Promote Pet Waste Disposal Program by providing information to dog owners (e.g. pet waste fact sheets distributed to dog owners with application for dog license).
- 6) Work with local schools and resource organizations to develop and implement a program for elementary school children focused on household stormwater management.

***Activity Implementation Plan:**

Activity #1

Years 1-5) Continue Annual Clean-Up Day each spring in cooperation with Hennepin County and the City of Maple Plain.

Activity #2

Years 1-5) Continue to publish advertisements for stormwater activities in the City newsletter, and post in the "Events" section of the City website.

Activity #3

Year 1) Solicit example material pertaining to minimum control measures from outside entities (i.e. state and federal agencies, watershed districts, other communities, etc.)

Years 1-5) Develop and publish at least 2 articles pertaining to stormwater each year, with all minimum control measures covered by the end of Year 5.

Years 1-5) Provide notices or updates as necessary on any City actions pertaining to stormwater issues.

Years 1-5) In the beginning of each year, contact watershed districts, Hennepin County, and other community groups asking for information on their events. Give approximate dates that the City newsletter will be published and a contact name for sending information. Publish info in newsletter.

Activity #4

Years 1-5) In the beginning of each year, contact watershed districts, Hennepin County, and other community groups asking for information on their events. Post info on City website.

Years 1) Develop a water resources/stormwater section of the City website.

Years 2-5) Develop materials and provide links to stormwater resources.

Activity #5

Year 1) Solicit and research informational material pertaining to stormwater from outside entities (i.e. state and federal agencies, watershed districts, other communities, etc.)

Years 2-5) Display collected materials in City Hall, in a place where the public may view the materials at any time during business hours. Update the collection as new materials become available.

Year 2) Utilize outside resources to develop or obtain a pet waste information sheet.

Years 3-5) Distribute pet waste information sheet to anyone who applies for a pet license.

Activity #6

Year 1) Investigate existing school programs relating to stormwater. Inquire about sharing services or utilizing existing program. If necessary, identify responsible person to initiate and develop a unique local program.

Years 2-5) Implement school stormwater program.

***Performance Measures:**

Activity #1

- Monitor and record number of households participating, and the amount of waste collected at the annual clean-up day, and report in the community newsletter.

Activity #2

- Number of event notices published or posted.

Activity #3

- Number of storm water related articles (at least 2 each year pertaining to minimum control measures)
- All minimum control measures covered in 5-year period.
- Number of households to which newsletter was sent

Activity #4

- Number of storm water related articles and links

Activity #5

- Number of materials, or size of area dedicated to stormwater materials
- Number of animal licenses issued with pet waste information sheet attached.

Activities #2-#5

At the end of Years 2 and 4, survey citizens to determine if the stormwater articles were read and if they felt that their knowledge of stormwater issues has increased. This survey can be an insert in the City's newsletter.

Activity #6

- Number of students participating in program
- Number of schools participating in program

***Responsible Party for this BMP:**

Name: Toni Hirsch

Department: Administration

Phone: 763-479-0527

E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-2

***BMP Title:** Education Program: Public Participation

***Audience(s) Involved:**

General public including residents and business owners.

***Educational Goals for Each Audience:**

- 1) Inform and educate the public about the impacts of stormwater runoff on water quality and what they can do to actively protect local lakes and streams from polluted stormwater runoff.
- 2) Inform and educate the public about how the City manages stormwater runoff through its Stormwater Pollution Prevention Program (SWPPP), and how the public can provide input.

***Activities Used to Reach Educational Goals:**

- 1) The City will report in the community newsletter and the City website on activities related to managing stormwater and implementing the SWPPP. Topics for the newsletter may include information about the water quality of our City lakes and streams; events and programs the public can participate in to raise their awareness about stormwater impacts; specific stormwater management activities the City is implementing, the stormwater budget/fees, and notices of stormwater-related meetings and comment periods.
- 2) Evaluate the feasibility of City-sponsored events such as a park clean-up day, and solicit volunteers.
- 3) Inform the public of opportunities to participate in water quality events sponsored by the County or other governments or interest groups.

***Activity Implementation Plan:**

Activity #1

Years 1-5) Publish articles on stormwater management and the SWPPP in the community newsletter and on the City's website.

Activity #2

Year 1) Meet as City staff and identify specific stakeholders or community group leaders that can provide input on the possibility of City events.

Year 2) Develop at least one City-sponsored annual event relating to stormwater. Plan the event with the assistance of volunteers.

Years 3-5) Conduct a City-sponsored annual stormwater/clean-up event.

Activity #3

Years 1-5) Continue to post upcoming events in on the "Events" section of the City's website, and advertise in the City newsletter.

***Performance Measures:**

Activity #1

- Publish stormwater at least twice per year in the City's newsletter.
- At the end of Years 2 and 4, survey citizens to determine if the stormwater articles were read and if they felt that their knowledge of stormwater issues has increased. Survey will be conducted under the BMP Summary Sheet 1c-1 (Education Program: Public Education and Outreach) Performance Measure.

Activity #2

- Number of community members involved in planning and executing a City-sponsored event.
- Report on the event in the City's newsletter.

Activity #3

- Number of events posted and/or advertised in the newsletter each year.

***Responsible Party for this BMP:**

Name: Toni Hirsch

Department: Administration

Phone: 763-479-0527

E-mail: thirsch@ci.independence.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-3

<p>*BMP Title: Education Program: Illicit Discharge Detection and Elimination</p>
<p>*Audience(s) Involved: General public and business owners; City Staff.</p>
<p>*Educational Goals for Each Audience:</p> <ol style="list-style-type: none">1) Increase public awareness and understanding of illicit discharge.2) Inform and educate the public about the impacts of illicit discharge on water quality and what they can do to actively protect local lakes and streams from illicit discharge.3) Inform and educate the public about how the City manages illicit discharge through its Stormwater Pollution Prevention Program (SWPPP).
<p>*Activities Used to Reach Educational Goals:</p> <p><u>Activity #1</u> The City will report in the community newsletter on the source and implications of illicit discharge, and will also inform the public on how to locate and report such discharge.</p> <p><u>Activity #2</u> Continue Annual Clean-Up Day each spring in cooperation with Hennepin County and the City of Maple Plain.</p>
<p>*Activity Implementation Plan:</p> <p><u>Activity #1</u> Publish at least one article on illicit discharge in the community newsletter, which defines illicit discharge and informs the public of how to report it.</p> <p><u>Activity 2</u> Publicize the Annual Clean-Up Day in the City's newsletter and on the "events" section of the website.</p>
<p>*Performance Measures:</p> <p><u>Activity #1</u> Publish an article on illicit discharge in one of the community newsletters in Year 2.</p> <p><u>Activity #2</u> Monitor and record number of households participating, and the amount of waste collected at the annual clean-up day, and report in the City newsletter.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-4

*BMP Title: Education Program: Construction Site Run-off Control
*Audience(s) Involved: General public, business owners, developers, contractors, City staff and maintenance crews.
*Educational Goals for Each Audience: 1) Increase public awareness and understanding of construction site run-off. 2) Inform and educate the public about the impacts of construction site run-off on water quality and what they can do to actively protect local lakes and streams from construction site run-off. 3) Inform and educate the public and developers/construction workers about how the City manages construction site run-off through its Stormwater Pollution Prevention Program (SWPPP) and existing City ordinances.
*Activities Used to Reach Educational Goals: 1) The City will report in the community newsletter on the source and implications of construction site run-off. 2) The City will maintain and update the existing handout containing a list and description of minimum erosion and sediment control measures/BMPs. This will continue to be made available to developers/contractors/construction site personnel.
*Activity Implementation Plan: <u>Activity #1</u> Year 2) Publish at least one article on construction site run-off articles in the community newsletter. <u>Activity #2</u> Year 1) Continue to distribute existing handout. Assess materials available with other similar communities, as well as outside entities, including, but not limited to non-profits, watersheds, soil and water conservation districts, water management organizations, extension, county, regional, state and federal agencies. Year 2) Revise existing handout based on research conducted. Years 2-5) Distribute new handout to developers/construction workers and other identified resources.
*Performance Measures: <u>Activity #1</u> Publish an article on construction site run-off in one of the community newsletters in Year 2. <u>Activity #2</u> Number of handouts distributed.
*Responsible Party for this BMP: Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-5

<p>*BMP Title: Education Program: Post-Construction Stormwater Management in New Development and Redevelopment</p>
<p>*Audience(s) Involved: General public, developers, contractors, City staff and maintenance crews.</p>
<p>*Educational Goals for Each Audience: 1) Increase public awareness and understanding of the implications of increased runoff as a result of new development/redevelopment. 2) Inform and educate the public and developers/construction workers about post-construction stormwater management requirements.</p>
<p>*Activities Used to Reach Educational Goals: 1) The City will report in the community newsletter on the potential causes of increased stormwater runoff as a result of new development/redevelopment. 2) Provide a list of applicable references of the zoning code or other informational material pertaining to post-construction stormwater requirements that may be helpful to developers when developing a site plan.</p>
<p>*Activity Implementation Plan: <u>Activity #1</u> Year 1) Develop a regulation reference sheet for developers, and distribute with any inquiries about new development. Year 3) Publish at least one article on post-construction stormwater management in the City newsletter.</p>
<p>*Performance Measures: <u>Activity #1</u> Publish an article on post-construction stormwater management in one of the City newsletters in Year 3. <u>Activity #2</u> Number of reference sheets distributed.</p>
<p>*Responsible Party for this BMP: Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

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BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1c-6

<p>*BMP Title: Education Program: Pollution Prevention/Good Housekeeping for Municipal Operations</p>
<p>*Audience(s) Involved: City staff and maintenance crews.</p>
<p>*Educational Goals for Each Audience: Inform City staff and maintenance crews on the importance of monitoring and maintenance, and the required activities that should be monitored under the new permit, and the frequency of monitoring. Introduce them to new methods of recording inspections and maintenance activities.</p>
<p>*Activities Used to Reach Educational Goals: 1) Conduct informational session or distribute information for City staff and maintenance workers on monitoring requirements of the permit. 2) Introduce maintenance and inspection log sheets, and solicit input.</p>
<p>*Activity Implementation Plan: <u>Activity #1</u> Years 1-5) Conduct annual training session and/or distribute information. This should be held early in the year, prior to busy monitoring/inspection seasons. <u>Activity #2</u> Year 1) Prior to first period of monitoring, develop maintenance and inspection log sheets, and provide for review from those who would use them on a regular basis.</p>
<p>*Performance Measures: <u>Activity #1</u> Number of City staff in attendance at training. <u>Activity #2</u> Number of monthly log sheets completed. Evaluate monitoring sheets at the end of each year to determine completion, and address deficiencies or issues with record keeping.</p>
<p>*Responsible Party for this BMP: Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1d-1

***BMP Title:** Coordination of Education Program

***BMP Description:**

The City will reach out to other organizations, municipalities, agencies and interest groups to coordinate its education program with the existing activities of these entities. Particular organizations with which the City will continue to cooperate include, among others:

- Independence Horse Owners Association
- Lake Stakeholders Group
- Lake Sarah Citizens Association
- Lake Independence Citizens Association
- Open Spaces Committee (City of Independence)
- Parks, Trails and Open Spaces Task Force (City of Independence)
- Pioneer-Sarah Creek Watershed Management Commission
- Minnehaha Creek Watershed District
- Hennepin County

The intent of coordinating with these groups and others is to become educated on the groups' individual activities, to utilize existing and proven resources, and to work together to coordinate a more regional program.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of agencies/groups/municipalities contacted.
Number of joint programs implemented by end of Year 5.

***Timeline/Implementation Schedule:**

Year 1) Develop a list of contacts, expanding on the list above. Contact each group and survey its education efforts. Identify overlaps in goals and education efforts.
Year 2) Follow up with those groups with common goals and programs with opportunity for sharing or collaboration.
Years 2-5) Execute at least one education program or resource in conjunction with another group.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Toni Hirsch
Department: Administration
Phone: 763-479-0527
E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: PUBLIC EDUCATION AND OUTREACH

Unique BMP Identification Number: 1e-1

<p>*BMP Title: Annual Public Meeting</p>
<p>*BMP Description:</p> <p>The City will conduct an annual stormwater meeting to discuss stormwater issues and allow for public input to the SWPPP. The meeting will be public noticed as detailed in SMP 2a-1. The SWPPP will also be available for public review at Independence City Hall. The meeting will be conducted in conjunction with a standing City Council meeting, at Independence City Hall.</p> <p>At the meeting, interested persons will be provided the opportunity to make oral statements regarding the SWPPP. All input received will be considered by City staff and will be incorporated into the SWPPP as applicable.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Meeting completed (y/n) Number in attendance</p>
<p>*Timeline/Implementation Schedule:</p> <p>Meetings will be conducted annually prior to Annual Report submittal through the life of the Permit. The meeting will take place in April of each year, so public input can be appropriately solicited and considered prior to submittal of the Annual Report by June 30. The specific meeting date will be selected based on current City agenda items, so that proper time is allocated for SWPPP comments.</p>
<p>Specific Components and Notes:</p> <p>On occasion, representatives from local watershed districts or other groups interested in or with a stake in water issues may be asked to attend and/or present at an annual meeting.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

Minimum Control Measure 2: PUBLIC PARTICIPATION/INVOLVEMENT

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
2a-1	Comply with Public Notice Requirements	V.G.2.a
2b-1	Solicit Public Input and opinion on the Adequacy of the SWPPP	V.G.2.b
2c-1	Consider Public Input	V.G.2.c

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2a-1

<p>*BMP Title: Comply with Public Notice Requirements</p>
<p>*BMP Description:</p> <p>At least 30 days prior to each annual public information meeting on the SWPPP, the City will issue a public notice stating the date, time, and location of the meeting; along with a short description of the manner in which the meeting will be conducted, and information on the availability of the SWPPP document for public review and comment.</p> <p>The notice will be published in the Delano Eagle and The Pioneer, which serve the Independence area. It will also be sent to the MPCA, City and County officials, watershed districts, and any other persons or groups requesting to be informed of public meetings relating to the SWPPP.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Affadavit of publication or copy of notice as appeared in newspaper.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Years 1-5) In March of each year (once meeting date is set), develop and publish public notice, taking into account submittal deadlines for the newspaper and MPCA.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us</p>

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BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2b-1

***BMP Title:** Solicit Public Input and opinion on the Adequacy of the SWPPP

***BMP Description:**

The City will use the education and outreach efforts outlined on BMP Summary Sheet 1c-2 (Education Program: Public Participation) for providing information to the general public about how the City manages stormwater runoff through its Stormwater Pollution Prevention Program (SWPPP), to encourage the public to learn about the SWPPP, and to facilitate public input and comment on the SWPPP.

As the annual public meeting on the SWPPP is planned to occur during a regular meeting of the City Council, the City will request that the SWPPP be placed on the meeting agenda at a time that will be conducive to the public attending and providing input on the SWPPP (i.e. not at the end of the agenda). At the meeting, the City will provide a brief presentation on the purpose, goals, and requirements of the SWPPP to educate, inform, and encourage citizens to provide input and comment on the SWPPP. The City will provide opportunity for interested persons to make oral statements or provide written comments on the SWPPP at the meeting. A reasonable amount of time will be made available at the meeting for a questions and comments relating to the SWPPP. Persons not able to attend the meeting may submit written comments on the SWPPP within the time identified in the public notice for the meeting. The public will have 30 days or more to provide written comments, which can be submitted via letter or email to the City.

The City will also solicit public input and provide opportunity for comment on the SWPPP at any other subsequent public meetings, as needed, regarding modifications of or amendments to the SWPPP.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

- 1) Track the number of attendees at the annual public meeting on the SWPPP (provide a sign-in sheet at the meeting).
- 2) Track the number of oral and written comments received on the SWPPP, and the number of questions addressed at the annual public meeting.
- 3) Hold additional public meeting(s) regarding modifications/amendments to the SWPPP and track public input.

***Timeline/Implementation Schedule:**

Years 1-5) The City will implement the education and outreach efforts according to the timeline/implementation schedule in BMP Summary Sheet 1c-2.

Years 1-5) Hold public meeting on the SWPPP annually.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Toni Hirsch

Department: Administration

Phone: 763-479-0527

E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 2-PUBLIC PARTICIPATION/INVOLVEMENT

Unique BMP Identification Number: 2c-1

<p>*BMP Title: Consider Public Input</p>
<p>*BMP Description:</p> <p>The City will implement methods for considering public input into the SWPPP. At the end of the comment period as identified in the public notice, City staff will review all comments received. All oral and written comments received will be summarized and addressed in a document that will be posted on the City's website. All commentors providing email addresses will also be emailed this document. Based on the City's review, comments will be incorporated into the SWPPP.</p> <p>The goal of this BMP is to foster ownership in the SWPPP among the City's residents and other interested parties, and also to make the best and most representative SWPPP possible.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Number of public comments received, and number of comments incorporated into the SWPPP.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Years 1-5) Comment period will commence in March of each year, 30 days prior to the public meeting. Comment period will extend at least 30 days. The City will provide feedback on comments within 30 days of the meeting, and any revisions to the SWPPP will be incorporated and recorded in the annual report prior to June 30th of each year.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us</p>

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Minimum Control Measure 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
3a-1	Storm Sewer System Map	V.G.3.a
3b-1	Regulatory Control Program	V.G.3.b
3c-1	Illicit Discharge Detection and Elimination Plan	V.G.3.c
3d-1	Public and Employee Illicit Discharge Information Program	V.G.3.d
3e-1	Identification of Non Stormwater Discharges and Flows	V.G.3.e

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3a-1

<p>*BMP Title: Storm Sewer System Map</p>
<p>*BMP Description:</p> <p>The City will develop and maintain an electronic map of the storm sewer system, and any changes or improvements to the system will be included in periodic updates. The storm sewer map will show:</p> <ul style="list-style-type: none">• Ponds, streams lakes & wetlands that are part of the MS4• Structural pollution devices that are part of the MS4• All pipes & conveyances in the MS4 system, as goal – but at minimum – those pipes \geq 24 inches in diameter• Outfalls, including discharges from Independence to other MS4s or waters and wetlands that are not part of Independence (and do not have operational control); structures that discharge storm water directly into groundwater; overland discharge points and all other points of discharge from the MS4's system <p>This map will act as a resource for use by various City departments to implement the various components of the SWPPP. It will also function as a public education tool.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>All components incorporated into the map. Number of maps distributed.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Data collection and field checking. Development of map and circulation for review by City staff. Year 2) Final map completed and submitted with the Annual Report by June 30, 2008. Distribute maps to City departments and other interested parties.</p>
<p>Specific Components and Notes:</p> <p>Information will be collected from various City departments, watershed districts, and the County to develop the map.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND
ELIMINATION

