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SOIL EROSION AND SEDIMENT CONTROL PLAN REPORT FOR REMEDIAL ACTION OPERABLE UNIT 1 (OU 1) SITE 4 AND SITE 5 WITH TRANSMITTAL NWS EARLE NJ
1/1/1998
BROWN AND ROOT ENVIRONMENTAL

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Soil Erosion and Sediment Control Plan Report

for

Remedial Action at Operable Unit 1 (Sites 4 and 5)

Naval Weapons Station Earle

Colts Neck, New Jersey

Northern Division

Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0289

January 1998

Brown & Root Environmental

A Division of Halliburton NUS Corporation

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January 2, 1998

Project Number 7602

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Naval Facilities Engineering Command
10 Industrial Highway
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Reference: CLEAN Contract No. N62472-90-D1298
Contract Task Order 0289

Subject: Soil Erosion and Sediment Control Plan
OU-1 Cap Design
Naval Weapons Station Earle
Colts Neck, NJ
Contract Task Order (CTO) No. 0289

Dear Mr. Briegel,

As requested, Brown & Root (B&R) Environmental is submitting five copies of the Erosion and Sediment (E&S) Control Plan for the Remedial Action at Operable Unit 1 (Sites 4 and 5) Naval Weapons Station Earle, Colts Neck, New Jersey. Please find enclosed the Soil E&S Control Plan Report (text and calculations), and the following full size drawings:

T-1	Title sheet
T-2	Legend and General Notes
C-1	Erosion and Sediment Control Plan Notes
C-2	Erosion and Sediment Control Revegetation Notes
C-4	Erosion and Sediment Control Plan
C-6	Final Grading Plan, Site 4
C-11	Erosion and Sediment Control Plan, Site 5
C-13	Final Grading Plan, Site 5
C-17	Cover System Details, Site 4 and 5 (Sheet 1 of 2)
C-18	Cover System Details, Site4 and 5 (Sheet 2 of 2)
C-19	Surface Water Management Details (Sheet 1 of 2)
C-20	Surface Water Management Details (Sheet 2 of 2)

These plans and the associated report have been sealed by a professional engineer registered in the State of New Jersey.

Subsequent to the November 10, 1997 submission, B&R Environmental's certifying engineer performed his final internal review of the Soil E&S Control Plan. As a result of this review, design improvements have been made that should improve constructibility and reduce the cost of construction for the erosion/sediment control appurtenances. As such, the following is a summary of the significant changes made to the Erosion and Sediment Control Plan Report and the drawings listed above.

- The configuration of the sediment/detention ponds at Site 5 have been modified, to enhance the discharge performance of the proposed principal/emergency spillway works. In addition, the principal spillway culvert and riser assembly have been removed from Basins 1 and 3 (the emergency spillway overflow channel will now provide both principal and emergency spillway functions), and the downstream dike has been removed altogether from Basin 1. These adjustments will provide a net decrease in the peak discharge from the basins, while eliminating the cost for construction of the aforementioned appurtenances.

  It should be noted that the design adjustments to Basin 1 at Site 5 extend the limits of the basin into the small wetlands depression area located to the west of the previously proposed pond location. Discussions with personnel at NWS Earle indicated that this depression was originally excavated while the landfill at Site 5 was in operation (at the request of the USEPA), to act as a sediment/detention pond. Based upon our recent telephone conversations with the Freehold Soil Conservation District and the New Jersey Department of Environmental Protection, the Navy can maintain the use of the entire depression area as a proposed sediment/detention pond (as intended by the current design configuration), without mitigation of wetlands within the depression area.

- The increased capacity of sediment/detention basin 1 at Site 5 affords sufficient additional storage capacity such that the discharge from the 24 inch diameter pipe beneath the railroad tracks may be routed directly into the sediment/detention pond. As such, the previously proposed bypass channel along the southern rim of the basin need not be constructed.

- The Erosion and Sediment Control Plan Sheets (C-4 and C-11) were modified to show the excavation contours for drainage channels, as required during the start of construction. Tables of coordinates and elevations on the drainage channels were also added to sheets C-4, C-6, C-11, and C-13.

- Sheet C-1 was modified to incorporated the Freehold Soil Conservation District's standard 20 Erosion and Sediment Control Plan Notes.

- The plan sheets were modified to show the outlet barrels from the sediment and detention ponds, invert elevations on the outlet barrels, and rock outlet protection at the outfall of these outlet barrels.

