STORM WATER POLLUTION PREVENTION PLAN

FOR
Rough Grading and Clearing Phase of
MARYRIDGE ESTATES
City of O'Fallon, MO

BAX PROJECT NO. 04-13070

July 28, 2006
Revised:
November 30, 2006
June 20, 2008

DEVELOPER:

Schneider Custom Homes
429 N. Main St.
O'Fallon, Missouri 63366

A. SITE DESCRIPTION:

Project Name and Location:

Mary Ridge Estates – Located on the North Side of Emge Rd., West of Hwy M.

Owner Name and Address:

Schneider Custom Homes
429 N. Main St.
O'Fallon, MO 63366

Site Area:

The site is comprised of 2.67 acres of which approximately 1.90 acres will be disturbed.

Runoff Coefficient:

The pre-developed coefficient of runoff is c=0.23, the post developed runoff coefficient will be c=0.38.

Name of Receiving Waters:

Peruque Creek

SWPPP Representatives and Inspectors:

Inspectors of the SWPPP for the site shall be provided by Schneider Custom Homes

Rough Grading Activity Overview:

The project consists of a Residential Development. The rough grading for the whole development will be completed in one phase.

The major soil disturbing activities will include: perimeter silt fence installation, clearing and grubbing, sediment basin excavation, mass grading activities and seeding and mulching of disturbed areas.

Rough Grading and Sediment & Erosion Control Plans for Mary Ridge Estates development are provided as an attachment to this SWPPP as well as Sediment Storage Calculations for the site and should be used in conjunction with the items listed in this SWPPP for the rough grading and clearing phase of this project.

ALTERNATE INSTALLATION: Install fence by slicing it into ground with specialized equipment. Install posts at reduced spacing as indicated on silt fence detail located in appendix A of this report.

O&M PROCEDURES: Inspect at least every week and after every storm event greater than ½" of rainfall. Remove sediment buildup deeper than ½ the fence height or 12" whichever is less.

Replace torn or clogged fabric; repair loose fabric. Repair unstable or broken posts; stabilize any areas susceptible to undermining. Extend fence or add additional row(s) of fence if necessary to provide adequate protection.

SEDIMENT BASIN

DESCRIPTION: A temporary area of impoundment designed to trap water and allow sediment to settle out. A basin usually consists of an excavated area with a dewatering device and an outlet control structure or a spillway.

INSTALLATION: Excavate trap/basin to size shown on plans. Place and compact fill to construct embankment. For basins that utilize a pipe control structure see attached Mary Ridge Estates, Rough Grading and Sediment & Erosion Control plans for details. Paint mark around slope marking clean out depth location, the clean out depth is equal to the elevation called out in the sediment storage section.

O&M PROCEDURES: Inspect at least every week and after every storm event greater than ½" of rainfall. Remove trash accumulation, remove sediment accumulation once sediment reaches design depth, as indicated on monitoring posts. Repair and revegetate any erosion damage, repair settlement, cracking or seepage at embankment during cleanout. Hose off fabric or replace with new fabric.

PERMANENT STABILIZATION (REVEGETATION)

DESCRIPTION: Where construction activities are complete, permanent seeding must be established in the area. The following table is to be used as a guide for seeding rates and timetables as well as fertilizer application rates. Weather may affect

planting seeding schedules and the times below should be considered as a guideline only.

DATES FOR SEEDING

Permanent Seeding	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Tall Fescue			O	O	O			O	O			
Smooth Brome			O	O	O			O	O			
Fescue & Brome			O	O	O	O		O	O			
Fescue, Rye & Bluegrass	A	A	O	O	O	P	P	O	O	P	P	A

O – Optimum seeding dates A – Acceptable seeding dates
P-Permitted seeding dates with reseeding 2 months later. Initially use 50% of seed and 75% of fertilizer. Reseed with additional 75% of seed and remaining fertilizer.

MINIMUM SEEDING AND FERTILIZER RATES

Permanent Seeding*	lb./acre	lb./1,000 s.f.
Tall Fescue	300	7
Smooth Brome	200	4.6
Mixture #1	250	5.7
Mixture #2	210	4.8

Mixture #1 – Tall Fescue @ 150 lbs./ac., and Brome @ 100 lbs./ac.

Mixture #2 - Tall Fescue @ 100 lbs./ac., Perennial rye grass @ 100 lbs./ac., and Kentucky blue grass @ 10 lbs./ac.

* Seeding rate for slopes in excess of 20% (3:1) shall be 10 lb./1,000 s.f.

Temporary Seeding	lb./acre	lb./1,000 s.f.
Rye or Sudan	150	3.5
Oats	120	2.8

Fertilizer	Permanent Seeding (lb./acre)	Temporary Seeding (lb./acre)
Nitrogen	45	30
Phosphate	45	30
Potassium	65	30
Lime-ENM	600	600

ENM- Effective neutralizing material per State evaluation of quarried rock.

C. Pollution Prevention Procedures:

Handling and disposal of hazardous materials

DO:
- Prevent spills
- Use products up
- Follow label directions for proper disposal
- Remove lids from empty bottles and cans when disposing in trash
- Recycle wastes whenever possible

DON'T:
- Don't pour waste into sewers or waterways on the ground
- Don't pur waste down the sink, floor drain or septic tanks
- Don't bury chemicals or containers, or dispose of them with construction debris
- Don't burn chemicals or containers
- Don't mix chemicals together

Containers shall be provided for collection of all waste material including construction debris, trash, petroleum products and any hazardous materials onsite. All waste material shall be disposed of at facilities approved for that material.

No waste materials shall be buried onsite.

Mixing, pumping, transferring or otherwise handling construction chemicals such as fertilizer, lime, asphalt, concrete drying compounds, and all other potentially hazardous materials shall be performed in an area away from any watercourse, ditch or storm drain.

Equipment fueling and maintenance, oil changing, etc..., shall be performed only in an area designated for that purpose. The designated area shall be equipped for recycling oil and catching spills. Designated area shall be determined on-site by grading contractor and representatives of Schneider Custom Homes. Any maintenance to equipment is to be performed in this designated area. In addition equipment shall be parked in this area overnight and on any other non working day.

If substances such as oil, diesel fuel, hydraulic fluid, antifreeze, etc... are spilled, leaked, or released onto soil, the soil shall be dug up and disposed of at a licensed sanitary landfill (not a construction/demolition debris landfill). Spills on pavement shall be absorbed with sawdust, kitty litter or product designed for that purpose and disposed of at a licensed sanitary landfill. Hazardous or industrial wastes such as most solvents, gasoline, oil-based paints and cement curing compounds require special handling. These materials will be removed from the site and recycled or disposed of in accordance with MODNR requirements.

State law requires the party responsible for a petroleum spill in excess of 50 gallons to report the spill to MODNR (537-634-2436) as soon as practical after discovery. Federal law requires the responsible party to report any release of oil if it reaches of threatens a sewer, lake, creek, stream, river, groundwater, wetland, or area like a road ditch that drains into one of the above.

A stabilized construction entrance has been provided to help reduce vehicle tracking of sediment. The paved street adjacent to the site will be inspected daily and swept for excess mud, dirt or rock tracked, if the on-site SWPPP representative deems necessary. Dump trucks hauling material from the construction site will be covered with a tarpaulin.

D. WEEKLY INSPECTIONS

Weekly inspections of the project will include: (a) The repair of any sediment (silt) fence out of place; (b) The removal of any accumulated trash and or debris; (c) The clearing of debris, weeds and wild growth and the removal of vegetation where necessary to allow the silt basin to perform effectively; and (d) The removal of any externally deposited waste materials.

Periodic Inspections: At least once every week and after every rainfall event of 1/2 " or more, erosion and siltation control devices shall be inspected for damage and amount of sedimentation accumulated and corrective actions taken. Reports of these inspections and corrective actions shall be prepared on the forms prepared by the site SWPPP representative and kept on site and available for review if requested by representatives of agencies with jurisdiction over the project.

The field inspections will be conducted in a systematic manner to minimize the possibility of any significant feature being overlooked. A detailed checklist will be developed and followed for the examination. Particular attention will be given to detecting evidence of erosion, slope instability, undue settlement, displacement, and tilting. Photographs and drawings will be used freely to record conditions in order to minimize descriptions. The field inspection will include appropriate features and items, including potential hazards to human life or property.

Measures will be taken to promote the growth of vegetation and repair of damage caused by erosion and sedimentation. Measures are to include limiting construction traffic to paved areas and using fertilizer on all areas to be revegetated. If damage does occur due to erosion or sedimentation, the affected areas will be regarded immediately and revegetated to the rates specified in section B of this plan. If erosion continually occurs in

specific areas of the site, sodding said area may be necessary. The developers inspector or City Engineer will decide whether sodding an area is warranted. The inspection will also provide recommendations for measures that need to be undertaken immediately, based on the experience and judgement of the inspector. Necessary follow up inspections will be made as necessary to verify that any maintenance, alteration, or repair measures are accomplished by methods acceptable by standard engineering practice.

Surplus erosion and siltation control devices for repair of damaged devices must be kept on site. Includes silt fence, ditch check devices and inlet throat protection devices. Contractor shall keep a minimum of 250 linear feet of surplus silt fence on site for repair usage.

The condition of the slopes and vegetative cover will be evaluated and examined for erosion. The basins will be examined for excessive sedimentation and increase in sediment loads, which will reduce the basins capacity.

E. CONCLUSION:

The following Form O – Application for General Permit is enclosed and Schneider Custom Homes asks for approval to commence and complete the excavation activities.

MODNR FORM O
PERMIT APPLICATION
&
STATE OPERATING PERMIT

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION BRANCH
(SEE MAP FOR APPROPRIATE REGIONAL OFFICE)

FORM O - APPLICATION FOR LAND DISTURBANCE PERMIT (< 5 ACRES)
UNDER MISSOURI CLEAN WATER LAW

FOR AGENCY USE ONLY	
CHECK NUMBER	17386
DATE RECEIVED	FEE SUBMITTED
8/23/06	$300.00

THIS FORM MUST BE SUBMITTED WITH THE PERMIT FEE ($300), MAP OF AREA, AND APPROVAL OF LOCAL AUTHORITY, IF APPLICABLE. UPON APPROVAL BY THE DEPARTMENT, THIS FORM, ITS ATTACHMENTS, AND THE CONDITIONS OF GENERAL PERMIT MO-R100A, MO-R101, OR MO-R109 (WHICHEVER IS APPROPRIATE) SHALL BECOME THE PERMIT TO DISCHARGE FROM THE FACILITY AND ACTIVITIES DESCRIBED BELOW.

1.00 DATE LAND DISTURBANCE ACTIVITY IS TO BEGIN (MO/DAY/YEAR)

September, 2006

2.00

☐ a. This facility is now in operation under Missouri Operating Permit Number (NPDES) MO - _____ OR

☒ b. This is a new permit: Missouri Operating Permit Number (NPDES) MO - R108628

3.00 OWNER

NAME	EMAIL ADDRESS	PHONE
SCHNEIDER CUSTOM HOMES	N/A	636-240-0930
		FAX 636-240-8053

ADDRESS STREET	CITY	STATE	ZIP CODE
429 NORTH MAIN ST.	O'FALLON	MO	63366

4.00 FACILITY

NAME: MARYRIDGE ESTATES

ADDRESS STREET	CITY	STATE	ZIP CODE
SOUTHEAST CORNER OF SCHOEN MORGAN & EMGE ROAD	O'Fallon	MO	63366

5.00 CONTINUING AUTHORITY

NAME	PHONE
SAME	FAX

ADDRESS STREET	CITY	STATE	ZIP CODE

6.00 FACILITY CONTACT

NAME	TITLE	PHONE
BRAD SCHNEIDER	PRESIDENT	636-240-0930
	EMAIL ADDRESS: N/A	FAX 636-240-8053

7.00 TOTAL AREA OF LAND TO BE DISTURBED (ACRES)

2.17

8.00 WILL A SEDIMENT BASIN BE CONSTRUCTED?

☐ YES ☒ NO (SEE CONDITION 8.H. OF GENERAL PERMIT MO-R101)

9.00 FOR EACH OUTFALL GIVE THE LEGAL DESCRIPTION (ATTACH ADDITIONAL SHEETS AS NECESSARY)

Outfall Number NE 1/4 SW 1/4 Sec 20 T 47N R 3E ST. CHARLES County

Outfall Number ____ 1/4 ____ 1/4 Sec ____ T ____ R ____ ____ County

Outfall Number ____ 1/4 ____ 1/4 Sec ____ T ____ R ____ ____ County

9.10 FOR EACH OUTFALL LIST THE NAME OF THE RECEIVING WATER

Outfall Number: 1 Receiving Water: Unnamed Tributary of Peruque Creek

Outfall Number: ____ Receiving Water: ____

Outfall Number: ____ Receiving Water: ____

MO 780-1629 (6-04)

MMR - 108628

MO-R108628

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

GENERAL PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	< MO-R101000 for existing sites or MO-R10A000 for new sites >
Owner:	< name >
Address:	< address >
Continuing Authority:	< name, or Same as above >
Address:	< address, or Same as above >
Facility Name:	< name >
Facility Address:	< physical address >
Legal Description:	¼, ¼, ¼, Sec. xx, TxxN, RxxW, < county > County
Receiving Stream:	< receiving stream > < (U, C, P, L1, L2, L3) >
First Classified Stream and ID:	< 1st classified stream > < (U, C, P, L1, L2, L3) > < (ID number) >
USGS Basin & Sub-watershed No.:	< (USGS HUC14 #) >

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

All Outfalls

Construction or land disturbance activity (e.g., clearing, grubbing, excavating, grading, and other activity that results in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes only wastewater, including storm waters, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System; it does not apply to other regulated areas. This permit may be appealed in accordance with Section 644.051.6, RSMO.

February 8, 2007
Issue Date

2/13/07
Effective Date

Doyle Childers
Doyle Childers, Director, Department of Natural Resources
Executive Secretary, Clean Water Commission

February 7, 2012
Expiration Date

Director of Staff, Clean Water Commission

APPLICABILITY

1. This general permit authorizes the discharge of storm water and certain non-storm water discharges from land disturbance sites that disturb one (1) or more acres over the life of the project or are part of a larger common plan of development or sale that will disturb one (1) or more acres over the life of the project. This general permit also authorizes the discharge of storm water and certain non-storm water discharges from smaller projects where the Department has exercised its discretion to require a permit [10 CSR 20-6.200 (1)(B)].

   A Missouri State Operating Permit that specifically identifies the project must be issued before any site vegetation is removed or the site disturbed.

   Any site owner/operator subject to these requirements for storm water discharges and who disturbs land prior to permit issuance from the MDNR is in violation of both State and Federal laws.

2. This permit authorizes non-storm water discharges from the following activities provided that these discharges are addressed in the permittee's specific Storm Water Pollution Prevention Plan (SWPPP) required by this general permit:
   a. Dewatering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section 8.j. of this permit.
   b. Flushing water hydrants and potable water lines;
   c. Water only (i.e., without detergents or additives) rinsing of streets and buildings, or
   d. Site watering to establish vegetation.

3. This permit does not apply to storm water discharges within 1000 stream feet of:
   a. Streams identified as a losing stream*;
   b. Streams or lakes listed as an outstanding national or state resource water*;
   c. Reservoirs or lakes used for public drinking water supplies*:
   d. Streams, lakes, or reservoirs identified as critical habitat for endangered species*;or
   e. Streams, lakes, or reservoirs listed as impaired for sediment and/or an unknown pollutant by standard MDNR methodology*.

4. This permit does not apply to storm water discharges:
   a. Within 100 stream feet of a permanent stream (class P) or major reservoir (class L2)*; or
   b. Within two stream miles upstream of biocriteria reference locations*.

   (For the purpose of this permit, "stream feet" shall be defined as: The measurement of the distance between the land disturbance site and the valuable resource water by means of the nearest drainage course.)

5. This permit does not apply to storm water discharges where:
   a. Any of the disturbed area is defined as a wetland (Class W) by 10 CSR 20-7.031(1)(F)7*: or
   b. The storm water discharges to a sinkhole or other direct conduit to groundwater.

6. This general permit does not authorize the placement of fill materials in flood plains, the obstruction of stream flow, directing storm waters across private property not owned or operated by the permittee, or changing the channel of a defined drainage course. This general permit is intended to address only the quality of the storm water runoff and minimize off-site migration of sediments and other water contaminants.

7. This general permit does not authorize any discharge to waters of the state of sewage, wastewaters, or pollutants such as:
   a. Hazardous substances or petroleum products from an on-site spill or improper handling and disposal practices. (All containers must be properly closed to prevent spillage.);
   b. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks unless such discharges are adequately treated and addressed in the Storm Water Pollution Prevention Plan;
   c. Wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds; or
   d. Domestic wastewaters, including gray waters.

* Identified or described in 10 CSR 20, Chapter 7. These regulations are available at many libraries and may be purchased from MDNR by calling the Water Pollution Control Program at (573)751-1300. The regulations are also available from the Missouri Secretary of States Office.

APPLICABILITY (continued)

8. MDNR reserves the right to deny coverage under this general permit to applicants for storm water discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. Such activities are normally covered by a site specific permit.

9. If at any time the Missouri Department of Natural Resources determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site specific permit, the Department may require any person to obtain a site specific operating permit [10 CSR 20-6.010 (13) and 10 CSR 20-6.200(5)].

   The Department may require the permittee to apply for and obtain a site specific or different general permit if:

   a. The permittee is not in compliance with the conditions of this general permit;
   b. The discharge no longer qualifies for this general permit due to changed site conditions and regulations; or
   c. Information becomes available that indicates water quality standards have been or may be violated.

   The permittee will be notified in writing of the need to apply for a site specific permit or a different general permit. When a site specific permit or different general permit is issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site specific or different general permit, whichever the case may be. The permittee shall submit the appropriate forms to the Department to terminate the permit that has been replaced.

10. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site specific permit [10 CSR 20-6.010 (13) and 10 CSR 20-6.200(6)].

11. This permit does not authorize land disturbance activity in jurisdictional waters of the U. S. as defined by the Army Corps of Engineers unless the permittee has obtained the required 404/401permits.

12. This permit is not transferable to other owners or operators.

EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all storm water runoff directly to a combined sewer system are exempt from storm water permit requirements.

2. Linear, strip, or ribbon construction (as described in 10 CSR 20-6.200.1.B.) on maintenance operations meeting one of the following criteria provided that water quality criteria are not exceeded:
   a. Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road;
   b. Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines or similar facilities.
   c. Trenches two (2) feet in width or less; or
   d. Emergency repair or replacement of existing facilities as long as best management practices are employed during emergency repairs.

3. Sites that disturb less than one acre of total land area that are not part of a common plan or sale and that do not cause any violations of water quality standards and are not otherwise designated by the department as requiring a permit, where water quality standards are not exceeded.

4. Agricultural storm water discharges and irrigation return flows. Animal Feeding Operations (AFO) are <u>not</u> included in the agricultural exemption.

REQUIREMENTS

Note: These requirements do not supersede nor remove liability for compliance with county and other local ordinances.

1. The discharge of storm water from these facilities shall not cause a violation of the state water quality standards. 10 CSR 20-7.031. which states. in part, that no water contaminant. by itself or in combination with other substances. shall prevent the waters of the state from meeting the following conditions:
   a. Waters shall be free from substances in sufficient amounts to cause the formation of putrescent. unsightly or harmful bottom deposits or prevent full maintenance of beneficial uses:
   b. Waters shall be free from oil, scum and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses;
   c. Waters shall be free from substances in sufficient amounts to cause unsightly color or turbidity. offensive odor or prevent full maintenance of beneficial uses:
   d. Waters shall be free from substances or conditions in sufficient amounts to have a harmful effect on human. animal or aquatic life:
   e. There shall be no significant human health hazard from incidental contact with the water;
   f. There shall be no acute toxicity to livestock or wildlife watering;
   g. Waters shall be free from physical. chemical or hydrologic changes that would impair the natural biological community; or
   h. Waters shall he free from used tires. car bodies, appliances, demolition debris, used vehicles, or equipment and solid waste as defined in Missouri's Solid Waste Law. Section 260.200. RSMo, except as the use of such materials is specifically permitted pursuant to Section 260.200 to 260.247 RSMO.

