PARADISE TOWNSHIP

YORK COUNTY, PENNSYLVANIA

ORDINANCE NO. 2005-04

AN ORDINANCE OF THE BOARD OF SUPERVISORS OF PARADISE TOWNSHIP, YORK COUNTY, PENNSYLVANIA, AMENDING CHAPTER 26 STORMWATER MANAGEMENT ORDINANCE SECTIONS 110 AND 111 (Ordinance 1996-1), ENACTED April 8, 1996

BE IT ORDAINED AND ENACTED, and it is hereby ordained and enacted by the Board of Supervisors of Paradise Township, York County, Pennsylvania as follows:

Section 1: Chapter 26, Section 110 Maintenance Guarantee.

Chapter 26 Paradise Township Stormwater Management Ordinance Section 110, is hereby amended by adding the following subparagraph as new subpart 1A. and 2A. and changing the existing subpart 1A. to subpart 1B. and 2B.:

"i) The entire facility shall be maintained in a grass cover. No shrubs or trees shall be planted or allowed to exist within the facility.

ii) Grass shall be maintained at a height not to exceed six (6) inches tall and shall be mowed a minimum of four (4) times per year."

Section 2: Chapter 26, Section 111 Inspections.

Chapter 26 Paradise Township Stormwater Management Ordinance Section 111, is hereby amended by adding the following language at the end thereof:

"4. Inlets shall be inspected after each rain and any debris removed at that time.

5. Detailed annual inspection will be made and records kept of the results. This inspection shall focus on the structural integrity of the facility including erosion, condition of drainage structures and drainage pipes. After the inspection the facility shall be repaired and items replaced as necessary to maintain the design condition.

6. Every ten (10) years a topography survey of the entire facility is to be performed and the facility shall be restored to the contours, dimensions, elevations and intent of the approved plans at lot owner's cost."

Section 3: Repealer.

The passage of this Ordinance amending in part the Paradise Township Stormwater Management Ordinance shall in no way be deemed to invalidate or repeal any provisions of said Ordinance except as specifically provided herein.

Section 4: Severability.

If any section, subsection, sentence or clause of this Ordinance is held for any reason to be invalid, such decision or decisions shall not affect the validity of the remaining portions of this Ordinance.

Section 5: Effective Date.

This Ordinance shall be effective upon adoption.

ENACTED AND ORDAINED INTO AN ORDINANCE THIS 10th day of October, 2005, by Paradise Township Board of Supervisors in lawful session duly assembled.

Attest:

Judy M. Katz
Secretary

PARADISE TOWNSHIP
BOARD OF SUPERVISORS

By: _____
Supervisor

By: _____
Supervisor

By: _____
Supervisor

PARADISE TOWNSHIP

YORK COUNTY, PENNSYLVANIA

STORMWATER MANAGEMENT ORDINANCE

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PARADISE TOWNSHIP
YORK COUNTY, PENNSYLVANIA

STORMWATER MANAGEMENT ORDINANCE

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STORMWATER MANAGEMENT ORDINANCE

PARADISE TOWNSHIP
YORK COUNTY, PENNSYLVANIA

ORDINANCE NO.

AN ORDINANCE CREATING A STORMWATER MANAGEMENT PLAN FOR PARADISE TOWNSHIP WATERSHEDS

WHEREAS, the Board of Supervisors of Paradise Township finds that:

Inadequate management of accelerated runoff of stormwater resulting from development throughout the Paradise Township Watersheds increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control stormwater, undermines floodplain management and flood-control efforts in downstream communities, reduces groundwater recharges and threatens public health and safety; and

A plan of stormwater management for the Paradise Township Watersheds, including reasonable regulation of development and activities causing accelerated runoff, is fundamental to the public health, safety and welfare and protection of the people of Paradise Township and for the protection of people and property in downstream communities.

NOW, THEREFORE, be it ordained and it is hereby ordained by the Board of Supervisors of Paradise Township as follows:

Section 1. Definitions. The following terms, wherever they appear in this Ordinance, shall have the following meanings:

Agriculture. The use of land for farming, dairying, pasturage, apiculture, horticulture, floriculture, viticulture and animal and poultry husbandry. Impervious material of any nature shall not be considered part of agriculture.

Cistern. A reservoir or tank for storing water.

Culvert. A structure intended to convey runoff under an embankment, and which is designed to take advantage of submergence to increase capacity.

Design Storm. The magnitude of precipitation from a storm event measured in probability of occurrence (e.g., 25-year storm) and duration (e.g., 24-hour), and used in computing stormwater management control systems.

Detention Basin. A basin designed to retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate. This basin is designed to drain completely after a storm event.

Development. The improvement or alteration of any lot, parcel, tract or piece of land for residential, commercial, or industrial purposes in any manner which increases the quantity of impervious material cover, such as the construction or expansion of buildings, parking facilities, streets, etc.

Impervious Material. Any material other than vegetative cover.

Infiltration Structures. A structure designed to direct runoff into the ground, e.g. french drains, seepage pits, seepage trenches, etc.

Land Development. For the purposes of this Ordinance, the definition of "Land Development" shall be any subdivision or new construction or expansion of any residential, commercial, industrial, accessory or other facility that creates a total additional area of impervious material on the parcel of six hundred and fifty (650) square feet or more.

Peak Discharge. The maximum rate of flow of water at a given point and time resulting from a predetermined storm.

Person. An individual, partnership, public or private association or corporation, firm, trust, estate, municipality, governmental unit, public utility or any other legal entity whatsoever. Whenever used in any section prescribing or imposing a penalty, the term "person" shall include the members of a partnership, the officers, agents and servants of a corporation and the officers of a municipality.

Retention Basin. A basin or pond containing a permanent pool of water and designed to retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Runoff. That part of precipitation which flows over the land.

Runoff Characteristics. The surface components on any watershed which either individually or in any combination thereof, directly affect the rate, amount and direction of stormwater runoff. These may include, but are not limited to: vegetation, soils, slopes and any type of manmade landscape alterations.

SCS. Soil Conservation Service, U.S. Department of Agriculture.

Seepage Pit/Seepage Trench. An area of excavated earth filled with loose stone or similar material and into which surface water is directed for infiltration into the ground.

Stormwater. Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

Subdivision. For the purposes of this Ordinance, the definition of "Subdivision" shall be identical to that contained in the current Paradise Township Subdivision and Land Development Ordinance.

Time of Concentration (tc). The interval of time required for water from the most remote portion of the drainage area to reach the point in question.

Township Paradise Township Board of Supervisors.

Watershed. The corporate limits of Paradise Township or other geographical districts as defined by resolution after adoption of this Ordinance.

Section 2. The Duty of Persons Engaged In Development of Land.

It shall be a violation of this Ordinance for any person to engage in any subdivision, alteration or development of land unless such subdivision, alteration or development is in compliance with a stormwater management plan which has been approved by the Township Engineer and all other requirements of this Ordinance have been complied with. The stormwater management plan may require measures to:

A. collect stormwater runoff from streets and other areas and convey same, as hereinafter provided, to a suitable point or points of discharge; and

B. assure that the maximum rate of stormwater runoff is no greater after development than prior to development activities; and

C. manage the quantity, velocity and direction of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury. Said measures shall be in accordance with the criteria hereinafter provided. Such measures may include, but are not limited to, the following:

1. Detention basins.
2. Retention basins.
3. Roof-top storage.
4. Parking lot and street ponding.
5. Seepage pits, seepage trenches or other infiltration structures.
6. Porous pavement and concrete lattice block surfaces.
7. Grassed channels and vegetated strips.
8. Cisterns and underground reservoirs.
9. Routing flow over grass.
10. Decreased impervious area coverage.