Unique BMP Identification Number: 3b-1

<p>*BMP Title: Regulatory Control Program</p>
<p>*BMP Description:</p> <p>Ordinance language that prohibits non-stormwater discharge (including hazardous and non-hazardous materials) and has provision for enforcement procedures and violations. The City currently has ordinances pertaining to non-stormwater discharge (Chapter VII, Section 710 of Independence City Ordinances). This ordinance should be reviewed to determine compliance with provisions of the Permit.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Review past violations, and record any violations after the ordinance is revised/added, to determine effectiveness of new ordinance.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Existing ordinance review, comparison with similar communities. Year 2) Development of language if necessary, consultation with attorney. Year 3) Changes to present ordinance, or implementation of new ordinance if necessary.</p>
<p>Specific Components and Notes:</p> <p>City Council has regulatory authority concerning ordinances. City Administrator, City Planner, or Building Inspector has authority to put stop work order on non-compliant activities.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3c-1

<p>*BMP Title: Illicit Discharge Detection and Elimination Plan</p>
<p>*BMP Description:</p> <p>The City will develop an Illicit Discharge Detection and Elimination Plan, which addresses procedures for locating priority areas likely to have illicit discharge; procedures for tracing the source of illicit discharge; procedures for removing the source of illicit discharge; and procedures for program evaluation and assessment.</p> <p>Location of priority areas will rely heavily on input from the public, and the City will advertise a contact number for reporting illicit discharges. In addition, land uses will be reviewed to determine potential locations of discharges and likely sources. Other site inspections and testing will occur depending on the nature of the illicit substance, and the source will be removed and/or immobilized as soon as possible. Specific procedures will be developed and contained in an Illicit Discharge Detection and Elimination Plan.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Number of public complaints and if/how they were addressed. Number of tests or visual inspections conducted on illicit discharge locations. Number of illicit discharges detected. Reduction in number of public complains, required tests, or number of discharges detected over 5-year period.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Meet as City Staff to discuss appropriate procedures for reporting and addressing complaints of illicit discharge, as well as other required elements of the Illicit Discharge Detection and Elimination Plan described above.</p> <p>Year 2) Establish hotline or designate phone contact for citizens to report illicit discharge. Inform citizens through actions identified in BMP 1c-3. Finalize Plan.</p> <p>Years 3-5) Implement Plan and record calls, inspections/tests, numbers and types of illicit discharges, and maintenance performed.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 3-ILLICIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3d-1

<p>*BMP Title: Public and Employee Illicit Discharge Information Program</p>
<p>*BMP Description:</p> <p>The City will use the education efforts outlined on BMP Summary Sheet 1c-3 (Education Program: Illicit Discharge Detection and Elimination) for providing information to the general public concerning the hazards associated with illegal discharges and the improper disposal of wastes. The City will develop a separate effort to provide training to City employees. This training will focus on those City employees that are involved in activities out in the community (e.g. Public Works/Engineering and Parks Department field staff) which may impact stormwater quality including; road salt and sand application, landscaping, and other activities. The City intends to provide each employee with broad based training followed by annual retraining which will focus on specific, yet to be determined issues.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <ol style="list-style-type: none">1) See BMP Summary Sheet 1c-3 for Measurable Goals concerning public education efforts regarding Illicit Discharge Detection and Elimination.2) Develop a training program for educating City employees about the hazards associated with illegal discharges and the improper disposal of wastes which relate to their work activities.3) Train all City employees who are involved in activities which could possibly result in illicit discharges to stormwater.4) Develop a training program to provide annual retraining, with specific focused training efforts, to City employees.5) Implement annual retraining and focused training efforts.
<p>*Timeline/Implementation Schedule:</p> <p>See BMP Summary Sheet 1c-3 for Timeline/Implementation Schedule concerning public education efforts regarding Illicit Discharge Detection and Elimination.</p> <p>Year 1) Develop training program for educating City employees about the hazards associated with illegal discharges and the improper disposal of wastes which relate to their work activities.</p> <p>Year 2) Train all City employees who are involved in activities which could possibly result in illicit discharges to stormwater.</p> <p>Year 3) Develop training program to provide annual retraining and focused training efforts to City employees and implement this training.</p> <p>Years 4-5) Continue annual retraining and focused training efforts.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant)</p> <p>Department: Water Resources</p> <p>Phone: 763-427-5860</p> <p>E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 3-ILLCIT DISCHARGE DETECTION AND ELIMINATION

Unique BMP Identification Number: 3e-1

<p>*BMP Title: Identification of Non Stormwater Discharges and Flows</p>
<p>*BMP Description:</p> <p>The City will develop a process to evaluate whether any of the following categories of non-stormwater discharges or flows are significant contributors of pollutants to our MS4:</p> <p>water line flushing, landscape irrigation, diverted stream flows, rising ground waters, uncontaminated ground water infiltration, uncontaminated pumped ground water, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, springs, water from crawl space pumps, footing drains, lawn watering, individual residential car washing, flows from riparian habitats and wetlands, dechlorinated swimming pool discharges, street wash water, and discharges or flows from fire fighting activities.</p> <p>For any non-stormwater discharges or flows which the City finds to be a significant contributor of pollutants to the MS4 the City will develop an action plan to evaluate and address the impact the discharge is having on stormwater quality.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Number of action plans developed and implemented. Reduction (or increase) in non-stormwater discharges and flows, based evaluation of implementation phase.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Develop process to investigate and evaluate non-stormwater discharges and flows. Year 2) Conduct investigation and evaluation of non-stormwater discharges and flows and develop action plans for those which are identified as being significant contributors of pollutants to our MS4. Year 3) Implement the action plans for significant non-stormwater discharges and flows. Years 4-5) Continue with action plan concerning significant non-stormwater discharges and flows. Years 4-5) Evaluate the implementation phase of the action plans and make adjustments as necessary to prepare for a permanent program for Identification of Non-Stormwater Discharges and Flows to be put in place.</p>
<p>Specific Components and Notes:</p> <p>The process of identifying non-stormwater discharges and flows will be developed in cooperation with studies already done and underway for TMDL requirements of Lake Sarah and Lake Independence.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Dan Koch Department: Public Works Phone: 763-479-0530 E-mail: dkoch@ci.independence.mn.us</p>

Minimum Control Measure 4: CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
4a-1	Ordinance or other Regulatory Mechanism	V.G.4.a
4b-1	Construction Site Implementation of Erosion and Sediment Control BMPs	V.G.4.b
4c-1	Waste Controls for Construction Site Operators	V.G.4.c
4d-1	Procedure for Site Plan Review	V.G.4.d
4e-1	Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance	V.G.4.e
4f-1	Establishment of Procedures for Site Inspections and Enforcement	V.G.4.f

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4a-1

<p>*BMP Title: Ordinance or other Regulatory Mechanism</p>
<p>*BMP Description:</p> <p>The City will develop ordinance language or other regulatory documents that provides controls for managing construction site stormwater runoff, and has provision for enforcement procedures and violations. The City currently has Erosion Control Measures (ECM) as documented in Section 508 of the City Code (Grading, Erosion and Sediment Control Ordinance). This ordinance should be reviewed to determine compliance with provisions of the Permit.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Review past violations, and record any violations after the regulatory control measures are revised/added, to determine effectiveness of new regulations.</p>
<p>*Timeline/Implementation Schedule:</p> <p>If a program is not in existence or warrants complete revision of the existing regulations, a program must be developed and enforced to reduce pollutants in any stormwater runoff from construction activities that result in over 1 acre of disturbance within 6 months of the issue of this permit.</p> <p>Year 1) Existing control document review, comparison with similar communities. Year 2) Development of language if necessary, consultation with attorney. Year 3) Changes to present document, or implementation of new regulations if necessary.</p>
<p>Specific Components and Notes:</p> <p>City Council has regulatory authority concerning ordinances. City Administrator, City Planner, or Building Inspector has authority to put stop work order on non-compliant activities.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4b-1

<p>*BMP Title: Construction Site Implementation of Erosion and Sediment Control BMPs</p>
<p>*BMP Description:</p> <p>The City Public Works/Engineering Departments, including the Building Inspector, will review its Erosion Control Measure documentation to determine which specific BMPs are most effective in keeping erosion under control and containing sediment on the construction site and off the streets. The results of this review will be incorporated into the existing City handout that is distributed to all local builders, contractors, and developers. Each year, information from inspectors and permit regulators will be collected to determine effectiveness of BMPs. Revisions to the list of BMPs will be completed based on those control measures that resulted in permit non-compliance.</p> <p>Once each year, a BMP workshop will be hosted for all local builders, contractors, and developers. The BMPs outlined in the guidance document are explained in detail, and installation and BMP maintenance will also be discussed. Evaluation forms will be provided at the end of the workshop to gather feedback on the event.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <ol style="list-style-type: none">1) Number of attendees at workshop.2) Review Workshop evaluation comments submitted by the attendees and determine the percentage that believed the BMP Workshop was meaningful and would help them do their job correctly.3) Review MPCA inspection data to determine which BMPs commonly resulted in permit on-compliance, and adjust BMP list accordingly.
<p>*Timeline/Implementation Schedule:</p> <p>During the year following the completion of the stormwater ordinance and the selection of the ten (10) BMPs, start the implementation of these BMPs.</p> <p>Years 1-5) Annual BMP Workshop in February.</p> <p>Years 2-5) Add five (5) new BMPs that the BMP Review Board feels are justifiable.</p>
<p>Specific Components and Notes:</p> <ol style="list-style-type: none">1) Make certain that the BMPs selected by the BMP Review Board are consistent with the requirements of the Phase II General Stormwater Permit for Construction Activity.
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant)</p> <p>Department: Water Resources</p> <p>Phone: 763-427-5860</p> <p>E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4c-1

<p>*BMP Title: Waste Controls for Construction Site Operators</p>
<p>*BMP Description:</p> <p>The City will implement or incorporate by reference waste controls for construction site operators. These waste controls will include provisions for discarded building materials, concrete truck washout, chemicals used at the construction site, litter, and disposal of sanitary waste.</p>
<p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Review past violations, and record any violations after the waste control measures are revised/added, to determine effectiveness of new measures.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Review existing ordinances and regulatory provisions governing construction site waste. Compare existing with other similarly-sized communities. Year 2) Development of language if necessary. Year 3) Changes to present document, or implementation of new regulations if necessary.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Bruce Satek Department: Building Inspector Phone: 763-479-0531 E-mail: bsatek@ci.independence.mn.us</p>

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4d-1

<p>*BMP Title: Procedure for Site Plan Review</p>
<p>*BMP Description:</p> <p>The City will review its current method of site review to determine if proper consideration is given on water quality impacts. Currently, any grade/fill permit applications are reviewed by City water resource staff and a representative from the Pioneer-Sarah Watershed before a permit is granted. In addition, the applicant is required to have all erosion control measures in place before grading of any kind is allowed.</p>
<p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Review past number of permits denied based on water quality issues. Track future permits denied based on same issues to determine effectiveness of new procedures.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Review existing site plan review. Compare existing with other similarly-sized communities. Year 2) Development of language if necessary. Year 3) Changes to present procedure, or implementation of procedure if necessary.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4e-1

<p>*BMP Title: Establishment of Procedures for the Receipt and Consideration of Reports of Stormwater Noncompliance</p>
<p>*BMP Description:</p> <p>The City will develop procedure for receiving reports from the public and other entities on stormwater noncompliance, and will formulate a procedure for responding to reports. The basis of this reporting system will be a City-established hotline or other contact number for reporting construction site stormwater noncompliance. Specific procedures will be documented and made available to the public.</p>
<p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Number of public complaints and if/how they were addressed. Number of follow-up inspections conducted, and the results of the inspection. Number of noncompliant controls detected, and documented follow-up actions. Reduction in number of public complains, required inspections, or records of non-compliance detected over 5-year period.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Meet as City Staff to discuss appropriate procedures for reporting and addressing complaints of construction stormwater noncompliance.</p> <p>Year 2) Establish hotline or designate phone contact for citizens to report stormwater noncompliance. Inform citizens through actions identified in BMP 1c-4.</p> <p>Years 3-5) Implement Plan and record calls, inspections/tests, numbers and types of stormwater noncompliance, and maintenance performed or actions taken.</p>
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p style="margin-left: 20px;">Name: Craig Jochum (consultant) Department: Water Resources Phone: 763-427-5860 E-mail: craigj@haa-inc.com</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 4-CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Unique BMP Identification Number: 4f-1

<p>*BMP Title: Establishment of Procedures for Site Inspections and Enforcement</p>
<p>*BMP Description:</p> <p>The City will develop procedures for inspection and enforcement of construction site control measures related to erosion and sediment as well as site waste. The City will formalize its construction site inspection program by specifying conditions that could lead to inspections, establishing inspection procedure, and enforcing control measures.</p>
<p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.</p>
<p>*Measurable Goals:</p> <p>Number of inspections conducted. Number of noncompliant controls detected, and documented follow-up actions. Percentage rate of compliance by construction contractors. Reduction in number of public complaints, required inspections, or records of non-compliance detected over 5-year period.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 1) Evaluate current inspection procedures. Year 2) Improve and document new procedures for inspection and develop guidelines for inspection and enforcement. If necessary include new enforcement language and procedures in existing ordinances. Year 3) Formalize procedures and communicate requirements and expectations to contractors and developers.</p>
<p>Specific Components and Notes:</p> <p>This BMP will work in concert with the provisions of BMP 4e-1.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Bruce Satek Department: Building Inspector Phone: 763-479-0531 E-mail: bsatek@ci.independence.mn.us</p>

Minimum Control Measure 5: POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
5a-1	Development and Implementation of Structural and/or Non-structural BMPs	V.G.5.a
5b-1	Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment	V.G.5.b
5c-1	Long-term Operation and Maintenance of BMPs	V.G.5.c

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5a-1

***BMP Title:** Development and Implementation of Structural and/or Non-structural BMPs

***BMP Description:**

City water resources staff will review a combination of structure and non-structure BMPs to manage post-construction stormwater. Existing guidance and regulations will also be assessed for consistency and effectiveness. The findings and results of these reviews will be incorporated into a post-construction stormwater management plan. This plan will help to better define requirements and provide better understanding for contractors, developers and the general public about controlling and maintaining stormwater management measures after construction.

Examples of non-structural BMPs to be considered include: policies and ordinances to direct growth, protect sensitive areas, increase open space, provide buffers, and minimize impervious surfaces, among others. Examples of structural BMPs include wet ponds and detention structures, swales, rain gardens, and infiltration basins. The City currently applies Nationwide Urban Runoff Program requirements, and sediment basins have been a part of the City's program since around 1995.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

- 1) Update wet detention pond design standards annually along with investigating new post-construction BMPs.
- 2) Track the number of new wet detention ponds created per calendar year.
- 3) Determine the acres of new impervious surface that has been put in place each calendar year.
- 4) Photograph receiving streams annually so comparisons per calendar year can be made in regards to scouring and acres of new impervious surface.

***Timeline/Implementation Schedule:**

Years 1-5) Review and update structural and non-structural BMPs.

The Engineering Department will continue to conduct reviews of all construction projects with stormwater management being a major component and focus of the review.

A post-construction stormwater management plan will be developed and implemented by June 30, 2008.

Specific Components and Notes:

- 1) All wet detention ponds should be designed to remove 60% of phosphorus load.
- 2) The wet detention ponds should release stormwater at a rate that is equal to or less than pre-development rates.
- 3) Review site plans to make sure that there is maximum infiltration of stormwater taking place.

***Responsible Party for this BMP:**

Name: Craig Jochum (consultant)

Department: Water Resources

Phone: 763-427-5860

E-mail: craigj@haa-inc.com

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5b-1

***BMP Title:** Regulatory Mechanism to Address Post Construction Runoff from New Development and Redevelopment

***BMP Description:**

The City will review existing ordinance language or other regulatory documents that provide controls for managing post-construction stormwater runoff. The review will ensure that existing ordinances and documentation has provision for enforcement procedures and violations. The City currently has Erosion Control Measures (ECM) and ponding requirements as documented in Section 508 of the City Code (Grading, Erosion and Sediment Control Ordinance). Applicable documents should be reviewed to determine compliance with provisions of the Permit.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Review past violations, and record any violations after the regulatory control measures are revised/added, to determine effectiveness of new regulations.

***Timeline/Implementation Schedule:**

Year 1) Existing ordinance review, comparison with similar communities.
Year 2) Development of language if necessary, consultation with attorney.
Year 3) Changes to present document, or implementation of new regulations if necessary.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Craig Jochum (consultant)
Department: Water Resources
Phone: 763-427-5860
E-mail: craigj@haa-inc.com

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 5-POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

Unique BMP Identification Number: 5c-1

***BMP Title:** Long-term Operation and Maintenance of BMPs

***BMP Description:**

The City will include in its Post-Construction Stormwater Management Plan, provisions for the long-term operation and maintenance of post-construction BMPs. This will include inspections during construction to ensure that BMPs are being constructed as originally designed, and regular monitoring and maintenance to ensure that BMPs are functioning properly. Many of these inspections will be developed and completed in accordance with BMP 6b-3.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Log of inspections completed, and any maintenance measures performed.

Number of post-construction BMPs inspected per year.

Percent of maintenance issues reported that were addressed.

Evaluate record of maintenance to review patterns and BMP effectiveness, and adjust BMPs accordingly.

***Timeline/Implementation Schedule:**

Year 1) Develop a log to record inspection results and any cleaning or maintenance performed/recommended. This will be developed prior to the first period of monitoring in Year 1.

Years 1 through 5) Inspect post-construction BMPs as outlined in BMP 6b-3, and maintain log of inspection and cleaning (where necessary) for life of the permit

Year 5) Evaluate maintenance record and review BMPs for effectiveness. Recommend new BMPs as necessary.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Bruce Satek

Department: Building Inspector

Phone: 763-479-0531

E-mail: bsatek@ci.independence.mn.us

Minimum Control Measure 6: POLLUTION PREVENTION/GOOD HOUSEKEEPING

Key to Unique BMP ID Numbers	Required BMP Title	Permit Reference
6a-1	Municipal Operations and Maintenance Program	V.G.6.a
6a-2	Street Sweeping**	
6b-2	Annual Inspection of All Structural Pollution Control Devices	V.G.6.b.2
6b-3	Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis	V.G.6.b.3
6b-4	Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas	V.G.6.b.4
6b-5	Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures	V.G.6.b.5
6b-6	Record Reporting and Retention of all Inspections and Responses to the Inspections	V.G.6.b.6
6b-7	Evaluation of Inspection Frequency	V.G.6.b.7

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-1

***BMP Title:** Municipal Operations and Maintenance Program

***BMP Description:**

The City will develop a maintenance program directed at City staff and maintenance crews, in accordance with the educational program outlined in BMP 1c-6. This will help to achieve the goal of reducing or preventing pollutant runoff from City operations. The program will utilize existing training materials from the EPA and other state and local agencies.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of City staff in attendance at each annual training program.

Survey of maintenance crews to identify if information received in training was useful, and if it was implemented on the job site.

Inspection of various job sites and daily activities to check for compliance with goals of reducing pollutant runoff from City operations.

***Timeline/Implementation Schedule:**

Year 1) Identify City staff and maintenance staff that would benefit from operations and maintenance training. Collect existing training materials and develop a training program.