2. Good housekeeping practices shall be maintained on the site to keep solid waste from entry into waters of the state.

3. All fueling facilities present on the site shall adhere to applicable federal and state regulations concerning underground storage. above ground storage. and dispensers.

4. Hazardous wastes that are transported. stored. or used for maintenance. cleaning or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

5. An individual shall be designated by the permittee as responsible for environmental matters. The individual responsible for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The individual responsible for environmental matters or a designated inspector knowledgeable in erosion. sediment. and stormwater control principles. shall periodically inspect all structures that function to prevent pollution of waters of the state. These inspections shall be conducted in accordance with paragraph 10 of the Requirements.

6. All paint. solvents. petroleum products and petroleum waste products. and storage containers (such as drums. cans. or cartons) shall be stored according to Best Management Practices (BMPs). The materials exposed to precipitation shall be stored in watertight. structurally sound. closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of Best Management Practices.

7. The primary requirement of this permit is the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP). A copy of the SWPPP must be available on site when land disturbance operations are in progress. or other operational activities that may affect the maintenance or integrity of the BMP structures. The SWPPP must be made available to a department representative upon request. The SWPPP should <u>not</u> be submitted to the Department unless it is requested. The SWPPP must:

   a. Incorporate required practices identified below:
   b. Incorporate erosion control practices specific to site conditions: and
   c. Provide for maintenance and adherence to the plan.

   Before disturbing earth. or submitting an application. the permittee shall develop a SWPPP that is specific to the land disturbance activities at the site. This plan must be developed before a permit can be issued and made available as specified under the RECORDS section of this permit.

REQUIREMENTS (continued)

The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project.

The purpose of the SWPPP is to ensure the design, implementation, management, and maintenance of Best Management Practices in order to reduce the amount of sediment and other pollutants in storm water discharges associated with the land disturbance activities; comply with the Missouri Water Quality Standards; and ensure compliance with the terms and conditions of this general permit.

The permittee shall select, install, use, operate, and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.

Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. (Document number EPA 832-R-92-005) published by the United States Environmental Protection Agency (USEPA) in 1992. **This manual is available at The USEPA internet site;** and

The latest version of ***Protecting Water Quality: A field guide to erosion, sediment and storm water best management practices for development sites in Missouri***, published by the Missouri Department of Natural Resources. This manual is available on the department's internet site at: http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs should be described and justified in the SWPPP. EPA and DNR continue to update BMP information on their web sites. It is recommended that the permittee review this information when developing a SWPPP.

8. SWPPP Requirements: The following information and practices shall be provided for in the SWPPP.
   a. Site Description: In order to identify the site, the SWPPP shall include the facility and outfall information provided in the application form.
   b. The SWPPP: The SWPPP shall have sufficient information to he of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs. Site boundaries and outfalls shall be marked on a site map included as part of the SWPPP.
   c. Selection Of Temporary And Permanent Non-Structural BMPs: The permittee shall select appropriate non-structural BMPs for use at the site and list them in the SWPPP. The SWPPP shall require existing vegetation to be preserved where practical. The time period for disturbed areas without vegetative cover shall be minimized to the maximum extent practicable. For sites that will be inactive six months or more, establishing a vegetative cover is a highly recommended choice for a proper BMP.

      Examples of non-structural BMPs which the permittee should consider specifying in the SWPPP include: preservation of trees and mature vegetation, protection of existing vegetation for use as buffer strips (especially along drainage courses), mulching, sodding, temporary seeding, final seeding, geotextiles, stabilization of disturbed areas, preserving existing stream channels as overflow areas when channel straightening or shortening is allowed, soil stabilizing emulsions and tackifiers, mulch tackifiers, stabilized site entrances/exits, and other appropriate BMPs.
   d. Selection Of Temporary And Permanent Structural BMPs: The permittee shall select appropriate structural BMPs for use at the site and list them in the SWPPP. Examples of structural BMPs that the permittee should consider specifying in the SWPPP include: diverting flows from undisturbed areas away from disturbed areas, silt (filter fabric and/or straw bale) fences, earthen diversion dikes, drainage swales, sediment traps, rock check dams, subsurface drains (to gather or transport water for surface discharge elsewhere), pipe slope drains (to carry concentrated flow down a slope face), level spreaders (to distribute concentrated flow into sheet flow), storm drain inlet protection and outlet protection, reinforced soil retaining systems, gabions, temporary or permanent sediment basins, and other appropriate BMPs.
   e. Description Of Best Management Practices: The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site. The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
      i. Physical description of the BMP;
      ii. Site and physical conditions that must he met for effective use of the BMP;
      iii. BMP installation/construction procedures, including typical drawings; and
      iv. Operation and maintenance procedures for the BMP.

The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:

i. Whether the BMP is temporary or permanent;
ii. Where, in relation to other site features, the BMP is to be located;
iii. When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
iv. What site conditions must be met before removal of the BMP if the BMP is not a permanent BMP.

f. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps, defining the sloped areas for all phases of the project, must be included in the SWPPP. Where soil disturbing activities cease in an area for 14 days or more, the permittee shall construct BMPs to establish interim stabilization. Interim stabilization shall consist of well established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. These BMPs may include a combination of sediment basins, check dams, sediment fences, and mulch. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (3 feet horizontal to 1 foot vertical) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within 7 days of ceasing operations on that part of the site.

g. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP. Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Storm water discharges from disturbed areas, which leave the site, shall pass through an appropriate impediment to sediment movement, such as a sedimentation basin, sediment traps, silt fences, etc. prior to leaving the land disturbance site. A drainage course change shall be clearly marked on a site map and described in the SWPPP. The location of all BMPs must be indicated on a site map, included in the SWPPP.

h. Sedimentation Basins: The SWPPP shall require a sedimentation basin for each drainage area with 10 or more acres disturbed at one time. The sedimentation basin shall be sized to contain a volume of at least 3600 cubic feet per each disturbed acre draining thereto. Accumulated sediment shall be removed from the basin as needed to ensure proper operation. Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream. The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

Where use of a sediment basin of this size is impractical, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment delivery. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent protection. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

i. Additional Site Management BMPs: The SWPPP shall address other BMPs, as required by site activities, to prevent contamination of storm water runoff. Such BMPs include:

i. Solid and hazardous waste management including: providing trash containers and regular site clean up for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers, and cups; and providing containers and proper disposal of waste paints, solvents, and cleaning compounds, etc.;
ii. Provision of portable toilets for proper disposal of sanitary sewage;
iii. Storage of construction materials away from drainage courses and low areas; and
iv. Installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers.

j Dewatering: The SWPPP shall require a description of any anticipated dewatering methods, including the anticipated volume of water to be discharged and the anticipated maximum flow discharged from these dewatering activities, expressed in gallons per minute. Maximum flow may be stated in the SWPPP as an estimate based on the type and capacity of equipment being used for dewatering. The SWPPP shall call for specific BMPs designed to treat water pumped from excavations and in no case shall this water be pumped off site without being treated by the specified BMPs.

k. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs. Where sediment is present on roadways all storm water curb inlets shall have inlet protection. Where storm water will flow off the end of where a roadway terminates, a sediment catching BMP (ex. gravel berm, silt fence, etc.) shall be provided. Roadways and curb inlets shall be cleaned weekly and following a rainfall that generates a run-off. Stabilized construction entrances shall be used to prevent sediment track-out.

9. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP, at a minimum, whenever the:
   a. Design, operation, or maintenance of BMPs is changed;
   b. Design of the construction project is changed that could significantly affect the quality of the storm water discharges;
   c. Permittee's inspections indicate deficiencies in the SWPPP or any BMP;
   d. MDNR notifies the permittee in writing of deficiencies in the SWPPP;
   e. SWPPP is determined to be ineffective in significantly minimizing or controlling erosion and sedimentation (e.g., there is visual evidence, such as excessive site erosion or excessive sediment deposits in streams or lakes);
   f. Settleable Solids from a storm water outfall exceed 2.5 mg/L/hr;
   g. MDNR determines violations of Water Quality Standards may occur or have occurred.

10. Site Inspections Reports: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections at least once per seven calendar days. These inspections shall be conducted by the person responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. All storm water outfalls shall be inspected for evidence of erosion or sediment deposition. Any structural or maintenance problem shall be noted in an inspection report and corrected within sever calendar days of the inspection. If a rainfall event results in storm water runoff on site, the BMPs must be inspected within a reasonable time period (not to exceed 48 hours) after the rainfall event has ceased. The SWPPP must explain how the person responsible for erosion control, will be notified when storm water runoff occurs. If weather conditions make it impossible to correct the problem within seven days, a detailed report, including pictures, must be filed with the regular inspection reports. The permittee shall correct the BMP problem as soon as weather conditions allow. Parts of the site that have been finally stabilized must be inspected at least once per month.

    A log of each inspection and copy of the inspection report must be retained on the construction site while on-site construction workers are present, and made available to the Department upon request. The inspection report is to include the following minimum information: inspector's name, date of inspection, observations relative to the effectiveness of the BMPs, actions taken or necessary to correct the observed problem, and listing of areas where land disturbance operations have permanently or temporarily stopped. The inspection report shall be signed by the person designated in the SWPPP to conduct the inspections.

11. Proper Operation and Maintenance: The permittee shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.

12. Notification to All Contractors: The permittee shall be responsible for notifying each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what action or precautions shall be taken while on site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

13. Public Notification: The permittee shall post a copy of the public notification sign described by the MDNR at the main entrance to the site. The public notification sign must be visible from the public road that provides access to the site's main entrance. The public notification sign must remain posted at the site until the permit has been terminated.

OTHER DISCHARGES

1. Hazardous Substance and Oil Spill Reporting: Refer to Section B. #14 of Part I of the Standard Conditions that accompany this permit.

2. Removed substances: Refer to Section B, #6 of Part I of the Standard Conditions that accompany this permit.

3. Change in discharge: In the event soil contamination or hazardous substances are discovered at the site during land disturbance activities, the permittee shall notify the MDNR regional office by telephone as soon as practicable and no later than 24 hours after discovery. The permittee must also notify the MDNR regional office in writing no later than 14 calendar days after discovery.

SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

1. Discharges shall not violate General Water Quality Standards 10 CSR 20 7.031(3).
Settleable Solids shall not exceed a maximum of 2.5 ml/L/hr. for each storm water outfall.

2. There are no regular sampling requirements in this permit. However, the Department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of off site contamination from activities at the site. If such an action is needed, the Department will specify in writing any additional sampling requirements, including such information as location, extent, and parameters.

RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis, and all site inspection records required by this general permit. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.

2. The permittee shall provide a copy of the SWPPP to MDNR, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties.

3. The permittee shall provide those who are responsible for installation, operation, or maintenance of any BMP a copy of the SWPPP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation, and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

LAND PURCHASE AND CHANGE OF OWNERSHIP

1. Individual Lot or Lots: Federal and Missouri storm water regulations (10 CSR 20-6.200) require a storm water permit and erosion control measures for one (1) or more acres of land disturbance that is a part of a common plan or sale. If the permittee sells less than 1 acre of the permitted site to an entity for, commercial, industrial, or residential use, (unless sold to an individual for the purpose of building his/her own private residence) this land remains a part of the common sale and regulated by this permit. Therefore, the permittee is still responsible for erosion control on the sold property until termination of the permit.

2. If the permittee sells 1 or more acres of the permitted site to an entity, the new owner of the property must obtain a land disturbance permit for the purchased property. The original permittee must amend the SWPPP to show that the property (one acre or more) has been sold and therefore no longer under the original permit jurisdiction.

3. If a lot is sold to an individual for purposes of building his/her own private residence, the permittee is no longer responsible for erosion control on the lot. However, Section 644.051.1(1) RSMO still gives the department the authority to hold the individual owner responsible for erosion control measures on the lot if it is deemed necessary to protect waters of the state.

4. Entire Tract: If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.

TERMINATION

This permit may be terminated when the project is stabilized. The project is considered to be stabilized when either perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetative cover shall be at least 70% of fully established plant density over 100% of the disturbed area.

In order to terminate the permit, the permittee shall notify MDNR by submitting Form H, included with the State Operating Permit. The permittee shall complete Form H and mail it to MDNR at the address noted in the cover letter of this permit.

This general permit will expire five years from the effective date of the permit (see page 1). The issue date is the date the State Operating Permit is issued to the applicant. The expiration date may or may not coincide with the date the authorized project or development is scheduled for completion.

If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for the permit to be re-issued. The permittee will receive notification of the expiration date of the permit before the expiration date listed on page 1 of this permit. In order for the permit to be re-issued, the permittee should submit the appropriate application form(s) at least 180 days before the expiration of the permit if land disturbance activity is expected to continue past the expiration date of this general permit.

If the permittee does not apply for the renewal of this permit, this permit will automatically terminate on the expiration date. Continued discharges from a site that has not been fully stabilized are prohibited beyond the expiration date; unless the permit is reissued or the permittee has filed a timely application for the reissuance of this permit. Failure to maintain a valid permit for the life of the project until permit termination, is a violation of the State and Federal Clean Water Law.

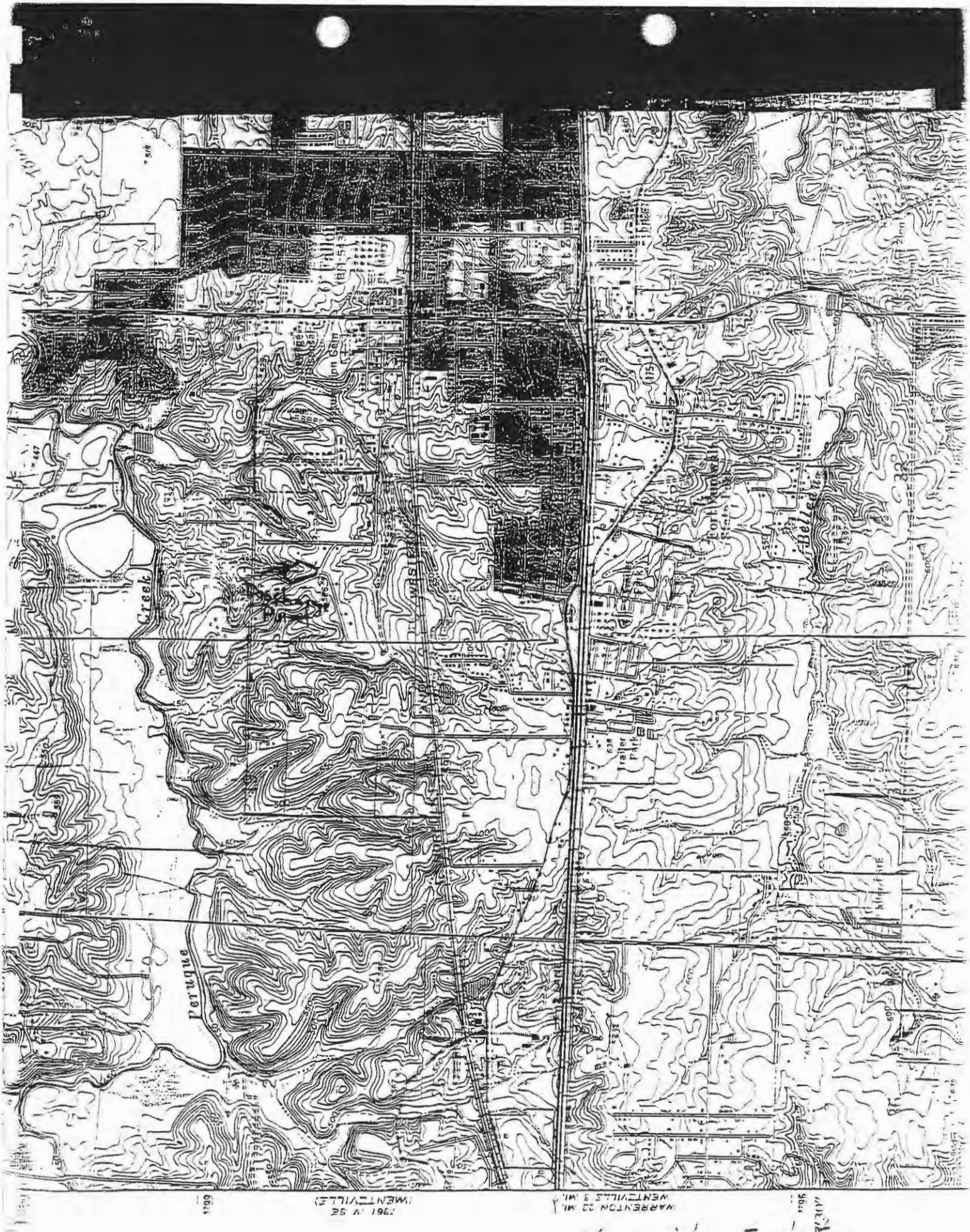
DUTY TO COMPLY

The permittee shall comply with all conditions of this general permit. Any noncompliance with this general permit constitutes a violation of Chapter 644, Missouri Clean Water Law, and 10 CSR 20-6.200. Noncompliance may result in enforcement action, termination of this authorization, or denial of the permittee's request for renewal.

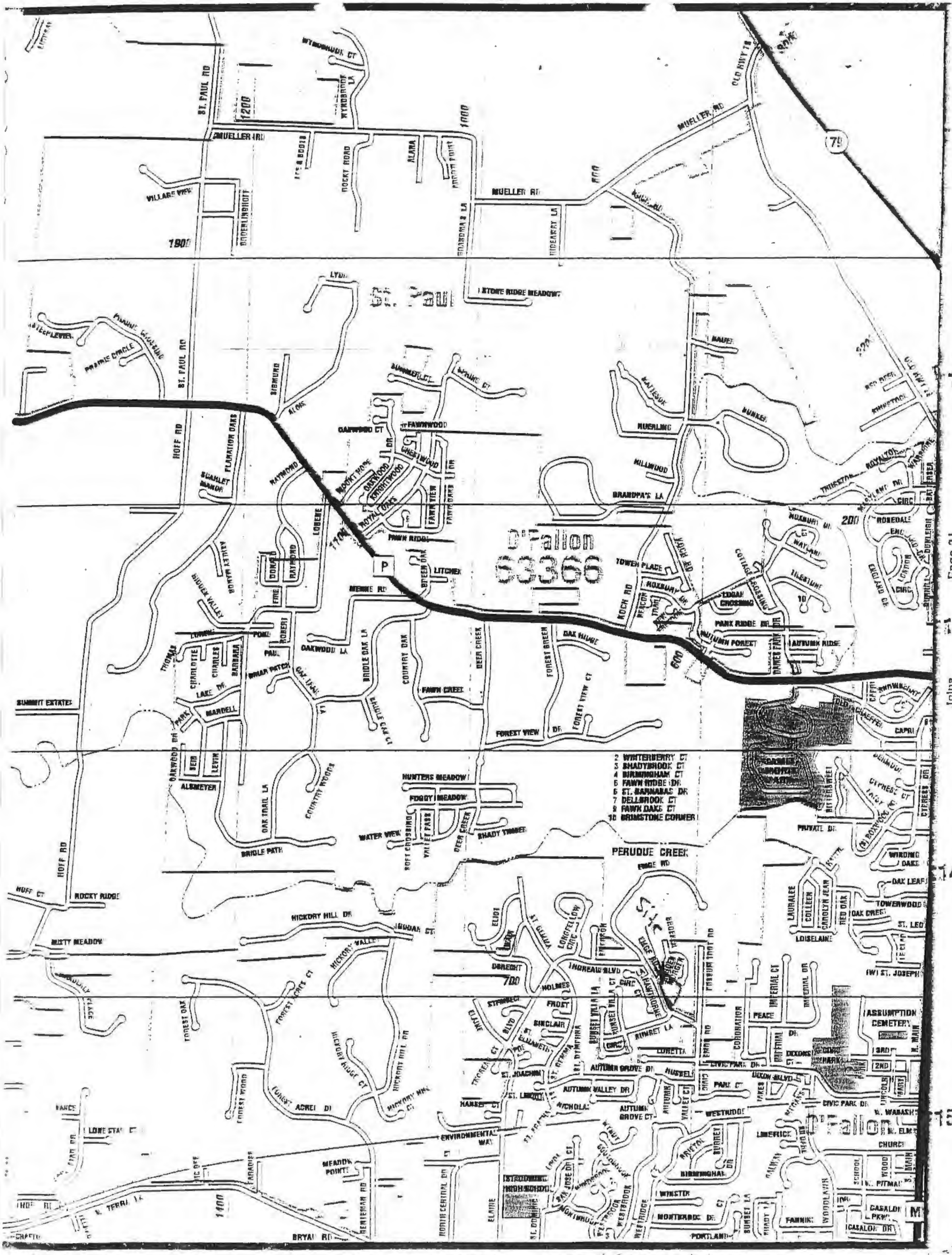
MAILING ADDRESS

The permittee shall send all written correspondence and forms, which are to be submitted to MDNR to the address listed in the cover letter that accompanies this permit.