- Sheet C-6 was modified to depict construction of the final drainage channels following removal of the sediment basins.

- The D_{50} size of Type II Riprap as shown on the drawings has been changed to 9 inches from a D_{50} of 6 inches.

- The surface contours on the final grading plan for Site 5 (Drawing C-13) were adjusted slightly to indicate a uniform cap thickness of at least 3.5 feet.

- The embankment material specification for the sediment/detention basins has been changed to structural fill, to require construction with soils that exhibit low permeability.

- A note was added to the General Notes (Sheet T-2) indicating that the limits of the wetlands must be field-verified by the RAC during construction.

Revisions to the E&S Control Plan were discussed with Mike Hill of the Freehold Soil Conservation District and they are aware of the changes as well as the construction schedule for the project. Please be aware that, due to budgetary constraints, revisions were not made to the remaining 16 drawings in the design package to address comments from others or to coordinate with the revised drawings. The corresponding specifications and cost estimate have not been revised.

Please call if you have any questions or require further information.

Sincerely,

David C Witt FOR

Michael J. Wierman, P.E.
Project Manager

Enclosure

c: Northern Division, Code 182/JK (John Kolicius) (w/o enclosure)
John Trepanowski (w/o enclosure)
Garth Glenn (w/o enclosure)

079716/P

SOIL EROSION AND SEDIMENT CONTROL PLAN REPORT FOR

REMEDIAL ACTION AT OPERABLE UNIT 1 (SITES 4 AND 5)

NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania 19113-2090

Submitted by:
Brown & Root Environmental
600 Clark Avenue, Suite 3
King of Prussia, Pennsylvania 19406-1433

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0289

January 1998

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1.0 INTRODUCTION

This Erosion and Sediment Control Plan Report was prepared under Subtasks 0104 and 0106 of Contract Task Order (CTO) 289 under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62472-90-D-1298. Under this CTO, Brown and Root (B&R) Environmental is performing engineering, design and construction phase services for the remedial action at Operable Unit - 1 which includes Sites 4 and 5 at the Naval Weapons Station (NWS) Earle, Colts Neck, New Jersey. A vicinity map, showing the approximate locations of Sites 4 and 5, is presented on Figure 1-1.