Years 2-5) Conduct training program annually, earlier in the year so there is time before the busy inspection season would begin.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6a-2

***BMP Title:** Street Sweeping**

***BMP Description:**

The City will review its current street sweeping program for effectiveness, and will utilize public input to identify high priority areas that may be swept more often or earlier in existing sweeping periods. Street sweeping is conducted by the City once a year, in the spring. Additional street sweeping is conducted when new development warrants, and is the responsibility of developers.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Street sweeping was conducted annually (y/n)
Survey residents to determine if street sweeping was effective.

***Timeline/Implementation Schedule:**

Years 1-5) This program is in place and will continue to occur annually in each permit year.
Year 3) Evaluate program effectiveness and recommend changes if needed.
Year 5) Revise program to include necessary changes.

Specific Components and Notes:

Street sweeping is conducted once per year, in the spring. The sweeping is completed using a combination of brush and vacuum equipment. The waste generated from street sweeping activities is collected and hauled to the City Public Works facility, where it is stockpiled and re-used.

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-2

***BMP Title:** Annual Inspection of All Structural Pollution Control Devices

***BMP Description:**

The City will implement an annual inspection program for all structural pollution control devices. Existing devices will be inventoried and will include trap manholes, grit chambers, sumps, floatable skimmers and traps, separators, and other small settling or filtering devices. The City is currently in the process of developing a sump pump monitoring program that will be included in the SWPPP when it is finalized.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

List and/or map of all structural pollution control devices in the City.

Inspections completed annually (y/n)

Number of inspections completed annually, and recorded results of inspections.

***Timeline/Implementation Schedule:**

Year 1) Data collection and field checking for structural pollution control devices. Development of list/map and circulation for review by City staff.

Year 2) Final map completed and submitted with the Annual Report by June 30, 2008. Distribute maps to City departments and other interested parties.

Years 2-5) Annual inspections of each structural pollution control device.

Specific Components and Notes:

This BMP will occur in conjunction with developing a stormwater system map, as outlined in BMP 3a-1.

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-3

***BMP Title:** Inspection of a Minimum of 20 percent of the MS4 Outfalls, Sediment Basins and Ponds Each Year on a Rotating Basis

***BMP Description:**

A minimum of 20% of the ponds, sediment basins and outfalls in the City will be inspected annually in rotation until all have been inspected during the Permit period. Records will be kept of inspection results, date and any maintenance performed or recommended. Inspections will be performed in the fall, when water levels are lower and structures can be seen. This will also ensure that structures are in proper condition to handle spring water flows.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of outfalls and ponds inspected (20% minimum/year)
Number of outfalls or ponds where sediment was removed or other cleaning was necessary

***Timeline/Implementation Schedule:**

Year 1: Develop a log to record inspection results and any cleaning or maintenance performed/recommended. This will be developed prior to the first period of monitoring in Year 1.
Year 1) Data collection and field checking for outfalls, sediment basins and ponds. Development of list/map and circulation for review by City staff.
Years 1 through 5: Inspect 20% of current outfalls and ponds annually in the fall and maintain log of inspection and cleaning (where necessary) for life of the permit

Specific Components and Notes:

This BMP will occur in conjunction with developing a stormwater system map, as outlined in BMP 3a-1.

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-4

***BMP Title:** Annual Inspection of All Exposed Stockpile, Storage and Material Handling Areas

***BMP Description:**

The City will identify and maintain a list of all permanent exposed stockpile, storage and material handling areas on job sites or at City maintenance facilities. This includes, but is not limited to: topsoil, salt, lumber, coal, or parts. A plan for annual inspection of each area will be developed. Records will be kept of inspection results, date and any maintenance performed or recommended.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of exposed stockpile, storage and material handling areas inspected each year.
Number of exposed stockpile, storage and material handling areas where maintenance was necessary.
Track improvements in maintenance records during the permit period, and/or document continuous problem areas.

***Timeline/Implementation Schedule:**

Year 1: Develop a log to record inspection results and any cleaning or maintenance performed/recommended. This will be developed prior to the first period of monitoring in Year 1.
Year 1) Data collection and field checking for exposed stockpile, storage and material handling areas. Development of list/map and circulation for review by City staff.
Years 1 through 5: Inspect exposed stockpile, storage and material handling areas annually each fall and maintain log of inspection and cleaning (where necessary) for life of the permit.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-5

***BMP Title:** Inspection Follow-up Including the Determination of Whether Repair, Replacement, or Maintenance Measures are Necessary and the Implementation of the Corrective Measures

***BMP Description:**

The City will develop inspection follow-up protocol for each of the resources and areas described in BMPs 6b-2 through 6b-4. In general, a log will be kept documenting inspections and any maintenance issues. Larger issues (such as replacement of a device or other issues that may require additional funds or resources) will be reviewed and approved by City staff. Corrective measures will be documented and logged with the date of implementation, which should occur as soon as possible, usually during the same year as the inspection documenting the problem. When corrective action is not practicable in this timeframe, the reasons for waiting to implement corrective measures should be documented in the Annual Report.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of maintenance issues addressed each year.
Timeframe in which corrective action occurs.
Log of implementation dates for corrective actions.

***Timeline/Implementation Schedule:**

Year 1) Develop the protocol for recording and reporting maintenance issues to the Public Works Department. Communicate protocol to staff performing inspections.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Dan Koch
Department: Public Works
Phone: 763-479-0530
E-mail: dkoch@ci.independence.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-6

***BMP Title:** Record Reporting and Retention of All Inspections and Responses to the Inspections

***BMP Description:**

The City will develop inspection reporting protocol for each of the resources and areas described in BMPs 6b-2 through 6b-4. In general, a log will be kept documenting inspections and any maintenance issues. Responses to any issues will also be documented. Responses may include corrective or protective measures, or documentation stating why the issue was not resolved. Specific dates of any repairs will also be logged. The results of annual inspections will be summarized in the Annual Report.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

Number of issues and responses.
Log of all inspections and responses.

***Timeline/Implementation Schedule:**

Year 1) Develop the protocol for recording and reporting maintenance issues to the Public Works Department. Communicate protocol to staff performing inspections.
Years 1-5) Record and report all inspections, responses, repairs, and/or justification for no action.
Years 2-5) Summarize results of annual inspections in each Annual Report.

Specific Components and Notes:

When communicating new protocol, emphasis will be placed on the importance of timely and accurate recording and reporting of inspections. Consistent recording and reporting will allow the City to better evaluate current practices, and will make the Annual Report process much easier.

***Responsible Party for this BMP:**

Name: Dan Koch
Department: Public Works
Phone: 763-479-0530
E-mail: dkoch@ci.independence.mn.us

**Indicates a REQUIRED field. Failure to complete any required field will result in rejection of the application due to incompleteness.*

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: 6-POLLUTION PREVENTION/GOOD HOUSEKEEPING

Unique BMP Identification Number: 6b-7

***BMP Title:** Evaluation of Inspection Frequency

***BMP Description:**

The City will utilize follow-up, recording and reporting functions described in BMPs 6b-5 and 6b-6 to collect data and help evaluate inspection frequency. After 2 years of inspection, the City will review records to determine the frequency and patterns of maintenance required for each stormwater resource. The frequency of inspections will be adjusted according to this evaluation. If maintenance or sediment removal is required within the first 2 years, inspection at that site or resource will be increased to 2 times annually. If maintenance or sediment removal is not required within the first 2 years, inspection will be reduced to every 2 years.

Location(s) in SWPPP of detailed information relating to this BMP:

The information included or referenced on this Summary Sheet is intended to meet all SWPPP requirements for this BMP.

***Measurable Goals:**

2-year inspection records for each resource.
Number of sites or resources for which inspection is reduced.

***Timeline/Implementation Schedule:**

Years 2 and 4) After inspection activities are completed for the year, review past 2 years of inspection records to determine necessary adjustments in the inspection schedule.
Years 3 and 5) Make necessary adjustments based on evaluation, and communicate to staff performing inspections.

Specific Components and Notes:

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

II. TOTAL MAXIMUM DAILY LOAD (TMDL) REQUIREMENTS

Lake Sarah and Lake Independence are listed as Impaired Waters under Section 303(d) of the Clean Waters Act. For each impaired water, a Total Maximum Daily Load (TMDL) document must be prepared to assess the pollutant load reductions needed for the water body to comply with Minnesota water quality standards. The TMDL document addresses the specific sources of pollution, target reductions from each source, and strategies to achieve the reductions.

As a designated MS4, the City of Independence must incorporate the strategies identified in the TMDL document into its SWPPP within 18 months of the adoption date of the TMDL document. The following sections discuss the TMDL status, as well as the status of TMDL/SWPPP incorporation, for each impaired lake.

Lake Sarah

Currently, Total Maximum Daily Loads (TMDLs) are being developed for Lake Sarah, and the City is participating in the process. The findings and final requirements of the TMDL process will be incorporated into the SWPPP when they are available. The target TMDL completion date, according to the MPCA, is 2011.

Lake Independence

Lake Independence (MNDNR Lake ID# 27-0176-00) is an 851-acre lake located in the Pioneer-Sarah Creek Watershed. The lake is used extensively for recreational use by local residents as well as the region. The lake receives runoff from a 7,631-acre predominantly agricultural watershed which contains portions of three municipalities, Medina, Independence and Loretto.

Over the past 15 years, the water quality of the lake has declined and algal blooms now occur throughout much of the summer season, negatively impacting recreational use. In 2002, the MPCA listed Lake Independence as impaired for aquatic recreation under Section 303(d) of the Clean Waters Act. The main cause of the impairment is excessive nutrients, particularly phosphorous. Historic data shows that the total phosphorus concentration of the lake exceeds the water quality standard threshold for Class 2 recreational waters.

To address these issues, a community stakeholders committee was appointed by the Pioneer-Sarah Creek Watershed Management Commission (PSCWMC). This group worked for two years to execute the *Lake Independence Phosphorous TMDL*, adopted in January 2007. A summary of the document findings are presented below.

The stakeholder committee established a water quality goal of 36 ug/L for the mean growing season total phosphorus concentration for Lake Independence. Since the Minnesota water quality standards require that the mean phosphorus concentration not exceed 40 ug/L, achieving this goal would satisfy the Margin of Safety requirement of the TMDL process.

The existing phosphorus load to Lake Independence was determined to be 2,381 pounds annually. Achieving the desired water quality goal of 36 ug/L will require a phosphorus loading reduction of 1,081 pounds/year, or 45 percent of the current load. The stakeholder committee determined that the required phosphorus loading reductions would come from the following sources:

- Agricultural cropland 284 lbs/year (32 percent)
- Livestock manure management 370 lbs/year (29 percent)
- Urban Development 146 lbs/year (14 percent)
- Internal loading reduction 209 lbs/year (18 percent)
- Loretto Sewage Treatment Facility 53 lbs/year (5 percent)

- Shoreline and goose management 11 lbs/year (2 percent)
- Failing Septic Systems 8 lbs/year (< 2 percent)

Implementation Plan (section 7.0 of the TMDL document) presents a work plan to achieve the specified reduction under each source. Each community is responsible for a proportionate amount of phosphorus load reduction in each source category, which was agreed upon by the municipalities. Each community must fulfill the tasks identified in the work plan to achieve the designated reductions.

Currently, the existing phosphorous loading attributed to the City of Independence is 891 pounds per year. To achieve its portion of the TMDL, the City must reduce its load to 356 pounds per year. This equates to 535 pounds of phosphorous per year ($891 - 356 = 535$) that must be reduced by controlling the various sources that contribute to the lake (*Lake Independence Phosphorous TMDL*, January 2007).

Table 1 summarizes the proposed annual loading reduction goals designated to the City of Independence by source, the identified strategies to address the reduction, and a reference to a location in the SWPPP where the TMDL actions have been incorporated.

Specific pollutant reduction calculations for BMPs under each source have not been calculated at this time, however the City has identified the reasons why it believes the specified actions will work toward the proposed reductions in the “anticipated reduction” column of the table. The City will continue to work with the PSCWMC and Three Rivers Park District (TRPD) on identifying specific calculations as resources and guidance become more readily available. TRPD will continue its existing annual water quality monitoring for Lake Independence, which will help to provide more data on the effectiveness of the BMPs over time. Additional inflow monitoring will also be initiated during and after implementation of the TMDL to quantify actual external load reductions. The flow and water quality data will be used to estimate phosphorus loading to the lake to confirm the TMDL approved load and waste load allocations. Additional monitoring and sampling may also be initiated to locate specific sources of nutrient loading in the watershed. The monitoring activities will primarily be the responsibility of TRPD, with support from PSCWMC and each city in the watershed.

TABLE 1. CITY OF INDEPENDENCE PROPOSED REDUCTION AND BMPs BY SOURCE

Phosphorous Sources	Proposed Annual Loading Reduction (lbs/yr.)¹	BMP Summary (see SWPPP for specific actions/strategies)	Location in SWPPP	Anticipated Reduction
Agricultural Cropland	187	Initiate informational campaign targeting priority landowners through news releases, meetings and informational fliers.	TMDL-1 Education Program: Phosphorous Reduction	Having goals for more pointed ways of informing residents will increase the efficiency of existing tools (website, newsletters), and will expand the base of people reached.
Animal Waste	260	Update potential project sites and contact landowners to inform them of funding and projects that they can initiate to benefit the lake and their properties.	TMDL-1 Education Program: Phosphorous Reduction	
Urban Development	80	Identify and document current street sweeping schedules that Medina and Independence have in place. If necessary, work with the cities to implement a continual spring and fall schedule for sweeping within the lakeshed. Initiate water quality informational and educational campaign for all the lakeshore and watershed landowners through news releases, meetings and informational fliers. Construct urban BMPs within the watershed and on the shoreline of Lake Independence	See existing BMP: 6a-2 Street Sweeping TMDL-1 Education Program: Phosphorous Reduction TMDL-2 Shoreline Stabilization and Protection Projects	The City currently sweeps streets once per year, but is open to additional sweeping in targeted areas if necessary. Lakeshore development has been slowing in recent years, and the City feels the time is right to focus on stabilization of individual properties along the shoreline. The City is also currently going through a revision of its existing shoreland ordinance, and these projects will support future properties protected by ordinance.
Failing Individual Sewage Treatment Systems	6	Complete an MPCA Sewage System Compliance Inspection for all ISTSs in the lakeshed, and prioritize failing and non-compliant systems for remediation. Repair or Replace all failing and non-conforming systems within 12 months of inspection, and monitor Compliance with ISTS Maintenance Requirements.	TMDL-3 Management of ISTSs	The City has not been as diligent in identifying failing and non-compliant ISTS in the past. A more structured program of identification, mitigation, and monitoring will make a difference.
Sewage Effluent	0	N/A	N/A	
Geese	8	Provide informational letters and fliers to all lakeshore property owners to obtain permission to remove geese from private property. Contract with Dr. Jim Cooper to remove geese from Lake Independence.	TMDL-1 Education Program: Phosphorous Reduction TMDL-4 Annual Goose Removal	An individual goose can contribute around 0.3 lb. of phosphorus per year. Effective reduction of geese can make a noticeable difference.

¹Source: *Lake Independence Phosphorous TMDL*, January 2007

TMDL Best Management Practices

Key to Unique BMP ID Numbers	TMDL BMP Title
TMDL-1	Education Program: Phosphorus Reduction
TMDL-2	Shoreline Stabilization and Protection Projects
TMDL-3	Management of Individual Sewage Treatment Systems
TMDL-4	Annual Goose Removal

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: LAKE INDEPENDENCE TMDL

Unique BMP Identification Number: TMDL-1

***BMP Title:** Education Program: Phosphorous Reduction

***Audience(s) Involved:**

- “Priority landowners” of agricultural cropland, as identified by TRPD and PSCWMC
- Livestock operators
- Landowners in Lake Independence watershed (see also BMP 1c-1)
- Lakeshore homeowners

***Educational Goals for Each Audience:**

Priority Landowners

- Increase awareness and understanding of the benefit of buffer strips, and make them aware of any technical assistance and funding available.

Livestock Operators

- Inform livestock operators of beneficial projects they can undertake to benefit the lake and their properties, and make them aware of any technical assistance and funding available.

Landowners in Lake Independence Watershed

- Increase awareness and understanding of the benefits of urban BMPs such as rain gardens and pond construction, and make them aware of any technical assistance and funding available.

Lakeshore homeowners

- Increase awareness and understanding of the implications of an uncontrolled goose population, and make homeowners aware of any technical assistance and grant money available.
- Increase awareness and understanding of the benefits of shoreline stabilization and buffering, and make homeowners aware of any technical assistance and grant money available.

***Activities Used to Reach Educational Goals:**

- Advertisement and participation in activities hosted by the County, PSCWMC, or other community and government groups that cover the topics listed above, including informational meetings.
- Articles in the community newsletter that provide information on the topics listed above.
- Direct mailings to specific groups listed above.
- Informational materials provided at public places, such as City Hall.
- Regular postings to stormwater section of City website.
- Site visits with individual property owners.

***Activity Implementation Plan:**

Priority Landowners

- **Years 2008 – 2015** - Publish one article relating to the benefit of buffer strips in the City newsletter.
- **Years 2008 – 2015** – Post information relating to buffer strips on the city website.
- **Ongoing** – With assistance from other agencies, send direct information mailing to each identified “priority landowner.”

Livestock Operators

- **[Already completed]** – Compile list of all livestock operators within the city which are within Lake Independence watershed.
- **[Already completed]** – With assistance from PSCWMC and TRPD, create informational materials that identify potential projects and funding available to individual livestock owners.
- **2008 – 2009** – Publish one article relating to eligible projects and project funding in the city newsletter.
- **2008 - 2009** – Post information relating to grant programs on the city website.
- **[Already completed]** – With assistance from PSCWMC and TRPD, contact every livestock operator within the City’s portion of the watershed via phone or direct mail.

Landowners in Lake Independence Watershed

- **Every other year, beginning 2008** – Co-host a workshop for homeowners on the benefits of rain gardens.
- **2008 – 2012 (annually)** – Publish one article relating to rain gardens and other structural BMPs in the city newsletter.
- **2008 – 2012 (annually)** – Collect information from other organizations and post links and document on the City’s website.

Lakeshore homeowners

- **2008** – Compile list of all homeowners/landowners located on the shores of Lake Independence.
- **2008 – 2012 (annually)** – Distribute information on shoreline stabilization to homeowners via direct mail.
- **Ongoing** – Publish at least one article on goose management in City newsletter each year prior to late summer capture and removal.
- **Ongoing** – Distribute information on benefits of goose removal, and ways to deter geese from private property, via direct mail.

***Performance Measures:**

Priority Landowners

- Number of landowner letters sent.
- Number of buffer projects undertaken.

Livestock Operators

- Number of operators on initial list vs. number of operators contacted.
- Number of operators utilizing funding programs and/or undertaking beneficial projects on their property.

Landowners in Lake Independence Watershed

- Attendance at workshop.
- Number of rain gardens or other urban BMPs implemented.

Lakeshore homeowners

- Number of homeowners contacted.