The use of other control methods which meet the criteria in this section will be permitted when approved by the Paradise Township Engineer and the Board of Supervisors. Various combinations of methods may be tailored to suit the particular requirements of the type of development and the topographic features of the project area.

Section 3. Exemptions.

The following persons shall be exempted from the requirements of this Ordinance:

A. Any person who has secured a building permit prior to the effective date of this Ordinance;

B. Any person who applies for a permit for a building or structure within a subdivision or land development which was approved by the Township with an approved stormwater management plan and the subdivision or land development proposes the building or structure which is sought to be permitted, excepting that all stormwater management facilities proposed by such plan be completed.

C. Any person who engages in any alteration or development of land after it has been determined by a designated representative of the Township that stormwater management will not be necessary.

D. Construction of sidewalks, driveways and curbing within public rights-of-ways existing and actually improved on the effective date of this Ordinance.

E. Use of land for gardening for home consumption.

F. Agriculture when operated in accordance with a conservation plan approved by the York County Conservation District.

G. Land developments which involve the installation of 650 square feet or less of impervious surface.

Section 4. Duty to Submit Plan.

Before the subdivision, alteration or development of any tract, parcel or piece of land within the Township each person, except as exempted above, desiring to subdivide, alter or develop said land shall submit two (2) copies of a plan, to be approved by the Township, which will provide for the management of stormwater on the land proposed for subdivision, alteration or development. If a Subdivision or Land Development Ordinance is proposed, said plan shall be submitted at the same time as the subdivision or land development plan.

Section 5. Plan and Report Requirements.

The plan and report shall be sealed by a Registered Professional Engineer or Land Surveyor. The Engineer or Surveyor shall certify that the plan and report meets the minimum design requirements of this Ordinance and shall include the following:

A. Topographic features.

1. The location of the project relative to highways, municipalities or other identifiable landmarks.

2. Contours at intervals of one (1) foot. In areas of steep slopes (greater than 15%), five-foot contour intervals may be used.

3. Streams, lakes, ponds or other bodies of water within or near the project.

4. Other physical features including existing drainage swales and areas of natural vegetation to be preserved.

5. Locations of proposed underground utilities, sewers, and water lines.

B. Soil types and boundaries within the area tributary site.

C. Final topography.

1. Changes to land surface and vegetative cover.

2. Areas to be cut or filled.

3. Structures, roads, paved areas and buildings.

4. Final contours at intervals of one (1) foot. In areas of steep slopes (greater than 15%), five-foot contour intervals may be used. Final contours in area of stormwater management facilities may not exceed two (2) foot intervals.

D. Stormwater management controls.

1. All stormwater management controls must be shown on the plan and described in a narrative report, including:

a. Groundwater recharge methods such as seepage pits, beds or trenches. The location of the proposed structure, including a detailed cross-section. If these structures are proposed, the locations of septic tank infiltration areas and wells must be shown. Groundwater recharge methods must comply with the additional requirements in Subsection F of this section.

b. Other control devices or methods such as rooftop storage, semi-previous paving materials, grass swales, parking lot ponding, vegetated strips, detention or retention ponds, storm sewers, etc.

c. Basins - A cross-section of the basin showing the relationship between the existing topography and the proposed bottom, spillway, top of embankment and the outlet structure and the corresponding proposed finished grade elevations. A detail of the outlet structure shall be provided, including all pertinent construction requirements.

d. Schedule for installation of the control measures and devices. In all cases the proposed stormwater control devices must be completed prior to the creation of additional impervious area.

2. All calculations, assumptions and criteria used in the design of the control device or method must be submitted with the plan, including, but not limited to: (1) methodology for determining time of concentration and weighted runoff curve numbers; (2) stage/ storage/discharge table including sample calculations for determining discharge rates; (3) summary table showing pre-development, controlled and uncontrolled post-development peak discharge rates for all required storms; and (4) copies of percolation test results when required; and (5) drainage divide maps for stormwater management facilities; and (6) T_c paths and supporting calculations.

E. Stormwater collection system.

1. All catch basins, pipes, swales, and other means of conveyance of stormwater must be shown on the plan and described in a narrative report, including:

   a. A plan view of the collection system showing the location, size and material for all catch basins, ditches, swales, and pipes.

   b. A profile of the collection system showing existing and proposed finish grades, proposed invert elevations, top of grate elevations and slope of each storm sewer or open channel segment.

   c. A topographic-drainage delineation plan showing the area tributary to each design point in the collection system.

2. All calculations, assumptions, and criteria used in the design of the stormwater collection system must be submitted with the plans.

F. Additional Requirements for Groundwater Recharge Methods. The following requirements apply to all proposed groundwater recharge methods of stormwater management such as seepage pits, beds, trenches, leaching wells, and cisterns:

1. Seepage pits, beds, or trenches shall be provided for all residential developments as well as for all industrial and commercial developments for the purpose of groundwater recharge, except as designated in Section 3 of this Ordinance. All roof areas in excess of 650 square feet shall be discharged into a seepage structure. All gutters shall be provided with screening to prevent the introduction of debris into the seepage structure. Structures must be located at least fifty (50) feet from on-lot septic systems.

2. Representative percolation tests may be required throughout the area proposed for development. When required, at least one percolation test must be included in each soil group and at least one percolation test must be conducted for each five lots proposed for development. Testing, in general, should follow the same guidelines as though testing for an on-lot septic system.

G. Maintenance Program. A maintenance program for all stormwater management facilities must be included. This program must include the ownership of the facilities and detail the financial responsibility for any required maintenance consistent with the requirements of Section 10 of this Ordinance.

Section 6. Design Criteria: Stormwater Collection System.

The stormwater collection system shall be designed and approved based upon the following criteria:

A. General. Peak discharge shall be computed using the Rational Formula:

$$Q = CIA$$

where:

Q = Peak discharge in cubic feet per second.

C = Runoff factor expressed as a percent of the total water falling on an area.

I = The rate of rainfall for the time of concentration of the drainage area in inches per hour for a given storm frequency (Rainfall Intensity).

A = The drainage area expressed in acres.

The runoff factor "C" is a percentage factor which represents the proportion of the total quantity of water falling on the area that remains as runoff.

The runoff factors for various types of drainage areas, as presented in Table 1, shall be used for design.

A computation table similar to Table 2 shall be submitted with the storm sewer design.

Storm intensity-duration-frequency curves are presented on Figure 1. The curves provide for variation in rainfall intensity according to:

1. Storm frequency:

   a. The following storm frequencies shall be used for design:
      (1) Local streets - 10 Year
      (2) Culvert cross drains - 25 Year
      (3) Swales - 100 Year

   b. When a pipe or culvert is intended to convey the discharge from a stormwater management facility, its required capacity shall be computed by the rational method and compared to the peak outflow from the stormwater management facility for the 25 year storm. The greater flow shall govern the design of the pipe or culvert.

c. When a pipe is part of a storm sewer system and crosses the roadway, it shall be designed as a storm sewer with the same design storm as the remainder of the drainage system.

d. Greater design frequencies may be justified on individual projects, as may be recommended by the Township Engineer.

e. A 25 year storm frequency may be required for design of the stormwater collection system to insure that the resultant stormwater runoff from the post development storm is directed into the management facility.

2. Storm Duration:

a. The time of concentration approach shall be used in determining storm duration.

b. A minimum duration of five (5) minutes shall be used.