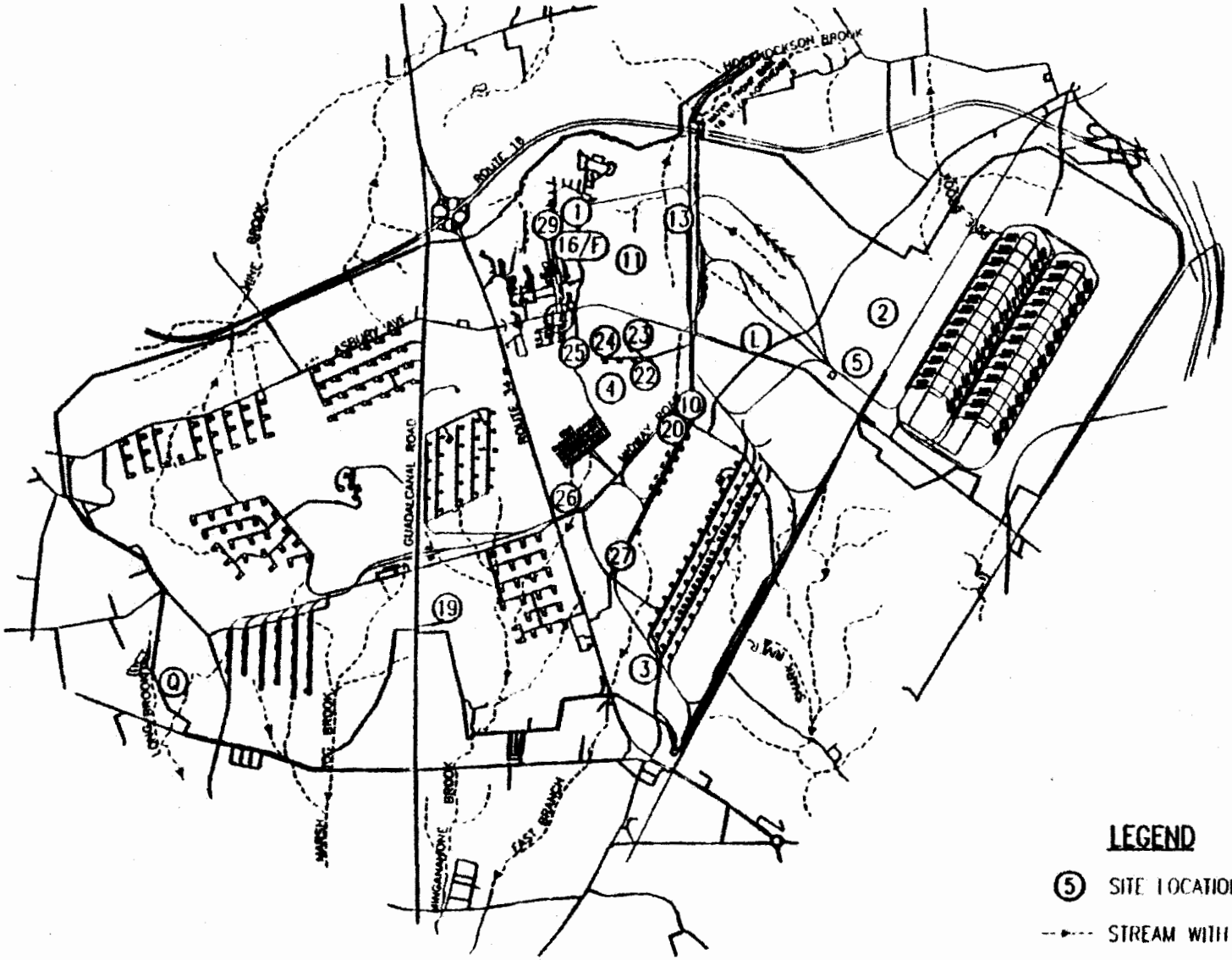
1.1 SITE HISTORY

NWS Earle is located in Monmouth County, New Jersey, approximately 47 miles south of New York City. The station consists of two areas, the 10,248-acre Main Base (Mainside) area, located inland, and the 706-acre Waterfront area. The two areas are connected by a Navy-controlled right-of-way. Commissioned in 1943, the facility's primary mission is to supply ammunition to the naval fleet. An estimated 2,500 people either work or live at the NWS Earle station.

Site 4 is a 3-acre landfill that received approximately 10,200 tons of mixed domestic and industrial wastes from 1943 until 1960. Figure 1-2 depicts the existing conditions at Site 4. Materials disposed of in the landfill include metal scrap, construction debris, pesticide and herbicide containers, paint residue, and rinse waters. It has been reported that containers of paint, paint thinners, varnishes, shellacs, acids, alcohols, caustics, and asbestos may have also been disposed of in the landfill. The landfilled materials are currently covered by a thin layer of sandy soil.

The Site 5 is an approximately 5-acre landfill that received approximately 6,600 tons of mixed domestic and industrial wastes between 1968 and 1978. Figure 1-3 depicts the existing conditions at Site 5. Wastes included paper, glass, plastic, construction debris, pesticide and herbicide containers, containers of paint, paint thinners, varnishes, shellacs, acids, alcohols, caustics, and small amounts of asbestos. The landfilled materials are currently covered by a sand and vegetated soil layer ranging in depth from 1 to 3 feet. Approximately 2.5 acres of the site are used as a skeet shooting range. While Site 5 was in operation, depressions were excavated to the southwest and southeast of the landfill to act as sediment/detention basins. These depressions still exist and do not have a positive drainage outlet (i.e., surface water collects in these depressions and eventually either evaporates or infiltrates into the ground.

A series of investigations were conducted to determine the nature and extent of contamination and evaluate the risks to human health and the environment related to Sites 4 and 5. Unacceptable risks were



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SCALE IN FEET

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MRM	1/7/97
CHECKED BY	DATE
RET	1/7/97
COST/SCHED.-AREA	
SCALE 1"=5000'	