***Responsible Party for this BMP:**

Name: Toni Hirsch

Department: Administration

Phone: 763-479-0527

E-mail: thirsch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: LAKE INDEPENDENCE TMDL

Unique BMP Identification Number: TMDL-2

***BMP Title:** Shoreline Stabilization and Protection Projects

***BMP Description:**

Work with LICA, TRPD, PSCWMC, and Hennepin County Environmental Services to plan and execute shoreline protection and stabilization projects. Efforts should focus on priority areas as previously identified by TRPD.

Location(s) in SWPPP of detailed information relating to this BMP:

See also Section 7.1.3 of *Lake Independence Phosphorous TMDL*, January 2007.

***Measurable Goals:**

Number of linear feet of shoreline stabilized under new projects.
Number of landowners participating in stabilization and protection projects.

***Timeline/Implementation Schedule:**

2007 – 2015 (Years 2 through 5 of current permit [2007-2011] and Years 1 through 4 of subsequent permit [2012-2015])

Specific Components and Notes:

Public areas of shoreline stabilization may be partially funded by the participating agencies. Grant assistance will be sought to assist private landowners with similar projects.

***Responsible Party for this BMP:**

Name: Dan Koch

Department: Public Works

Phone: 763-479-0530

E-mail: dkoch@ci.independence.mn.us

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: LAKE INDEPENDENCE TMDL

Unique BMP Identification Number: TMDL-3

<p>*BMP Title: Management of Individual Sewage Treatment Systems</p>
<p>*BMP Description:</p> <p>Reduction of loading from ISTSs through increased inspections of septic systems, required remediation of failing systems, and more frequent pump-out of all septic system tanks.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>See also Section 7.1.4 of <i>Lake Independence Phosphorous TMDL</i>, January 2007.</p>
<p>*Measurable Goals:</p> <p>Number of ISTSs inspected. Number of failing ISTSs brought into compliance.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Year 3 (2008)</p> <ul style="list-style-type: none">- Develop annual ISTS maintenance inspection program to ensure that tanks are pumped on a 3-year interval.- Develop reporting form for homeowners to report pumping events. <p>Years 3 and 4 (2008-2009)</p> <ul style="list-style-type: none">- Review files to identify systems with outdated compliance inspections.- Contact homeowners with outdated compliance inspections and schedule inspection.- Complete inspections.- Develop priority ranking scheme based on system condition and proximity to Lake Independence.- Rank all failing and non-conforming systems. <p>Years 4 and 5 (2009-2010)</p> <ul style="list-style-type: none">- Meet on-site with owners of failing and non-compliant ISTSs to provide technical assistance to repair/replace system.- Repair/replace failing and non-conforming ISTSs.
<p>Specific Components and Notes:</p> <p>Financial obligation for repair and/or replacement of failing or non-conforming ISTSs will often reside with the homeowner.</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Dan Koch Department: Public Works Phone: 763-479-0530 E-mail: dkoch@ci.independence.mn.us</p>

BMP Summary Sheet

MS4 Name: City of Independence

Minimum Control Measure: LAKE INDEPENDENCE TMDL

Unique BMP Identification Number: TMDL-4

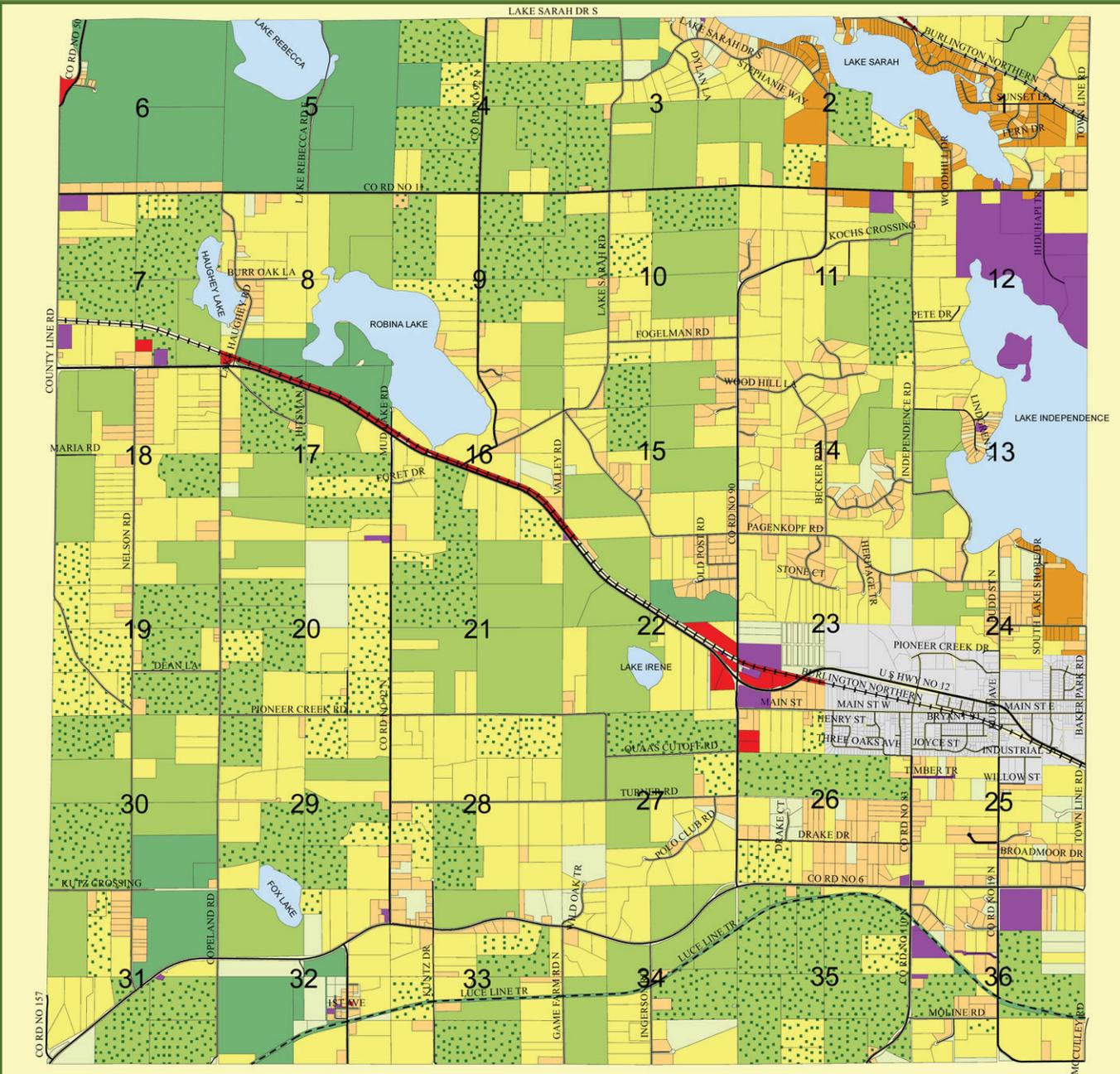
<p>*BMP Title: Annual Goose Removal</p>
<p>*BMP Description:</p> <p>A reduction in phosphorus loading will be achieved by reducing the resident goose population. TRPD, Medina and Independence will develop a cooperative program to capture and remove geese from the lake in late summer when the birds are flightless.</p> <p>Location(s) in SWPPP of detailed information relating to this BMP:</p> <p>See also Section 7.1.5 of <i>Lake Independence Phosphorous TMDL</i>, January 2007.</p>
<p>*Measurable Goals:</p> <p>Number of ISTSs inspected. Number of failing ISTSs brought into compliance.</p>
<p>*Timeline/Implementation Schedule:</p> <p>Ongoing (annually)</p> <ul style="list-style-type: none">- Work with LICA to contact each lakeshore homeowner via phone or by mail to request permission to enter the property to collect any geese.- Contract with Dr. Jim Cooper to remove geese.
<p>Specific Components and Notes:</p>
<p>*Responsible Party for this BMP:</p> <p>Name: Toni Hirsch Department: Administration Phone: 763-479-0527 E-mail: thirsch@ci.independence.mn.us</p>

APPENDIX C

Existing and Proposed Land Use Maps

City of INDEPENDENCE

Figure 1: Land Use



Legend

-  Agricultural Preserve Tax Classification
-  Single Family Sewered
-  Single Family Residential (< 5 Acre)
-  Rural Residential (5 - 40 Acres)
-  Agriculture (> 40 Acres)
-  Commercial / Industrial
-  Semi-Public / Institutional
-  Parks and Recreation
-  Open Space / Vacant
-  Open Water

Source: City Assessor and Hennepin County



0 1,600 3,200 Feet


City of INDEPENDENCE

Figure 7: Comprehensive Land Use Plan

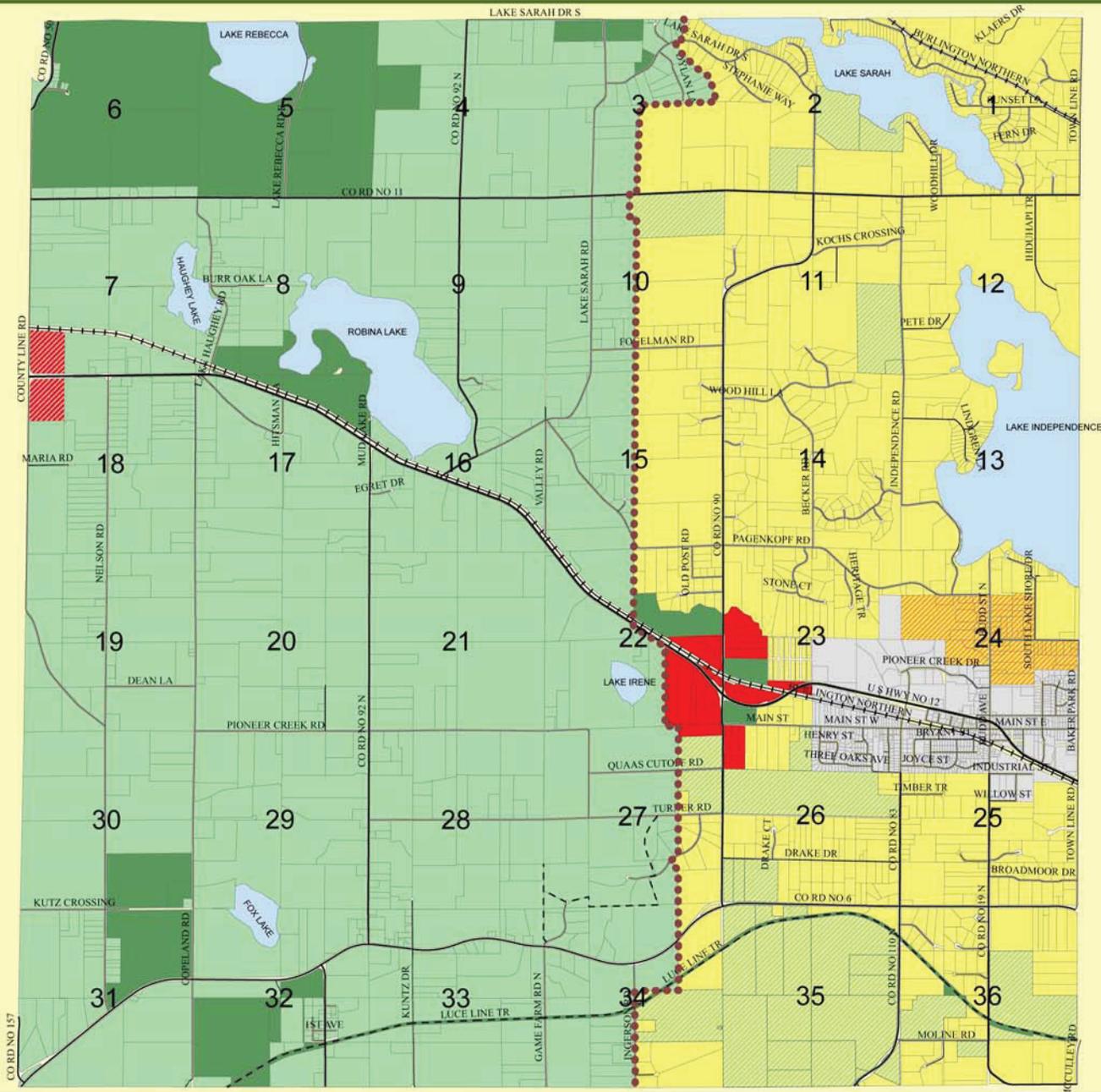
Legend

-  Agriculture (Rural Reserve Area)
1 Unit per 40 Acres Maximum
-  Agriculture Preserve
-  Rural Residential
1 Unit per 5 Acres Maximum
-  Urban Residential
41-7 Units per Acre
-  Commercial / Industrial
5 Acre Lot Minimum
-  Urban Commercial
-  Public / Semi-Public
-  Open Water
-  Rural Residential Planning Boundary
-  Trail



0 1,600 3,200 Feet
|-----|-----|

Map Design Provided by Loucks Associates



APPENDIX D

**Preliminary Drainage Study
Urban Commercial Area**

SUMMARY OF XP-SWMM DATA																		
SUBCATCHMENT DATA							POND/STRUCTURE DATA						OUTLET DATA					
NAME	AREA (acres)	CN	T of C (min)	PEAK RUNOFF (cfs)	RUNOFF DEPTH (in)	RUNOFF VOLUME (ac-ft)	NAME	BOTTOM ELEV.	INITIAL DEPTH	HWL	MAX. VOLUME (cf)	MAX. VOLUME (ac-ft)	NAME	DIAMETER (feet)	PIPE LENGTH (feet)	SLOPE (%)	MANNING'S N	PEAK FLOW (cfs)
EXIST1	12.9	77	15	52.7	3.4	3.7	EXIST1	951.5	0	954.3	200,676	4.6	L4	1.00	500	0.3	0.012	3.3
EXIST2	72.1	79	25	244.4	3.6	21.6	EXIST2	952.5	0	955.3	646,288	14.8	L3	1.25	78	0.6	0.025	4.9
EXIST3	101.3	82	25	371.5	3.9	32.9	EXIST3	955.0	0	958.6	579,900	13.3	L1	2.50	80	0.5	0.012	62.1
EXIST4	88.9	90	20	430.7	4.7	34.8	EXIST4	949.5	0	952.2	2,014,217	46.2	L2	1.50	80	0.5	0.012	16.8
PROP1	12.9	77	15	52.7	3.4	3.7	PROP1	951.5	0	953.7	141,113	3.2	L7	1.00	500	0.3	0.012	3.0
PROP2	72.1	82	25	264.4	3.9	23.4	PROP2	952.5	0	955.6	766,294	17.6	L8	1.00	78	0.6	0.025	2.9
PROP3	101.3	86	25	407.2	4.3	36.3	PROP3	955.0	0	959.4	823,179	18.9	L6	1.50	80	0.5	0.012	23.2
PROP4	88.9	90	20	430.7	4.7	34.8	PROP4	949.5	0	951.9	1,732,227	39.8	L5	1.50	80	0.5	0.012	15.2



LEGEND

-  URBAN COMMERCIAL DISTRICT BOUNDARY
-  DRAINAGE DIVIDE
-  OUTLET LOCATION

FIGURE 1
DRAINAGE
AREAS


```

| section :solve or in the windows version XPSWMM32 in the
| file solve.bat
|
| Note: the cfg file should be in the subdirectory swmnp
| or defined by the set variable in the xpswm.bat
| file. Some examples of the command lines possible
| are shown below:
|
| swmnd swmcom.cfg
| swmnd my.cfg
| swmnd nokeys nconv5 perv extranwq
|
|=====

```

\$powerstation	0.0000	1	2
\$perv	0.0000	0	4
\$oldegg	0.0000	0	7
\$as	0.0000	0	11
\$noflat	0.0000	0	21
\$oldomega	0.0000	0	24
\$oldvol	0.0000	1	28
\$implicit	0.0000	1	29
\$oldhot	0.0000	1	31
\$oldscs	0.0000	0	33
\$flood	0.0000	1	40
\$nokeys	0.0000	0	42
\$pzero	0.0000	0	55
\$oldvol2	0.0000	2	59
\$storage2	0.0000	3	62
\$oldhot1	0.0000	1	63
\$pumpwt	0.0000	1	70
\$ecloss	0.0000	1	77
\$exout	0.0000	0	97
\$spatial = 0.90	0.9000	5	124
\$djref = -1.0	-0.1000	3	143
\$weirlen = 50	50.0000	1	153
\$oldbnd	0.0000	1	154
\$nogrelev	0.0000	1	161
\$ncmid	0.0000	0	164
\$new_nl_97	0.0000	2	290
\$best97	0.0000	1	294
\$newbound	0.0000	1	295
\$q_tol = 0.1	0.0010	1	316
\$new_storage	0.0000	1	322
\$old_iteration	0.0000	1	333
\$minlen=30.0	30.0000	1	346
\$review_elevation	0.0000	1	383
\$use_half_volume	0.0000	1	385

```

$min_ts = 0.5                0.5000      1      407
$design_restart = on          0.0000      1      412
$zero_value=1.e-05          0.0000      1      414

```

```

*====*
| Parameter Values on the Tapes Common Block.These are the |
| values read from the data file and dynamically allocated |
| by the model for this simulation.                          |
*====*

```

```

Number of Subcatchments in the Runoff Block (NW)....      8
Number of Channel/Pipes in the Runoff Block (NG)....      0
Runoff Water quality constituents (NRQ).....              0
Runoff Land Uses per Subcatchment (NLU).....              0
Number of Elements in the Transport Block (NET).....      0
Number of Storage Junctions in Transport (NTSE).....      0
Number of Input Hydrographs in Transport (NTH).....      0
Number of Elements in the Extran Block (NEE).....          9
Number of Groundwater Subcatchments in Runoff (NGW).      0
Number of Interface locations for all Blocks (NIE)..      9
Number of Pumps in Extran (NEP).....                      0
Number of Orifices in Extran (NEO).....                   0
Number of Tide Gates/Free Outfalls in Extran (NTG)..      1
Number of Extran Weirs (NEW).....                         0
Number of scs hydrograph points.....                      3360
Number of Extran printout locations (NPO).....             0
Number of Tide elements in Extran (NTE).....              1
Number of Natural channels (NNC).....                     0
Number of Storage junctions in Extran (NVSE).....         8
Number of Time history data points in Extran(NTVAL).      0
Number of Variable storage elements in Extran (NVST)      3
Number of Input Hydrographs in Extran (NEH).....          0
Number of Particle sizes in Transport Block (NPS)...      0
Number of User defined conduits (NHW).....                8
Number of Connecting conduits in Extran (NECC).....       20
Number of Upstream elements in Transport (NTCC).....     10
Number of Storage/treatment plants (NSTU).....            0
Number of Values for R1 lines in Transport (NR1)...      0
Number of Nodes to be allowed for (NNOD).....            9
Number of Plugs in a Storage Treatment Unit.....          1

```

```

#####
#   Entry made to the Runoff Layer(Block) of SWMM   #
#   Last Updated October, 2000 by XP Software       #
#   and is CURRENTLY under development.            #
#####

```

```

=====
|      RUNOFF TABLES IN THE OUTPUT FILE.      |
|  These are the more important tables in the  |
|  output file.                               |
|  You can use your editor to find the table  |
|  numbers, for example: search for Table R3 |
|  to check continuity.                       |
|  This output file can be imported into a   |
|  Word Processor and printed on US letter  |
|  or A4 paper using portrait mode, courier |
|  font, a size of 8 pt. and margins of 0.75|
|                                              |
|  Table R1 - Physical Hydrology Data         |
|  Table R2 - Infiltration data               |
|  Table R3 - Raingage and Infiltration       |
|  Database Names                            |
|  Table R4 - Groundwater Data               |
|  Table R5 - Continuity Check for Surface    |
|  Water                                     |
|  Table R6 - Continuity Check for           |
|  Channels/Pipes                           |
|  Table R7 - Continuity Check for           |
|  Subsurface Water                         |
|  Table R8 - Infiltration/Inflow            |
|  Continuity Check                         |
|  Table R9 - Summary Statistics for         |
|  Subcatchments                            |
|  Table R10 - Sensitivity analysis for      |
|  Subcatchments                            |
=====

```

```

#####
#      RUNOFF JOB CONTROL      #
#####

```

```

Snowmelt parameter - ISNOW..... 0
Number of rain gages - NRGAG..... 1
Quality is not simulated - KWALTY..... 0
Default evaporation rate used - IVAP..... 0
Hour of day at start of storm - NHR..... 0
Minute of hour at start of storm - NMN..... 0
Time TZERO at start of storm (hours)..... 0.000
Use U.S. Customary units for most I/O - METRIC... 0
Runoff input print control... 0
Runoff graph plot control... 0
Runoff output print control.. 0
Limit number of groundwater convergence messages to 10000

Print headers every 50 lines - NOHEAD (0=yes, 1=no) 0

Print land use load percentages -LANDUPR (0=no, 1=yes) 0
Month, day, year of start of storm is: 1/ 1/1995
Wet time step length (seconds)..... 60.0
Dry time step length (seconds)..... 86400.0
Wet/Dry time step length (seconds)... 60.0

```

Simulation length is.....