B. Inlet Placement

In general, inlets shall be spaced such that, based upon the Rational Method, time of concentration (tc) = 5 min. and 10 year rainfall intensity, the area contributing to the inlet shall not produce a peak runoff of greater than 4 cubic feet per second (cfs). Also, inlets shall be spaced so that their efficiency, based upon efficiency curves published by the Pennsylvania Department of Transportation, is not less than 65% (Figures 2 through 6).

Additional inlets shall be placed at the upper side of street intersections, to prevent stormwater from crossing an intersection. Other devices such as high efficiency grates or perforated pipe may be required if conditions warrant.

C. Pipe and Swale capacity

Manning's equation shall be used for the design of all storm sewer pipes and for open channel design:

$$V = \frac{1.486}{n} R2/3\ S1/2$$

where:

V = Velocity of the water in feet per second

R = Hydraulic radius which is equal to the net effective area (A) divided by the wetted perimeter (W.P.):

$$R = \frac{A}{W.P.}$$

The wetted perimeter is the lineal feet of the drainage facility cross-section which is wetted by the water.

S = Slope of energy line (for approximation, use water surface slope in wetted stream and stream bed slope in dry stream.

n = The roughness coefficient. Roughness coefficients are presented in Table 3.

The maximum permitted velocity in an unlined swale shall be 5.0 feet per second.

D. Culverts:

In all cases where drainage is picked up by means of a headwall, and inlet or outlet conditions control, the pipe shall be designed as a culvert. The minimum diameter of culvert shall be 18 inches. The procedure contained in Hydraulic Engineer Circulars No. 5 and No. 13, as prepared by the U.S. Department of Transportation, Federal Highway Administration, Washington, D.C., shall be used for the design of culverts.

Section 7. Design Criteria: Stormwater Management Facilities.

The plan shall be designed and approved based upon the following criteria:

A. General. Peak discharge and runoff shall be computed using either the soil-cover complex method contained in "Urban Hydrology for Small Water Sheds", Technical Release No. 55 published by Engineering Division, Soil Conservation Service, United States Department of Agriculture, dated January, 1975, except as modified herein or the Modified Rational method for drainage areas less than 20 acres.

B. Outflow Determination. The maximum permitted stormwater discharge, in cubic feet per second, from any site shall not exceed the capacity of the receiving pipe or structure, nor 90 per cent of the calculated peak discharge from the site at pre-development ground cover and soil conditions for all design storms specified below. For the purpose of this ordinance, pre-development ground cover conditions shall be assumed to be "meadow" as defined in "Urban Hydrology for Small Water Sheds", Technical Release No. 55 published by Engineering Division, Soil Conservation Service, United State Department of Agriculture, dated January, 1975 (or, if using the Rational method use a "C" = 0.2).
The maximum permitted stormwater discharge shall be calculated using either the SCS method or the Modified Rational method for the same intervals for twenty-four hour rainfalls having recurrence intervals of 2, 5, 10, and 25 years. For the purposes of this Ordinance, the following rainfall depths for the SCS method shall be used for design:

Recurrence Interval, Years	24-Hour Rainfall Depth, Inches
2	3.1
5	4.1
10	4.9
25	5.5
100	7.1

The PA DOT Intensity-Duration Frequency (IDF) curves used to generate the proper rainfall intensity for design when using the Modified Rational Method.

C. Existing runoff volume. Existing runoff volume, in inches, shall be determined using the SCS method at pre-development conditions for the 25-year rainfall depth listed in Subsection B herein.

D. Future runoff volume. The future runoff volume, in inches, shall be determined using the SCS method at post-development conditions (including any future expansion) for the 25-year rainfall depth listed in Subsection B above.

E. Minimum required detention storage. The minimum required detention storage, shall be determined by routing the 25-year post-development hydrograph through the stormwater management facility, using either manual methods or computerized routing. Routing shall be based upon the modified Pul's method; other routing methodologies shall be subject to the approval of the Township Engineer.

F. Emergency spillway. Emergency spillways or over flow structures shall be designed to pass the peak flow resulting from a one-hundred year storm computed at post-development conditions. All retention basins and detention basins shall be provided with an emergency spillway.

G. All stormwater management facilities must discharge into adequate drainage ways or storm sewers.

H. Minimum bottom slope. All detention basins shall have a minimum bottom slope of 2 per cent, unless a paved low-flow channel is provided.

I. Maximum depth. The permitted depth for detention or retention basins shall be 6 feet, measured from the bottom of the emergency spillway to the lowest point in the basin.

J. Side slopes. The maximum permitted side slopes for detention or retention basins shall be 4 horizontal to 1 vertical.

K. Location. All stormwater management facility discharge pipes may not be located closer than ten (10) feet from any property line.

L. Fencing. Any stormwater detention/retention facility that is designed so that it retains water on a temporary basis may be subject to the following fencing requirements:

1. In accordance with current Township standard.

2. All gates or doors opening through such enclosure shall be equipped with a self-closing and self-latching device for keeping the gate or door securely closed at all times.

M. No stormwater management facilities shall be installed over existing utility mains and services.

N. Groundwater Recharge.

1. Roof discharge shall be routed through the seepage structure using a TR-55, Type 2 storm distribution and a void ratio appropriate for the medium being used. If percolation tests are unavailable for design, the seepage structure shall be designed to contain the volume of the entire 10 year post-development flow to the structure.

2. Seepage structures shall be designed to handle, with no overflow, the entire 10-year post-development runoff. No credit will be given for pre-development flows.

3. An at grade overflow shall be provided.

4. If perforated pipe is used, a cleanout shall be provided at the end of the pipe to allow for flushing of the line.

5. Figure 7 at the end of this Ordinance presents a suggested design for a residential stormwater management seepage basin based on a 3 foot deep basin and a 2" per hour percolation rate.

O. If the flow from a detention facility would otherwise damage or interfere with the agricultural or residential use of a property over which it would flow, it shall be piped to a stream with the pipe at such a depth so as not to interfere with the agricultural use of the property through which the water is piped. This requirement shall not apply if the owner of the property which would be adversely affected by the flow refuses to grant to the subdivider or land developer a right-of-way without charge to the subdivider or developer except for damage to growing crops and trees. Any pipeline shall be located so as to minimize surface damage.

Section 8. Plan Review and Approval.

The Township shall forward one copy of the plan to the Township Engineer for review. The Township Engineer shall recommend to the Township in writing whether the plan should be approved, disapproved or amended within forty-five (45) days following its submission. Failure of the Township Engineer to render an opinion within the forty-five (45) day time limit shall be deemed a favorable review unless the applicant has agreed in writing to an extension of time. At a scheduled public meeting, the Board of Supervisors shall render its decision on the application not later than sixty-five (65) days after such application has been filed.

Section 9. Fees and Expenses.

Any engineering, legal and administrative costs incurred shall be the responsibility of the subdivider or developer and shall be paid promptly upon being notified by the Township. All costs must be paid prior to issuance of a Certificate of Use and Occupancy.

Section 10. Maintenance Guarantee.

A. Maintenance by private entity. In cases where permanent control facilities are owned by a private entity (such as a homeowner's association), such entity shall be responsible for maintenance. In this case a legally binding agreement between the entity and the municipality shall be made providing for maintenance of all permanent control facilities, including the inspection by the Township Engineer of all such facilities deemed critical to the public welfare annually and after each major flood event. Such maintenance shall be guaranteed by all of the property owners in the subdivision or land development whose stormwater management needs are provided by the control facility.