Brown & Root Environmental

MAINSIDE SITE LOCATIONS
NAVAL WEAPONS STATION EARLE
COLTS NECK, NEW JERSEY

CONTRACT NO	OWNER NO.
APPROVED BY	DATE
APPROVED BY	DATE
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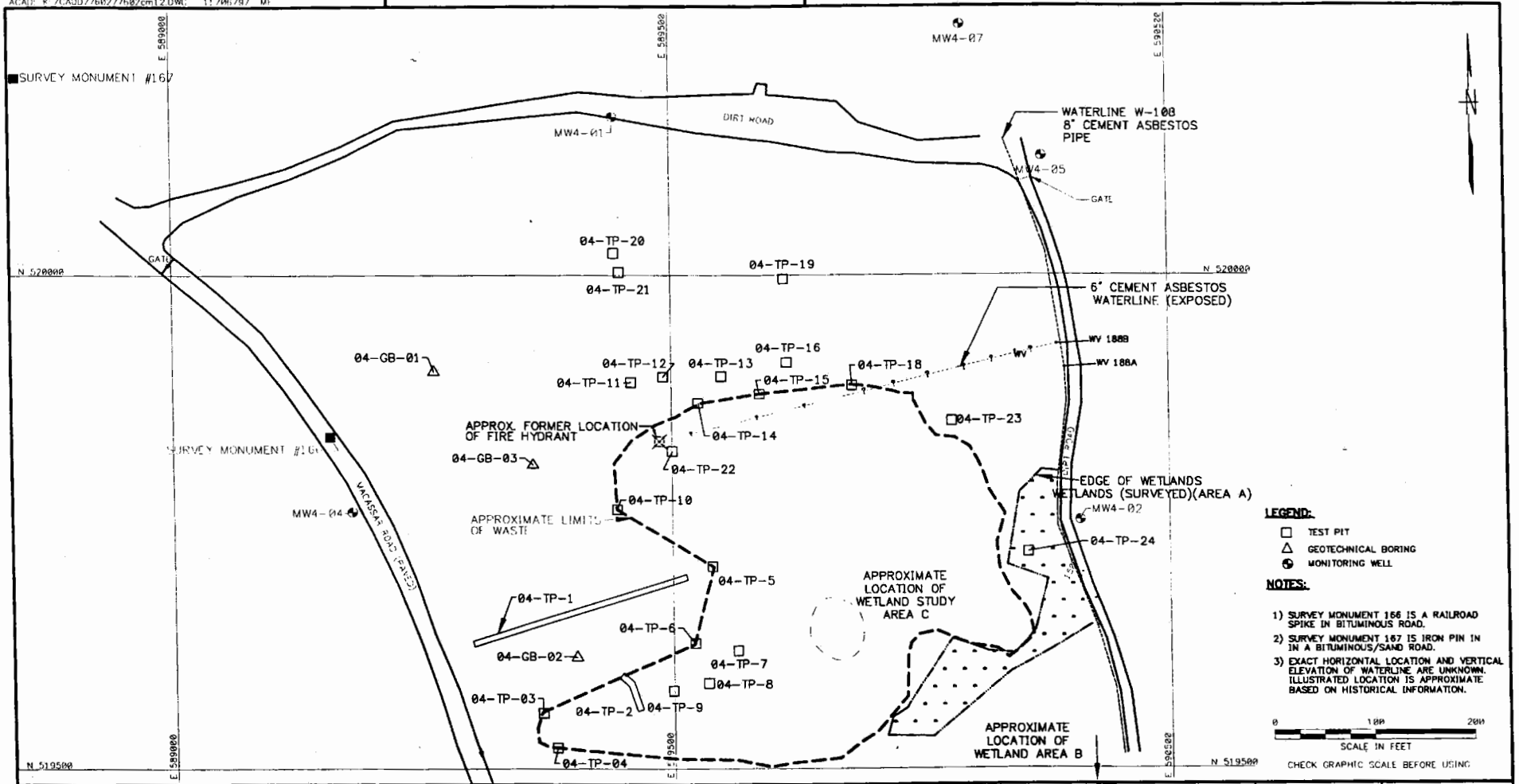

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY TAD DATE 8/28/97	Brown & Root Environmental	CONTRACT NO. 7602	OWNER NO.
CHECKED BY DATE	SITE 4 PRE-DESIGN INVESTIGATION EXISTING CONDITIONS PLAN NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY	APPROVED BY DATE	
COST/SCHED-AREA		APPROVED BY DATE	
SCALE AS NOTED		DRAWING NO. FIGURE 1-2	REV. 0