USGS MAP LOCATION
OF THE SITE



Margridge Estates


St. Paul
O'Fallon
63366
ST. PAUL RD
MUELLER RD
OLD HWY 79
79
HOFF RD
PLANTATION OAKS
SCARLET MANOR
SIGMUND
ALOIS
RAYMOND
OAKWOOD CT
FAWNWOOD
FAWN VIEW
FAWN OAKS
ROYAL OAKS
FAWN RIDGE
P
LITCHER
MENNE RD
GREEN OAK
OAKWOOD LA
BRIDLE OAK LA
COUNTRY OAK
DEER CREEK
FAWN CREEK
FOREST GREEN
OAK RIDGE
FOREST VIEW CT
FOREST VIEW DR
KOCH RD
TOWER PLACE
ROXBURY DR
LOGAN CROSSING
COTTAGE CROSSING
PARK RIDGE DR
AUTUMN FOREST
AUTUMN RIDGE
TILESTONE
WAYLAND
ROSEDALE
LONDON
HUELLING
HILLWOOD
GRANDPA'S LA
BUNKER
RED DEER
THURSTON
ROYALTON
MARYLAND DR
CIRC
SUMMIT ESTATES
THOMAS
CHARLOTTE
CHARLES
BARBARA
LAKE DR
MARDELL
PARK
OAKWOOD DR
SEIB
LEVIN
ALBMEYER
BRIAR PATCH
OAK TRAIL LA
COUNTRY WOODS
BRIDLE PATH
HUNTERS MEADOW
FOGGY MEADOW
WATER VIEW
SOFT CROSSING
VALLEY PASS
SHADY TIMBER
2 WINTERBERRY CT
3 SHADYBROOK CT
4 BIRMINGHAM CT
5 FAWN RIDGE DR
6 ST. BARNABAS DR
7 DELLBROOK CT
8 FAWN OAKS CT
10 BRIMSTONE CORNER
PERUDUE CREEK
BITTERSWEET
CYPRESS CT
CYPRESS DR
PRIVATE DR
CAPRI
WINDING OAKS
OAK LEAF
TOWERWOOD
OAK CREST
ST. LEO
LAURALEE
COLLEEN
CAROLYN JEAN
RED OAK
LOISELAINE
(W) ST. JOSEPH
HOFF CT
ROCKY RIDGE
MISTY MEADOW
HICKORY HILL DR
HICKORY VALLEY
FOREST OAK
FOREST ACRES CT
FOREST ACRES DR
FOREST WOOD
HICKORY RIDGE CT
HICKORY HILL CT
LONE STAR CT
N. TERRA LA
1400
PARADISE
MEADOW POINT
HENEMAN RD
BRYAN RD
ENVIRONMENTAL WAY
NORTH CENTRAL DR
ELAINE
ELIOT
LONGFELLOW CIRC
THOREAU BLVD
HOLMES
FROST
SINCLAIR
700
SUNSET VILLA LA
SUNSET LA
HAWTHORNE
LORETTA
AUTUMN GROVE DR
AUTUMN VALLEY DR
AUTUMN GROVE CT
RUSSELL
ST. JOACHIM
NICHOLAS
WESTRIDGE
BRISTOL
SURREY DR
BIRMINGHAM
WINSTER
MONTBROOK DR
PORTLAND
SUNSET LA
FANNING
WOODLAWN
CORONATION
IMPERIAL CT
IMPERIAL DR
PEACE
DIXON BLVD
CIVIC PARK DR
PARK CT
ASSUMPTION CEMETERY
N. MAIN
3RD
2ND
LINCOLN
W. WABASH
W. ELM
CHURCH
SCHOOL
WOOD
W. PITMAN
CASALON PKWY
CASALON DR
LIMERICK
Site
11
12
13
14
15
Joins Page 31

SOIL MAPS

TABLE 14.9 Runoff Coefficients for the Rational Formula by Hydrologic Soil Group and Slope Range

	A			B			C			D		
LAND USE	0–2%	2–6%	6%+	0–2%	2–6%	6%+	0–2%	2–6%	6%+	0–2%	2–6%	6%+
Cultivated Land	0.09[a] 0.14[b]	0.13 0.18	0.16 0.22	0.11 0.16	0.15 0.20	0.21 0.28	0.14 0.20	0.19 0.25	0.28 0.34	0.18 0.24	0.23 0.29	0.28 0.34
Pasture	0.12 0.18	0.20 0.28	0.30 0.37	0.18 0.25	0.28 0.34	0.37 0.45	0.24 0.30	0.34 0.42	0.44 0.52	0.30 0.37	0.40 0.50	0.50 0.62
Meadow	0.10 0.14	0.16 0.22	0.25 0.30	0.14 0.20	0.22 0.28	0.30 0.37	0.20 0.26	0.28 0.35	0.36 0.44	0.24 0.30	0.30 0.40	0.40 0.50
Forest	0.05 0.08	0.08 0.11	0.11 0.14	0.08 0.10	0.11 0.14	0.14 0.18	0.10 0.12	0.13 0.16	0.17 0.20	0.12 0.15	0.16 0.20	0.20 0.25
Residential Lot Size ⅛ acre	0.25 0.33	0.28 0.37	0.31 0.40	0.27 0.35	0.30 0.39	0.35 0.44	0.30 0.38	0.33 0.42	0.38 0.45	0.33 0.41	0.37 0.45	0.42 0.54
Lot Size ¼ acre	0.22 0.30	0.26 0.34	0.29 0.37	0.24 0.33	0.29 0.37	0.33 0.42	0.27 0.36	0.31 0.40	0.36 0.47	0.30 0.36	0.34 0.42	0.40 0.52
Lot Size ½ acre	0.19 0.26	0.22 0.30	0.26 0.33	0.22 0.30	0.26 0.33	0.30 0.39	0.25 0.33	0.29 0.38	0.34 0.45	0.28 0.36	0.32 0.42	0.39 0.50
Lot Size ½ acre	0.16 0.25	0.20 0.29	0.24 0.32	0.19 0.28	0.23 0.30	0.28 0.36	0.22 0.30	0.27 0.35	0.32 0.42	0.26 0.34	0.30 0.39	0.37 0.46
Lot Size 1 acre	0.14 0.22	0.19 0.26	0.22 0.29	0.17 0.24	0.21 0.28	0.26 0.34	0.20 0.28	0.25 0.33	0.31 0.40	0.24 0.31	0.29 0.37	0.35 0.45
Industrial	0.67 0.85	0.68 0.85	0.68 0.86	0.68 0.85	0.68 0.86	0.69 0.86	0.68 0.86	0.69 0.86	0.69 0.87	0.69 0.86	0.69 0.87	0.70 0.88
Commercial	0.71 0.88	0.71 0.88	0.72 0.89	0.71 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.90	0.72 0.89	0.72 0.89	0.73 0.90
Streets	0.76 0.76	0.77 0.77	0.79 0.79	0.77 0.80	0.79 0.82	0.82 0.84	0.80 0.84	0.82 0.85	0.85 0.89	0.81 0.89	0.84 0.91	0.87 0.93
Open Space	0.05 0.11	0.10 0.16	0.14 0.20	0.08 0.14	0.13 0.19	0.19 0.26	0.12 0.18	0.17 0.23	0.24 0.32	0.16 0.22	0.21 0.28	0.28 0.36
Parking	0.85 0.95	0.86 0.96	0.87 0.97	0.86 0.96	0.86 0.96	0.87 0.97	0.86 0.96	0.86 0.96	0.87 0.97	0.86 0.96	0.87 0.96	0.87 0.97

Source: Kibler, D.F. et al. 1982. *Recommended Hydrologic Procedures for Computing Urban Runoff in Pennsylvania*. Commonwealth of Pa. Harrisburg, Pa.: Dept. of Environmental Resources.

[a] Runoff coefficients for storm recurrence intervals less than 25 years.

[b] Runoff coefficients for storm recurrence intervals of 25 years or more.

10 and 30 minutes for flow paths between 100 and 500 feet.

There are numerous empirical methods to determine the time of concentration. The method selected depends on the information available and any preferences dictated by local review agencies. Some of the various methods are listed in Table 14.11. Two of these methods are subsequently discussed.

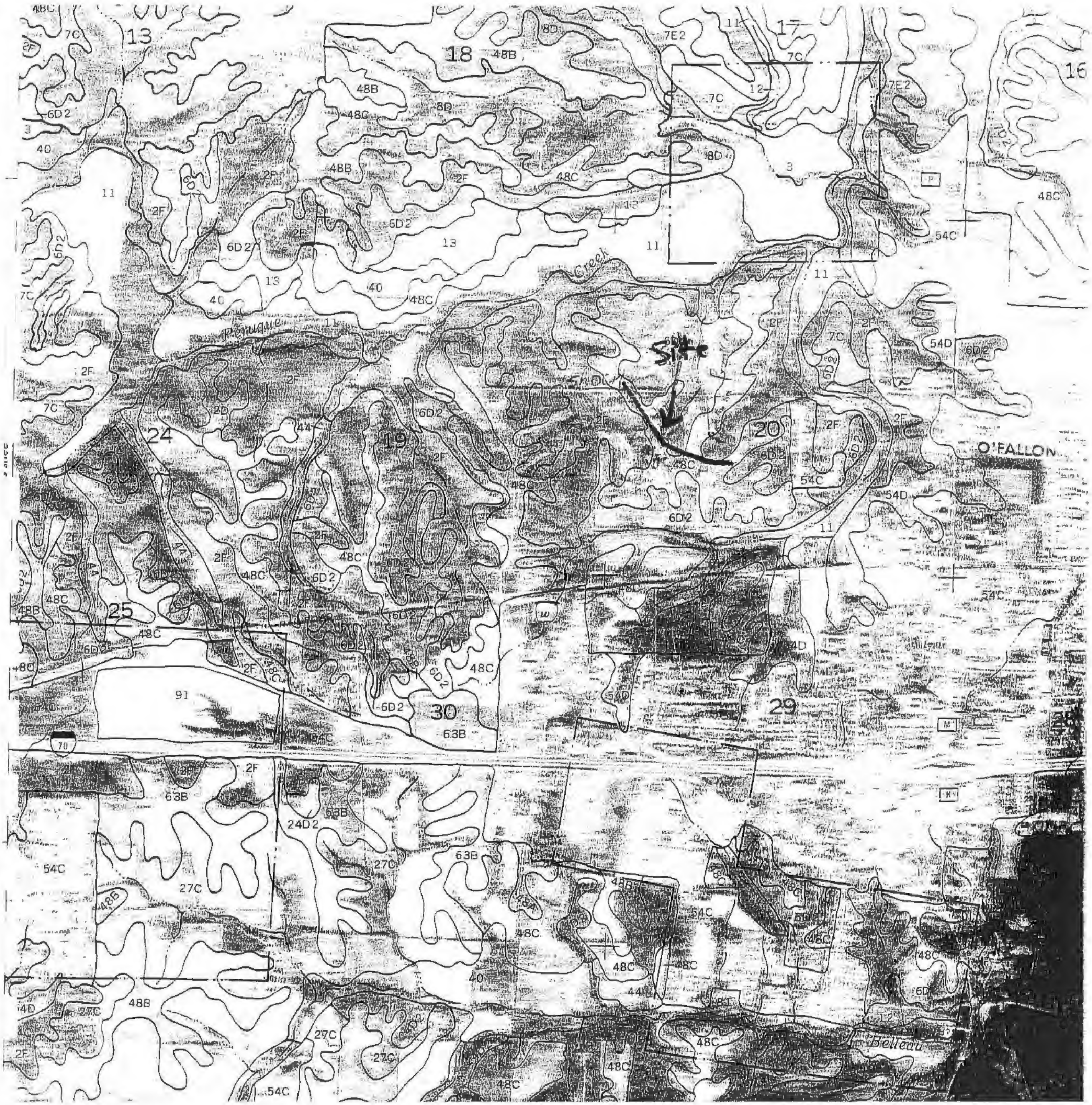
One of the better-known methods that relates the overland flow time to slope and length parameters is the Kirpich equation. Initially, the equation was developed for small agricultural watersheds with drainage areas less than 200 acres.

Adjustment factors are applied to the equation for application to pavement surfaces (see table 14.10). The Kirpich equation is

$$t_c = 0.078\left(\frac{L^{0.77}}{S^{0.385}}\right)$$

where t_c is the time of concentration in minutes, L is the length of the flow path in feet, and S is the average slope of the flow path = $\Delta E / L$.

The use of Manning's kinematic solution can be used to compute shallow flow travel time. The equation is



13
18
17
16
19
20
24
25
29
30
Peruque
Creek
Site
O'FALLON
70
91
Belleau
48B
48C
7C
7E2
8D
6D2
2F
2D
11
12
13
40
44
3
54C
54D
63B
27C
24D2
48A

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
31C---------- Hatton	C	None--------	---	---	1.5-3.0	Perched	Oct-Apr	>60	---	High-----	High-----	Moderate.
34E---------- Lindley	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
35B---------- Mexico	D	None--------	---	---	1.0-2.0	Perched	Nov-Apr	>60	---	Moderate	High-----	Moderate.
37---------- Marion	D	None--------	---	---	1.0-2.0	Perched	Nov-May	>60	---	Moderate	High-----	High.
40---------- Westerville	C	Rare--------	---	---	1.0-3.0	Apparent	Nov-Apr	>60	---	High-----	---	---
41---------- Freeburg	C	Rare--------	---	---	1.5-3.0	Perched	Nov-May	>60	---	High-----	Moderate	High.
43---------- Cedargap	B	Occasional	Very brief	Nov-Mar	>6.0	---	---	>60	---	Moderate	Low------	Low.
44---------- Sensabaugh	B	Occasional	Very brief	Jan-Apr	4.0-6.0	Apparent	Jan-Apr	>60	---	---	Low------	Low.
48A, 48B, 48C----- Weller	C	None--------	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	High.
54C*, 54D*: Harvester-------- Urban land.	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Low.
62---------- Edinburg	C	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
63B---------- Herrick	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	High.
67E---------- Menfro	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
70---------- Booker	D	Frequent----	Brief to long.	Apr-Jul	+.5-1.0	Perched	Nov-May	>60	---	Moderate	High-----	Moderate.
71---------- Waldron	D	Rare--------	Brief-----	Mar-Jun	1.0-3.0	Perched	Nov-May	>60	---	High-----	High-----	Low.
72---------- Blake	B	Rare--------	Very brief	Feb-Nov	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Low.
73---------- Haynie	B	Rare--------	Very brief	Feb-Nov	>6.0	---	---	>60	---	High-----	Low------	Low.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES

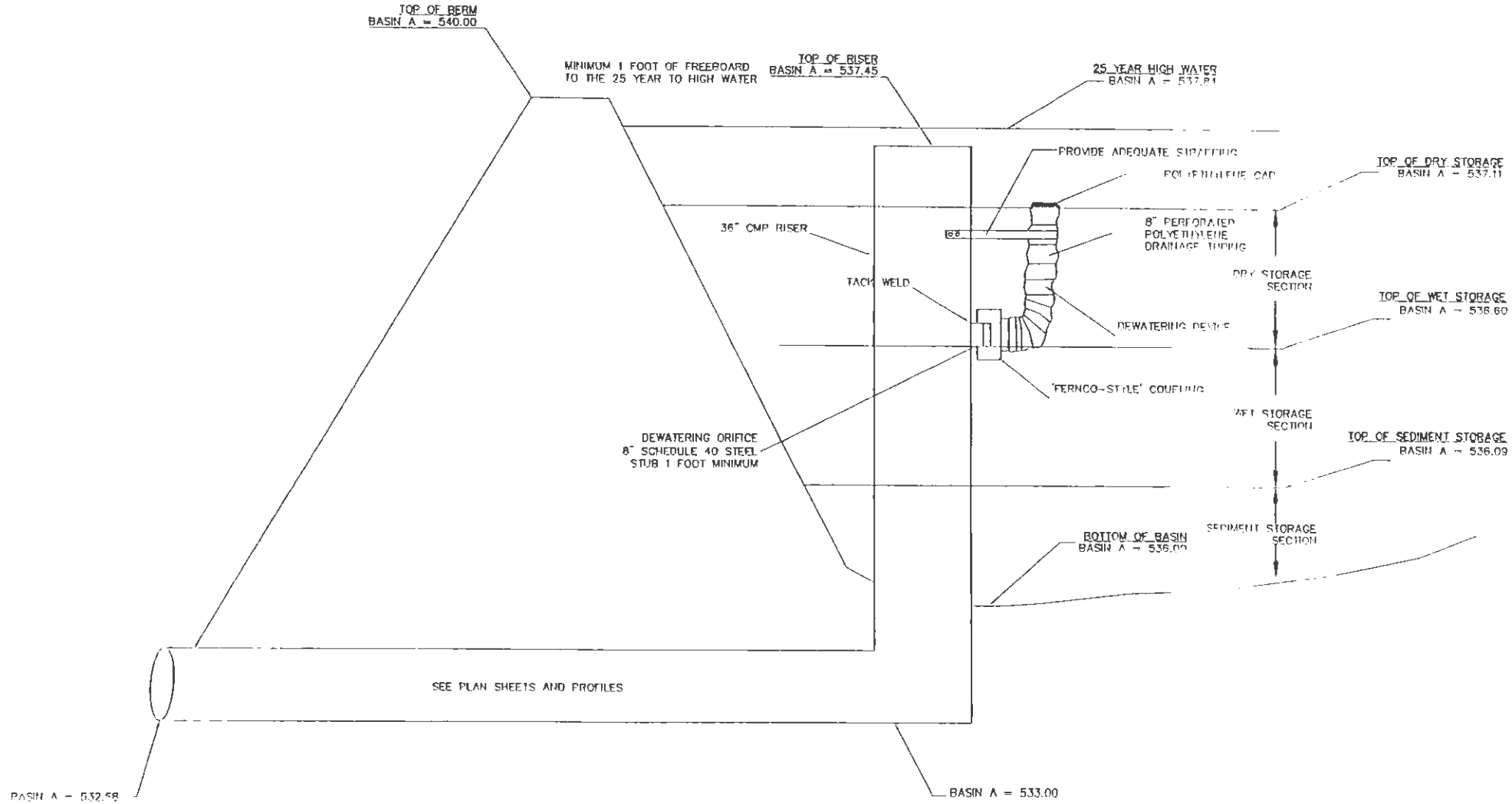
["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
2D, 2F---------- Goss	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
3---------- Iwomile	C/D	Rare---------	---	---	1.0-2.0	Perched	Nov-May	>60	---	High-----	High------	High.
4D*: Menfro----------	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Low-------	Moderate.
Goss----------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
6C, 6D2, 6E------- Crider	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
7B, 7C, 7D2, 7E2, 7F---------- Menfro	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Low-------	Moderate.
8C, 8D, 8E2------- Winfield	B	None---------	---	---	2.5-4.0	Perched	Nov-Apr	>60	---	High-----	Moderate	Moderate.
9E---------- Holstein	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
10F*: Gasconade-------- Rock outcrop.	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	High -----	Low.
11---------- Dockery	C	Occasional	Brief-----	Nov-Jun	1.0-3.0	Apparent	Nov-Apr	>60	---	High-----	Moderate	Low.
12---------- Kennebec	B	Occasional	Brief-----	Feb-Nov	3.0-5.0	Apparent	Nov-Jul	>60	---	High-----	Moderate	Low.
13---------- Aukvasse	D	Rare---------	---	---	1.0-2.0	Perched	Nov-May	>60	---	Moderate	High-----	High.
22F*: Gatewood---------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	High------	Moderate.
Gasconade--------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	High -----	Low.
Crider----------	B	None---------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
24D2---------- Keswick	D	None---------	---	---	1.0-3.0	Perched	Nov-Jul	>60	---	High-----	High -----	Moderate.
27C---------- Nimster	C	None---------	---	---	2.5-4.0	Perched	Nov-Mar	>60	---	Moderate	High -----	Moderate.