If the Township determines at any time that any permanent stormwater management control facility has been eliminated, altered or improperly maintained, the owner of the property shall be advised of corrective measures required and given a reasonable period of time to take necessary action. If such action is not taken by the property owner, the Township may cause the work to be done and a lien for costs incurred by the Township together with attorney's commission for collection in the amount of twenty-five (25%) per cent of the amount of such costs may be entered as a municipal lien against any or all of the lots within the subdivision without duty to apportion.

B. Maintenance by individual lot owners. When stormwater management facilities are located on all individual lots, and when they are the responsibility of that landowner to maintain, a description of the facility or system and the terms of the required maintenance shall be recorded with the deed to the property.

If the Township determines at any time that any permanent stormwater management facility has been eliminated, altered, or improperly maintained, the owner of the property shall be advised of corrective measures required and given a reasonable period of time to take necessary action. A lien for the cost incurred by the Township together with attorney's commission for collection in the amount of twenty-five (25%) per cent of such costs may be placed against the property in accordance with the requirements of the Municipal Lien Law.

C. Maintenance by Township. The Township is authorized, where it is deemed necessary for the public welfare, to enter into contracts with persons whereby such persons will dedicate such stormwater management facilities to the Township; provided, however, before such stormwater management facility is dedicated to the Township and accepted by the Township such person shall have deposited a sum of money with the Township sufficient, in the opinion of the Township, to provide for the future maintenance and repair of the stormwater management facility for a period of not less than ten years.

Section 11. Inspections.

The Township Engineer or his designee may periodically inspect the site during construction of the permanent stormwater facilities. It is the responsibility of the permittee to notify the Township Engineer seventy-two (72) hours in advance of the beginning of construction of stormwater management facilities.

Any portion of the work which does not comply with the approved plan and report must be promptly corrected by the permittee. No work may proceed on any subsequent phase of the stormwater management plan, the subdivision or land development or building construction, until the required corrections have been made.

After construction of the facility, the developer's engineer will certify to the Township that the construction of the stormwater management facility was completed in accordance with the plans, specifications, and reports as originally submitted and approved by the Township. Work which is not properly documented and certified or which do not accurately reflect correct site conditions will be rejected.

Section 12. Civil Remedies.

Any person violating any of the provisions of this Ordinance shall, upon conviction thereof before a District Magistrate, be subject to a penalty in the amount of six hundred ($600.00) dollars for each and every offense. Each and every day that a violation continues shall constitute a separate and distinct offense and shall be subject to separate and distinct penalties hereunder.

Section 13. Penalties.

Any person violating any of the terms or provisions of this Ordinance shall be fined a sum not exceeding six hundred ($600.00) dollars and summary proceedings commenced by the Township before any District Magistrate. Each day's violation shall constitute a separate offense for the purpose of commencing summary proceedings.

Section 14. Appeals.

Any person aggrieved by any decision of the Township may appeal to the Court of Common Pleas of York County, Pennsylvania within the time allowed by law for such an appeal.

Section 15. Waivers.

The provisions of these regulations are intended as a minimum standard for the protection of the public health, safety, and welfare. If the literal compliance with any mandatory provision of these regulations is shown by the applicant, to the satisfaction of the Township and the Township Engineer, to be unreasonable or to cause undue hardship as it applies to a particular property, or if the applicant shows that an alternative proposal will allow for equal or better results, the Township may grant a waiver from such mandatory provision. However, the granting of a waiver shall not have the effect of making null and void the intent and purpose of this Ordinance. In granting waivers, the Township may impose such conditions as will, in its judgment, secure substantially the objectives of the standards and requirements of this Ordinance.

Section 16. Validity

Should any section or provision of this Ordinance be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of the Ordinance as a whole or any part thereof other than the part so declared to be unconstitutional or invalid, and it is hereby declared to be the intent of the Township that the remainder of this Ordinance would have been adopted without any such provisions held to be invalid.

Section 17. Effective Date

This Ordinance shall be known and cited as the "Paradise Township Stormwater Management Ordinance" and shall become effective the 8 day of April, 1996.

Section 18. Authority to Enact Ordinance.

This Ordinance is enacted by Paradise Township pursuant to authority vested in Second Class Townships by the Second Class Township Code, 53 P.E. s65101 through s67201, the terms and provisions of the Pennsylvania Municipalities Code, 53 P.S. s10101 through s11202, and to carry out the express intent of the Legislature of the Commonwealth of Pennsylvania as set forth in the Stormwater Management Act, No. 1978-167, 32 P.S. s680.1 through s680.20, approved October 4, 1978.

Enacted and ordained this 8th day of April, 1996

ATTEST:

By _____
Carol E. Emig, Secretary

PARADISE TOWNSHIP
BOARD OF SUPERVISORS

By _____
Dean L. Bentzel, Chairman

_____
Russell E. Wire

_____
James A. Cappetta, Jr.

FIGURE 1

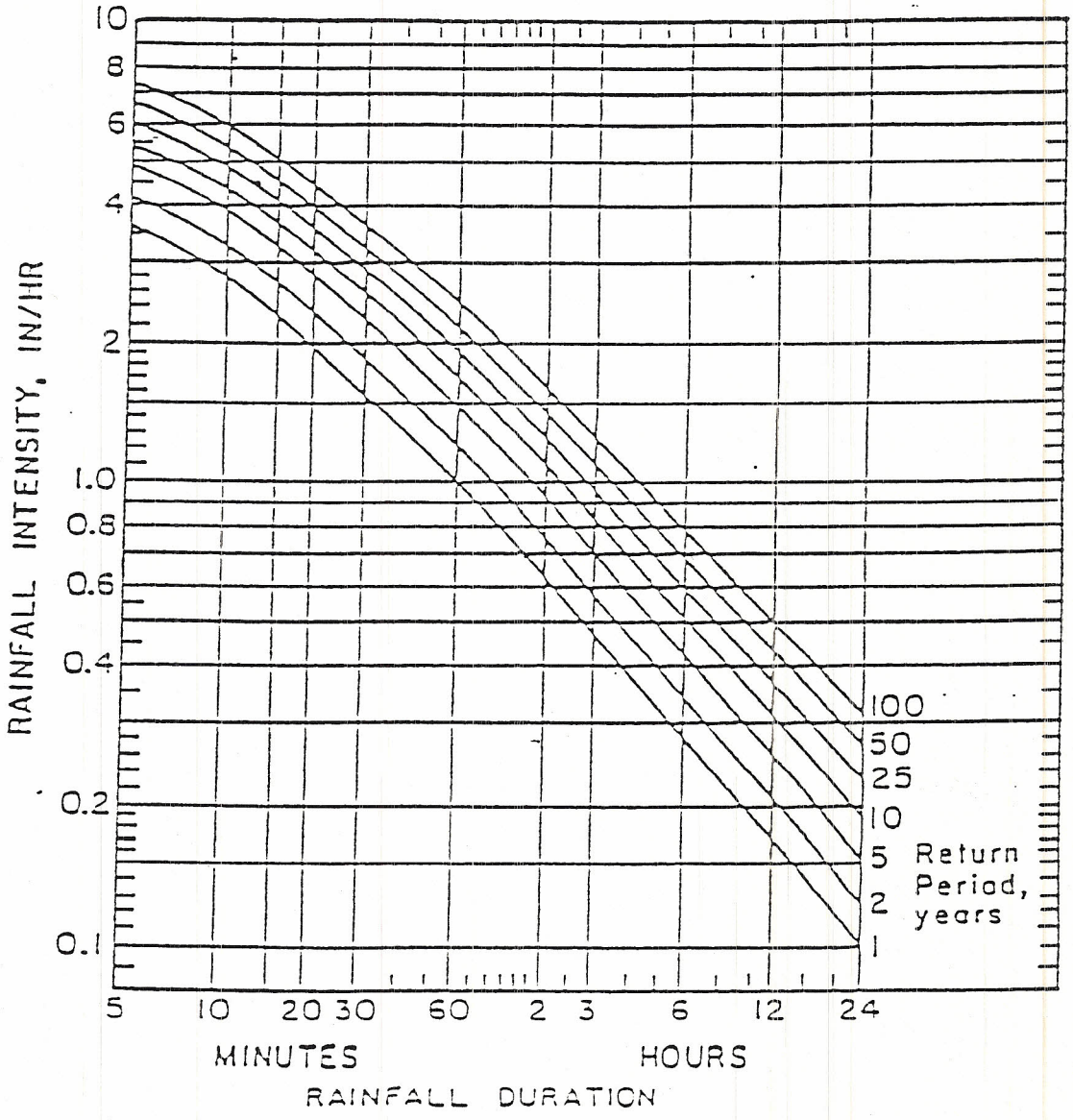

10
8
6
4
2
1.0
0.8
0.6
0.4
0.2
0.1
RAINFALL INTENSITY, IN/HR
100
50
25
10
5
2
1
Return Period, years
5
10
20
30
60
2
3
6
12
24
MINUTES
HOURS
RAINFALL DURATION

TABLE 1

RUNOFF FACTORS FOR THE RATIONAL EQUATION

TYPE OF DRAINAGE AREA OR SURFACE	RUNOFF FACTOR "C" MINIMUM	MAXIMUM
Pavement, concrete or bituminous concrete	0.75	0.95
Pavement, bituminous macadam or surface-treated gravel	0.65	0.80
Pavement, gravel, macadam, etc.	0.25	0.60
Sandy soil, cultivated or light growth	0.15	0.30
Sandy soil, woods or heavy brush	0.15	0.30
Gravel, bare or light growth	0.20	0.40
Gravel, woods or heavy brush	0.15	0.35
Clay soil, bare or light growth	0.35	0.75
Clay soil, woods or heavy growth	0.25	0.60
City business sections	0.60	0.80
Dense residential sections	0.50	0.70
Suburban, normal residential areas	0.35	0.60
Rural areas, parks, golf courses	0.15	0.30

NOTES

1. Higher values are applicable to denser soils and steep slopes.

2. Consideration should be given to future land use changes in the drainage area in selecting the "C" factor.

3. For drainage area containing several different types of ground cover, a weighted value of "C" factor must be used.

4. In special situations where sinkholes, stripped abandoned mines, etc. exist, careful evaluation shall be given to the selection of a suitable runoff factor with consideration given to possible reclamation of the land in the future.

"lmb3539"

ΔAC_o = AC(rib. Surface Flow Between Inlets)
ΔAC_p = AC(B, passing Flow From Previous Inlet)
ΔAC_i = AC(Entering Inlet)
C = Runoff Factor

Sheet No. ___ Of ___ By ___ Date ___
S.R. ___ Chkd. By ___ Date ___

2.10.45

INLET NUMBER	STATION	DRAINAGE AREA							TIME		(I) RAINFALL INTENSITY	(Q) DISCHARGE	LENGTH OF PIPE	SLOPE OF PIPE	TYPE OF PIPE	MANNINGS N VALUE	SIZE OF PIPE	MEAN VELOCITY	PIPE CAPACITY FLOWING FULL	REMARKS
		ΔA	C	ΔAC_o	ΔAC_p	ΔAC_o + ΔAC_p	ΔAC_i	ΣAC_i	ΔT	ΣT										
		(Acres)		(Acres)	(Acres)	(Acres)	(Acres)	(Acres)	(Min)	(Min)	(In/Hr)	(CFS)	(Feet)	(F/F)			(In)	(FPS)	(FPS)	

TABLE 2.10.5.7
COMPUTATION TABLE FOR STORM SEWER DESIGN

TABLE 3

ROUGHNESS COEFFICIENT "n" FOR MANNING'S EQUATION

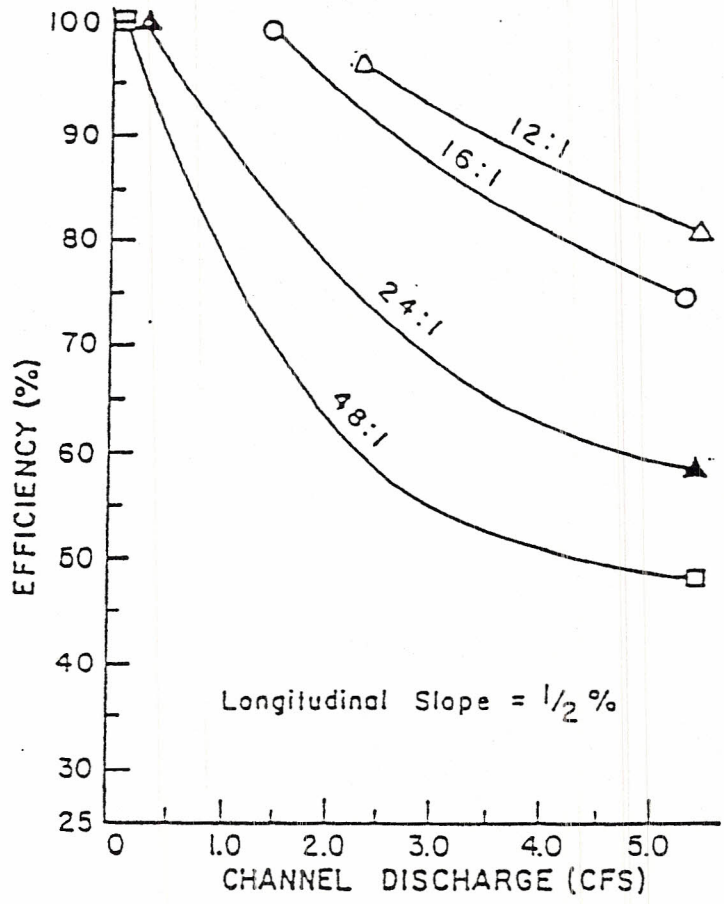
Description	"n"
Concrete Pipe	.012
Annular Corrugated Steel and Alum. Alloy Pipe or Pipe Arch* (plain or coated)	.024
Vitrified Clay Pipe	.012
Cast Iron Pipe	.013
Brick Sewer	.015
Asphalt Pavement	.015
Concrete Pavement	.014
Grass Medians	.05
Earth	.02
Gravel	.02
Rock	.035
Cultivated Areas	.03 - .05
Dense Brush	.07 - .14
Heavy Timber - Little Undergrowth	.10 - .15
Streams	
a. some grass and weeds - little or no brush	.03 - .035
b. dense growth of weeds	.035 - .05
c. some weeds - heavy brush on banks	.05 - .07

Note: In considering each factor more critical judgment will be exercised if it is kept in mind that any condition that causes turbulence and retards flow results in a greater value of "n".