48.0 Hours

If Horton infiltration model is being used
A mixture of infiltration options may be used in
XP-SWMM2000 as a watershed specific option.
Rate for regeneration of infiltration = REGEN * DECAF
Decay is read in for each subcatchment

REGEN = 0.01000

Raingage #.....	1
KTYPE - Rainfall input type.....	0
NHISTO - Total number of rainfall values..	240
KINC - Rainfall values(pairs) per line..	10
KPRINT - Print rainfall(0-Yes,1-No).....	0
KTIME - Precipitation time units	
0 --> Minutes 1 --> Hours.....	1
KPREP - Precipitation unit type	
0 --> Intensity 1 --> Volume.....	1
KTHIS - Variable rainfall intervals	
0 --> No, > 1 --> Yes.....	0
THISTO - Rainfall time interval.....	0.10
TZRAIN - Starting time(KTIME units).....	0.00

Rainfall input summary from Runoff #
#####

Total rainfall for gage # 1 is 5.8500 inches

Data Group Fl #
Evaporation Rate (in/day) #
#####

JAN.	FEB.	MAR.	APR.	MAY	JUN.	JUL.	AUG.	SEP.	OCT.	NOV	DEC.
----	----	----	----	----	----	----	----	----	----	----	----
0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100

* No Channel or Pipe Network *
* This is a good idea, the hydraulic routing *
* in your network should be done in either *
* the Transport Layer or Extran Layer of SWMM. *

```
#####
# Table R1. S U B C A T C H M E N T D A T A #
# Physical Hydrology Data #
#####
```

Subcatchment Number	Channel Name	Width or inlet ft	Area ac	Per- cent Imperv	Slope ft/ft	"n" Imprv	"n" Perv	Deprs -sion Storage Imprv	Deprs -sion Storage Perv	Prct Zero Deten -tion	
1	EXIST2#1	EXIST2	1.0000	72.100	0.00	0.100	0.020	0.020	0.000	0.000	0.00
2	EXIST1#1	EXIST1	1.0000	12.900	0.00	0.100	0.020	0.020	0.000	0.000	0.00
3	EXIST3#1	EXIST3	1.0000	101.30	0.00	0.100	0.020	0.020	0.000	0.000	0.00
4	EXIST4#1	EXIST4	1.0000	88.900	0.00	0.100	0.020	0.020	0.000	0.000	0.00
5	PROP3#1	PROP3	1.0000	101.30	0.00	0.100	0.020	0.020	0.000	0.000	0.00
6	PROP4#1	PROP4	1.0000	88.900	0.00	0.100	0.020	0.020	0.000	0.000	0.00
7	PROP2#1	PROP2	1.0000	72.100	0.00	0.100	0.020	0.020	0.000	0.000	0.00
8	PROP1#1	PROP1	1.0000	12.900	0.00	0.100	0.020	0.020	0.000	0.000	0.00

```
#####
# Table R2. SUBCATCHMENT DATA #
# Infiltration or Time of Concentration Data #
# #
# Infiltration Type Infl #1(#5) Infl #2(#6) Infl #3(#7) Infl #4(#8) #
# SCS -> Comp CN Time Conc Shape Factor Depth or Fraction #
# SBUH -> Comp CN Time Conc N/A N/A #
# Green Ampt -> Suction Hydr Cond Initial MD N/A #
# Horton -> Max Rate Min Rate Decay Rate (1/sec) Max. Infiltr. Volume #
# Proportional -> Constant N/A N/A N/A #
# Initial/Cont Loss -> Initial Continuing N/A N/A #
# Initial/Proportional -> Initial Constant N/A N/A #
# Laurenson Parameters -> B Value Pervious "n" Impervious Cont Exponent #
# Rational Formula -> Tc Method Flow Path Length Flow Path Slope Roughness or Retardance #
# (#1 - #4 is Impervious Data / #5 - #8 is Pervious Data) #
# Rational Formula Tc Method: 1 = Constant #
# 2 = Friend's Equation #
# 3 = Kinematic Wave #
# 4 = Alameda Method #
# 5 = Izzard's Formula #
# 6 = Kerby's Equation #
# 7 = Kirpich's Equation #
# 8 = Bransby Williams Equation #
# 9 = Federal Aviation Authority Equation #
```

#####

Subcatchment Number	Name	Infl # 1	Infl # 2	Infl # 3	Infl # 4	Infl # 5	Infl # 6	Infl # 7	Infl # 8
1	EXIST2#1	79.0000	0.4167	484.0000	0.2000				
2	EXIST1#1	77.0000	0.2500	484.0000	0.2000				
3	EXIST3#1	82.0000	0.4167	484.0000	0.2000				
4	EXIST4#1	90.0000	0.3333	484.0000	0.2000				
5	PROP3#1	86.0000	0.4167	484.0000	0.2000				
6	PROP4#1	90.0000	0.3333	484.0000	0.2000				
7	PROP2#1	82.0000	0.4167	484.0000	0.2000				
8	PROP1#1	77.0000	0.2500	484.0000	0.2000				

Table R3. SUBCATCHMENT DATA #
Rainfall and Infiltration Database Names #
#####

Subcatchment Number	Name	Gage No	Infiltrn Type	Routing Type	Rainfall Database Name	Infiltration Database Name
1	EXIST2#1	1	SCS Method	SCS curvilinear	SCS Type II	
2	EXIST1#1	1	SCS Method	SCS curvilinear	SCS Type II	
3	EXIST3#1	1	SCS Method	SCS curvilinear	SCS Type II	
4	EXIST4#1	1	SCS Method	SCS curvilinear	SCS Type II	
5	PROP3#1	1	SCS Method	SCS curvilinear	SCS Type II	
6	PROP4#1	1	SCS Method	SCS curvilinear	SCS Type II	
7	PROP2#1	1	SCS Method	SCS curvilinear	SCS Type II	
8	PROP1#1	1	SCS Method	SCS curvilinear	SCS Type II	

Total Number of Subcatchments... 8
Total Tributary Area (acres).... 550.40
Impervious Area (acres)..... 0.00
Pervious Area (acres)..... 550.40
Total Width (feet)..... 8.00
Percent Imperviousness..... 0.00

```
#####
#           S U B C A T C H M E N T   D A T A           #
#   Default, Ratio values for subcatchment data   #
#   Used with the calibrate node in the runoff.   #
# 1 - width      2 - area      3 - impervious %    #
# 4 - slope      5 - imp "n"    6 - perv "n"      #
# 7 - imp ds     8 - perv ds    9 - 1st infil     #
#10 - 2nd infil          11 - 3rd infil          #
#####
```

Column	1	2	3	4	5	6	7	8	9	10	11
Default	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Ratio	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

```
*****
*   Arrangement of Subcatchments and Channel/Pipes   *
*****
```

Inlet

```
EXIST2      No Tributary Channel/Pipes
             Tributary Subareas..... EXIST2#1
EXIST1      No Tributary Channel/Pipes
             Tributary Subareas..... EXIST1#1
EXIST3      No Tributary Channel/Pipes
             Tributary Subareas..... EXIST3#1
EXIST4      No Tributary Channel/Pipes
             Tributary Subareas..... EXIST4#1
PROP3       No Tributary Channel/Pipes
             Tributary Subareas..... PROP3#1
PROP4       No Tributary Channel/Pipes
             Tributary Subareas..... PROP4#1
PROP2       No Tributary Channel/Pipes
             Tributary Subareas..... PROP2#1
PROP1       No Tributary Channel/Pipes
             Tributary Subareas..... PROP1#1
```

```
*****
* Hydrographs will be stored for the following 8 INLETS *
*****
```

```
EXIST2      EXIST1      EXIST3      EXIST4      PROP3      PROP4
PROP2      PROP1
```

 * Quality Simulation not included in this run *

 * Precipitation Interface File Summary *
 * Number of precipitation station... 1 *

Location Station Number

 1. 1

 * End of time step DO-loop in Runoff *

Final Date (Mo/Day/Year) = 1/ 3/1995
 Total number of time steps = 2880
 Final Julian Date = 1995003
 Final time of day = 0. seconds.
 Final time of day = 0.00 hours.
 Final running time = 48.0000 hours.
 Final running time = 2.0000 days.

 * Extrapolation Summary for Watersheds *
 * Explains the number of time steps and iterations *
 * used in the solution of the subcatchments. *
 * # Steps ==> Total Number of Extrapolated Steps *
 * # Calls ==> Total Number of OVERLND Calls *

Subcatchment	# Steps	# Calls	Subcatchment	# Steps	# Calls
EXIST2#1	0	0	EXIST1#1	0	0
EXIST4#1	0	0	PROP3#1	0	0
PROP2#1	0	0	PROP1#1	0	0

 # Rainfall input summary from Runoff Continuity Check #
 #####

Total rainfall read for gage # 1 is 5.8500 in
 Total rainfall read for gage # 1 is 1440.00 minutes

 * Table R5. CONTINUITY CHECK FOR SURFACE WATER *
 * Any continuity error can be fixed by lowering the *
 * wet and transition time step. The transition time *
 * should not be much greater than the wet time step. *

	cubic feet	Inches over Total Basin
Total Precipitation (Rain plus Snow)	1.168802E+07	5.850
Total Infiltration	3.420976E+06	1.712
Total Evaporation	0.000000E+00	0.000
Surface Runoff from Watersheds	8.316140E+06	4.162
Total Water remaining in Surface Storage	0.000000E+00	0.000
Infiltration over the Pervious Area...	3.420976E+06	1.712

Infiltration + Evaporation + Surface Runoff + Snow removal + Water remaining in Surface Storage + Water remaining in Snow Cover.....	1.173712E+07	5.875
Total Precipitation + Initial Storage.	1.168802E+07	5.850

The error in continuity is calculated as

 * Precipitation + Initial Snow Cover *
 * - Infiltration - *
 *Evaporation - Snow removal - *
 *Surface Runoff from Watersheds - *
 *Water in Surface Storage - *
 *Water remaining in Snow Cover *

 * Precipitation + Initial Snow Cover *

 Percent Continuity Error..... -0.4201

 * Table R6. Continuity Check for Channel/Pipes *
 * You should have zero continuity error *
 * if you are not using runoff hydraulics *

	cubic feet	Inches over Total Basin
Initial Channel/Pipe Storage.....	0.000000E+00	0.000
Final Channel/Pipe Storage.....	0.000000E+00	0.000
Surface Runoff from Watersheds.....	8.316140E+06	4.162
Groundwater Subsurface Inflow or Diversion..	0.000000E+00	0.000
Evaporation Loss from Channels.....	0.000000E+00	0.000
Groundwater Flow Diverted Out of Network....	0.000000E+00	0.000
Channel/Pipe/Inlet Outflow.....	8.316140E+06	4.162
Initial Storage + Inflow.....	8.316140E+06	4.162
Final Storage + Outflow + Diverted GW.....	8.316140E+06	4.162

* Final Storage + Outflow + Evaporation - *		
* Watershed Runoff - Groundwater Inflow - *		
* Initial Channel/Pipe Storage *		
* ----- *		
* Final Storage + Outflow + Evaporation *		

Percent Continuity Error.....		0.000

Table R9. Summary Statistics for Subcatchments #
#####

Note: Total Runoff Depth includes pervious & impervious area
Pervious and Impervious Runoff Depth is only the runoff from those two areas.

Subcatchment.....	EXIST2#1	EXIST1#1	EXIST3#1	EXIST4#1	PROP3#1	PROP4#1
Area (acres).....	72.10000	12.90000	101.30000	88.90000	101.30000	88.90000
Percent Impervious....	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Total Rainfall (in)....	5.85000	5.85000	5.85000	5.85000	5.85000	5.85000
Max Intensity (in/hr)..	8.02035	8.02035	8.02035	8.02035	8.02035	8.02035
Pervious Area						

Total Runoff Depth (in)	3.56855	3.36777	3.87385	4.72464	4.29418	4.72464
Total Losses (in).....	2.28145	2.48223	1.97615	1.12536	1.55582	1.12536
Remaining Depth (in)...	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	244.43634	52.74414	371.50762	430.67833	407.19029	430.67833
Total Impervious Area						

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Area with depression storage						

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Impervious Area without depression storage

Total Runoff Depth (in)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Total Area						

Total Runoff Depth (in)	3.56855	3.36777	3.87385	4.72464	4.29418	4.72464
Peak Runoff Rate (cfs).	244.43634	52.74414	371.50762	430.67833	407.19029	430.67833
Unit Runoff (in/hr)....	3.39024	4.08869	3.66740	4.84453	4.01965	4.84453
Rational Formula						

Pervious Tc. (mins)....	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Pervious C	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Imp. Intensity (in/hr).	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Impervious C	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

Subcatchment.....	PROP2#1	PROP1#1
Area (acres).....	72.10000	12.90000
Percent Impervious....	0.00000	0.00000
Total Rainfall (in)....	5.85000	5.85000
Max Intensity (in/hr)..	8.02035	8.02035
Pervious Area		

Total Runoff Depth (in)	3.87385	3.36777
Total Losses (in).....	1.97615	2.48223
Remaining Depth (in)...	0.00000	0.00000
Peak Runoff Rate (cfs).	264.41954	52.74414
Total Impervious Area		

Total Runoff Depth (in)	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000
Impervious Area with depression storage		

Total Runoff Depth (in)	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000
Impervious Area without depression storage		

Total Runoff Depth (in)	0.00000	0.00000
Peak Runoff Rate (cfs).	0.00000	0.00000
Total Area		

Total Runoff Depth (in)	3.87385	3.36777
Peak Runoff Rate (cfs).	264.41954	52.74414
Unit Runoff (in/hr)....	3.66740	4.08869
Rational Formula		

Pervious Tc. (mins)....	0.00000	0.00000
Perv. Intensity (in/hr)	0.00000	0.00000
Pervious C	0.00000	0.00000
Impervious Tc. (mins)..	0.00000	0.00000
Imp. Intensity (in/hr).	0.00000	0.00000
Impervious C	0.00000	0.00000
Partial Area (Ha).....	0.00000	0.00000
Partial Area Tc.....	0.00000	0.00000
Partial Area Intensity.	0.00000	0.00000

==> Runoff simulation ended normally.

```
#####
#   Entry made to the HYDRAULIC Layer(Block) of SWMM #
#   Last Updated October,2000 by XP Software      #
~~~ Extran - Get Cross Section
```

```
*=====*
```

	HYDRAULICS TABLES IN THE OUTPUT FILE	
	These are the more important tables in the output file.	
	You can use your editor to find the table numbers,	
	for example: search for Table E20 to check continuity.	
	This output file can be imported into a Word Processor	
	and printed on US letter or A4 paper using portrait	
	mode, courier font, a size of 8 pt. and margins of 0.75	
	Table E1 - Basic Conduit Data	
	Table E2 - Conduit Factor Data	
	Table E3a - Junction Data	
	Table E3b - Junction Data	
	Table E4 - Conduit Connectivity Data	
	Table E4a - Dry Weather Flow Data	
	Table E4b - Real Time Control Data	
	Table E5 - Junction Time Step Limitation Summary	
	Table E5a - Conduit Explicit Condition Summary	
	Table E6 - Final Model Condition	
	Table E7 - Iteration Summary	
	Table E8 - Junction Time Step Limitation Summary	

Table E9	- Junction Summary Statistics	
Table E10	- Conduit Summary Statistics	
Table E11	- Area assumptions used in the analysis	
Table E12	- Mean conduit information	
Table E13	- Channel losses(H) and culvert info	
Table E13a	- Culvert Analysis Classification	
Table E14	- Natural Channel Overbank Flow Information	
Table E14a	- Natural Channel Encroachment Information	
Table E14b	- Floodplain Mapping	
Table E15	- Spreadsheet Info List	
Table E15a	- Spreadsheet Reach List	
Table E16	- New Conduit Output Section	
Table E17	- Pump Operation	
Table E18	- Junction Continuity Error	
Table E19	- Junction Inflow Sources	
Table E20	- Junction Flooding and Volume List	
Table E21	- Continuity balance at simulation end	
Table E22	- Model Judgement Section	

Time Control from Hydraulics Job Control

Year.....	1995 Month.....	1
Day.....	1 Hour.....	0
Minute.....	0 Second.....	0

Control information for simulation

Integration cycles.....	2880
Length of integration step is.....	60.00 seconds
Simulation length.....	48.00 hours
Do not create equiv. pipes(NEQUAL).	0
Use U.S. customary units for I/O...	0
Printing starts in cycle.....	1
Intermediate printout intervals of.	500 cycles
Intermediate printout intervals of.	500.00 minutes
Summary printout intervals of.....	500 cycles
Summary printout time interval of..	500.00 minutes
Hot start file parameter (REDO)....	0
Initial time.....	0.00 hours

Iteration variables: Flow Tolerance.	0.00010
Head Tolerance.	0.00050
Minimum depth (m or ft).....	0.00001
Underrelaxation parameter.....	0.85000
Time weighting parameter.....	0.85000