See footnote at end of table.

APPENDIX A

SILTATION CONTROL DETAILS



TYPICAL TEMPORARY SEDIMENT BASIN CONTROL STRUCTURE DETAIL

NOT TO SCALE

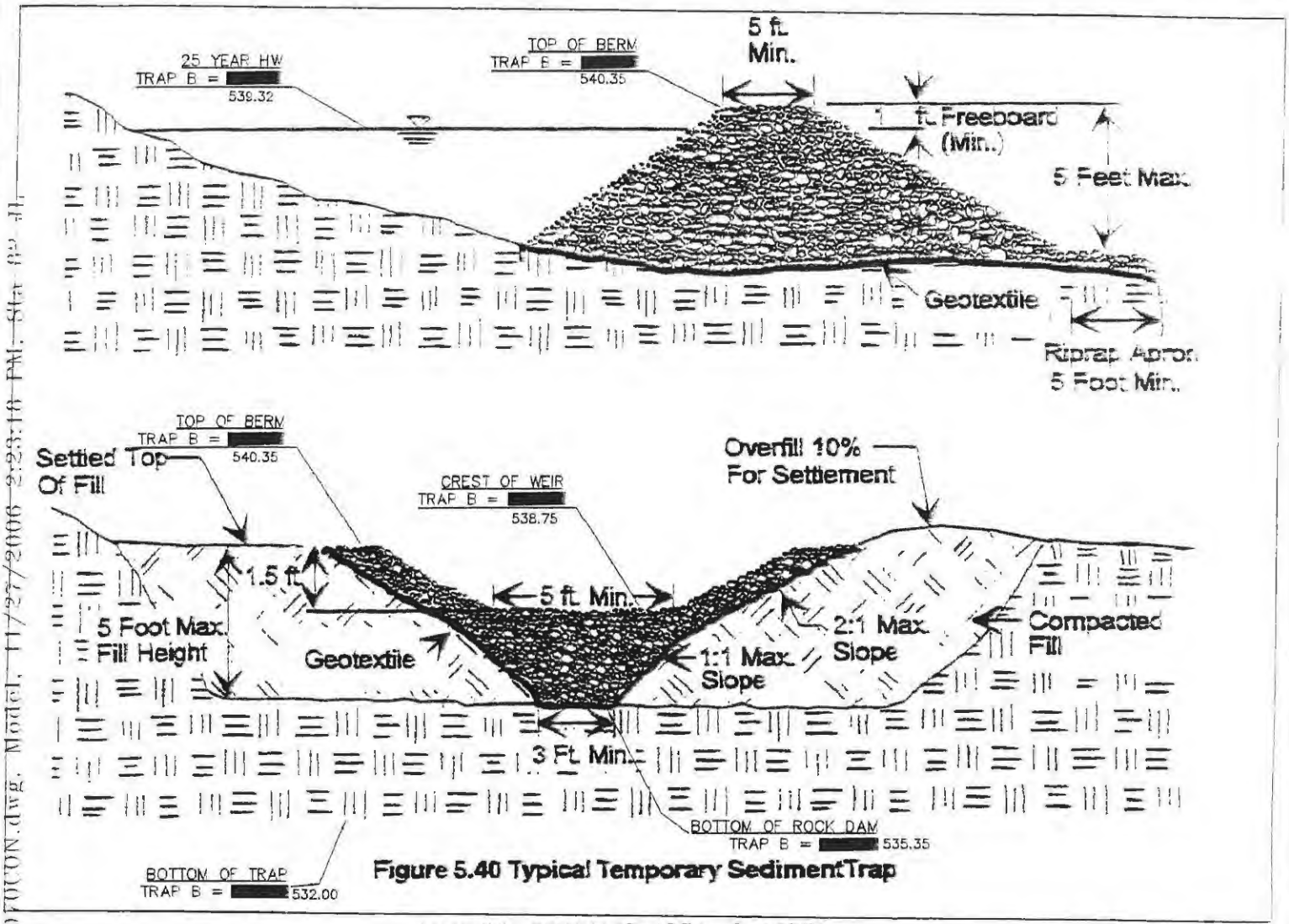


Figure 5.40 Typical Temporary Sediment Trap

MAXIMUM DRAINAGE AREA: 5 ACRES
2 YEAR MAXIMUM STRUCTURE LIFE

1. Volume of sediment storage shall be 1800 cubic feet per disturbed acre of contributory drainage area.

2. Embankment:
   Dam Height: Less than 5 feet
   Top Width: 5 feet minimum
   Fill Slopes: 2.5:1 or flatter
   Settlement: 10% or less

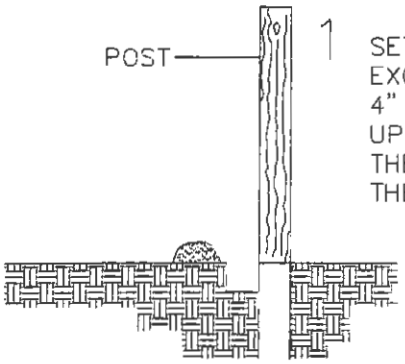
3. Spillway:
   A rock-lined open channel spillway should be constructed in the embankment to safely pass stormwater run-off.
   Capacity: Sufficient to safely pass run-off from the 2 year/24 hour storm event or local design storm event.
   (City of O'Fallon-25 year/20 minute)
   Bottom Width: 5 feet minimum
   Crest: A minimum of 18 inches below top of embankment.
   Outlet: 5 feet minimum
   Filter: Geotextile should be placed between embankment soil and the rock in the spillway section.

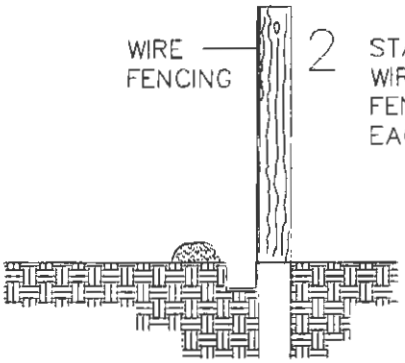
4. Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to ½ the design of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode. Replace the spillway gravel if it becomes clogged.

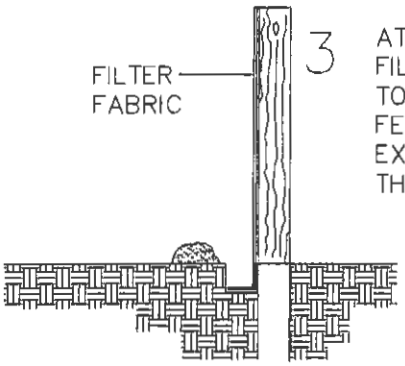
5. The structure shall be inspected after each rain and repairs made as needed.

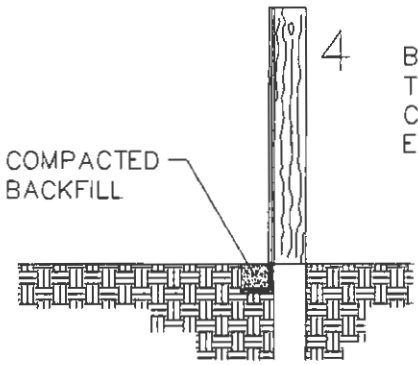
6. Construction operations shall be carried out in such a manner that erosion and water pollution shall be minimized.

7. The sediment trap shall be removed and area stabilized when the remaining drainage area has been properly stabilized.

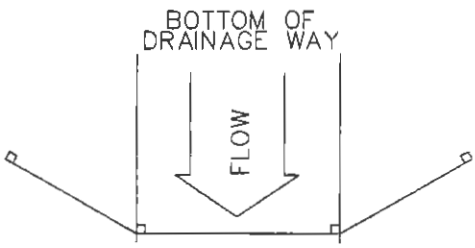


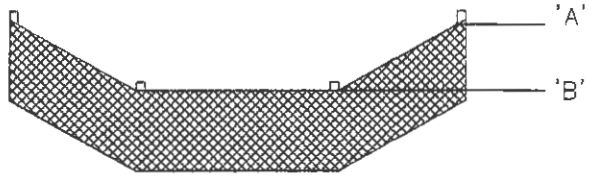






1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATLY AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. ANY REQUIRED REPAIRS SHALL BE MADE IMMEDIATELY.
2. SHOULD THE FABRIC DECOMPOSE OR BECOME INEFFECTIVE PRIOR TO THE END OF THE EXPECTED USABLE LIFE AND THE BARRIER STILL BE NECESSARY, THE FABRIC SHALL BE REPLACED PROMTLY.
3. SEDIMENT DEPOSITS SHOULD BE REMOVED AFTER EACH STORM EVENT. THEY MUST BE REMOVED WHEN DEPOSITS REACH APPROXIMATELY HALF THE HEIGHT OF THE BARRIER.
4. ANY SEDIMENT DEPOSITS REMAINING IN PLACE AFTER THIE SILT FENCE OR FILTER BARRIER IS NO LONGER REQUIRED SHALL BE DRESSED TO CONFORM WITH THE EXISTING GRADE, PREPARED AND SEDDED.





ELEVATION
POINT 'A' SHOULD BE HIGHER THAN POINT 'B'

SILTATION FENCE DETAIL

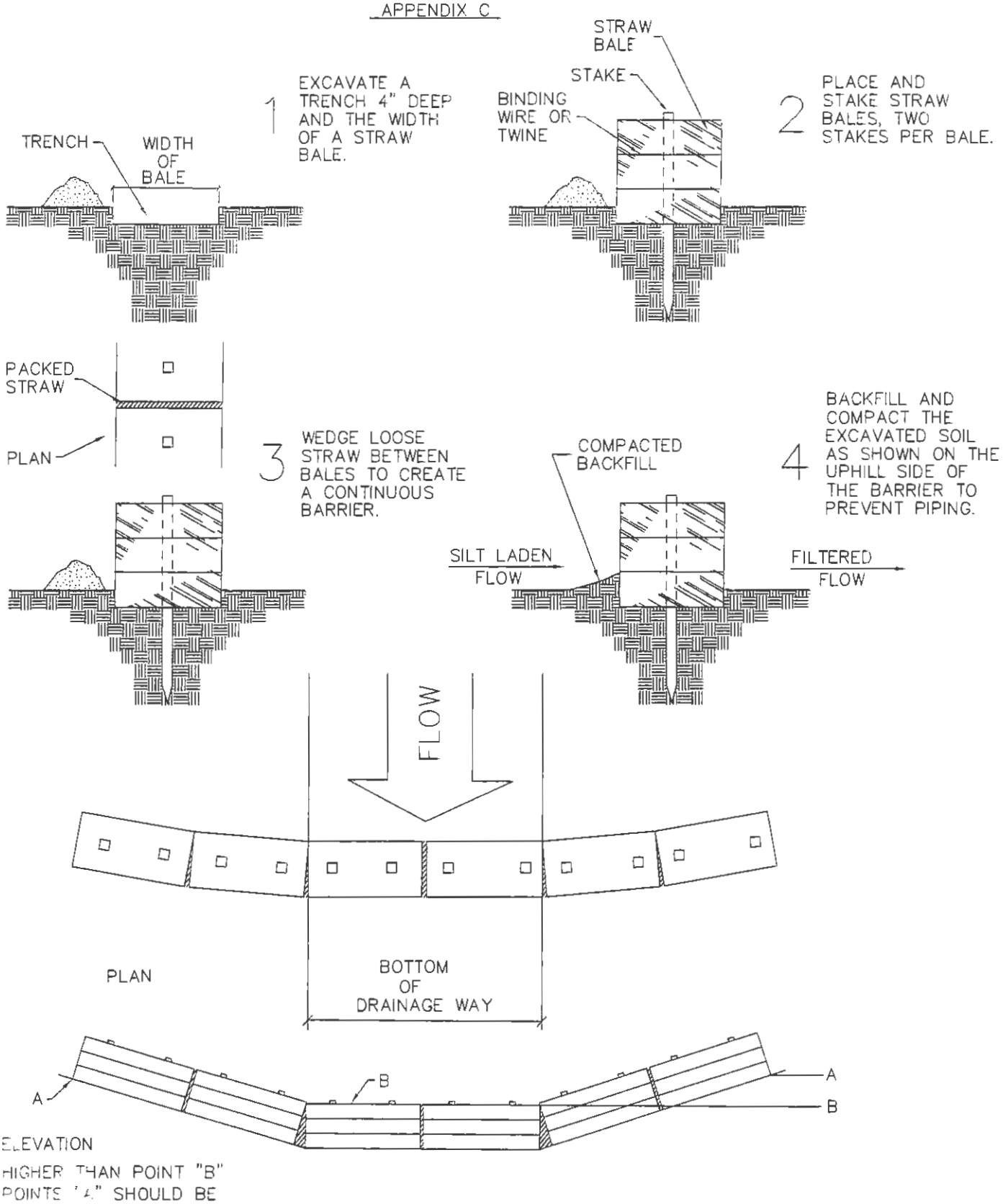
NOT TO SCALE

NOTE: PRE-FABRICATED SILT FENCE CAN BE USED IN LIEU OF ABOVE DETAIL PRE-FABRICATED SILT FENCE MUST BE INSTALLED PER THE MANUFACTURERS SPECIFICATIONS.

STRAW BALES BARRIERS

FOR URBAN DEVELOPMENT SITES

APPENDIX C



PLACEMENT AND CONSTRUCTION OF A STRAW BALE BARRIER

NOT TO SCALE

DIVERSIONS

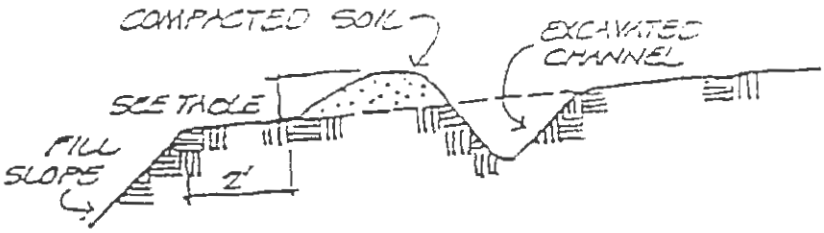
For Urban Development Sites

APPENDIX B

** Outlets for diversions must be stable. Stable outlets consist of grass waterways, earthen channels with capacity adequate to prevent gully erosion, grade stabilization structures or other practices as approved by the Designated Official.

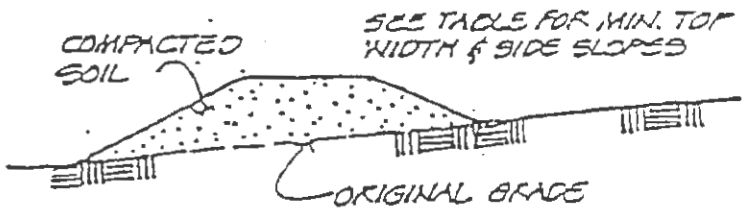
Combination Diversion

Used at the top of a fill slope.



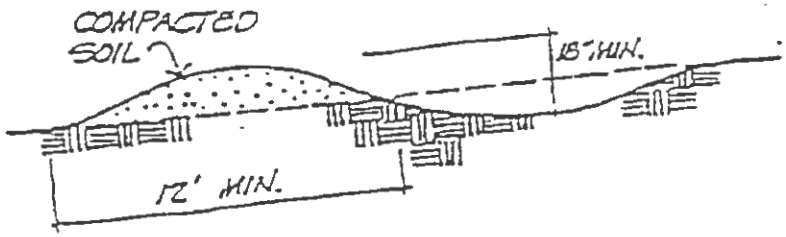
Earth Ridge Diversion

Used around the perimeter of a construction site.



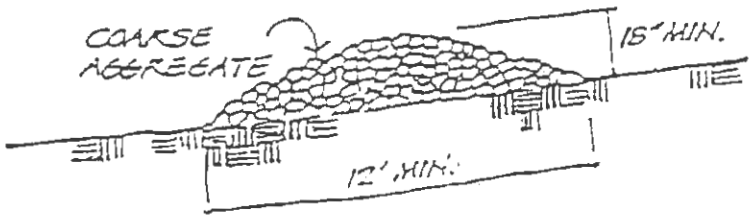
Combination Diversion

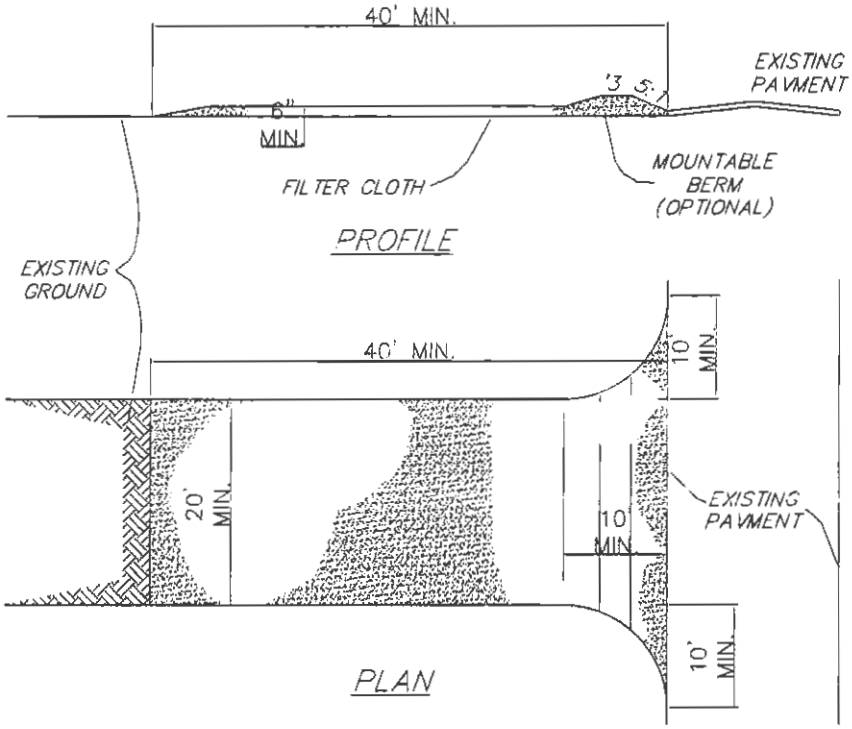
General use.



Gravel Ridege Diversion

General use.





CONSTRUCTION SPECIFICATIONS

1. Stone Size – Use 2" stone, or reclaimed or recycled concrete equivalent.

2. Length – As required, but not less than 40 feet (except on a single residence lot where a 30 foot minimum length would apply).

3. Thickness – Not less than six (6) inches.

4. Width – Twenty (20) foot minimum, but not less than the full width at points where ingress or egress occurs.

5. Filter Cloth – Will be placed over the entire area prior to placing of stone. Filter will not be required on a single family residence lot.

6. Surface Water – All surface water flowing or diverted toward construction entrances shall be piped across the entrance. If piping is impractical, a mountable berm with 5:1 slopes will be permitted.

7. Maintenance – The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public rights-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.

8. Washing – Wheels shall be cleaned to remove sediment prior to entrance onto public rights-of-way. When washing is required, it shall be done on an area stabilized with stone and which drains into an approved sediment trapping device.