*Roughness Coefficient (n) for Helical Corrugated Steel and Alum. Alloy Pipe

Corrugations	$2\frac{2}{3}" \times \frac{1}{2}"$								$3" \times 1"$
Diameters	18"	24"	36"	48"	60"	72"	84"	96"	ALL DIA.
Plain or Coated	.014	.016	.019	.020	.021	.021	.021	.021	.024

FIGURE 2

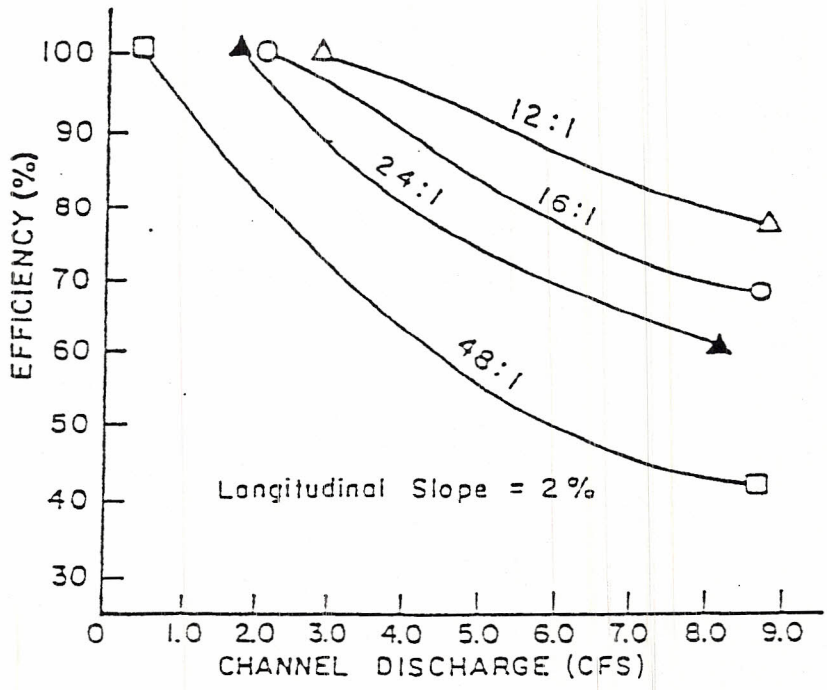


EFFICIENCY CURVES: CAPACITY OF TYPE C INLET OR TYPE M INLET (MOUNTABLE CURB)

* Swale Slope 12 : 1 △
16 : 1 ○
24 : 1 ▲
48 : 1 □

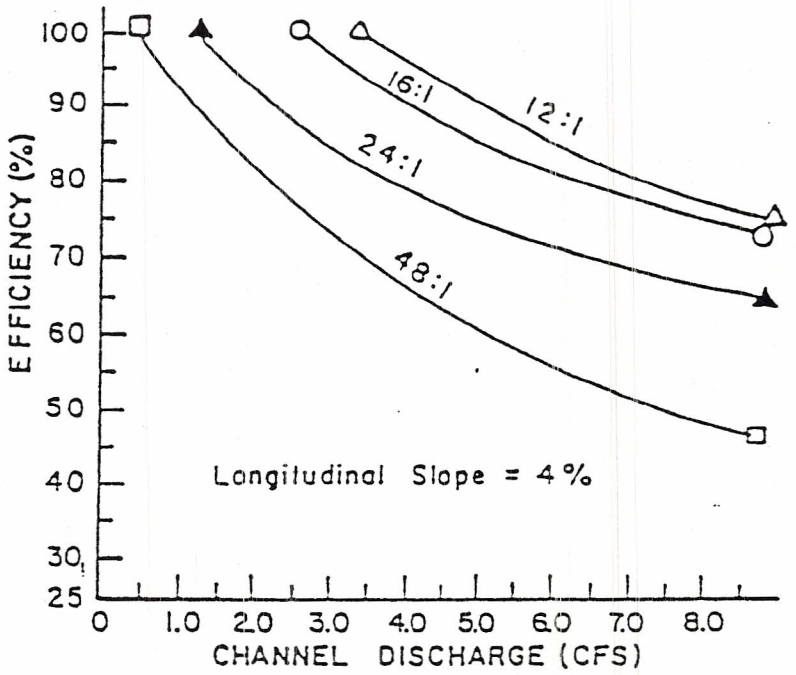
*Pavement Cross Slope

12:1 = .08 ft/ft
16:1 = .06 ft/ft
24:1 = .04 ft/ft
48:1 = .02 ft/ft



EFFICIENCY CURVES: CAPACITY OF TYPE C INLET OR TYPE M INLET (MOUNTABLE CURB)