```

Conduit roughness factor..... 1.00000
Flow adjustment factor..... 1.00000
Initial Condition Smoothing..... 0
Courant Time Step Factor..... 1.00000
Default Expansion/Contraction K. 0.00000
Default Entrance/Exit K..... 0.00000
Routing Method..... Dynamic Wave
Default surface area of junctions... 12.57 square feet.
Minimum Junction/Conduit Depth..... 0.00001 feet.
Ponding Area Coefficient..... 50000.00
Ponding Area Exponent..... 5.0000
Minimum Orifice Length..... 300.00 feet.
NJSW input hydrograph junctions.... 0
or user defined hydrographs....

```

```

*=====
| Table E1 - Conduit Data |
*=====

```

Inp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft^2)	Manning Coef.	Max Width (ft)	Depth (ft)	Trapezoid Side Slopes
1	L1	80.0000	Circular	4.9087	0.0120	2.5000	2.5000	
2	L2	80.0000	Circular	1.7671	0.0120	1.5000	1.5000	
3	L3	78.0000	Circular	1.2272	0.0250	1.2500	1.2500	
4	L4	500.0000	Circular	0.7854	0.0120	1.0000	1.0000	
5	L6	80.0000	Circular	1.7671	0.0120	1.5000	1.5000	
6	L5	80.0000	Circular	1.7671	0.0120	1.5000	1.5000	
7	L8	78.0000	Circular	0.7854	0.0250	1.0000	1.0000	
8	L7	500.0000	Circular	0.7854	0.0120	1.0000	1.0000	
Total length of all conduits				1476.0000 feet				

```

*=====
| If there are messages about (sqrt(g*d)*dt/dx), or |
| the sqrt(wave celerity)*time step/conduit length |
| in the output file all it means is that the |
| program will lower the internal time step to |
| satisfy this condition (explicit condition). |
| You control the actual internal time step by |
| using the minimum courant time step factor in the |
| HYDRAULICS job control. The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection. |
| You have further control by using the modify |
| conduit option in the HYDRAULICS Job Control. |
*=====

```

Conduit Name	Courant Ratio	
L1	6.73	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L2	5.21	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L3	4.88	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L4	0.68	
L6	5.21	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L5	5.21	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L8	4.37	==> Warning ! (sqrt(wave celerity)*time step/conduit length)
L7	0.68	

*=====
| Conduit Volume |
*=====

Full pipe or full open conduit volume
Input full depth volume..... 1.7592E+03 cubic feet

*=====
| Table E3a - Junction Data |
*=====

Inp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst cfs	Initial Depth-ft	Interface Flow (%)
1	EXIST1	956.0000	956.0000	951.5000	0.0000	0.0000	100.0000
2	EXIST2	960.0000	960.0000	952.5000	0.0000	0.0000	100.0000
3	EXIST3	970.0000	970.0000	955.0000	0.0000	0.0000	100.0000
4	EXIST4	960.0000	960.0000	949.5000	0.0000	0.0000	100.0000
5	DUMMY	960.0000	951.0000	940.0000	0.0000	0.0000	100.0000
6	PROP3	970.0000	970.0000	955.0000	0.0000	0.0000	100.0000
7	PROP4	960.0000	960.0000	949.5000	0.0000	0.0000	100.0000
8	PROP1	956.0000	956.0000	951.5000	0.0000	0.0000	100.0000
9	PROP2	960.0000	960.0000	952.5000	0.0000	0.0000	100.0000

*=====
| Table E3b - Junction Data |
*=====

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Capacity	Pavement Shape	Slope
1	EXIST1	142.8853	396.1515	Flooded	Normal		0	0.0000
2	EXIST2	200.1344	396.4672	Flooded	Normal		0	0.0000
3	EXIST3	200.4438	451.6904	Flooded	Normal		0	0.0000
4	EXIST4	141.0285	451.6904	Flooded	Normal		0	0.0000
5	DUMMY	103.8940	423.9210	No Ponding	Normal		0	0.0000
6	PROP3	12.9448	453.6146	Flooded	Normal		0	0.0000
7	PROP4	59.9817	451.0901	Flooded	Normal		0	0.0000
8	PROP1	60.4639	388.7849	Flooded	Normal		0	0.0000
9	PROP2	13.8730	384.8222	Flooded	Normal		0	0.0000

| Table E4 - Conduit Connectivity |

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation		
1	L1	EXIST3	EXIST4	955.0000	954.6000	No Design	
2	L2	EXIST4	DUMMY	949.5000	949.1000	No Design	
3	L3	EXIST2	EXIST1	952.5000	952.0300	No Design	
4	L4	EXIST1	DUMMY	951.5000	950.0000	No Design	
5	L6	PROP3	PROP4	955.0000	954.6000	No Design	
6	L5	PROP4	DUMMY	949.5000	949.1000	No Design	
7	L8	PROP2	PROP1	952.5000	952.0300	No Design	
8	L7	PROP1	DUMMY	951.5000	950.0000	No Design	

| Storage Junction Data |

STORAGE JUNCTION NUMBER OR NAME	JUNCTION TYPE	MAXIMUM OR CONSTANT SURFACE AREA (FT2)	PEAK OR CONSTANT VOLUME (CUBIC FEET)	CROWN ELEVATION (FT)	DEPTH STARTS FROM
EXIST1	Stage/Area	178596.0000	459790.8756	956.0000	Node Invert
EXIST2	Stage/Area	618552.0000	2.944789E+06	960.0000	Node Invert
EXIST3	Stage/Area	2.156220E+06	13.851229E+06	970.0000	Node Invert
EXIST4	Stage/Area	1.089000E+06	9.543598E+06	960.0000	Node Invert
PROP3	Stage/Area	2.156220E+06	13.851229E+06	970.0000	Node Invert
PROP4	Stage/Area	1.089000E+06	9.543598E+06	960.0000	Node Invert
PROP1	Stage/Area	178596.0000	459790.8756	956.0000	Node Invert
PROP2	Stage/Area	618552.0000	2.944789E+06	960.0000	Node Invert

=====

| Variable storage data for node | EXIST1

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	951.5000	0.0000	26136.0000	0.0000	0.6000	0.0000
2	952.0625	0.5625	45193.5000	19818.3301	1.0375	0.4550
3	952.6250	1.1250	64251.0000	50442.8450	1.4750	1.1580
4	953.1875	1.6875	83308.5000	91828.0958	1.9125	2.1081
5	953.7500	2.2500	102366.0000	143957.1164	2.3500	3.3048
6	954.3125	2.8125	121423.5000	206821.7013	2.7875	4.7480
7	954.8750	3.3750	140481.0000	280417.2532	3.2250	6.4375
8	955.4375	3.9375	159538.5000	364740.9357	3.6625	8.3733
9	956.0000	4.5000	178596.0000	459790.8756	4.1000	10.5553

=====

| Variable storage data for node | EXIST2

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	952.5000	0.0000	113256.0000	0.0000	2.6000	0.0000
2	952.8125	0.3125	141025.5000	39652.2724	3.2375	0.9103
3	953.1250	0.6250	168795.0000	87996.7769	3.8750	2.0201
4	953.4375	0.9375	196564.5000	145029.1544	4.5125	3.3294
5	953.7500	1.2500	224334.0000	210746.7810	5.1500	4.8381
6	954.0625	1.5625	252103.5000	285147.9544	5.7875	6.5461
7	954.3750	1.8750	279873.0000	368231.5072	6.4250	8.4534
8	954.6875	2.1875	307642.5000	459996.6039	7.0625	10.5601
9	955.0000	2.5000	335412.0000	560442.6260	7.7000	12.8660
10	955.6250	3.1250	370804.5000	781042.8430	8.5125	17.9303
11	956.2500	3.7500	406197.0000	1.023772E+06	9.3250	23.5026
12	956.8750	4.3750	441589.5000	1.288628E+06	10.1375	29.5828
13	957.5000	5.0000	476982.0000	1.575611E+06	10.9500	36.1710
14	958.1250	5.6250	512374.5000	1.884719E+06	11.7625	43.2672
15	958.7500	6.2500	547767.0000	2.215951E+06	12.5750	50.8712
16	959.3750	6.8750	583159.5000	2.569308E+06	13.3875	58.9832
17	960.0000	7.5000	618552.0000	2.944789E+06	14.2000	67.6030

=====

| Variable storage data for node | EXIST3

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	955.0000	0.0000	21780.0000	0.0000	0.5000	0.0000
2	955.6250	0.6250	69696.0000	27174.4268	1.6000	0.6238
3	956.2500	1.2500	117612.0000	85058.9601	2.7000	1.9527
4	956.8750	1.8750	165528.0000	173114.8056	3.8000	3.9742
5	957.5000	2.5000	213444.0000	291226.7455	4.9000	6.6856
6	958.1250	3.1250	261360.0000	439350.4990	6.0000	10.0861
7	958.7500	3.7500	309276.0000	617464.3220	7.1000	14.1750
8	959.3750	4.3750	357192.0000	825555.9155	8.2000	18.9522
9	960.0000	5.0000	405108.0000	1.063618E+06	9.3000	24.4173
10	961.2500	6.2500	623997.0000	1.701902E+06	14.3250	39.0703
11	962.5000	7.5000	842886.0000	2.615283E+06	19.3500	60.0386
12	963.7500	8.7500	1061775.0000	3.803067E+06	24.3750	87.3064
13	965.0000	10.0000	1280664.0000	5.264956E+06	29.4000	120.8668
14	966.2500	11.2500	1499553.0000	7.000794E+06	34.4250	160.7161
15	967.5000	12.5000	1718442.0000	9.010488E+06	39.4500	206.8523
16	968.7500	13.7500	1937331.0000	11.293980E+06	44.4750	259.2741
17	970.0000	15.0000	2156220.0000	13.851229E+06	49.5000	317.9805

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| Variable storage data for node | EXIST4

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	949.5000	0.0000	26136.0000	0.0000	0.6000	0.0000
2	949.5625	0.0625	120334.5000	4219.8199	2.7625	0.0969
3	949.6250	0.1250	214533.0000	14543.5744	4.9250	0.3339
4	949.6875	0.1875	308731.5000	30806.5413	7.0875	0.7072
5	949.7500	0.2500	402930.0000	52980.7361	9.2500	1.2163
6	949.8125	0.3125	497128.5000	81056.0757	11.4125	1.8608
7	949.8750	0.3750	591327.0000	115027.7707	13.5750	2.6407
8	949.9375	0.4375	685525.5000	154893.1671	15.7375	3.5559
9	950.0000	0.5000	779724.0000	200650.6404	17.9000	4.6063
10	951.2500	1.7500	818383.5000	1.199370E+06	18.7875	27.5338
11	952.5000	3.0000	857043.0000	2.246419E+06	19.6750	51.5707
12	953.7500	4.2500	895702.5000	3.341796E+06	20.5625	76.7171
13	955.0000	5.5000	934362.0000	4.485501E+06	21.4500	102.9729
14	956.2500	6.7500	973021.5000	5.677534E+06	22.3375	130.3383
15	957.5000	8.0000	1011681.0000	6.917895E+06	23.2250	158.8130
16	958.7500	9.2500	1050340.5000	8.206583E+06	24.1125	188.3972
17	960.0000	10.5000	1089000.0000	9.543598E+06	25.0000	219.0909

=====

| Variable storage data for node | PROP3

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	955.0000	0.0000	21780.0000	0.0000	0.5000	0.0000
2	955.6250	0.6250	69696.0000	27174.4268	1.6000	0.6238
3	956.2500	1.2500	117612.0000	85058.9601	2.7000	1.9527
4	956.8750	1.8750	165528.0000	173114.8056	3.8000	3.9742
5	957.5000	2.5000	213444.0000	291226.7455	4.9000	6.6856
6	958.1250	3.1250	261360.0000	439350.4990	6.0000	10.0861
7	958.7500	3.7500	309276.0000	617464.3220	7.1000	14.1750
8	959.3750	4.3750	357192.0000	825555.9155	8.2000	18.9522
9	960.0000	5.0000	405108.0000	1.063618E+06	9.3000	24.4173
10	961.2500	6.2500	623997.0000	1.701902E+06	14.3250	39.0703
11	962.5000	7.5000	842886.0000	2.615283E+06	19.3500	60.0386
12	963.7500	8.7500	1061775.0000	3.803067E+06	24.3750	87.3064
13	965.0000	10.0000	1280664.0000	5.264956E+06	29.4000	120.8668
14	966.2500	11.2500	1499553.0000	7.000794E+06	34.4250	160.7161
15	967.5000	12.5000	1718442.0000	9.010488E+06	39.4500	206.8523
16	968.7500	13.7500	1937331.0000	11.293980E+06	44.4750	259.2741
17	970.0000	15.0000	2156220.0000	13.851229E+06	49.5000	317.9805

=====

| Variable storage data for node | PROP4

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	949.5000	0.0000	26136.0000	0.0000	0.6000	0.0000
2	949.5625	0.0625	120334.5000	4219.8199	2.7625	0.0969
3	949.6250	0.1250	214533.0000	14543.5744	4.9250	0.3339
4	949.6875	0.1875	308731.5000	30806.5413	7.0875	0.7072
5	949.7500	0.2500	402930.0000	52980.7361	9.2500	1.2163
6	949.8125	0.3125	497128.5000	81056.0757	11.4125	1.8608
7	949.8750	0.3750	591327.0000	115027.7707	13.5750	2.6407
8	949.9375	0.4375	685525.5000	154893.1671	15.7375	3.5559
9	950.0000	0.5000	779724.0000	200650.6404	17.9000	4.6063
10	951.2500	1.7500	818383.5000	1.199370E+06	18.7875	27.5338
11	952.5000	3.0000	857043.0000	2.246419E+06	19.6750	51.5707
12	953.7500	4.2500	895702.5000	3.341796E+06	20.5625	76.7171
13	955.0000	5.5000	934362.0000	4.485501E+06	21.4500	102.9729
14	956.2500	6.7500	973021.5000	5.677534E+06	22.3375	130.3383
15	957.5000	8.0000	1011681.0000	6.917895E+06	23.2250	158.8130
16	958.7500	9.2500	1050340.5000	8.206583E+06	24.1125	188.3972
17	960.0000	10.5000	1089000.0000	9.543598E+06	25.0000	219.0909

=====

| Variable storage data for node | PROP1

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	951.5000	0.0000	26136.0000	0.0000	0.6000	0.0000
2	952.0625	0.5625	45193.5000	19818.3301	1.0375	0.4550
3	952.6250	1.1250	64251.0000	50442.8450	1.4750	1.1580
4	953.1875	1.6875	83308.5000	91828.0958	1.9125	2.1081
5	953.7500	2.2500	102366.0000	143957.1164	2.3500	3.3048
6	954.3125	2.8125	121423.5000	206821.7013	2.7875	4.7480
7	954.8750	3.3750	140481.0000	280417.2532	3.2250	6.4375
8	955.4375	3.9375	159538.5000	364740.9357	3.6625	8.3733
9	956.0000	4.5000	178596.0000	459790.8756	4.1000	10.5553

=====

| Variable storage data for node | PROP2

=====

Data Point	Elevation ft	Depth ft	Area ft^2	Volume ft^3	Area acres	Volume ac-ft
1	952.5000	0.0000	113256.0000	0.0000	2.6000	0.0000
2	952.8125	0.3125	141025.5000	39652.2724	3.2375	0.9103
3	953.1250	0.6250	168795.0000	87996.7769	3.8750	2.0201
4	953.4375	0.9375	196564.5000	145029.1544	4.5125	3.3294
5	953.7500	1.2500	224334.0000	210746.7810	5.1500	4.8381
6	954.0625	1.5625	252103.5000	285147.9544	5.7875	6.5461
7	954.3750	1.8750	279873.0000	368231.5072	6.4250	8.4534
8	954.6875	2.1875	307642.5000	459996.6039	7.0625	10.5601
9	955.0000	2.5000	335412.0000	560442.6260	7.7000	12.8660
10	955.6250	3.1250	370804.5000	781042.8430	8.5125	17.9303
11	956.2500	3.7500	406197.0000	1.023772E+06	9.3250	23.5026
12	956.8750	4.3750	441589.5000	1.288628E+06	10.1375	29.5828
13	957.5000	5.0000	476982.0000	1.575611E+06	10.9500	36.1710
14	958.1250	5.6250	512374.5000	1.884719E+06	11.7625	43.2672
15	958.7500	6.2500	547767.0000	2.215951E+06	12.5750	50.8712
16	959.3750	6.8750	583159.5000	2.569308E+06	13.3875	58.9832
17	960.0000	7.5000	618552.0000	2.944789E+06	14.2000	67.6030

=====

| FREE OUTFALL DATA (DATA GROUP I1) |

| BOUNDARY CONDITION ON DATA GROUP J1 |

=====

Outfall at Junction....DUMMY has boundary condition number... 1

==> Warning !! Outfall Junction DUMMY has two or more connecting conduits.

```

*=====*
| INTERNAL CONNECTIVITY INFORMATION |
*=====*

CONDUIT      JUNCTION      JUNCTION
-----
FREE # 1      DUMMY        BOUNDARY

*=====*
| Boundary Condition Information |
| Data Groups J1-J4             |
*=====*

```

BC NUMBER.. 1 has no control water surface.