9. Periodic inspection and needed maintenance shall be provided after each rain.

APPENDIX B

Rough Grading and Sediment & Erosion Control Plans and Sediment Storage Calculations for Maryridge Estates

ENGINEERING *PLANNING* *SURVEYING*

SEDIMENTATION CALCULATIONS
FOR
MARY RIDGE ESTATES

Prepared For:
Schneider Custom Homes
Bax Project No. 04-13070

October 18, 2006
Revised Nov. 27, 2006

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
www.baxengineering.com

Sediment Storage Calculations
Prepared By: Bax Engineering CO., Inc.
Mary Ridge Estates
Bax Project NO. 04-13070
October 18, 2006
Revised Nov. 9, 2006
JEL

Temporary Sediment Basin A:

Basin Inflow Data

Basin design to accommodate the 25 year, 20 minute design storm and allowing for 1 foot minimum of freeboard above the 25 year high-water elevation.
Disturbed area to the basin = 0.44 Acres
25-Year, 20 minute P.I. – 3.80; Discharge Q = 0.44(3.80)+1.25(2.71)+0.75(2.58)=6.99cfs
Total drainage area to basin 2.44 Ac.
Total discharge to basin 6.99 cfs
Annual sediment storage volume required per City of O'Fallon requirements is 125 ft³ of sediment storage/Acre of disturbed area to sediment basin.

A. **Sediment storage volume required**
2 years of sediment storage = 0.44 Acres (125 ft³/Acre/year)(2 years)
2 years of sediment storage = **110.00 ft³**

Basin Volume:

			TOTAL
ELEVATION	AREA (SF)	VOLUME (CF)	VOLUME (CF)
536	1,161	0	0
538	1,943	3,071	3,071
540	3,602	5,460	8,531

Sediment storage volume achieved at elevation: **536.07**

B. **"Wet" storage volume required**
Note: "Wet" storage volume to be provided above sediment storage volume elevation.
67 yd³ / Ac x 27 ft³ / yd x 0.56 Ac = **795.96 ft³**

"Wet" storage volume achieved at elevation: **536.59**

C. **"Dry" storage volume required**
Note: "Dry" storage volume to be provided above "wet" storage volume elevation
67 yd^3 / Ac x 27 ft^3 / yd x 0.56 Ac = **795.96 ft^3**
"Dry" storage volume achieved at elevation: **537.11**

D. **Basin interim outfall structure**
Structure to consist of a permanent 21" R.C.P. with 36" C.M.P. insert. Permanent Dewatering device to be composed of 8" perforated polyethylene drainage tubing connected to the C.M.P. riser at the "wet" storage volume elevation. Top of riser is set at a 537.45 elevation. See Figure 1 for details.

E. **25-Year routing results**
See attached calculations for details. Calculations ran assuming a starting water surface elevation equal to the "Dry" storage volume: 537.41
25-Year H.W. – 537.84
Top of Berm – 540.00
Freeboard – 2.16'

Check Differential Velocity and Discharge

The velocity and discharge rate after rough grading has been completed shall not exceed the velocity and discharge that existed before grading. The following analysis demonstrates that no increase in velocity or discharge will occur.

Existing Discharge to Outfall Point A

$$Q_{ex} = 1.25\ (2.71) + 2.38\ (2.58) = 9.53 \text{ cfs}$$

Proposed Discharge to Outfall Point A

Includes direct runoff as well as discharge from sediment basin A. Outflow from the sediment basin has been determined by routing the 25 year, 20 minute storm. See attached Pond Pack data for a detailed routing calculation.

$Q_{DR} = 0.10\ (3.80) + 0.12\ (2.58) = 0.69$ cfs
$Q_{Basin} = 6.99$ cfs
$Q_{tot} = 0.69 + 6.99 = 7.68$ cfs

$7.68 \text{ cfs} \leq 9.53 \text{ cfs}$

Existing Velocity to Outfall Point A

AutoCad has been used to calculate the existing velocity in the channel at outfall point A. A copy of this calculation is included with this report and a cross section of this channel has been included in the plans.

$V_{ex} = 2.57$ fps

Proposed Velocity to Outfall Point A

AutoCad has been used to calculate the proposed velocity in the channel at outfall point A. A copy of this calculation is included with this report and a cross section of this channel has been included in the plans.

$V_{post} = 2.36$ fps

$2.36 \text{ fps} \leq 2.57 \text{ fps}$

Temporary Sediment Trap B:

Basin Inflow Data

Trap design to accommodate the 25 year, 20 minute design storm and allowing for 1 foot minimum of freeboard above the 25 year high-water elevation.
Disturbed area to the trap = 1.13 Acres
25-Year, 20 minute P.I. = 2.50: Discharge Q=1.08(3.26)+0.15(2.58)+1.13(3.80)=8.20cfs

Total drainage area to trap 2.36 Ac.
Total discharge to trap 8.20 cfs

Annual sediment storage volume required per City of O'Fallon requirements is 125 ft³ of sediment storage/Acre of disturbed area to sediment basin.

F. **Sediment storage volume required**
2 years of sediment storage = 1.13 Acres (125 ft³/Acre/year)(2 years)
2 years of sediment storage = **282.50 ft³**

Basin Volume:

ELEVATION	AREA (SF)	VOLUME (CF)	TOTAL VOLUME (CF)
532	343.25	0	0
534	789	1102	1102
536	1,387	2148	3,250
538	2,119	3,481	6,730
540	2,986	5,080	11,811
540.35	3,595	1150	12,961

Sediment storage volume achieved at elevation: **532.51**

G. **"Wet" storage volume required**
Note: "Wet" storage volume to be provided above sediment storage volume elevation.
67 yd^3 / Ac x 27 ft^3 / yd x 1.13 Ac = **2,044.17 ft^3**

"Wet" storage volume achieved at elevation: **535.14**

H. **"Dry" storage volume required**
Note: "Dry" storage volume to be provided above "wet" storage volume elevation
67 yd^3 / Ac x 27 ft^3 / yd x 1.13 Ac = **2,044.17 ft^3**

"Dry" storage volume achieved at elevation: **536.64**

I. **Basin interim outfall structure**
Structure to consist of a temporary rocked weir. 5' wide. The weir's crest elevation is set at 538.75. See plans for detail.

J. **25-Year routing results**
See attached calculations for details. Calculations ran assuming a starting water surface elevation equal to the "Dry" storage volume: 536.64
25-Year H.W. – 539.32
Top of Berm – 540.35
Freeboard – 1.03'

Check Differential Velocity and Discharge

The velocity and discharge rate after rough grading has been completed shall not exceed the velocity and discharge that existed before grading. The following analysis demonstrates that no increase in velocity or discharge will occur.

Existing Discharge to Outfall Point B

$$Q_{ex} = 1.08\ (3.26) + 0.50\ (2.58) = 4.81\ \text{cfs}$$

Proposed Discharge to Outfall Point B

Includes direct runoff as well as discharge from sediment trap B. Outflow from the sediment trap has been determined by routing the 25 year, 20 minute storm. See attached Pond Pack data for a detailed routing calculation.

$Q_{DR} = 0.03\,(2.58) + 0.14(3.80) = 0.61$ cfs
$Q_{Basin} = 3.21$ cfs
$Q_{tot} = 0.61 + 3.21 = 3.82$ cfs

3.82 cfs $\leq$ 4.81 cfs

Existing Velocity to Outfall Point B

AutoCad has been used to calculate the existing velocity in the channel at outfall point A. A copy of this calculation is included with this report and a cross section of this channel has been included in the plans.

$V_{ex} = 2.29$ fps

Proposed Velocity to Outfall Point B

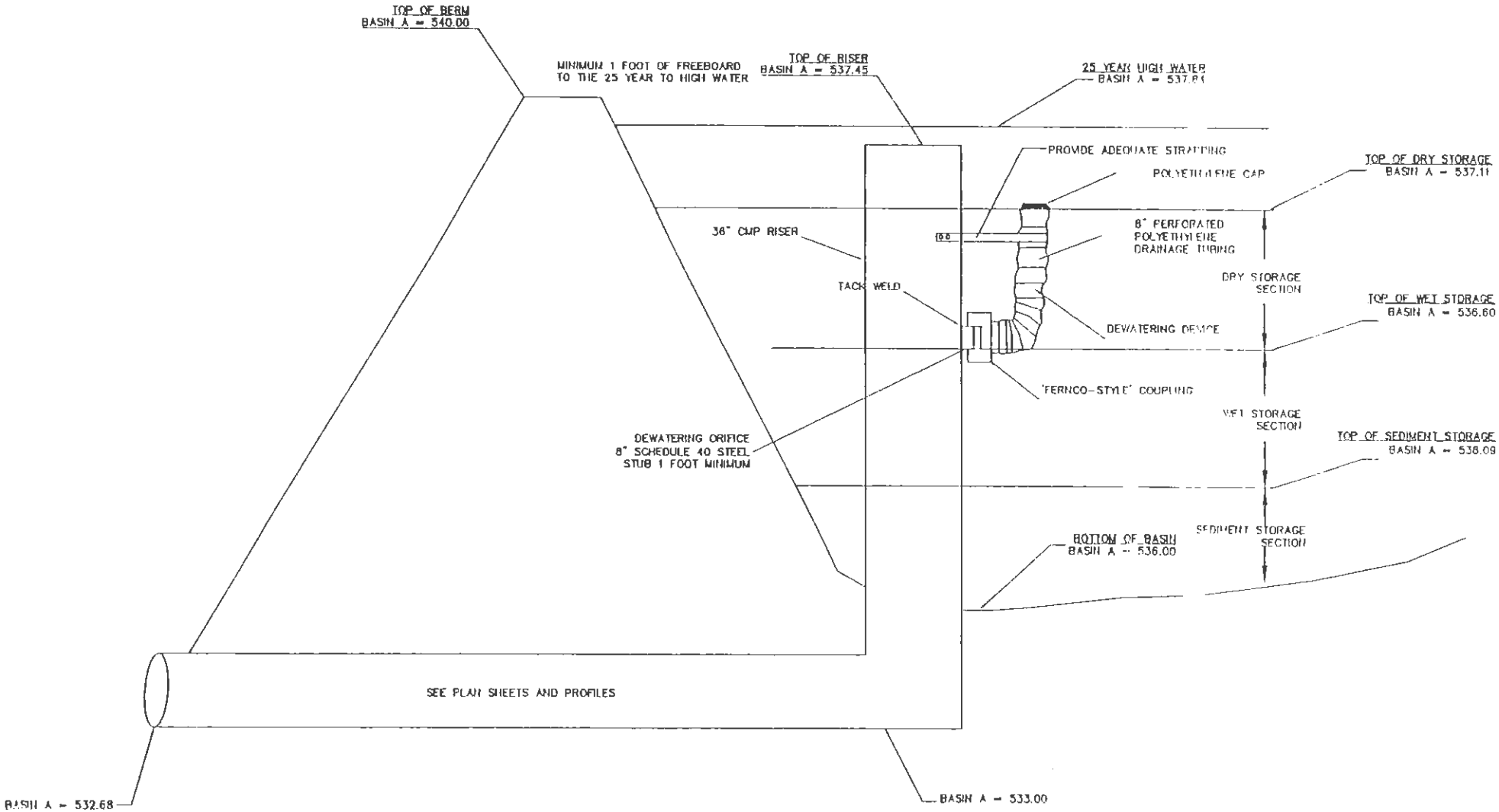
AutoCad has been used to calculate the proposed velocity in the channel at outfall point A. A copy of this calculation is included with this report and a cross section of this channel has been included in the plans.

$V_{post} = 2.09$ fps

2.09 fps $\leq$ 2.29 fps

Structure Details

E:\DWG\A13000PLUS\13070\CONSTRUCTION\13070CON.dwg, Model, 11/27/2006 2:22:37 PM, S



TYPICAL TEMPORARY SEDIMENT BASIN CONTROL STRUCTURE DETAIL

NOT TO SCALE

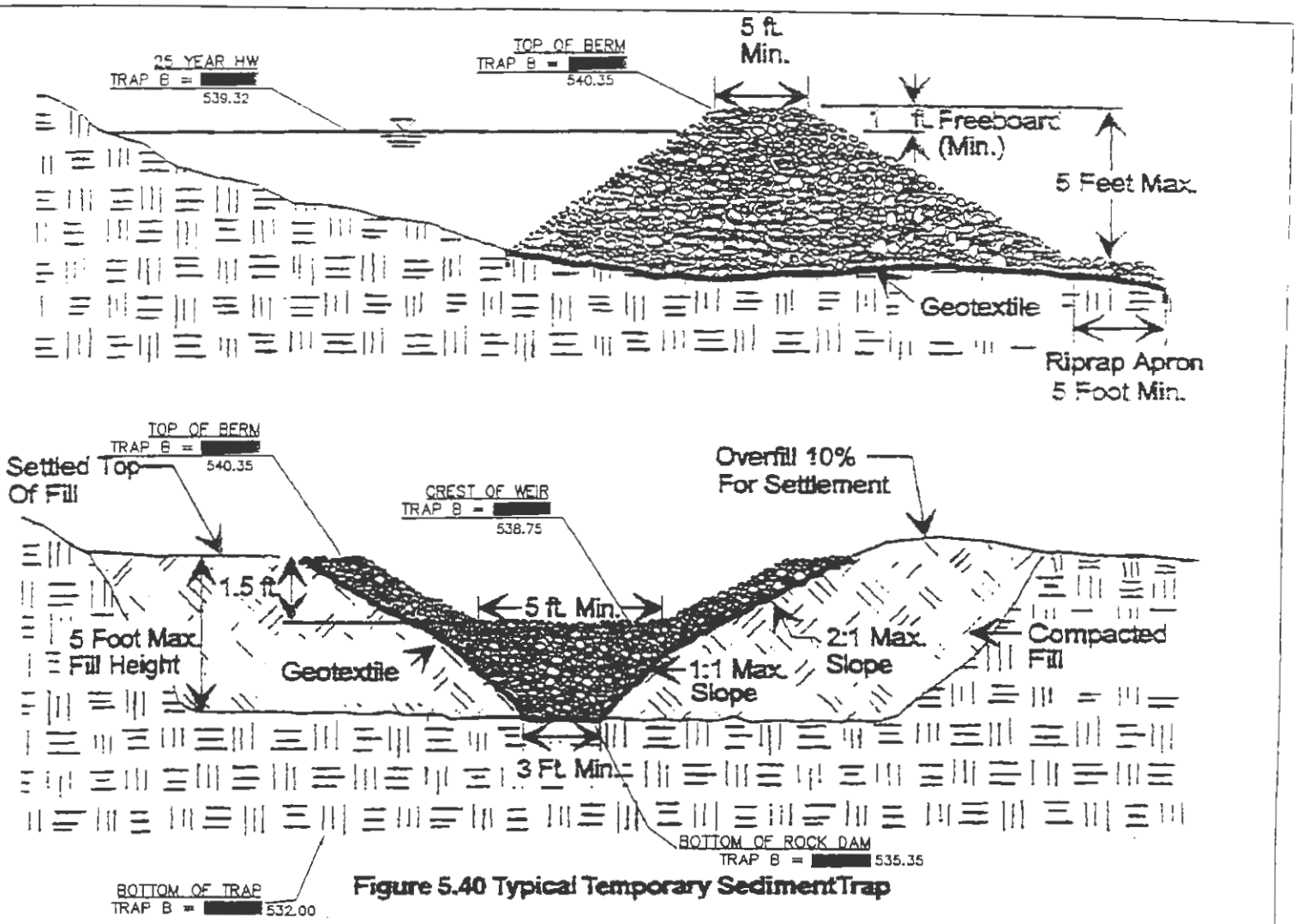


Figure 5.40 Typical Temporary Sediment Trap

MAXIMUM DRAINAGE AREA: 5 ACRES
2 YEAR MAXIMUM STRUCTURE LIFE

1. Volume of sediment storage shall be 1800 cubic feet per disturbed acre of contributory drainage area.

2. Embankment:
   Dam Height: Less than 5 feet
   Top Width: 5 feet minimum
   Fill Slopes: 2.5:1 or flatter
   Settlement: 10% or less

3. Spillway:
   A rock-lined open channel spillway should be constructed in the embankment to safely pass stormwater run-off.
   Capacity: Sufficient to safely pass run-off from the 2 year/24 hour storm event or local design storm event. (City of O'Fallon-25 year/20 minute)
   Bottom Width: 5 feet minimum
   Crest: A minimum of 18 inches below top of embankment.
   Outlet: 5 feet minimum
   Filter: Geotextile should be placed between embankment soil and the rock in the spillway section.

4. Sediment shall be removed and trap restored to its original dimensions when the sediment has accumulated to ½ the design of the trap. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode. Replace the spillway gravel if it becomes clogged.

5. The structure shall be inspected after each rain and repairs made as needed.

6. Construction operations shall be carried out in such a manner that erosion and water pollution shall be minimized.

7. The sediment trap shall be removed and area stabilized when the remaining drainage area has been properly stabilized.

Calculations

MARY RIDGE ESTATES
04-13070
11-09-06
OUTFALL POINT A
EXISTING CONDITIONS
Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	9.5300 cfs
Slope	0.0708 ft/ft
Manning's n	0.0350
Height	2.0000 ft
Bottom width	32.6200 ft
Left slope	0.0909 ft/ft (V/H)
Right slope	0.2500 ft/ft (V/H)

Computed Results:

Depth	0.1110 ft
Velocity	2.5661 fps
Full Flowrate	1417.8947 cfs
Flow area	3.7138 ft2
Flow perimeter	34.3041 ft
Hydraulic radius	0.1083 ft
Top width	34.2854 ft
Area	95.2422 ft2
Perimeter	62.9591 ft
Percent full	5.5508 %

MARY RIDGE ESTATES
04-13070
11-09-06
OUTFALL POINT A
PROPOSED CONDITIONS
Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	7.6800 cfs
Slope	0.0708 ft/ft
Manning's n	0.0350
Height	2.0000 ft
Bottom width	32.6200 ft
Left slope	0.0909 ft/ft (V/H)
Right slope	0.2500 ft/ft (V/H)

Computed Results:

Depth	0.0976 ft
Velocity	2.3595 fps
Full Flowrate	1417.8947 cfs
Flow area	3.2549 ft2
Flow perimeter	34.1004 ft
Hydraulic radius	0.0955 ft
Top width	34.0840 ft
Area	95.2422 ft2
Perimeter	62.9591 ft
Percent full	4.8796 %

MARY RIDGE ESTATES
04-13070
11-09-06
OUTFALL POINT B
EXISTING CONDITIONS
Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	4.8100 cfs
Slope	0.1046 ft/ft
Manning's n	0.0350
Height	2.0000 ft
Bottom width	29.8100 ft
Left slope	0.1592 ft/ft (V/H)
Right slope	0.1040 ft/ft (V/H)

Computed Results:

Depth	0.0693 ft
Velocity	2.2877 fps
Full Flowrate	1628.4288 cfs
Flow area	2.1026 ft2
Flow perimeter	30.9200 ft
Hydraulic radius	0.0680 ft
Top width	30.9109 ft
Area	91.4136 ft2
Perimeter	61.8655 ft
Percent full	3.4627 %

MARY RIDGE ESTATES
04-13070
11-09-06
rev 11-27-06
OUTFALL POINT B
PROPOSED CONDITIONS
Channel Calculator

Given Input Data:

Shape	Trapezoidal
Solving for	Depth of Flow
Flowrate	3.8200 cfs
Slope	0.1046 ft/ft
Manning's n	0.0350
Height	2.0000 ft
Bottom width	29.8100 ft
Left slope	0.1592 ft/ft (V/H)
Right slope	0.1040 ft/ft (V/H)

Computed Results:

Depth	0.0603 ft
Velocity	2.0901 fps
Full Flowrate	1628.4288 cfs
Flow area	1.8277 ft2
Flow perimeter	30.7771 ft
Hydraulic radius	0.0594 ft
Top width	30.7692 ft
Area	91.4136 ft2
Perimeter	61.8655 ft
Percent full	3.0170 %

BAX ENGINEERING
Engineering - Planning - Surveying

1052 South Cloverleaf Drive
St. Peters, MO 63376-6445
636-928-5552
FAX: 636-928-1718

SHEET ____ of ____

Project: Manufactured Estates

Date: 11-9-05 Project No: [illegible]

Designed: JEL Checked: ____

BAX ENGINEERING
Engineering - Planning - Surveying

221 Point West Blvd.
St. Charles, MO 63301
636-928-5552
FAX: 636-928-1718

SHEET 2 of 2

Project: Mary Ridge Estates

Date: 11-27-06 Project No: 06-13070

Designed: JEC Checked:

Outfall Dt. B

- Existing Runoff

1.08ac. (offsite) @ 3.26 cfs/ac.
0.50ac. (onsite) @ 2.58 cfs/ac.