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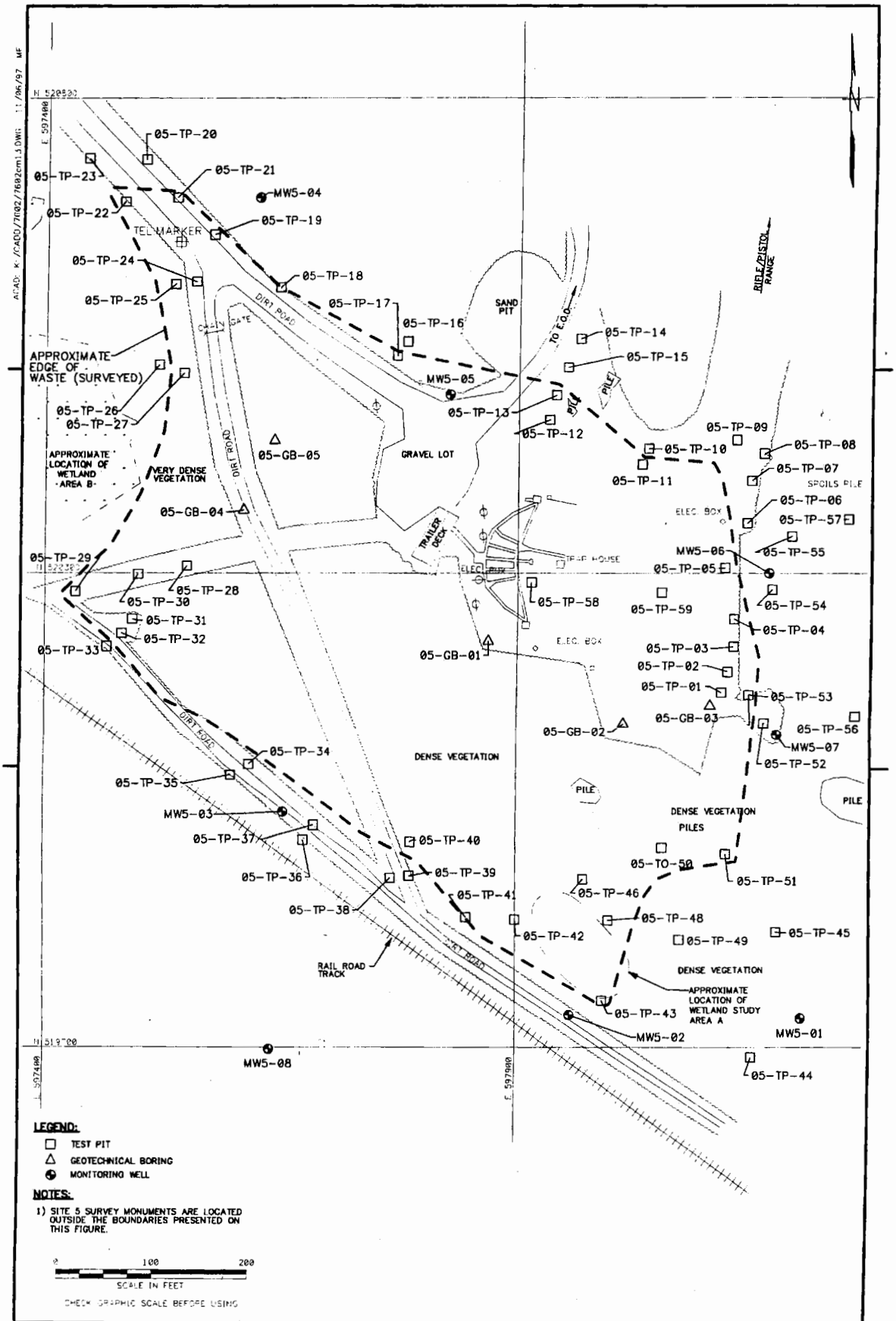

DRAWN BY TAD DATE 8/28/97	Brown & Root Environmental	CONTRACT NO. 7602	OWNER NO. 0289
CHECKED BY DATE	SITE 5 PRE-DESIGN EXISTING CONDITIONS PLAN NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY	APPROVED BY	DATE
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 1-3	REV. 0

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identified at each site. The preferred remedial action for both sites is consolidation of the waste, construction of a cap over the existing waste, institutional controls, and long-term monitoring.

1.2 REPORT OBJECTIVE

The objective of this report is to describe the project and present the erosion and sediment control measures that will be utilized during construction of the caps at Sites 4 and 5. The 1987 *Standards for Soil Erosion and Sediment Control in New Jersey* were used as the basis for developing the soil erosion and sediment control measures included in this report.