```

#####
# Header information from interface file: #
#####

```

Title from first computational layer:

Title from immediately preceding computational layer

```

Name of preceding layer:..... Runoff Layer
Initial Julian date (IDATEZ)..... 1995001
Initial time of day in seconds (TZERO)..... 0.0
No. Transferred input locations..... 8
No. Transferred pollutants..... 0
Size of total catchment area (acres)..... 550.40

```

```

#####
# Element numbers of interface inlet locations: #
#####

```

EXIST2 EXIST1 EXIST3 EXIST4 PROP3 PROP4 PROP2
 PROP1

Conversion factor to cfs for flow units on interface file. Multiply by: 1.00000

Important Information #####
 Start date/time of interface file was.. 1995001 0.0000 hours
 Start date/time of the simulation was.. 1995001 0.0000 hours
 Same date/time found in interface file and model

=====

XP Note Field Summary

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Conduit Convergence Criteria

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Conduit Name	Full Flow	Conduit Slope
L1	31.4205	0.0050
L2	8.0467	0.0050
L3	2.6075	0.0060
L4	2.1140	0.0030
L6	8.0467	0.0050
L5	8.0467	0.0050
L8	1.4381	0.0060
L7	2.1140	0.0030

=====

Initial Model Condition
Initial Time = 0.02 hours

=====

Junction / Depth / Elevation	==>	"*" Junction is Surcharged.		
EXIST1/ 0.00 / 951.50		EXIST2/ 0.00 / 952.50	EXIST3/ 0.00 / 955.00	
EXIST4/ 0.00 / 949.50		DUMMY/ 0.00 / 940.00	PROP3/ 0.00 / 955.00	
PROP4/ 0.00 / 949.50		PROP1/ 0.00 / 951.50	PROP2/ 0.00 / 952.50	

Conduit/	FLOW	==>	"*" Conduit uses the normal flow option.		
L1/	0.00		L2/ 0.00	L3/	0.00
L4/	0.00		L6/ 0.00	L5/	0.00
L8/	0.00		L7/ 0.00	FREE # 1/	0.00

Conduit/	Velocity				
L1/	0.00	L2/	0.00	L3/	0.00
L4/	0.00	L6/	0.00	L5/	0.00
L8/	0.00	L7/	0.00		

Conduit/	Cross Sectional Area				
L1/	0.00	L2/	0.00	L3/	0.00
L4/	0.00	L6/	0.00	L5/	0.00
L8/	0.00	L7/	0.00		

Conduit/	Hydraulic Radius				
L1/	0.00	L2/	0.00	L3/	0.00
L4/	0.00	L6/	0.00	L5/	0.00
L8/	0.00	L7/	0.00		

Conduit/	Upstream/	Downstream	Elevation					
L1/	949.50/	949.50	L2/	940.00/	940.00	L3/	951.50/	951.50
L4/	940.00/	940.00	L6/	949.50/	949.50	L5/	940.00/	940.00
L8/	951.50/	951.50	L7/	940.00/	940.00			

====> System inflows (file) at 8.33 hours (Junction / Inflow, cfs)

EXIST2 / 1.05E+00 EXIST1 / 1.31E-01 EXIST3 / 2.61E+00 EXIST4 / 6.08E+00 PROP3 / 4.44E+00 PROP4 / 6.08E+00
 PROP2 / 1.86E+00 PROP1 / 1.31E-01

Cycle 500 Time 8 Hrs - 20.00 Min

Junction /	Depth /	Elevation	====>	"*" Junction is Surcharged.		
EXIST1/	0.01 /	951.51	EXIST2/	0.02 /	952.52	EXIST3/ 0.25 / 955.25
EXIST4/	0.22 /	949.72	DUMMY/	0.21 /	940.21	PROP3/ 0.46 / 955.46
PROP4/	0.23 /	949.73	PROP1/	0.01 /	951.51	PROP2/ 0.05 / 952.55

Conduit/	FLOW	====>	"*" Conduit uses the normal flow option.			
L1/	0.59	L2/	0.34	L3/	0.00	L4/ 0.00
L6/	1.62	L5/	0.39	L8/	0.00	L7/ 0.00
FREE # 1/	1.37					

====> System inflows (file) at 16.67 hours (Junction / Inflow, cfs)

EXIST2 / 8.35E+00 EXIST1 / 1.43E+00 EXIST3 / 1.22E+01 EXIST4 / 1.13E+01 PROP3 / 1.27E+01 PROP4 / 1.13E+01
 PROP2 / 8.66E+00 PROP1 / 1.43E+00

Cycle 1000 Time 16 Hrs - 40.00 Min

Junction /	Depth /	Elevation	====>	"*" Junction is Surcharged.		
EXIST1/	2.24 /	953.74	EXIST2/	2.66 /	955.16	EXIST3/ 2.22 / 957.22

EXIST4/	2.50 /	952.00	DUMMY/	1.41 /	941.41	PROP3/	4.24 /	959.24
PROP4/	1.96 /	951.46	PROP1/	2.00 /	953.50	PROP2/	2.90 /	955.40

Conduit/	FLOW	===> "*" Conduit uses the normal flow option.						
L1/	38.10		L2/	15.69	L3/	4.55	L4/	2.99
L6/	22.72		L5/	12.91	L8/	2.92	L7/	2.84
FREE # 1/	62.75							

===> System inflows (file) at 25.00 hours (Junction / Inflow, cfs)

EXIST2	/	4.53E-02	EXIST1	/	0.00E+00	EXIST3	/	6.56E-02	EXIST4	/	9.16E-03	PROP3	/	6.79E-02	PROP4	/	9.16E-03
PROP2	/	4.67E-02	PROP1	/	0.00E+00												

Cycle 1500 Time 25 Hrs - 0.00 Min

Junction / Depth / Elevation	===> "*" Junction is Surcharged.							
EXIST1/	2.70 /	954.20	EXIST2/	2.73 /	955.23	EXIST3/	0.67 /	955.67
EXIST4/	2.68 /	952.18	DUMMY/	1.43 /	941.43	PROP3/	3.15 /	958.15
PROP4/	2.37 /	951.87	PROP1/	2.22 /	953.72	PROP2/	3.07 /	955.57

Conduit/	FLOW	===> "*" Conduit uses the normal flow option.						
L1/	4.98		L2/	16.53	L3/	3.89	L4/	3.21
L6/	18.31		L5/	15.06	L8/	2.88	L7/	2.97
FREE # 1/	66.14							

===> System inflows (file) at 33.33 hours (Junction / Inflow, cfs)

EXIST2	/	0.00E+00	EXIST1	/	0.00E+00	EXIST3	/	0.00E+00	EXIST4	/	0.00E+00	PROP3	/	0.00E+00	PROP4	/	0.00E+00
PROP2	/	0.00E+00	PROP1	/	0.00E+00												

Cycle 2000 Time 33 Hrs - 20.00 Min

Junction / Depth / Elevation	===> "*" Junction is Surcharged.							
EXIST1/	2.76 /	954.26	EXIST2/	2.47 /	954.97	EXIST3/	0.13 /	955.13
EXIST4/	2.24 /	951.74	DUMMY/	1.39 /	941.39	PROP3/	1.26 /	956.26
PROP4/	2.34 /	951.84	PROP1/	2.18 /	953.68	PROP2/	2.88 /	955.38

Conduit/	FLOW	===> "*" Conduit uses the normal flow option.						
L1/	0.16		L2/	14.40	L3/	3.21	L4/	3.25
L6/	8.84		L5/	14.91	L8/	2.75	L7/	2.95
FREE # 1/	57.61							

===> System inflows (file) at 41.67 hours (Junction / Inflow, cfs)

EXIST2	/	0.00E+00	EXIST1	/	0.00E+00	EXIST3	/	0.00E+00	EXIST4	/	0.00E+00	PROP3	/	0.00E+00	PROP4	/	0.00E+00
PROP2	/	0.00E+00	PROP1	/	0.00E+00												

Cycle 2500 Time 41 Hrs - 40.00 Min

Junction / Depth / Elevation ==> "*" Junction is Surcharged.
 EXIST1/ 2.71 / 954.21 EXIST2/ 2.23 / 954.73 EXIST3/ 0.06 / 955.06
 EXIST4/ 1.83 / 951.33 DUMMY/ 1.33 / 941.33 PROP3/ 0.26 / 955.26
 PROP4/ 2.01 / 951.51 PROP1/ 2.12 / 953.62 PROP2/ 2.68 / 955.18

Conduit/ FLOW ==> "*" Conduit uses the normal flow option.
 L1/ 0.04 L2/ 12.45 L3/ 2.77 L4/ 3.22
 L6/ 0.54 L5/ 13.17 L8/ 2.64 L7/ 2.91
 FREE # 1/ 49.79

```

=====
| Table E5 - Junction Time Limitation Summary |
|           (0.10 or 0.25)* Depth * Area   |
| Time step = -----                       |
|           Sum of Flow                     |
=====
| The time this junction was the limiting junction |
|           is listed in the third column.       |
=====

```

Junction	Time(.10)	Time(.25)	Time(sec)
EXIST1	114.6952	286.7380	172800.000
EXIST2	97.3048	243.2619	0.0000
EXIST3	65.4305	163.5762	0.0000
EXIST4	171.6338	429.0845	0.0000
DUMMY	600.0000	600.0000	0.0000
PROP3	62.1162	155.2904	0.0000
PROP4	180.2480	450.6200	0.0000
PROP1	117.0181	292.5452	0.0000
PROP2	94.7076	236.7690	0.0000

The junction requiring the smallest time step was...EXIST1

```

=====
| Table E5a - Conduit Explicit Condition Summary |
| Courant = Conduit Length                     |
| Time step = -----                         |
|           Velocity + sqrt(g*depth)          |
| Conduit Implicit Condition Summary          |
| Courant = Conduit Length                     |
| Time step = -----                         |
|           Velocity                           |
=====

```

```

*=====
| The 3rd column is the Explicit time step times the |
| minimum courant time step factor |
| |
| Minimum Conduit Time Step in seconds in the 4th column |
| in the list. Maximum possible is 10 * maximum time step |
| |
| The 5th column is the maximum change at any time step |
| during the simulation. The 6th column is the wobble |
| value which is an indicator of the flow stability. |
| |
| You should use this section to find those conduits that |
| are slowing your model down. Use modify conduits to |
| alter the length of the slow conduits to make your |
| simulation faster, or change the conduit name to |
| "CHME?????" where ????? are any characters, this will |
| lengthen the conduit based on the model time step, |
| not the value listed in modify conduits. |
*=====

```

Conduit	Time(exp)	Expl*Cmin	Time(imp)	Time(min)	Max Qchange	Wobble	Type of Soln
L1	3.4155	3.4155	6.3406	277.0000	0.1777	3.9507	Normal Soln
L2	4.2497	4.2497	8.4628	263.0000	0.0254	2.8589	Normal Soln
L3	6.0244	6.0244	19.8206	0.0000	0.0221	2.8611	Normal Soln
L4	36.7873	36.7873	120.1307	0.0000	0.0208	1.6312	Normal Soln
L6	3.2200	3.2200	6.1611	1295.0000	0.0399	5.7750	Normal Soln
L5	4.6093	4.6093	9.3266	1045.0000	0.0267	2.3053	Normal Soln
L8	5.7337	5.7337	21.2078	0.0000	0.0092	2.5944	Normal Soln
L7	40.6572	40.6572	130.2296	0.0000	0.0144	1.5117	Normal Soln

```

The conduit with the smallest time step limitation was..L6
The conduit with the largest wobble was.....L6
The conduit with the largest flow change in any
consecutive time step.....L1

```

```

*=====
| Table E6. Final Model Condition |
| This table is used for steady state |
| flow comparison and is the information |
| saved to the hot-restart file. |
| Final Time = 48.017 hours |
*=====

```

```

Junction / Depth / Elevation ==> "*" Junction is Surcharged.
EXIST1/ 2.62 / 954.12/ EXIST2/ 2.06 / 954.56/ EXIST3/ 0.04 / 955.04/
EXIST4/ 1.56 / 951.06/ DUMMY/ 1.25 / 941.25/ PROP3/ 0.13 / 955.13/
PROP4/ 1.72 / 951.22/ PROP1/ 2.06 / 953.56/ PROP2/ 2.53 / 955.03/

```

Conduit/ Flow ==> "*" Conduit uses the normal flow option.

L1/	0.02 /	L2/	10.69 /	L3/	2.55 /
L4/	3.17 /	L6/	0.12 /	L5/	11.98 /
L8/	2.56 /	L7/	2.88 /	FREE # 1/	42.78 /

Conduit/	Velocity				
L1/	0.72 /	L2/	6.02 /	L3/	2.07 /
L4/	4.08 /	L6/	1.62 /	L5/	6.54 /
L8/	3.23 /	L7/	3.73 /		

Conduit/	Width				
L1/	0.98 /	L2/	0.63 /	L3/	0.01 /
L4/	0.09 /	L6/	0.83 /	L5/	0.45 /
L8/	0.01 /	L7/	0.09 /		

Junction/	EGL				
EXIST1/	2.68 /	EXIST2/	2.06 /	EXIST3/	0.04 /
EXIST4/	5.13 /	DUMMY/	11.08 /	PROP3/	0.13 /
PROP4/	5.26 /	PROP1/	2.22 /	PROP2/	2.53 /

Junction/	Freeboard				
EXIST1/	1.88 /	EXIST2/	5.44 /	EXIST3/	14.96 /
EXIST4/	8.94 /	DUMMY/	18.75 /	PROP3/	14.87 /
PROP4/	8.78 /	PROP1/	2.44 /	PROP2/	4.97 /

Junction/	Max Volume				
EXIST1/	200675.74 /	EXIST2/	646287.56 /	EXIST3/	579899.83 /
EXIST4/	2014217.30 /	DUMMY/	18.03 /	PROP3/	823179.14 /
PROP4/	1732227.08 /	PROP1/	141113.22 /	PROP2/	766293.56 /

Junction/Total Fldng					
EXIST1/	0.00 /	EXIST2/	0.00 /	EXIST3/	0.00 /
EXIST4/	0.00 /	DUMMY/	0.00 /	PROP3/	0.00 /
PROP4/	0.00 /	PROP1/	0.00 /	PROP2/	0.00 /

Conduit/	Cross Sectional Area				
L1/	0.03 /	L2/	1.78 /	L3/	1.23 /
L4/	0.78 /	L6/	0.07 /	L5/	1.83 /
L8/	0.79 /	L7/	0.77 /		

Conduit/	Final Volume				
L1/	2.12 /	L2/	142.22 /	L3/	96.12 /
L4/	389.21 /	L6/	5.71 /	L5/	146.50 /
L8/	61.82 /	L7/	386.41 /		

Conduit/ Hydraulic Radius

L1/	0.03 /	L2/	0.38 /	L3/	0.31 /
L4/	0.26 /	L6/	0.08 /	L5/	0.38 /
L8/	0.25 /	L7/	0.25 /		

Conduit/	Upstream/	Downstream	Elevation				
L1/	955.04/	954.62	L2/	951.06/	950.35	L3/	954.56/ 954.12/
L4/	954.12/	950.76	L6/	955.13/	954.72	L5/	951.22/ 950.41/
L8/	955.03/	953.56	L7/	953.56/	950.73		

| Table E7 - Iteration Summary |

Total number of time steps simulated.....	2880
Total number of passes in the simulation.....	34737
Total number of time steps during simulation....	34550
Ratio of actual # of time steps / NTCYC.....	11.997
Average number of iterations per time step.....	1.005
Average time step size(seconds).....	5.001
Smallest time step size(seconds).....	3.158
Largest time step size(seconds).....	60.000
Average minimum Conduit Courant time step (sec).	11.775
Average minimum implicit time step (sec).....	4.783
Average minimum junction time step (sec).....	4.783
Average Courant Factor Tf.....	4.783
Number of times omega reduced.....	3

| Table E8 - Junction Time Step Limitation Summary |

Not Convr = Number of times this junction did not	
converge during the simulation.	
Avg Convr = Average junction iterations.	
Conv err = Mean convergence error.	
Omega Cng = Change of omega during iterations	
Max Itern = Maximum number of iterations	

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
EXIST1	0	1.03	35453	0	5	0	0	0
EXIST2	0	1.03	35494	1	11	1	0	0
EXIST3	0	1.04	36042	0	19	3	0	0
EXIST4	0	1.06	36523	0	62	5	1	1
DUMMY	0	1.09	37654	1	83	13	1	1
PROP3	0	1.03	35695	0	40	7	2	1

```

PROP4      0      1.03    35715      0      36      9      1      0
PROP1      0      1.03    35592      1      11      1      0      0
PROP2      0      1.02    35375      0      4       0      0      0
Total number of iterations for all junctions.. 323543
Minimum number of possible iterations..... 310950
Efficiency of the simulation..... 1.04
Good Efficiency

```

```

*====*
| Extran Efficiency is an indicator of the efficiency of |
| the simulation. Ideal efficiency is one iteration per |
| time step. Altering the underrelaxation parameter, |
| lowering the time step, increasing the flow and head |
| tolerance are good ways of improving the efficiency, |
| another is lowering the internal time step. The lower the |
| efficiency generally the faster your model will run. |
| If your efficiency is less than 1.5 then you may try |
| increasing your time step so that your overall simulation |
| is faster. Ideal efficiency would be around 2.0 |
|
| Good Efficiency < 1.5 mean iterations |
| Excellent Efficiency < 2.5 and > 1.5 mean iterations |
| Good Efficiency < 4.0 and > 2.5 mean iterations |
| Fair Efficiency < 7.5 and > 4.0 mean iterations |
| Poor Efficiency > 7.5 mean iterations |
*====*

```

```

*====*
| Table E9 - JUNCTION SUMMARY STATISTICS |
| The Maximum area is only the area of the node, it |
| does not include the area of the surrounding conduits |
*====*

```

Junction Name	Ground Elevation feet	Uppermost PipeCrown Elevation feet	Maximum Junction Elevation feet	Time of Occurrence Hr. Min.	Feet of Surcharge at Max Elevation	Freeboard of node feet	Maximum Junction Area ft^2	Maximum Gutter Depth feet	Maximum Gutter Width feet	Maximum Gutter Velocity ft/s
EXIST1	956.0000	953.2800	954.2614	32 52	0.9814	1.7386	119691.11	0.0000	0.0000	0.0000
EXIST2	960.0000	953.7500	955.2507	24 11	1.5007	4.7493	349606.01	0.0000	0.0000	0.0000
EXIST3	970.0000	957.5000	958.6263	12 54	1.1263	11.3737	299794.14	0.0000	0.0000	0.0000
EXIST4	960.0000	957.1000	952.2277	21 32	0.0000	7.7723	848620.55	0.0000	0.0000	0.0000
DUMMY	960.0000	951.0000	941.4346	21 1	0.0000	18.5654	12.5660	0.0000	0.0000	0.0000
PROP3	970.0000	956.5000	959.3683	14 12	2.8683	10.6317	356680.30	0.0000	0.0000	0.0000
PROP4	960.0000	956.1000	951.8933	28 26	0.0000	8.1067	838279.37	0.0000	0.0000	0.0000
PROP1	956.0000	953.0300	953.7220	24 23	0.6920	2.2780	101416.15	0.0000	0.0000	0.0000
PROP2	960.0000	953.5000	955.5851	24 19	2.0851	4.4149	368542.64	0.0000	0.0000	0.0000

```

*=====
| Table E10 - CONDUIT SUMMARY STATISTICS |
| Note: The peak flow may be less than the design flow |
| and the conduit may still surcharge because of the |
| downstream boundary conditions. |
| |
| * denotes an open conduit that has been overtopped |
| this is a potential source of severe errors |
*=====

```

Conduit Name	Design Flow (cfs)	Conduit Design Velocity (ft/s)	Maximum Vertical Depth (in)	Maximum Computed Flow (cfs)	Time of Occurrence		Maximum Computed Velocity (ft/s)	Time of Occurrence		Ratio of Max. to Design Flow	Maximum Depth at Pipe Ends		Ratio d/D	
					Hr.	Min.		Hr.	Min.		Upstream (ft)	Dwnstrm (ft)	US	DS
L1	31.4205	6.4009	30.0000	62.0754	12	54	12.6170	12	54	1.9756	958.6263	957.0781	1.450	.9913
L2	8.0467	4.5535	18.0000	16.7574	21	32	9.4531	21	32	2.0825	952.2277	950.5345	1.818	.9564
L3	2.6075	2.1248	15.0000	4.8469	12	57	3.9356	12	57	1.8588	955.2507	954.2614	2.200	1.785
L4	2.1140	2.6917	12.0000	3.2454	32	52	4.1621	32	52	1.5351	954.2614	950.7710	2.761	.7710
L6	8.0467	4.5535	18.0000	23.1971	14	12	12.9846	14	12	2.8828	959.3683	956.1000	2.912	1.000
L5	8.0467	4.5535	18.0000	15.1673	28	26	8.5777	28	26	1.8849	951.8933	950.5036	1.595	.9357
L8	1.4381	1.8311	12.0000	2.9212	17	3	3.6779	16	37	2.0312	955.5851	953.7220	3.085	1.692
L7	2.1140	2.6917	12.0000	2.9738	24	23	3.8394	24	23	1.4067	953.7220	950.7388	2.222	.7388
FREE # 1	Undefnd	Undefnd	Undefn	67.0441	21	1								