$TQ = 0.50(2.58) + 1.08(3.26) = 4.31$ cfs

- Proposed Runoff

- D.R.

0.17ac D.R.
- 0.03ac (Undisturbed)
- 0.14ac (Disturbed)

$Q = 0.03(2.58) + 0.14(3.30)$

$Q = 0.161$ cfs

- Basin Inflow

- 1.08 (offsite) @ 3.26
- 1.28 (onsite)
  - + 0.15 ac (Undisturbed) @ 2.58 cfs/ac
  - + 1.13ac (Disturbed) @ 3.30 cfs/ac

$Q_{Basin} = 1.08(3.26) + 0.15(2.58) + 1.13(3.30)$

$Q_{Basin} = 5.120$ cfs

- Proposed Q to Dt. B

D.R. + Basin Outflow

0.161 cfs + 3.721 cfs = 3.92 cfs

$Q_{DOS} \leq Q_{pre} \Rightarrow 3.92 \text{ cfs} \leq 4.31 \text{ cfs}$ ✓

$V_{post} \leq V_{pre} \Rightarrow 2.00 \text{ fps} \leq 2.20 \text{ fps}$ ✓

POND 10
Routing Calculations for
25 Year, 20 Minute Design Storm
For Sediment Basin A

Table of Contents

HYG file =
HYG ID = 25
HYG Tag =

Peak Discharge =	6.99 cfs
Time to Peak =	5.00 min
HYG Volume =	8389 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.40	2.80	4.19	5.59
5.00	6.99	6.99	6.99	6.99	6.99
10.00	6.99	6.99	6.99	6.99	6.99
15.00	6.99	6.99	6.99	6.99	6.99
20.00	6.99	5.59	4.19	2.80	1.40
25.00	.00	.00	.00	.00	.00
30.00	.00	.00	.00	.00	.00
35.00	.00	.00	.00	.00	.00
40.00	.00				

TIME vs. ELEVATION (Ft

Output Time Increment = 1.00 min

Time min	Time on left represents time for first value in each row.				
.00	537.11	537.14	537.21	537.34	537.51
5.00	537.67	537.77	537.81	537.83	537.84
10.00	537.84	537.84	537.84	537.84	537.84
15.00	537.84	537.84	537.84	537.84	537.84
20.00	537.84	537.83	537.79	537.74	537.68
25.00	537.62	537.57	537.54	537.52	537.50
30.00	537.49	537.48	537.48	537.47	537.47
35.00	537.47	537.47	537.46	537.46	537.46
40.00	537.46	537.46	537.46	537.46	537.46
45.00	537.46	537.46	537.46	537.45	537.45
50.00	537.45	537.45	537.45	537.45	537.45
55.00	537.45	537.45	537.45	537.45	537.45
60.00	537.45	537.45	537.45	537.45	

POND VOLUME CALCULATIONS

Planimeter scale: 1.0, ft/in

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	a+A1+sqr.A1*A2 (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
536.00	1161.500	1162	0	0	0
538.00	1942.800	1943	4606	3071	3071
540.00	3602.090	3602	8190	5460	8531

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3 * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 536.00 ft
Increment = .01 ft
Max. Elev.= 540.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	RC	--->	CO	537.450	540.000
Culvert-Circular	CO	--->	TW	533.000	540.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = RC
Structure Type = Stand Pipe

# of Openings	=	1
Invert Elev.	=	537.45 ft
Diameter	=	3.0000 ft
Orifice Area	=	7.0686 sq.ft
Orifice Coeff.	=	.600
Weir Length	=	9.42 ft
Weir Coeff.	=	3.000
K, Reverse	=	1.000
Mannings n	=	.0000
Kev,Charged Riser	=	.000
Weir Submergence	=	No

OUTLET STRUCTURE INPUT DATA

Structure ID = 01
Structure Type = Culvert-Circular

No. Barrels	=	1
Barrel Diameter	=	1.7500 ft
Upstream Invert	=	533.00 ft
Dnstream Invert	=	532.69 ft
Horiz. Length	=	31.18 ft
Barrel Length	=	31.18 ft
Barrel Slope	=	.00994 ft/ft

OUTLET CONTROL DATA...

Mannings n	=	.0130	
Ke	=	.2000	(forward entrance loss)
Kb	=	.014830	(per ft of full flow)
Kr	=	.2000	(reverse entrance loss)
HW Convergence	=	.001	+/- ft

INLET CONTROL DATA...

Equation form	=	1
Inlet Control K	=	.0045
Inlet Control M	=	2.0000
Inlet Control c	=	.03170
Inlet Control Y	=	.6900
T1 ratio (HW/D)	=	1.090
T2 ratio (HW/D)	=	1.192
Slope Factor	=	-.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 534.91 ft ---> Flow = 11.14 cfs
At T2 Elev = 535.09 ft ---> Flow = 12.73 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...

Maximum Iterations=	40	
Min. TW tolerance	=	.01 ft
Max. TW tolerance	=	.01 ft
Min. HW tolerance	=	.01 ft
Max. HW tolerance	=	.01 ft
Min. Q tolerance	=	.00 cfs
Max. Q tolerance	=	.00 cfs

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev. ft	Total Q cfs	Notes: Convergence TW Elev ft	Convergence Error +/-ft	Contributing Structures
536.00	.00	Free Outfall		(no Q: R0,C0
536.01	.00	Free Outfall		(no Q: R0,C0
536.02	.00	Free Outfall		(no Q: R0,C0)
536.03	.00	Free Outfall		(no Q: R0,C0)
536.04	.00	Free Outfall		(no Q: R0,C0)
536.05	.00	Free Outfall		(no Q: R0,C0)
536.06	.00	Free Outfall		(no Q: R0,C0)
536.07	.00	Free Outfall		(no Q: R0,C0)
536.08	.00	Free Outfall		(no Q: R0,C0)
536.09	.00	Free Outfall		(no Q: R0,C0)
536.10	.00	Free Outfall		(no Q: R0,C0)
536.11	.00	Free Outfall		(no Q: R0,C0)
536.12	.00	Free Outfall		(no Q: R0,C0)
536.13	.00	Free Outfall		(no Q: R0,C0)
536.14	.00	Free Outfall		(no Q: R0,C0)
536.15	.00	Free Outfall		(no Q: R0,C0)
536.16	.00	Free Outfall		(no Q: R0,C0)
536.17	.00	Free Outfall		(no Q: R0,C0)
536.18	.00	Free Outfall		(no Q: R0,C0)
536.19	.00	Free Outfall		(no Q: R0,C0)
536.20	.00	Free Outfall		(no Q: R0,C0)
536.21	.00	Free Outfall		(no Q: R0,C0)
536.22	.00	Free Outfall		(no Q: R0,C0)
536.23	.00	Free Outfall		(no Q: R0,C0)
536.24	.00	Free Outfall		(no Q: R0,C0)
536.25	.00	Free Outfall		(no Q: R0,C0)
536.26	.00	Free Outfall		(no Q: R0,C0)
536.27	.00	Free Outfall		(no Q: R0,C0)
536.28	.00	Free Outfall		(no Q: R0,C0)
536.29	.00	Free Outfall		(no Q: R0,C0)
536.30	.00	Free Outfall		(no Q: R0,C0)
536.31	.00	Free Outfall		(no Q: R0,C0)
536.32	.00	Free Outfall		(no Q: R0,C0)
536.33	.00	Free Outfall		(no Q: R0,C0)
536.34	.00	Free Outfall		(no Q: R0,C0)
536.35	.00	Free Outfall		(no Q: R0,C0)
536.36	.00	Free Outfall		(no Q: R0,C0)
536.37	.00	Free Outfall		(no Q: R0,C0)

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total I		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error - cft	Contributing Structures
536.38	.00	Free Outfall		(no Q: R0,C0
536.39	.00	Free Outfall		(no Q: R0,C0
536.40	.00	Free Outfall		(no Q: R0,C0)
536.41	.00	Free Outfall		(no Q: R0,C0)
536.42	.00	Free Outfall		(no Q: R0,C0
536.43	.00	Free Outfall		(no Q: R0,C0)
536.44	.00	Free Outfall		(no Q: R0,C0)
536.45	.00	Free Outfall		(no Q: R0,C0)
536.46	.00	Free Outfall		(no Q: R0,C0)
536.47	.00	Free Outfall		(no Q: R0,C0)
536.48	.00	Free Outfall		(no Q: R0,C0)
536.49	.00	Free Outfall		(no Q: R0,C0)
536.50	.00	Free Outfall		(no Q: R0,C0
536.51	.00	Free Outfall		(no Q: R0,C0)
536.52	.00	Free Outfall		(no Q: R0,C0)
536.53	.00	Free Outfall		(no Q: R0,C0)
536.54	.00	Free Outfall		(no Q: R0,C0)
536.55	.00	Free Outfall		(no Q: R0,C0)
536.56	.00	Free Outfall		(no Q: R0,C0)
536.57	.00	Free Outfall		(no Q: R0,C0)
536.58	.00	Free Outfall		(no Q: R0,C0)
536.59	.00	Free Outfall		(no Q: R0,C0)
536.60	.00	Free Outfall		(no Q: R0,C0)
536.61	.00	Free Outfall		(no Q: R0,C0)
536.62	.00	Free Outfall		(no Q: R0,C0)
536.63	.00	Free Outfall		(no Q: R0,C0)
536.64	.00	Free Outfall		(no Q: R0,C0)
536.65	.00	Free Outfall		(no Q: R0,C0)
536.66	.00	Free Outfall		(no Q: R0,C0)
536.67	.00	Free Outfall		(no Q: R0,C0)
536.68	.00	Free Outfall		(no Q: R0,C0)
536.69	.00	Free Outfall		(no Q: R0,C0)
536.70	.00	Free Outfall		(no Q: R0,C0)
536.71	.00	Free Outfall		(no Q: R0,C0)
536.72	.00	Free Outfall		(no Q: R0,C0)
536.73	.00	Free Outfall		(no Q: R0,C0)
536.74	.00	Free Outfall		(no Q: R0,C0)
536.75	.00	Free Outfall		(no Q: R0,C0)

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Notes	
		Converge	
Elev. ft	Q cfs	TW Elev ft	Error + cfs	Contributing Structures
536.76	.00	Free Outfall		no Q: R0,C0
536.77	.00	Free Outfall		no Q: R0,C0
536.78	.00	Free Outfall		no Q: R0,C0
536.79	.00	Free Outfall		no Q: R0,C0
536.80	.00	Free Outfall		no Q: R0,C0
536.81	.00	Free Outfall		no Q: R0,C0
536.82	.00	Free Outfall		no Q: R0,C0
536.83	.00	Free Outfall		no Q: R0,C0
536.84	.00	Free Outfall		no Q: R0,C0
536.85	.00	Free Outfall		no Q: R0,C0
536.86	.00	Free Outfall		no Q: R0,C0
536.87	.00	Free Outfall		no Q: R0,C0
536.88	.00	Free Outfall		no Q: R0,C0
536.89	.00	Free Outfall		no Q: R0,C0
536.90	.00	Free Outfall		no Q: R0,C0
536.91	.00	Free Outfall		no Q: R0,C0
536.92	.00	Free Outfall		no Q: R0,C0
536.93	.00	Free Outfall		no Q: R0,C0
536.94	.00	Free Outfall		no Q: R0,C0
536.95	.00	Free Outfall		no Q: R0,C0
536.96	.00	Free Outfall		no Q: R0,C0
536.97	.00	Free Outfall		no Q: R0,C0
536.98	.00	Free Outfall		no Q: R0,C0
536.99	.00	Free Outfall		no Q: R0,C0
537.00	.00	Free Outfall		no Q: R0,C0
537.01	.00	Free Outfall		no Q: R0,C0
537.02	.00	Free Outfall		no Q: R0,C0
537.03	.00	Free Outfall		no Q: R0,C0
537.04	.00	Free Outfall		no Q: R0,C0
537.05	.00	Free Outfall		no Q: R0,C0
537.06	.00	Free Outfall		no Q: R0,C0
537.07	.00	Free Outfall		no Q: R0,C0
537.08	.00	Free Outfall		no Q: R0,C0
537.09	.00	Free Outfall		no Q: R0,C0
537.10	.00	Free Outfall		no Q: R0,C0
537.11	.00	Free Outfall		no Q: R0,C0
537.12	.00	Free Outfall		no Q: R0,C0
537.13	.00	Free Outfall		no Q: R0,C0

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total I		Notes		
		Converge		
Elev, ft	I, cfs	TW Elev, ft	Error, +/- ft	Contributing Structures
537.14	.00	Free Outfall		(no Q: R0,C0
537.15	.00	Free Outfall		(no Q: R0,C0
537.16	.00	Free Outfall		(no Q: R0,C0
537.17	.00	Free Outfall		(no Q: R0,C0
537.18	.00	Free Outfall		(no Q: R0,C0
537.19	.00	Free Outfall		(no Q: R0,C0)
537.20	.00	Free Outfall		(no Q: R0,C0)
537.21	.00	Free Outfall		(no Q: R0,C0)
537.22	.00	Free Outfall		(no Q: R0,C0)
537.23	.00	Free Outfall		(no Q: R0,C0)
537.24	.00	Free Outfall		(no Q: R0,C0)
537.25	.00	Free Outfall		(no Q: R0,C0)
537.26	.00	Free Outfall		(no Q: R0,C0
537.27	.00	Free Outfall		(no Q: R0,C0)
537.28	.00	Free Outfall		(no Q: R0,C0)
537.29	.00	Free Outfall		(no Q: R0,C0)
537.30	.00	Free Outfall		(no Q: R0,C0)
537.31	.00	Free Outfall		(no Q: R0,C0)
537.32	.00	Free Outfall		(no Q: R0,C0)
537.33	.00	Free Outfall		(no Q: R0,C0)
537.34	.00	Free Outfall		(no Q: R0,C0)
537.35	.00	Free Outfall		(no Q: R0,C0)
537.36	.00	Free Outfall		(no Q: R0,C0)
537.37	.00	Free Outfall		(no Q: R0,C0)
537.38	.00	Free Outfall		(no Q: R0,C0)
537.39	.00	Free Outfall		(no Q: R0,C0)
537.40	.00	Free Outfall		(no Q: R0,C0)
537.41	.00	Free Outfall		(no Q: R0,C0)
537.42	.00	Free Outfall		(no Q: R0,C0)
537.43	.00	Free Outfall		(no Q: R0,C0)
537.44	.00	Free Outfall		(no Q: R0,C0)
537.45	.00	Free Outfall		(no Q: R0,C0)
537.46	.03	Free Outfall		R0,C0
537.47	.08	Free Outfall		R0,C0
537.48	.15	Free Outfall		R0,C0
537.49	.23	Free Outfall		R0,C0
537.50	.32	Free Outfall		R0,C0
537.51	.41	Free Outfall		R0,C0