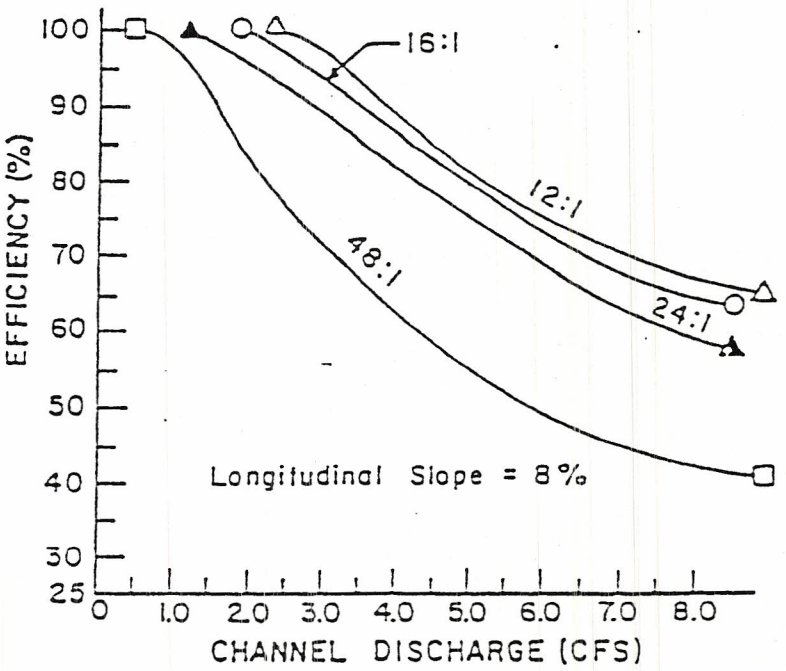
FIGURE 3



* Swale Slope	12 : 1 △
	16 : 1 ○
	24 : 1 ▲
	48 : 1 □

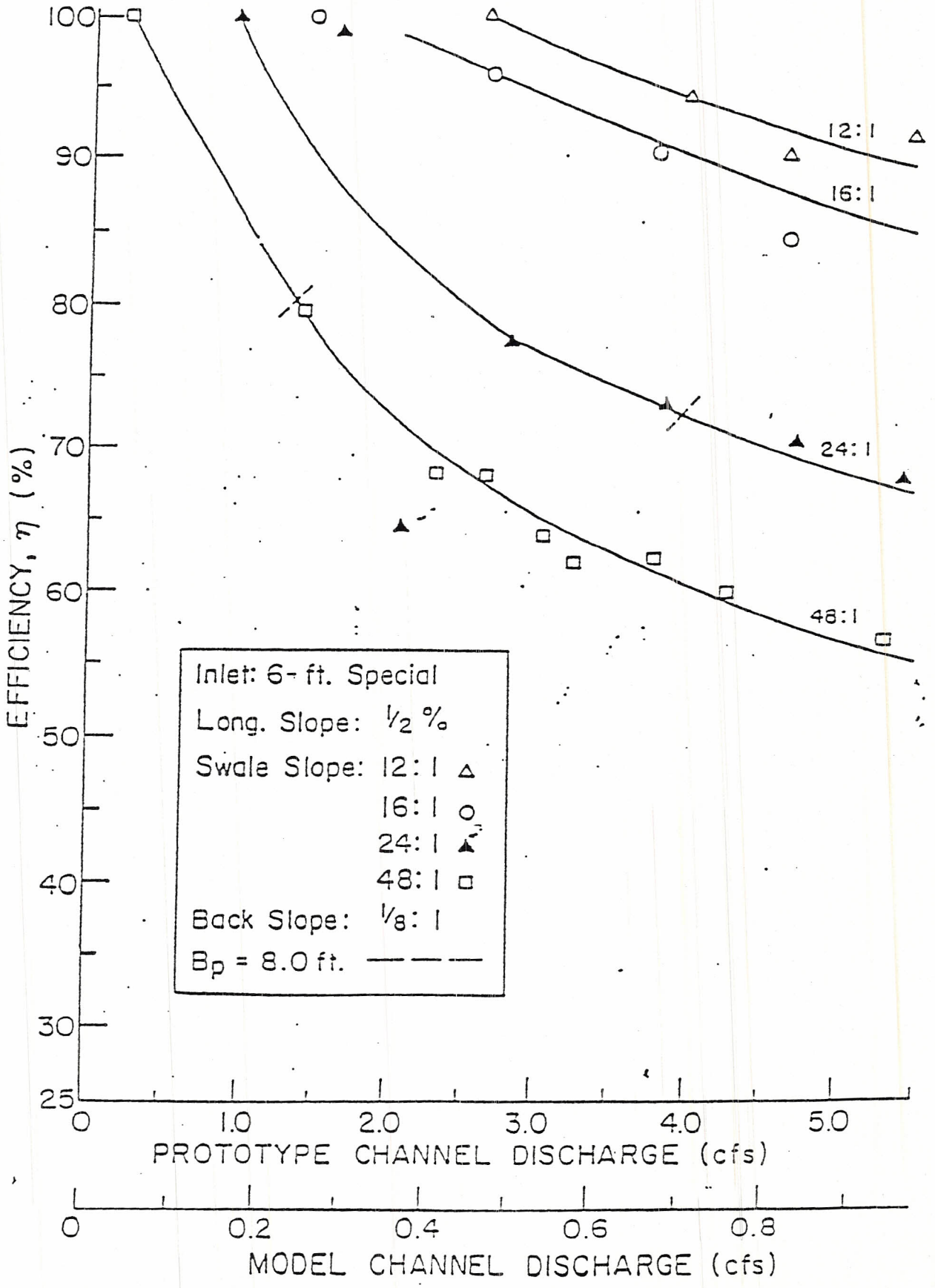
*Pavement Cross Slope

EFFICIENCY CURVES: CAPACITY OF TYPE C INLET OR TYPE M INLET (MOUNTABLE CURB)



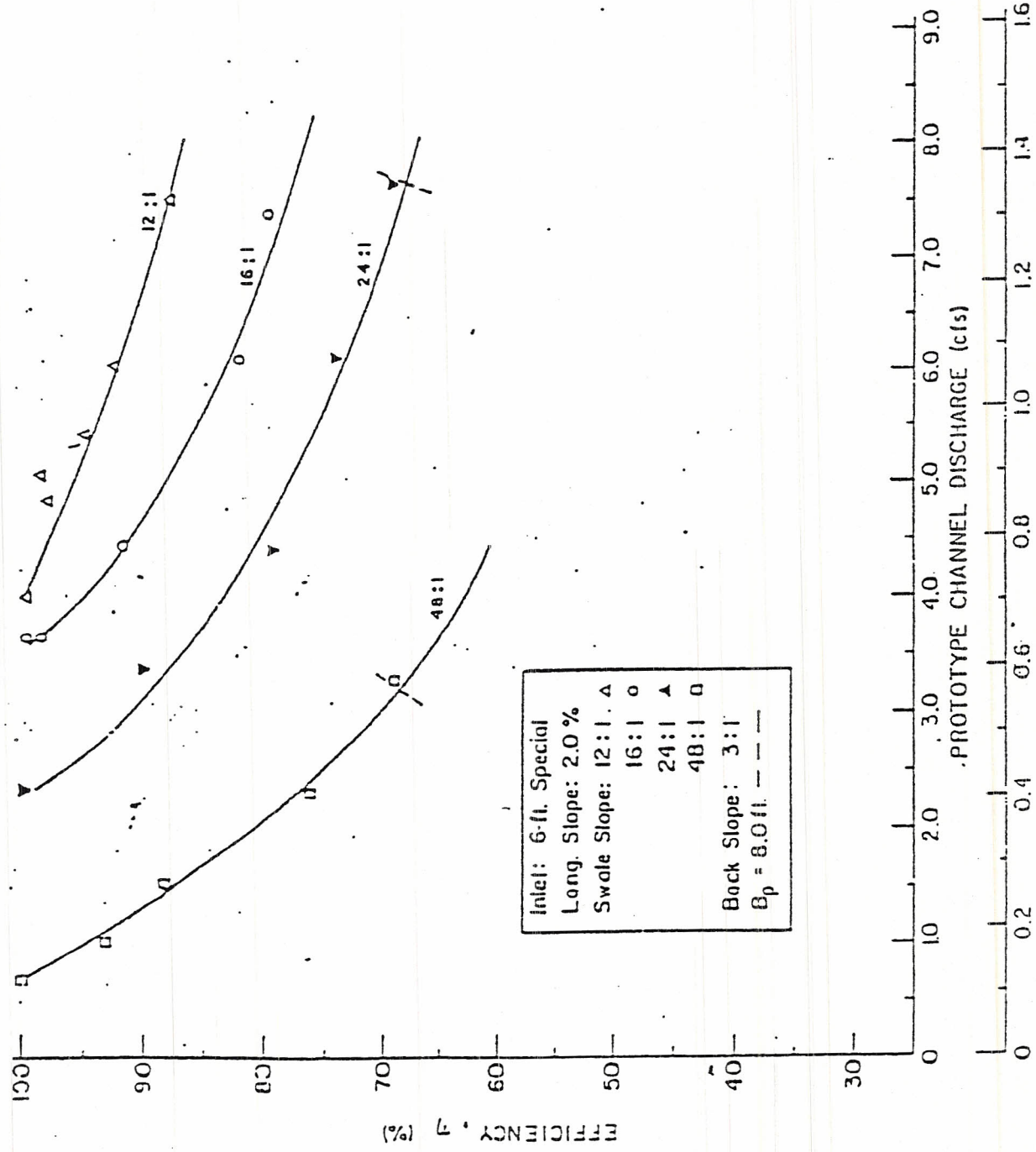
EFFICIENCY CURVES: CAPACITY OF TYPE C INLET OR TYPE M INLET (MOUNTABLE CURB)