```

*=====
| Table E11. Area assumptions used in the analysis |
| Subcritical and Critical flow assumptions from |
| Subroutine Head. See Figure 17-1 in the |
| manual for further information. |
*=====

```

Conduit Name	Duration of Dry Flow (min)	Duration of Sub-Critical Flow (min)	Durat. of Upstream Critical Flow (min)	Durat. of Downstream Critical Flow (min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area (ft^2)	Maximum Vel*D (ft^2/s)
L2	208.0000	0.0000	0.0000	2672.0000	0.4558	1.8313	19.6730
L3	415.7500	2148.3333	0.0000	315.9167	0.3748	1.2428	8.1288
L4	445.0000	0.0000	0.0000	2435.0000	0.3014	0.7957	7.3510
L6	284.5000	0.0000	0.0000	2595.5000	0.4559	1.8313	38.0989
L5	207.0000	0.0000	0.0000	2673.0000	0.4558	1.8313	16.2843
L8	364.0000	2152.4286	0.0000	363.5714	0.2992	0.7960	8.6865
L7	444.8000	0.0000	0.0000	2435.2000	0.3013	0.7957	5.6837

 | Table E12. Mean Conduit Flow Information |

Conduit Name	Mean Flow (cfs)	Total Flow (ft^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
L1	8.4305	1456789.3	0.0004	0.9872	0.9755	0.3205	1.5003	0.0120
L2	10.7975	1865805.4	0.0001	0.9939	1.1997	0.3640	1.6474	0.0120
L3	2.6656	460617.89	0.0000	0.9817	0.4069	0.2897	1.1352	0.0250
L4	2.3641	408522.67	0.0000	0.9777	0.8105	0.2366	0.7158	0.0120
L6	9.2574	1599679.0	0.0002	0.9914	1.3024	0.3243	1.2829	0.0120
L5	10.4040	1797803.6	0.0001	0.9939	1.1496	0.3651	1.6434	0.0120
L8	2.0873	360686.89	0.0000	0.9867	0.5095	0.2330	0.7324	0.0250
L7	2.1828	377196.17	0.0000	0.9777	0.7730	0.2364	0.7119	0.0120
FREE # 1	43.1897	7463187.4						

 | Table E13. Channel losses(H), headwater depth (HW), tailwater |
 | depth (TW), critical and normal depth (Yc and Yn). |
 | Use this section for culvert comparisons |

Conduit Name	Maximum Flow	Head Loss	Friction Loss	Critical Depth	Normal Depth	HW Elevat	TW Elevat	
L1	62.0754	0.0000	1.5482	2.4781	2.5000	958.6263	957.0781	Max Flow
L2	16.7574	0.0000	1.6931	1.4345	1.5000	952.2277	950.5345	Max Flow
L3	4.8465	0.0000	1.5851	0.8923	1.2500	954.8185	953.2317	Max Flow
L4	3.2454	0.0000	3.4876	0.7710	1.0000	954.2614	950.7710	Max Flow
L6	23.1971	0.0000	3.2526	4.3683	1.5000	959.3683	956.1000	Max Flow
L5	15.1673	0.0000	1.3897	1.4036	1.5000	951.8933	950.5036	Max Flow
L8	2.9212	0.0000	1.8960	0.7323	1.0000	955.4210	953.5155	Max Flow
L7	2.9738	0.0000	2.9717	0.7388	1.0000	953.7220	950.7388	Max Flow

 | Table E13a. CULVERT ANALYSIS CLASSIFICATION, |
 | and the time the culvert was in a particular |
 | classification during the simulation. The time is |
 | in minutes. The Dynamic Wave Equation is used for |
 | all conduit analysis but the culvert flow classification |
 | condition is based on the HW and TW depths. |

Mild Mild Steep Mild Mild

Conduit Name	Slope Critical D Outlet Control	Slope TW Control	Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Slope TW > D Outlet Control	Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration
L1	198.0000	1095.0000	885.0000	0.0000	0.0000	0.0000	702.0000	0.0000	None
L2	361.0000	922.0000	424.0000	0.0000	0.0000	0.0000	1173.0000	0.0000	None
L3	184.0000	142.0000	417.0000	0.0000	2090.0000	0.0000	47.0000	0.0000	None
L4	225.0000	70.0000	446.0000	0.0000	0.0000	0.0000	2139.0000	0.0000	None
L6	209.0000	419.0000	852.0000	0.0000	0.0000	0.0000	1400.0000	0.0000	None
L5	758.0000	722.0000	423.0000	0.0000	0.0000	0.0000	977.0000	0.0000	None
L8	254.0000	111.0000	366.0000	0.0000	2134.0000	0.0000	15.0000	0.0000	None
L7	196.0000	101.0000	446.0000	0.0000	0.0000	0.0000	2137.0000	0.0000	None

=====

| Kinematic Wave Approximations |

| Time in Minutes for Each Condition |

=====

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
L1	0.0000	0.0000	184.9147	0.0000
L2	0.0000	0.0000	35.0000	0.0000
L3	0.0000	0.0000	0.0000	0.0000
L4	0.0000	0.0000	108.5762	0.0000
L6	0.0000	0.0000	22.0909	0.0000
L5	0.0000	0.0000	35.0000	0.0000
L8	0.0000	0.0000	0.0000	0.0000
L7	0.0000	0.0000	108.9762	0.0000

=====

| Table E15 - SPREADSHEET INFO LIST |

| Conduit Flow and Junction Depth Information for use in |

| spreadsheets. The maximum values in this table are the |

| true maximum values because they sample every time step. |

| The values in the review results may only be the |

| maximum of a subset of all the time steps in the run. |

| Note: These flows are only the flows in a single barrel. |

=====

Conduit Name	Maximum Flow (cfs)	Total Flow (ft^3)	Maximum Velocity (ft/s)	Maximum Volume (ft^3)	##	Junction Name	Invert Elevation (ft)	Maximum Elevation (ft)
L1	62.0754	1456789.291	12.6170	395.3500	##	EXIST1	951.5000	954.2614

L2	16.7574	1865805.390	9.4531	140.6359	##	EXIST2	952.5000	955.2507
L3	4.8469	460617.8851	3.9356	99.1434	##	EXIST3	955.0000	958.6263
L4	3.2454	408522.6657	4.1621	185.1944	##	EXIST4	949.5000	952.2277
L6	23.1971	1599679.017	12.9846	142.2313	##	DUMMY	940.0000	941.4346
L5	15.1673	1797803.613	8.5777	139.8016	##	PROP3	955.0000	959.3683
L8	2.9212	360686.8892	3.6779	63.4103	##	PROP4	949.5000	951.8933
L7	2.9738	377196.1699	3.8394	173.6100	##	PROP1	951.5000	953.7220
FREE # 1	67.0441	7463187.376	0.0000	0.0000	##	PROP2	952.5000	955.5851

```

*=====
| Table E15a - SPREADSHEET REACH LIST |
| Peak flow and Total Flow listed by Reach or those |
| conduits or diversions having the same |
| upstream and downstream nodes. |
*=====

```

Upstream Node	Downstream Node	Maximum Flow (cfs)	Total Flow (ft^3)
EXIST3	EXIST4	62.0754	1456789.29
EXIST4	DUMMY	16.7574	1865805.39
EXIST2	EXIST1	4.8469	460617.885
EXIST1	DUMMY	3.2454	408522.666
PROP3	PROP4	23.1971	1599679.02
PROP4	DUMMY	15.1673	1797803.61
PROP2	PROP1	2.9212	360686.889
PROP1	DUMMY	2.9738	377196.170

```

#####
# Table E16. New Conduit Information Section #
# Conduit Invert (IE) Elevation and Conduit #
# Maximum Water Surface (WS) Elevations #
#####

```

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
L1	EXIST3	EXIST4	955.0000	954.6000	958.6263	957.0781	Circular
L2	EXIST4	DUMMY	949.5000	949.1000	952.2277	950.5345	Circular
L3	EXIST2	EXIST1	952.5000	952.0300	955.2507	954.2614	Circular
L4	EXIST1	DUMMY	951.5000	950.0000	954.2614	950.7710	Circular
L6	PROP3	PROP4	955.0000	954.6000	959.3683	956.1000	Circular
L5	PROP4	DUMMY	949.5000	949.1000	951.8933	950.5036	Circular
L8	PROP2	PROP1	952.5000	952.0300	955.5851	953.7220	Circular
L7	PROP1	DUMMY	951.5000	950.0000	953.7220	950.7388	Circular

```

*=====
| Table E18 - Junction Continuity Error. Division by Volume added 11/96 |
| Continuity Error = Net Flow + Beginning Volume - Ending Volume |
|-----|
| Total Flow + (Beginning Volume + Ending Volume)/2 |
|-----|
| Net Flow = Node Inflow - Node Outflow |
| Total Flow = absolute (Inflow + Outflow |
| Intermediate column is a judgement on the node continuity error. |
|-----|
| Excellent < 1 percent Great 1 to 2 percent Good 2 to 5 percent |
| Fair 5 to 10 percent Poor 10 to 25 percent Bad 25 to 50 percent |
| Terrible > 50 percent |
*=====

```

Junction Name	<-----Continuity Error ----->			Remaining Volume	Beginning Volume	Net Flow Thru Node	Total Flow Thru Node	Failed to Converge
	Volume	% of Node	% of Inflow					
EXIST1	26030.9688	2.3266	0.3129	183845.2330	0.0000	209876.2018	1026902.414	0
EXIST2	51383.2999	3.1994	0.6176	422303.5838	0.0000	473686.8837	1394893.063	0
EXIST3	-32743.1872	-1.1360	0.3935	997.3255	0.0000	-31745.8616	2881820.904	0
EXIST4	74542.7946	1.3883	0.8959	1042162.856	0.0000	1116705.651	4848177.031	0
DUMMY	-3014386.98	-25.3038	36.2305	507.1411	0.0000	-3013879.84	11912515.21	0
PROP3	-23249.5464	-0.7309	0.2794	3340.8704	0.0000	-19908.6760	3179453.934	0
PROP4	155579.1513	2.8241	1.8699	1171848.661	0.0000	1327427.813	4923064.979	0
PROP1	15637.9869	1.6316	0.1880	125637.0330	0.0000	141275.0199	895644.9219	0
PROP2	82422.4638	4.9636	0.9907	571181.6358	0.0000	653604.0995	1374949.271	0

The total continuity error was -2.66478E+06 cubic feet
The remaining total volume was 3.52182E+06 cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Bad

```

*=====
| Table E19 - Junction Inflow Sources |
| Units are either ft^3 or m^3 |
| depending on the units in your model. |
*=====

```

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inflow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Outflow from Node	Evaporation from Node
EXIST1	0.0000	0.0000	157710.1890	0.0000	0.0000	0.0000	0.0000	0.0000
EXIST2	0.0000	0.0000	934019.2064	0.0000	0.0000	0.0000	0.0000	0.0000
EXIST3	0.0000	0.0000	1.4246E+06	0.0000	0.0000	0.0000	0.0000	0.0000
EXIST4	0.0000	0.0000	1.5249E+06	0.0000	0.0000	0.0000	0.0000	0.0000

DUMMY	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	7.4632E+06	0.0000
PROP3	0.0000	0.0000	1.5792E+06	0.0000	0.0000	0.0000	0.0000	0.0000
PROP4	0.0000	0.0000	1.5249E+06	0.0000	0.0000	0.0000	0.0000	0.0000
PROP1	0.0000	0.0000	157710.1890	0.0000	0.0000	0.0000	0.0000	0.0000
PROP2	0.0000	0.0000	1.0140E+06	0.0000	0.0000	0.0000	0.0000	0.0000

```

*=====
| Table E20 - Junction Flooding and Volume Listing. |
| The maximum volume is the total volume |
| in the node including the volume in the |
| flooded storage area. This is the max |
| volume at any time. The volume in the |
| flooded storage area is the total volume |
| above the ground elevation, where the |
| flooded pond storage area starts. |
| The fourth column is instantaneous, the fifth is the |
| sum of the flooded volume over the entire simulation |
| Units are either ft^3 or m^3 depending on the units. |
*=====

```

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of System Flooded Volume	Maximum Volume	Stored in System Ponding Allowed Flood Pond Volume
EXIST1	2089.6842	0.0000	0.0000	200675.7381	0.0000
EXIST2	2150.0000	0.0000	0.0000	646287.5569	0.0000
EXIST3	228.9965	0.0000	0.0000	579899.8297	0.0000
EXIST4	0.0000	0.0000	0.0000	2014217.296	0.0000
DUMMY	0.0000	0.0000	0.0000	18.0273	0.0000
PROP3	1231.6573	0.0000	0.0000	823179.1414	0.0000
PROP4	0.0000	0.0000	0.0000	1732227.080	0.0000
PROP1	2133.5556	0.0000	0.0000	141113.2234	0.0000
PROP2	2157.9167	0.0000	0.0000	766293.5557	0.0000

```

*=====
| Simulation Specific Information |
*=====
Number of Input Conduits..... 8
Number of Natural Channels..... 0
Number of Storage Junctions..... 8
Number of Orifices..... 0
Number of Free Outfalls..... 1

```

```

8 Number of Simulated Conduits..... 9
0 Number of Junctions..... 9
8 Number of Weirs..... 0
0 Number of Pumps..... 0
1 Number of Tide Gate Outfalls..... 0

```

```

*====*
| Average % Change in Junction or Conduit is defined as: |
| Conduit % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Qfull |
| Junction % Change ==> 100.0 ( Y(n+1) - Y(n) ) / Yfull |
*====*

```

```

The Conduit with the largest average change was..L1      with      0.000 percent
The Junction with the largest average change was.PROP3    with      0.026 percent
The Conduit with the largest sinuosity was.....L6        with      5.775

```

```

*====*
| Table E21. Continuity balance at the end of the simulation |
| Junction Inflow, Outflow or Street Flooding |
| Error = Inflow + Initial Volume - Outflow - Final Volume |
*====*

```

Inflow Junction	Inflow Volume, ft^3	Average Inflow, cfs
EXIST1	157761.8629	0.9130
EXIST2	934275.1778	5.4067
EXIST3	1.42503E+06	8.2467
EXIST4	1.52558E+06	8.8286
PROP3	1.57977E+06	9.1422
PROP4	1.52558E+06	8.8286
PROP1	157761.8629	0.9130
PROP2	1.01426E+06	5.8696
DUMMY	-7.463E+06	-43.1897

Outflow Junction	Outflow Volume, ft^3	Average Outflow, cfs
DUMMY	7.46319E+06	43.1897

```

*====*
| Initial system volume      =      0.0000 Cu Ft |
| Total system inflow volume =  8.317025E+06 Cu Ft |
| Inflow + Initial volume    =  8.317025E+06 Cu Ft |
*====*
| Total system outflow       =  7.463187E+06 Cu Ft |
| Volume left in system      =  3.521824E+06 Cu Ft |
| Evaporation                 =      0.0000 Cu Ft |
| Outflow + Final Volume     = 10.985012E+06 Cu Ft |
*====*

```

```

*=====*
| Total Model Continuity Error          |
| Error in Continuity, Percent =      -32.0401 |
| Error in Continuity, ft^3 =      -2664783.053 |
| + Error means a continuity loss, - a gain |
*=====*

```

```

#####
# Table E22. Numerical Model judgement section #
#####

```

```

Your overall error was                -32.0401 percent
Worst nodal error was in node DUMMY    with      -25.3044 percent
Of the total inflow this loss was      36.2436 percent
Your overall continuity error was      Bad
                                        Excellent Efficiency
Efficiency of the simulation            1.04
Most Number of Non Convergences at one Node  0.
Total Number Non Convergences at all Nodes  0.
Total Number of Nodes with Non Convergences  0.

```

```

===> Hydraulic model simulation ended normally.
===> XP-SWMM Simulation ended normally.
===> Your input file was named : C:\Tim\XP Swmm\Files\In402\Urban Commercial Area (12-3-09).DAT
===> Your output file was named : C:\Tim\XP Swmm\Files\In402\Urban Commercial Area (12-3-09).out

```

```

*=====*
|                SWMM Simulation Date and Time Summary                |
*=====*
| Starting Date... December   3, 2009  Time...   8:56:21: 4 |
| Ending Date...  December   3, 2009  Time...   8:56:34:35 |
| Elapsed Time...   0.22183 minutes or   13.31000 seconds |
*=====*

```

APPENDIX E

**Ordinance No. 2003-04 – Establishing
Pioneer-Sarah Creek Watershed Tax District**

CITY OF
Independence
HENNEPIN COUNTY

CITY OF INDEPENDENCE

ORDINANCE NO. 2003-04

AN ORDINANCE ADDING SECTION 720 TO THE
INDEPENDENCE CITY CODE; ESTABLISHING PIONEER-
SARAH CREEK WATERSHED TAX DISTRICT

THE CITY OF INDEPENDENCE DOES ORDAIN:

Section 1. Chapter VII of the Independence City Code is amended by adding a section to read as follows:

Section 702 – Pioneer-Sarah Creek Watershed Tax District Established

720.01 Tax District. Subdivision 1. Purpose. A tax district is established for purposes of paying the costs of planning for water management as required by law, for paying capital costs of the water management facilities described in a capital improvement program, and for paying for normal and routine maintenance of such facilities.

Subd. 2. District Territory. The tax district is established in that portion of the City of Independence located within the Pioneer-Sarah Creek watershed. The territory or area is more particularly described in a schedule on file with the City Administrator.

Subd. 3. Levy. The tax shall be levied annually on all taxable property in the district at a rate equal to 0.02418 percent of the market value of such taxable property.

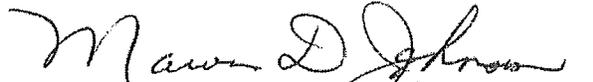
Subd. 4. Proceeds. The proceeds of the tax shall be paid into a fund reserved for the purposes described herein, or disbursed in support of activities of the Pioneer-Sarah Creek Watershed Management District consistent with the purposes described herein. Any proceeds remaining in the reserve fund at the time the tax is terminated or the district is dissolved shall be transferred and irrevocably pledged to the debt service fund of the local unit to be used solely to reduce tax levies for bonded indebtedness of taxable property in the district.

Sec. 2. This ordinance shall be filed with the county auditor and county recorder.

Sec. 3. This ordinance shall be effective the day following its publication.

RJV-236562v1
ND115-75

Adopted this 26th day of August, 2003.


Marvin D. Johnson, Mayor

ATTEST:

Toni Hirsch, City Clerk-Administrator