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, ft	Total Q cfs	Converge TW Elev ft	Converge Error +/-ft	Notes Contributing Structures
537.52	.52	Free Outfall		RO,CO
537.53	.64	Free Outfall		RO,CO
537.54	.76	Free Outfall		RO,CO
537.55	.89	Free Outfall		RO,CO
537.56	1.03	Free Outfall		RO,CO
537.57	1.17	Free Outfall		RO,CO
537.58	1.33	Free Outfall		RO,CO
537.59	1.48	Free Outfall		RO,CO
537.60	1.64	Free Outfall		RO,CO
537.61	1.81	Free Outfall		RO,CO
537.62	1.98	Free Outfall		RO,CO
537.63	2.16	Free Outfall		RO,CO
537.64	2.34	Free Outfall		RO,CO
537.65	2.52	Free Outfall		RO,CO
537.66	2.72	Free Outfall		RO,CO
537.67	2.92	Free Outfall		RO,CO
537.68	3.11	Free Outfall		RO,CO
537.69	3.32	Free Outfall		RO,CO
537.70	3.53	Free Outfall		RO,CO
537.71	3.75	Free Outfall		RO,CO
537.72	3.97	Free Outfall		RO,CO
537.73	4.19	Free Outfall		RO,CO
537.74	4.42	Free Outfall		RO,CO
537.75	4.65	Free Outfall		RO,CO
537.76	4.88	Free Outfall		RO,CO
537.77	5.12	Free Outfall		RO,CO
537.78	5.36	Free Outfall		RO,CO
537.79	5.61	Free Outfall		RO,CO
537.80	5.86	Free Outfall		RO,CO
537.81	6.11	Free Outfall		RO,CO
537.82	6.36	Free Outfall		RO,CO
537.83	6.62	Free Outfall		RO,CO
537.84	6.88	Free Outfall		RO,CO
537.85	7.15	Free Outfall		RO,CO
537.86	7.42	Free Outfall		RO,CO
537.87	7.69	Free Outfall		RO,CO
537.88	7.96	Free Outfall		RO,CO
537.89	8.26	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge		Notes
Elev ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
537.90	8.58	Free Outfall		RO,CO
537.91	8.81	Free Outfall		RO,CO
537.92	9.10	Free Outfall		RO,CO
537.93	9.40	Free Outfall		RO,CO
537.94	9.70	Free Outfall		RO,CO
537.95	10.00	Free Outfall		RO,CO
537.96	10.31	Free Outfall		RO,CO
537.97	10.60	Free Outfall		RO,CO
537.98	10.91	Free Outfall		RO,CO
537.99	11.22	Free Outfall		RO,CO
538.00	11.53	Free Outfall		RO,CO
538.01	11.85	Free Outfall		RO,CO
538.02	12.17	Free Outfall		RO,CO
538.03	12.49	Free Outfall		RO,CO
538.04	12.80	Free Outfall		RO,CO
538.05	13.14	Free Outfall		RO,CO
538.06	13.47	Free Outfall		RO,CO
538.07	13.80	Free Outfall		RO,CO
538.08	14.14	Free Outfall		RO,CO
538.09	14.47	Free Outfall		RO,CO
538.10	14.82	Free Outfall		RO,CO
538.11	15.16	Free Outfall		RO,CO
538.12	15.51	Free Outfall		RO,CO
538.13	15.85	Free Outfall		RO,CO
538.14	16.20	Free Outfall		RO,CO
538.15	16.56	Free Outfall		RO,CO
538.16	16.92	Free Outfall		RO,CO
538.17	17.27	Free Outfall		RO,CO
538.18	17.63	Free Outfall		RO,CO
538.19	18.00	Free Outfall		RO,CO
538.20	18.36	Free Outfall		RO,CO
538.21	18.73	Free Outfall		RO,CO
538.22	19.10	Free Outfall		RO,CO
538.23	19.48	Free Outfall		RO,CO
538.24	19.85	Free Outfall		RO,CO
538.25	20.23	Free Outfall		RO,CO
538.26	20.61	Free Outfall		RO,CO
538.27	20.99	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev.	Total Q	Notes	
		Convarge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
538.28	21.38	Free Outfall		RO,CO
538.29	21.77	Free Outfall		RO,CO
538.30	22.16	Free Outfall		RO,CO
538.31	22.55	Free Outfall		RO,CO
538.32	22.95	Free Outfall		RO,CO
538.33	23.34	Free Outfall		RO,CO
538.34	23.74	Free Outfall		RO,CO
538.35	24.14	Free Outfall		RO,CO
538.36	24.55	Free Outfall		RO,CO
538.37	24.95	Free Outfall		RO,CO
538.38	25.36	Free Outfall		RO,CO
538.39	25.77	Free Outfall		RO,CO
538.40	26.18	Free Outfall		RO,CO
538.41	26.60	Free Outfall		RO,CO
538.42	27.01	Free Outfall		RO,CO
538.43	27.43	Free Outfall		RO,CO
538.44	27.82	Free Outfall		RO,CO
538.45	27.85	Free Outfall		RO,CO
538.46	27.88	Free Outfall		RO,CO
538.47	27.92	Free Outfall		RO,CO
538.48	27.95	Free Outfall		RO,CO
538.49	27.98	Free Outfall		RO,CO
538.50	28.01	Free Outfall		RO,CO
538.51	28.05	Free Outfall		RO,CO
538.52	28.08	Free Outfall		RO,CO
538.53	28.11	Free Outfall		RO,CO
538.54	28.15	Free Outfall		RO,CO
538.55	28.18	Free Outfall		RO,CO
538.56	28.21	Free Outfall		RO,CO
538.57	28.24	Free Outfall		RO,CO
538.58	28.28	Free Outfall		RO,CO
538.59	28.31	Free Outfall		RO,CO
538.60	28.34	Free Outfall		RO,CO
538.61	28.37	Free Outfall		RO,CO
538.62	28.40	Free Outfall		RO,CO
538.63	28.43	Free Outfall		RO,CO
538.64	28.47	Free Outfall		RO,CO
538.65	28.50	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total I		Notes	
		Converge	
Elev. ft	I cfs	TW Elev ft	Error + -ft	Contributing Structures
538.66	28.53	Free Outfall		RO,CO
538.67	28.56	Free Outfall		RO,CO
538.68	28.60	Free Outfall		RO,CO
538.69	28.63	Free Outfall		RO,CO
538.70	28.66	Free Outfall		RO,CO
538.71	28.69	Free Outfall		RO,CO
538.72	28.72	Free Outfall		RO,CO
538.73	28.75	Free Outfall		RO,CO
538.74	28.79	Free Outfall		RO,CO
538.75	28.81	Free Outfall		RO,CO
538.76	28.85	Free Outfall		RO,CO
538.77	28.88	Free Outfall		RO,CO
538.78	28.91	Free Outfall		RO,CO
538.79	28.94	Free Outfall		RO,CO
538.80	28.98	Free Outfall		RO,CO
538.81	29.01	Free Outfall		RO,CO
538.82	29.04	Free Outfall		RO,CO
538.83	29.08	Free Outfall		RO,CO
538.84	29.10	Free Outfall		RO,CO
538.85	29.13	Free Outfall		RO,CO
538.86	29.16	Free Outfall		RO,CO
538.87	29.20	Free Outfall		RO,CO
538.88	29.23	Free Outfall		RO,CO
538.89	29.26	Free Outfall		RO,CO
538.90	29.29	Free Outfall		RO,CO
538.91	29.32	Free Outfall		RO,CO
538.92	29.36	Free Outfall		RO,CO
538.93	29.39	Free Outfall		RO,CO
538.94	29.41	Free Outfall		RO,CO
538.95	29.44	Free Outfall		RO,CO
538.96	29.48	Free Outfall		RO,CO
538.97	29.51	Free Outfall		RO,CO
538.98	29.54	Free Outfall		RO,CO
538.99	29.57	Free Outfall		RO,CO
539.00	29.60	Free Outfall		RO,CO
539.01	29.63	Free Outfall		RO,CO
539.02	29.67	Free Outfall		RO,CO
539.03	29.70	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev ft	Total Q cfs	Converge TW Elev ft	Error +-ft	Notes: Contributing Structures
539.04	29.72	Free Outfall		RO,CO
539.05	29.75	Free Outfall		RO,CO
539.06	29.78	Free Outfall		RO,CO
539.07	29.81	Free Outfall		RO,CO
539.08	29.84	Free Outfall		RO,CO
539.09	29.88	Free Outfall		RO,CO
539.10	29.91	Free Outfall		RO,CO
539.11	29.94	Free Outfall		RO,CO
539.12	29.97	Free Outfall		RO,CO
539.13	30.00	Free Outfall		RO,CO
539.14	30.03	Free Outfall		RO,CO
539.15	30.06	Free Outfall		RO,CO
539.16	30.09	Free Outfall		RO,CO
539.17	30.12	Free Outfall		RO,CO
539.18	30.15	Free Outfall		RO,CO
539.19	30.18	Free Outfall		RO,CO
539.20	30.21	Free Outfall		RO,CO
539.21	30.24	Free Outfall		RO,CO
539.22	30.27	Free Outfall		RO,CO
539.23	30.30	Free Outfall		RO,CO
539.24	30.33	Free Outfall		RO,CO
539.25	30.36	Free Outfall		RO,CO
539.26	30.39	Free Outfall		RO,CO
539.27	30.42	Free Outfall		RO,CO
539.28	30.45	Free Outfall		RO,CO
539.29	30.48	Free Outfall		RO,CO
539.30	30.51	Free Outfall		RO,CO
539.31	30.54	Free Outfall		RO,CO
539.32	30.57	Free Outfall		RO,CO
539.33	30.60	Free Outfall		RO,CO
539.34	30.63	Free Outfall		RO,CO
539.35	30.66	Free Outfall		RO,CO
539.36	30.69	Free Outfall		RO,CO
539.37	30.72	Free Outfall		RO,CO
539.38	30.75	Free Outfall		RO,CO
539.39	30.78	Free Outfall		RO,CO
539.40	30.81	Free Outfall		RO,CO
539.41	30.84	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
539.41	30.87	Free Outfall		RO,CO
539.43	30.90	Free Outfall		RO,CO
539.44	30.93	Free Outfall		RO,CO
539.45	30.96	Free Outfall		RO,CO
539.46	30.99	Free Outfall		RO,CO
539.47	31.02	Free Outfall		RO,CO
539.48	31.05	Free Outfall		RO,CO
539.49	31.08	Free Outfall		RO,CO
539.50	31.10	Free Outfall		RO,CO
539.51	31.13	Free Outfall		RO,CO
539.52	31.16	Free Outfall		RO,CO
539.53	31.19	Free Outfall		RO,CO
539.54	31.22	Free Outfall		RO,CO
539.55	31.25	Free Outfall		RO,CO
539.56	31.28	Free Outfall		RO,CO
539.57	31.31	Free Outfall		RO,CO
539.58	31.34	Free Outfall		RO,CO
539.59	31.37	Free Outfall		RO,CO
539.60	31.39	Free Outfall		RO,CO
539.61	31.42	Free Outfall		RO,CO
539.62	31.45	Free Outfall		RO,CO
539.63	31.48	Free Outfall		RO,CO
539.64	31.51	Free Outfall		RO,CO
539.65	31.54	Free Outfall		RO,CO
539.66	31.57	Free Outfall		RO,CO
539.67	31.60	Free Outfall		RO,CO
539.68	31.63	Free Outfall		RO,CO
539.69	31.66	Free Outfall		RO,CO
539.70	31.69	Free Outfall		RO,CO
539.71	31.72	Free Outfall		RO,CO
539.72	31.75	Free Outfall		RO,CO
539.73	31.77	Free Outfall		RO,CO
539.74	31.80	Free Outfall		RO,CO
539.75	31.83	Free Outfall		RO,CO
539.76	31.86	Free Outfall		RO,CO
539.77	31.89	Free Outfall		RO,CO
539.78	31.92	Free Outfall		RO,CO
539.79	31.94	Free Outfall		RO,CO

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev. Total Q		Notes	
		Converge	
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
539.80	31.97	Free Outfall		R0,C0
539.81	32.00	Free Outfall		R0,C0
539.82	32.03	Free Outfall		R0,C0
539.83	32.06	Free Outfall		R0,C0
539.84	32.09	Free Outfall		R0,C0
539.85	32.11	Free Outfall		R0,C0
539.86	32.14	Free Outfall		R0,C0
539.87	32.17	Free Outfall		R0,C0
539.88	32.20	Free Outfall		R0,C0
539.89	32.23	Free Outfall		R0,C0
539.90	32.26	Free Outfall		R0,C0
539.91	32.28	Free Outfall		R0,C0
539.92	32.31	Free Outfall		R0,C0
539.93	32.34	Free Outfall		R0,C0
539.94	32.37	Free Outfall		R0,C0
539.95	32.40	Free Outfall		R0,C0
539.96	32.42	Free Outfall		R0,C0
539.97	32.45	Free Outfall		R0,C0
539.98	32.48	Free Outfall		R0,C0
539.99	32.51	Free Outfall		R0,C0
540.00	32.54	Free Outfall		R0,C0

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\AI3000PLUS\13070
Inflow HYG File = NONE STORED - TRAP A IN 25
Outflow HYG File = NONE STORED - TRAP A OUT 25

Pond Node Data = TRAP A
Pond Volume Data = TRAP A
Pond Outlet Data = Sediment A

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	537.11 ft
Starting Volume	=	1510 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	6.99 cfs	at	5.00 min
Peak Outflow	=	6.99 cfs	at	15.00 min
Peak Elevation	=	537.84 ft		
Peak Storage	=	2773 cu.ft		

MASS BALANCE (cu.ft)

- Initial Vol	=	1510
+ HYG Vol IN	=	8388
- Infiltration	=	0
- HYG Vol OUT	=	7829
- Retained Vol	=	2069
Unrouted Vol	=	- cu.ft (.000% of Inflow Volume)

Index of Starting Page Numbers for TI Names

POND 10

Routing Calculations for

25 Year, 20 Minute Design Storm

For Sediment Basin A (Discharge & Velocity Calculations)

Table of Contents

HYG file =
HYG ID = 25
HYG Tag =

Peak Discharge =	6.99 cfs
Time to Peak =	5.00 min
HYG Volume =	8388 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.40	2.80	4.19	5.59
5.00	6.99	6.99	6.99	6.99	6.99
10.00	6.99	6.99	6.99	6.99	6.99
15.00	6.99	6.99	6.99	6.99	6.99
20.00	6.99	5.59	4.19	2.80	1.40
25.00	.00	.00	.00	.00	.00
30.00	.00	.00	.00	.00	.00
35.00	.00	.00	.00	.00	.00
40.00	.00				

TIME vs. ELEVATION (ft)

Time min	Output Time increment = 1.00 min Time on left represents time for first value in each row.				
.00	536.06	536.04	536.14	536.31	536.53
5.00	536.80	537.07	537.36	537.51	537.63
10.00	537.72	537.76	537.77	537.78	537.78
15.00	537.78	537.78	537.78	537.78	537.78
20.00	537.79	537.77	537.73	537.67	537.61
25.00	537.54	537.48	537.43	537.39	537.35
30.00	537.32	537.28	537.24	537.21	537.18
35.00	537.16	537.13	537.11	537.09	537.07
40.00	537.05	537.03	537.01	537.00	536.98
45.00	536.97	536.96	536.94	536.93	536.92
50.00	536.91	536.90	536.89	536.88	536.88
55.00	536.87	536.86	536.85	536.85	536.84
60.00	536.83	536.83	536.82	536.82	536.81
65.00	536.81	536.80	536.80	536.79	536.79
70.00	536.79	536.78	536.78	536.78	536.77
75.00	536.77	536.77	536.76	536.76	536.76
80.00	536.75	536.75	536.75	536.75	536.75
85.00	536.74	536.74	536.74	536.74	536.74
90.00	536.74	536.73	536.73	536.73	536.73
95.00	536.73	536.73	536.73	536.72	536.72
100.00	536.72	536.72	536.72	536.72	536.72
105.00	536.72	536.72	536.72	536.72	536.72
110.00	536.71	536.71	536.71	536.71	536.71
115.00	536.71	536.71	536.71	536.71	536.71
120.00	536.71	536.71	536.71	536.71	536.71
125.00	536.71	536.71	536.71	536.71	536.71
130.00	536.71	536.71	536.71	536.71	536.71
135.00	536.70	536.70	536.70	536.70	536.70
140.00	536.70	536.70	536.70	536.70	536.70
145.00	536.70	536.70	536.70		

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation ft	Planimeter (sq.in	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft	Volume (cu.ft	Volume Sum (cu.ft)
536.00	1161.500	1162	0	0	0
538.00	1942.600	1943	4606	3071	3071
540.00	3602.090	3602	8190	5460	8531

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 536.00 ft
Increment = .10 ft
Max. Elev.= 540.00 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Stand Pipe	R0	--->	C0	537.450	540.000
Orifice-Circular	O0	--->	C0	536.750	540.000
Culvert-Circular	C0	--->	TW	533.000	540.000

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID	= R(	
Structure Type	= Stand Pipe	
# of Openings	= 1	
Invert Elev.	= 537.45	ft
Diameter	= 3.0000	ft
Orifice Area	= 7.0686	sq.ft
Orifice Coeff.	= .600	-
Weir Length	= 9.42	ft
Weir Coeff.	= 3.000	
K, Reverse	= 1.000	
Mannings n	= .0000	
Kev,Charged Riser	= .000	
Weir Submergence	= No	

Structure ID	= O0	
Structure Type	= Orifice-Circular	
# of Openings	= 1	
Invert Elev.	= 536.60	ft
Diameter	= .6667	ft
Orifice Coeff.	= .600	

OUTLET STRUCTURE INPUT DATA

Structure ID = C0
Structure Type = Culvert-Circular

No. Barrels = 1
Barrel Diameter = 1.7500 ft
Upstream Invert = 533.00 ft
Dnstream Invert = 532.69 ft
Horiz. Length = 31.18 ft
Barrel Length = 31.18 ft
Barrel Slope = .00994 ft/ft

OUTLET CONTROL DATA...
Mannings n = .0130
Ke = .2000 (forward entrance loss)
Kb = .014830 (per ft of full flow)
Kr = .5000 (reverse entrance loss)
HW Convergence = .001 +/- ft

INLET CONTROL DATA...
Equation form = 1
Inlet Control K = .0045
Inlet Control M = 2.0000
Inlet Control c = .03170
Inlet Control Y = .6900
T1 ratio (HW/D) = 1.090
T2 ratio (HW/D) = 1.192
Slope Factor = -.500

Use unsubmerged inlet control Form 1 equ. below T1 elev.
Use submerged inlet control Form 1 equ. above T2 elev.

In transition zone between unsubmerged and submerged inlet control,
interpolate between flows at T1 & T2...
At T1 Elev = 534.91 ft ---> Flow = 11.14 cfs
At T2 Elev = 535.09 ft ---> Flow = 12.73 cfs

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
536.00	.00	Free Outfall		(no Q: R0,O0,C0)
536.10	.00	Free Outfall		(no Q: R0,O0,C0)
536.20	.00	Free Outfall		(no Q: R0,O0,C0)
536.30	.00	Free Outfall		(no Q: R0,O0,C0)
536.40	.00	Free Outfall		(no Q: R0,O0,C0)
536.50	.00	Free Outfall		(no Q: R0,O0,C0)
536.60	.00	Free Outfall		(no Q: R0,O0,C0)
536.70	.00	Free Outfall		(no Q: R0,O0,C0)
536.80	.11	Free Outfall		O0,C0 (no Q: R0)
536.90	.23	Free Outfall		O0,C0 (no Q: R0)
537.00	.39	Free Outfall		O0,C0 (no Q: R0)
537.10	.58	Free Outfall		O0,C0 (no Q: R0)
537.20	.79	Free Outfall		O0,C0 (no Q: R0)
537.30	1.02	Free Outfall		O0,C0 (no Q: R0)
537.40	1.15	Free Outfall		O0,C0 (no Q: R0)
537.45	1.21	Free Outfall		O0,C0 (no Q: R0)
537.50	1.58	Free Outfall		R0,O0,C0
537.60	3.02	Free Outfall		R0,O0,C0
537.70	5.00	Free Outfall		R0,O0,C0
537.80	7.42	Free Outfall		R0,O0,C0
537.90	10.18	Free Outfall		R0,O0,C0
538.00	13.26	Free Outfall		R0,O0,C0
538.10	16.63	Free Outfall		R0,O0,C0
538.20	20.24	Free Outfall		R0,O0,C0
538.30	23.82	Free Outfall		R0,O0,C0
538.40	26.98	Free Outfall		R0,O0,C0
538.50	28.02	Free Outfall		R0,C0 (no Q: O0)
538.60	28.34	Free Outfall		R0,C0 (no Q: O0)
538.70	28.66	Free Outfall		R0,O0,C0
538.80	28.98	Free Outfall		R0,O0,C0
538.90	29.29	Free Outfall		R0,C0 (no Q: O0)
539.00	29.60	Free Outfall		R0,C0 (no Q: O0)
539.10	29.91	Free Outfall		R0,C0 (no Q: O0)
539.20	30.21	Free Outfall		R0,O0,C0
539.30	30.51	Free Outfall		R0,O0,C0
539.40	30.81	Free Outfall		R0,C0 (no Q: O0)
539.50	31.10	Free Outfall		R0,C0 (no Q: O0)
539.60	31.39	Free Outfall		R0,C0 (no Q: O0)

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Converge	Notes
Elev ft	Q cfs	TW Elev ft	Error + cfs	Contributing Structures
838.70	31.69	Free Outfall		R0,00,00
839.80	31.97	Free Outfall		R0,00,00
839.90	32.26	Free Outfall		R0,00 (no Q: 00)
840.00	31.54	Free Outfall		R0,00 (no Q: 03)

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A13000PLUS\13070\
Inflow HYG file = NONE STORED - TRAP A IN 25
Outflow HYG file = NONE STORED - TRAP A OUT 25

Pond Node Data = TRAP A
Pond Volume Data = TRAP A
Pond Outlet Data = VELOCITY CHECK

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	536.00 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	6.99 cfs	at	5.00 min
Peak Outflow	=	6.99 cfs	at	19.00 min
Peak Elevation	=	537.78 ft		
Peak Storage	=	2658 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	8388
- Infiltration	=	0
- HYG Vol OUT	=	7485
- Retained Vol	=	903
Unrouted Vol	= -	cu.ft (.000% of Inflow Volume)

Index of Starting Page Numbers for ID Names

POND 10
Routing Calculations for
25 Year, 20 Minute Design Storm
For Sediment Trap B

Table of Contents

HYG file =
HYG ID = 25
HYG Tag =

Peak Discharge =	8.20 cfs
Time to Peak =	5.00 min
HYG Volume =	9840 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.64	3.28	4.92	6.56
5.00	8.20	8.20	8.20	8.20	8.20
10.00	8.20	8.20	8.20	8.20	8.20
15.00	8.20	8.20	8.20	8.20	8.20
20.00	8.20	6.56	4.92	3.28	1.64
25.00	.00	.00	.00	.00	.00
30.00	.00	.00	.00	.00	.00
35.00	.00	.00	.00	.00	.00
40.00	.00				

TIME vs. ELEVATION (ft)

Output Time increment = 1.00 min

Time min	Time on left represents time for first value in each row.				
.00	536.64	536.67	536.74	536.91	537.11
5.00	537.35	537.61	537.85	538.09	538.31
10.00	538.52	538.73	538.92	539.06	539.16
15.00	539.23	539.27	539.30	539.31	539.32
20.00	539.32	539.31	539.28	539.22	539.16
25.00	539.09	539.02	538.97	538.94	538.91
30.00	538.89	538.87	538.85	538.84	538.83
35.00	538.82	538.81	538.81	538.80	538.80
40.00	538.79	538.79	538.79	538.78	538.78
45.00	538.78	538.78	538.77	538.77	538.77
50.00	538.77	538.77	538.77	538.76	538.76
55.00	538.76	538.76	538.76	538.76	538.76
60.00	538.76	538.76	538.76	538.76	538.76
65.00	538.76	538.75	538.75	538.75	538.75
70.00	538.75	538.75	538.75	538.75	538.75
75.00	538.75	538.75	538.75	538.75	538.75
80.00	538.75	538.75	538.75	538.75	538.75
85.00	538.75	538.75	538.75		

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sq(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
532.00	343.250	343	0	0	0
534.00	788.930	789	1653	1102	1102
536.00	1387.100	1387	3222	2148	3250
538.00	2119.340	2119	5221	3481	6730
540.00	2985.660	2986	7620	5080	11811
540.35	3595.000	3595	9857	1150	12961

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 538.00 ft
Increment = .10 ft
Max. Elev = 540.35 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-XY Points	WC	--->	TW	538.750	540.350

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = W
Structure Type = Well-H Point