FIGURE 4



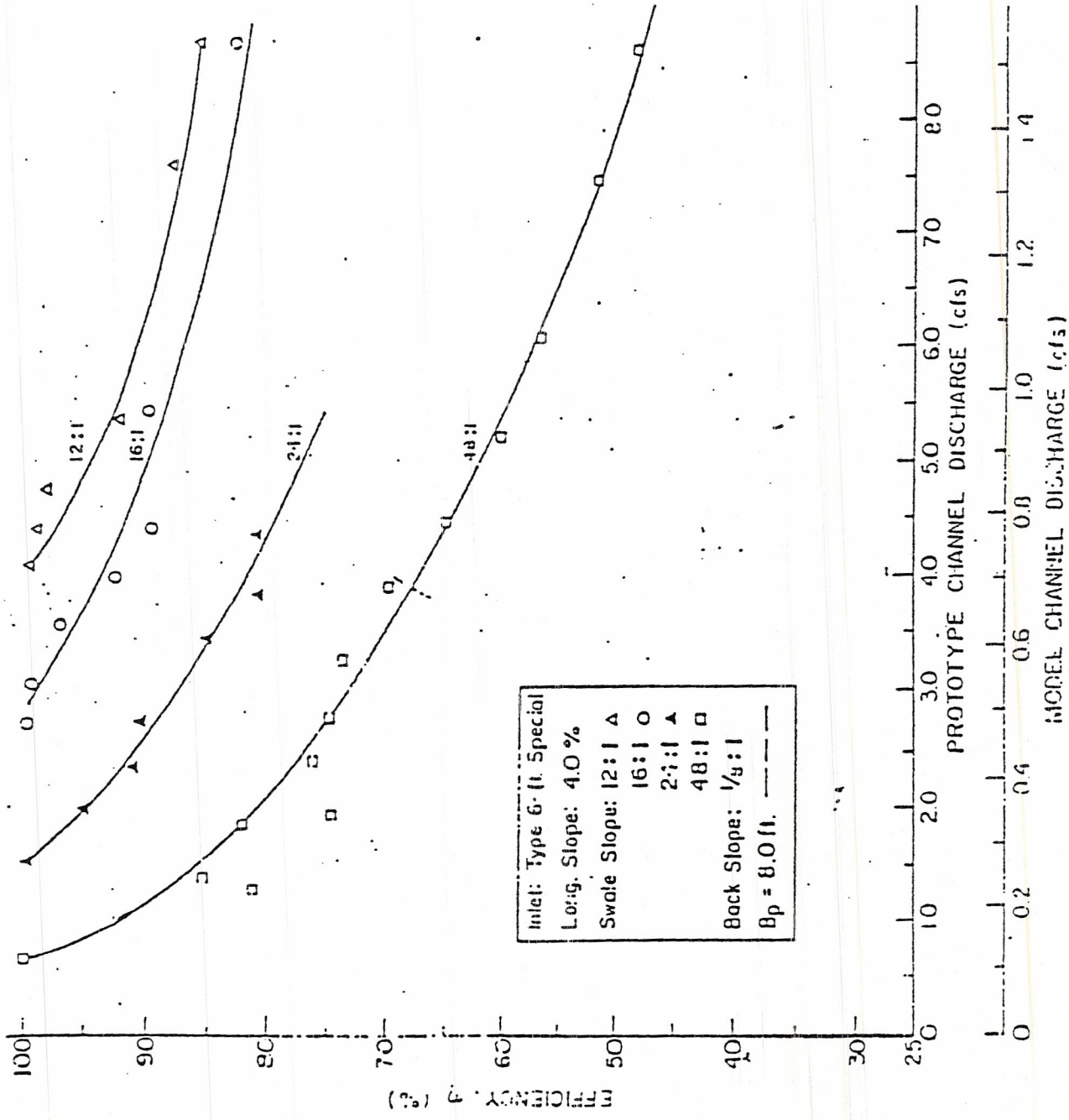
Efficiency Curves; 6-Ft Special (Long. Slope = ½%)

FIGURE 5

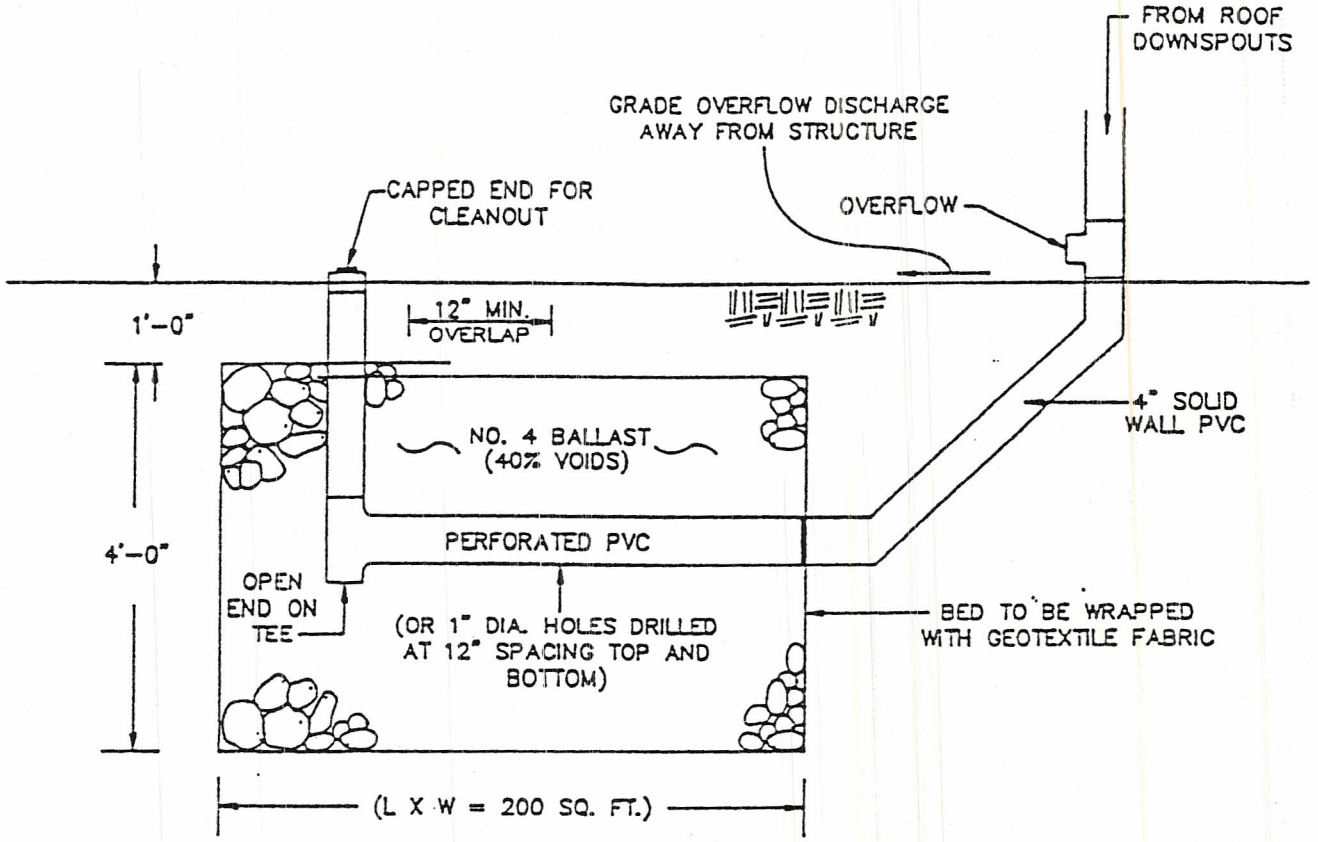


Efficiency Curves; 6-Ft Special (Long. Slope = 2.0)

FIGURE 6



Efficiency Curves; 6-Ft Special (Long. Slope = 4%)



DESIGN PARAMETERS

- 25 YEAR STORM FREQUENCY
- CN=98, P=5.5" (RAINFALL), PR=5.26" (RUNOFF)
- IMPERVIOUS AREA 30'X50'=1500 SQ. FT. (AVERAGE HOME)
- PERC RATE = 2"/HOUR AVERAGE

C.S.DAVIDSON, INC. CONSULTING CIVIL ENGINEERS 38 NORTH DUKE STREET YORK, PENNA.	TYPICAL RESIDENTIAL STORMWATER MANAGEMENT SEEPAGE BASIN	DATE: 1/9/90 DRAWN BY: BAM CHK. BY: NO. NONE