# of Openings = 1
WELL H-V GROUND POINTS

X, ft	Elev, ft
.00	540.35
4.50	538.75
9.50	538.75
14.00	540.35

Lowest Elev. = 538.75 ft

Weir Coeff. = 3.000000

Weir TW effects (Use adjustment equation,

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

**** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
532.00	.00	Free Outfall		None contributing
532.10	.00	Free Outfall		None contributing
532.20	.00	Free Outfall		None contributing
532.30	.00	Free Outfall		None contributing
532.40	.00	Free Outfall		None contributing
532.50	.00	Free Outfall		None contributing
532.60	.00	Free Outfall		None contributing
532.70	.00	Free Outfall		None contributing
532.80	.00	Free Outfall		None contributing
532.90	.00	Free Outfall		None contributing
533.00	.00	Free Outfall		None contributing
533.10	.00	Free Outfall		None contributing
533.20	.00	Free Outfall		None contributing
533.30	.00	Free Outfall		None contributing
533.40	.00	Free Outfall		None contributing
533.50	.00	Free Outfall		None contributing
533.60	.00	Free Outfall		None contributing
533.70	.00	Free Outfall		None contributing
533.80	.00	Free Outfall		None contributing
533.90	.00	Free Outfall		None contributing
534.00	.00	Free Outfall		None contributing
534.10	.00	Free Outfall		None contributing
534.20	.00	Free Outfall		None contributing
534.30	.00	Free Outfall		None contributing
534.40	.00	Free Outfall		None contributing
534.50	.00	Free Outfall		None contributing
534.60	.00	Free Outfall		None contributing
534.70	.00	Free Outfall		None contributing
534.80	.00	Free Outfall		None contributing
534.90	.00	Free Outfall		None contributing
535.00	.00	Free Outfall		None contributing
535.10	.00	Free Outfall		None contributing
535.20	.00	Free Outfall		None contributing
535.30	.00	Free Outfall		None contributing
535.40	.00	Free Outfall		None contributing
535.50	.00	Free Outfall		None contributing
535.60	.00	Free Outfall		None contributing
535.70	.00	Free Outfall		None contributing

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, ft	Total Q cfs	Notes: Converge TW Elev ft	Converge Error +/-ft	Notes: Contributing Structures
535.80	.00	Free Outfall		None contributing
535.90	.00	Free Outfall		None contributing
536.00	.00	Free Outfall		None contributing
536.10	.00	Free Outfall		None contributing
536.20	.00	Free Outfall		None contributing
536.30	.00	Free Outfall		None contributing
536.40	.00	Free Outfall		None contributing
536.50	.00	Free Outfall		None contributing
536.60	.00	Free Outfall		None contributing
536.70	.00	Free Outfall		None contributing
536.80	.00	Free Outfall		None contributing
536.90	.00	Free Outfall		None contributing
537.00	.00	Free Outfall		None contributing
537.10	.00	Free Outfall		None contributing
537.20	.00	Free Outfall		None contributing
537.30	.00	Free Outfall		None contributing
537.40	.00	Free Outfall		None contributing
537.50	.00	Free Outfall		None contributing
537.60	.00	Free Outfall		None contributing
537.70	.00	Free Outfall		None contributing
537.80	.00	Free Outfall		None contributing
537.90	.00	Free Outfall		None contributing
538.00	.00	Free Outfall		None contributing
538.10	.00	Free Outfall		None contributing
538.20	.00	Free Outfall		None contributing
538.30	.00	Free Outfall		None contributing
538.40	.00	Free Outfall		None contributing
538.50	.00	Free Outfall		None contributing
538.60	.00	Free Outfall		None contributing
538.70	.00	Free Outfall		None contributing
538.75	.00	Free Outfall		WO
538.80	.17	Free Outfall		WO
538.90	.92	Free Outfall		WO
539.00	2.06	Free Outfall		WO
539.10	3.54	Free Outfall		WO
539.20	5.34	Free Outfall		WO
539.30	7.46	Free Outfall		WO
539.40	9.89	Free Outfall		WO

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev	Total Q	Notes	
		Converge	
Elev. ft	Q cfs	TW Elev ft	Error + cfs	Controlling Structure
539.50	12.65	Free Outfall	WO
539.60	15.73	Free Outfall	WO
539.70	19.14	Free Outfall	WO
539.80	22.88	Free Outfall	WO
539.90	26.96	Free Outfall	WO
540.00	31.39	Free Outfall	WO
540.10	36.16	Free Outfall	WO
540.20	41.30	Free Outfall	WO
540.30	46.79	Free Outfall	WO
540.35	49.68	Free Outfall	WO

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A13000PLUS\13070\
Inflow HYG file = NONE STORED - TRAP B IN 25
Outflow HYG file = NONE STORED - TRAP B OUT 25

Pond Node Data = TRAP B
Pond Volume Data = TRAP B
Pond Outlet Data = Sediment B

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	536.64 ft
Starting Volume	=	4206 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	8.20 cfs	at	5.00 min
Peak Outflow	=	8.04 cfs	at	20.00 min
Peak Elevation	=	539.32 ft		
Peak Storage	=	9898 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	4206
+ HYG Vol IN	=	9840
- Infiltration	=	0
- HYG Vol OUT	=	5610
- Retained Vol	=	8436
Unrouted Vol	=	0 cu.ft (.000% of Inflow Volume)

Index of Starting Page Numbers for II Names

POND 10

Routing Calculations for

25 Year, 20 Minute Design Storm

For Sediment Trap B (Discharge & Velocity Calculations)

Table of Contents

HYG file =
HYG ID = 25
HYG Tag =

Peak Discharge =	8.20 cfs
Time to Peak =	5.00 min
HYG Volume =	9840 cu.ft

HYDROGRAPH ORDINATES (cfs)
Output Time increment = 1.00 min
Time on left represents time for first value in each row.

Time min					
.00	.00	1.64	3.28	4.92	6.56
5.00	8.20	8.20	8.20	8.20	8.20
10.00	8.20	8.20	8.20	8.20	8.20
15.00	8.20	8.20	8.20	8.20	8.20
20.00	8.20	6.56	4.92	3.28	1.64
25.00	.00	.00	.00	.00	.00
30.00	.00	.00	.00	.00	.00
35.00	.00	.00	.00	.00	.00
40.00	.00				

TIME vs. ELEVATION (ft)

Time min	Output Time increment = 1.00 min Time on left represents time for first value in each row.				
.00	532.00	532.14	532.50	533.01	533.57
5.00	534.16	534.70	535.17	535.59	535.96
10.00	536.31	536.62	536.92	537.20	537.47
15.00	537.72	537.96	538.19	538.41	538.62
20.00	538.82	538.97	539.05	539.08	539.06
25.00	539.02	538.97	538.93	538.91	538.89
30.00	538.87	538.85	538.84	538.83	538.82
35.00	538.81	538.81	538.80	538.80	538.79
40.00	538.79	538.79	538.78	538.78	538.78
45.00	538.78	538.77	538.77	538.77	538.77
50.00	538.77	538.77	538.76	538.76	538.76
55.00	538.76	538.76	538.76	538.76	538.76
60.00	538.76	538.76	538.76	538.76	538.76
65.00	538.75	538.75	538.75	538.75	538.75
70.00	538.75	538.75	538.75	538.75	538.75
75.00	538.75	538.75	538.75	538.75	538.75
80.00	538.75	538.75	538.75	538.75	538.75
85.00	538.75	538.75			

POND VOLUME CALCULATIONS

Planimeter scale: 1.00 ft/in

Elevation (ft)	Planimeter (sq.in)	Area (sq.ft)	A1+A2+sqr(A1*A2) (sq.ft)	Volume (cu.ft)	Volume Sum (cu.ft)
532.00	343.250	343	0	0	0
534.00	786.930	789	1653	1102	1102
536.00	1387.100	1387	3222	2148	3250
538.00	2119.340	2119	5221	3481	6730
540.00	2985.660	2986	7620	5080	11811
540.35	3595.000	3595	9857	1150	12961

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 538.75 ft
Increment = .1 ft
Max. Elev = 540.35 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-XY Points	WO	--->	TW	538.750	540.350

TW SETUP, DS Channel

OUTLET STRUCTURE INPUT DATA

Structure ID = 1
Structure Type = Well-X Points

# of Openings = 1
WEIR X-Y GROUND POINTS

X, ft	Elev, ft
.00	540.35
4.50	538.75
9.50	538.75
14.00	540.35

Lowest Elev. = 538.75 ft

Weir Coeff. = 3.000000

Weir TW effects (Use adjustment equation)

Structure ID = TW
Structure Type = TW SETUP, DS Channel

FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations= 40
Min. TW tolerance = .01 ft
Max. TW tolerance = .01 ft
Min. HW tolerance = .01 ft
Max. HW tolerance = .01 ft
Min. Q tolerance = .00 cfs
Max. Q tolerance = .00 cfs

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Notes		
		Converge		
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
532.00	.00	Free Outfall		None contributing
532.10	.00	Free Outfall		None contributing
532.20	.00	Free Outfall		None contributing
532.30	.00	Free Outfall		None contributing
532.40	.00	Free Outfall		None contributing
532.50	.00	Free Outfall		None contributing
532.60	.00	Free Outfall		None contributing
532.70	.00	Free Outfall		None contributing
532.80	.00	Free Outfall		None contributing
532.90	.00	Free Outfall		None contributing
533.00	.00	Free Outfall		None contributing
533.10	.00	Free Outfall		None contributing
533.20	.00	Free Outfall		None contributing
533.30	.00	Free Outfall		None contributing
533.40	.00	Free Outfall		None contributing
533.50	.00	Free Outfall		None contributing
533.60	.00	Free Outfall		None contributing
533.70	.00	Free Outfall		None contributing
533.80	.00	Free Outfall		None contributing
533.90	.00	Free Outfall		None contributing
534.00	.00	Free Outfall		None contributing
534.10	.00	Free Outfall		None contributing
534.20	.00	Free Outfall		None contributing
534.30	.00	Free Outfall		None contributing
534.40	.00	Free Outfall		None contributing
534.50	.00	Free Outfall		None contributing
534.60	.00	Free Outfall		None contributing
534.70	.00	Free Outfall		None contributing
534.80	.00	Free Outfall		None contributing
534.90	.00	Free Outfall		None contributing
535.00	.00	Free Outfall		None contributing
535.10	.00	Free Outfall		None contributing
535.20	.00	Free Outfall		None contributing
535.30	.00	Free Outfall		None contributing
535.40	.00	Free Outfall		None contributing
535.50	.00	Free Outfall		None contributing
535.60	.00	Free Outfall		None contributing
535.70	.00	Free Outfall		None contributing

***** COMPOSITE OUTFLOW SUMMARY ****

WS Elev, Total Q		Converge		Notes
Elev. ft	Q cfs	TW Elev ft	Error +/-ft	Contributing Structures
535.80	.00	Free Outfall		None contributing
535.90	.00	Free Outfall		None contributing
536.00	.00	Free Outfall		None contributing
536.10	.00	Free Outfall		None contributing
536.20	.00	Free Outfall		None contributing
536.30	.00	Free Outfall		None contributing
536.40	.00	Free Outfall		None contributing
536.50	.00	Free Outfall		None contributing
536.60	.00	Free Outfall		None contributing
536.70	.00	Free Outfall		None contributing
536.80	.00	Free Outfall		None contributing
536.90	.00	Free Outfall		None contributing
537.00	.00	Free Outfall		None contributing
537.10	.00	Free Outfall		None contributing
537.20	.00	Free Outfall		None contributing
537.30	.00	Free Outfall		None contributing
537.40	.00	Free Outfall		None contributing
537.50	.00	Free Outfall		None contributing
537.60	.00	Free Outfall		None contributing
537.70	.00	Free Outfall		None contributing
537.80	.00	Free Outfall		None contributing
537.90	.00	Free Outfall		None contributing
538.00	.00	Free Outfall		None contributing
538.10	.00	Free Outfall		None contributing
538.20	.00	Free Outfall		None contributing
538.30	.00	Free Outfall		None contributing
538.40	.00	Free Outfall		None contributing
538.50	.00	Free Outfall		None contributing
538.60	.00	Free Outfall		None contributing
538.70	.00	Free Outfall		None contributing
538.75	.00	Free Outfall		W0
538.80	.17	Free Outfall		W0
538.90	.92	Free Outfall		W0
539.00	2.06	Free Outfall		W0
539.10	3.54	Free Outfall		W0
539.20	5.34	Free Outfall		W0
539.30	7.46	Free Outfall		W0
539.40	9.89	Free Outfall		W0

***** COMPOSITE OUTFLOW SUMMARY *****

WS Elev, Total Q		Notes		
		Tailwater		
Elev. ft	Q cfs	TW Elev ft	Error - cfs	Contributing Structures
539.50	12.65	Free Outfall		WO
539.60	15.73	Free Outfall		WO
539.70	19.14	Free Outfall		WO
539.80	22.88	Free Outfall		WO
539.90	26.96	Free Outfall		WO
540.00	31.39	Free Outfall		WO
540.10	36.16	Free Outfall		WO
540.20	41.30	Free Outfall		WO
540.30	46.79	Free Outfall		WO
540.35	49.68	Free Outfall		WO

LEVEL POOL ROUTING SUMMARY

HYG Dir = H:\PONDPACK\A13000PLUS\13070\
Inflow HYG file = NONE STORED - TRAP B IN 25
Outflow HYG file = NONE STORED - TRAP B OUT 25

Pond Node Data = TRAP B
Pond Volume Data = TRAP B
Pond Outlet Data = Sediment B

No Infiltration

INITIAL CONDITIONS

Starting WS Elev	=	532.00 ft
Starting Volume	=	0 cu.ft
Starting Outflow	=	.00 cfs
Starting Infiltr.	=	.00 cfs
Starting Total Qout	=	.00 cfs
Time Increment	=	1.00 min

INFLOW/OUTFLOW HYDROGRAPH SUMMARY

Peak Inflow	=	8.20 cfs	at	5.00 min
Peak Outflow	=	3.21 cfs	at	23.00 min
Peak Elevation	=	539.08 ft		
Peak Storage	=	9253 cu.ft		

MASS BALANCE (cu.ft)

+ Initial Vol	=	0
+ HYG Vol IN	=	9840
- Infiltration	=	0
- HYG Vol OUT	=	1404
- Retained Vol	=	8436
Unrouted Vol	=	0 cu.ft (.000% of Inflow Volume)

Index of Starting Page Numbers for ID Names


SEDIMENT AND EROSION CONTROL PLAN
MARYRIDGE ESTATES
04-13070
SEPTEMBER 8, 2006
10-20-06 CITY COMMENTS
11-14-06 CITY COMMENTS
11-2?-06 CITY COMMENTS
06-?0-08 PER CLIENT
NORTH
GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.
LOT 3
MARYRIDGE
P.B.31 PG.166
PROPERTY N/F
MARY & MICHAEL G. THORNTON
3624/1644
ID#2-050D-6956-00-3
LOT 9
MARYRIDGE
P.B.31 PG.166
PROPERTY N/F
NANCY K. WARREN
1538/777
ID#2-050D-6956-00-9
LOT 1C
RESUBDVISION
OF LOT 2 &
RESUBDIVISION
OF PART OF
LOTS 1 & 10
MARY RIDGE
P.B. 32 PG. 349
PROPERTY N/F
JOHN & MARGARET BRASS
0/0
ID#2-050D-7353-00-1C
LOT 1B
RESUBDVISION
OF PART OF
LOTS 1 & 10
MARY RIDGE
P.B. 32 PG. 94
PROPERTY N/F
FREDERICK E. & MARGARET M. VORWERK
1727/83
ID#2-050D-7353-00-1B
LOT 1A
RESUBDVISION
OF PART OF
LOTS 1 & 10
MARY RIDGE
P.B. 32 PG. 94
PROPERTY N/F
JERRY & MARY DAVIS
0/0
ID#2-050D-7353-00-1A
LOT 10
RESUBDVISION
OF PART OF
LOTS 1 & 10
MARY RIDGE
P.B. 32 PG. 94
PROPERTY N/F
GERALD E. & RITA M. PHILLIPS
0/0
ID#2-050D-6956-00-10
LOT 1
O'FALLON GARDENS
P.B. 50 PG. 262
PROPERTY N/F
JAMES LEWIS JONES AND
LEE ANNA JONES
1425/1121
ID#2-050D-4371-00-1
FOR CONSTRUCTION OF SANITARY MH G TO MH I, PROPERTY OWNERS TO BE NOTIFIED 24 HOURS PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL RESTORE ALL OF THE EXISTING DRIVEWAYS AND ANY EXISTING IMPROVEMENTS (INCLUDING GRASS) THAT WILL BE DAMAGED OR DESTROYED DURING CONSTRUCTION.
SCHOEN MORGAN
50' WIDE P.B. 31 PG.166
SANITARY MANHOLES BEYOND THIS POINT NOT FOUND
COMMON GROUND UTILITY EASEMENT P.B. 32 PG. 94
R=68.00'
L=62.47'
S07°28'49"W
111.68
N25°05'39"E
80.83
S22°14'00"W
206.66
S57°46'23"E
260.36
N21°49'00"E
90.49
N26°20'00"W 104.07
N22°45'00"W 174.95
N23°27'46"W 89.26
R=123.00'
L=60.57'
R=25.00'
L=21.01'
DISTURBED
ONSITE
25-YR. FLOW
0.44 Ac. @ 3.80
Q=1.67 c.f.s.
UNDISTURBED
ONSITE
25-YR FLOW
0.75 Ac. @ 2.58
Q=1.93 c.f.s.
UNDISTURBED
ONSITE
25-YR FLOW
0.15 Ac. @ 2.58
Q=0.39 c.f.s.
DISTURBED
ONSITE
25-YR FLOW
1.13 Ac. @ 3.80
Q=4.29 c.f.s.
OFFSITE
25-YR FLOW
1.25 Ac. @ 2.71
Q=3.39 c.f.s.
OFFSITE
25-YR FLOW
1.08 Ac. @ 3.26
Q=3.52 c.f.s.
SEDIMENT BASIN A
TEMPORARY SEDIMENT BASIN B
TEMPORARY DIVERSION SWALE
DITCH CHECKS (TYP.)
SILT FENCE (TYP.)
GRADING LIMITS (TYP.)
TREES TO REMAIN
INTERIM CONTOURS (TYP.)
PERMANENT DRAINAGE EASEMENT TO THE CITY OF O'FALLON BK. 2796 PG. 1630
21" CONCRETE FLARED END SECTION
31.81' ~ 21" R.C.P. @ 1.0% UFL-533.00 LFL-532.68
EMGE ROAD
(VARIABLE WIDTH)
SUNSET LANE
PROPERTY N/F
NELCO DEVELOPMENT INC.
4064/944
ID#2-050D-4371-00-4
PROPERTY N/F
NELCO DEVELOPMENT INC.
4064/947
ID#2-050D-4371-00-8
PROPERTY N/F
MICHAEL, & VICKI SCHNEIDER
3851/1842
ID#2-050D-9275-00-3
PROPERTY N/F
BRAD, MICHAEL, & VICKI SCHNEIDER
ID#2-050D-9275-00-2
O'FALLON GARDENS P.B. 5 PG. 8
PROPERTY N/F
ALPHONSE EVANS & JULIE ILER
4130/2030
15
PROPERTY N/F
ROBERT AND HAZEL VOSS
576/642
ID#2-050D-4371-00-15
O'FALLON GARDENS
P.B. 5 PG. 8
TEMPORARY 20'W x 40'L CONSTRUCTION/ WASHOFF ENTRANCE WITH MINIMUM 6" TO 8" ROCK AGGREGATE BASE UNDERLAIN WITH GEOTEXTILE FABRIC IF WATER IS NOT AVAILABLE A WATER TRUCK WILL BE PROVIDED
O'FALLON FILE NUMBER 1805.02
UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THEREFORE THEIR LOCATIONS SHALL BE CONSIDERED APPROXIMATE ONLY. THE VERIFICATION OF THE LOCATION OF ALL UNDERGROUND UTILITIES, EITHER SHOWN OR NOT SHOWN ON THESE PLANS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, AND SHALL BE LOCATED PRIOR TO ANY GRADING OR CONSTRUCTION OF THE IMPROVEMENTS.
2
5