1.3 REPORT FORMAT

Section 1.0 of this report provides a short summary of the project and site background information. Sections 2.0 and 3.0 provide the details of the Erosion and Sediment Control Plans for Sites 4 and 5, respectively. Section 4.0 provides conclusions for the Site 4 and 5 Erosion and Sediment Control Plans. A copy of the New Jersey Guidelines for Soil Erosion and Sediment Control are included in Appendix A. Calculations to estimate storm water runoff from the two sites during three different scenarios (i.e., Pre-Construction, During-Construction, and Post-Construction) are provided in Appendix B. Calculations for the sizing of sediment basins for Site 4 are included in Appendix C. Similar calculations for Site 5 sediment and detention basins are included in Appendix D. Other miscellaneous erosion and sediment control calculations are included in Appendix E. The following plan sheets from the construction drawings are also included with this Erosion and Sediment Control Plan:

T-1 Title Sheet
T-2 Legend and General Notes
C-1 Erosion and Sediment Control Plan Notes
C-2 Erosion and Sediment Control Revegetation Notes
C-4 Erosion and Sediment Control Plan, Site 4
C-6 Final Grading Plan, Site 4
C-11 Erosion and Sediment Control Plan, Site 5
C-13 Final Grading Plan, Site 5
C-17 Cover System Details, Site 4 and 5 (Sheet 1 of 2)
C-18 Cover System Details, Site 4 and 5 (Sheet 2 of 2)
C-19 Surface Water Management Details (Sheet 1 of 2)
C-20 Surface Water Management Details (Sheet 2 of 2)

2.0 SITE 4 EROSION AND SEDIMENT CONTROL PLAN

2.1 PROJECT DESCRIPTION

A low permeability cap will be installed at Site 4 to reduce rainwater infiltration and associated leachate generation, promote surface water drainage, and provide isolation of the waste material from humans and the surrounding environment. Existing waste in two locations along the perimeter of the landfill will be excavated and moved toward the center of the site. A surface water diversion ditch will be installed on three sides of the Site 4 landfill. The ditch will intercept upgradient surface water runoff, collect runoff from the landfill, collect water from the drainage layer in the cap system, and convey the combined surface water around the landfill cap to one of two sediment basins. A permanent bench (diversion) will be constructed into the side slope of the landfill cap to redirect runoff from a steep slope of the cap to the sediment basins. Lastly, silt fence will be installed along the perimeter of areas not addressed by other erosion and sediment control devices.

2.2 EXISTING SITE CONDITIONS

The Site 4 landfill covers an aerial extent of approximately 3 acres. It is not currently used for military purposes and there are no structures built on the site. Figure 1-2 depicts the approximate boundary of the landfill. The boundary was determined by excavating test pits along the perimeter of the landfill.

The surface cover of the landfill is primarily wooded. The western and northern sections of the landfill are predominantly populated with pine trees. The southern and eastern portions of the landfill are less densely populated and are comprised of woods intermixed with grass. An area of bare soil/exposed debris is located within the southwestern corner of the landfill.

2.3 ADJACENT AREAS

The site is accessible by two roads. Macassar Road is a paved road and is located to the west of the site. A dirt road runs to the north and east of Site 4. An area of hardwood trees is located between the northern boundary of the landfill and the dirt road. Lake Earle is the closest surface water body to Site 4 and is located approximately 350 feet north of the site. Wetlands are located immediately to the southeast of the landfill and to the east (across the dirt road).

The landfill is located within the Hockhockson Drainage Basin. The total drainage area including upgradient areas and Site 4 is.approximately 11 acres. This area is delineated in the runoff calculations

contained in Appendix B. This area is divided into two drainage basins whose boundaries run through the central portion of the landfill. Drainage Area (DA) 1 flows from an maximum elevation of 180.5 ft northwest of the landfill to a minimum elevation of 146.5 ft in the wetlands southeast of the landfill. DA 2 flows from a maximum elevation of 182.5 feet northwest of the landfill to the same wetlands location (146.5 ft in elevation).

Flood insurance maps are not available for areas within the NWS Earle property boundary. Therefore, the proximity of floodplains to the site could not be determined. There are no major watercourses in close proximity to the site.

2.4 OFFSITE AREAS

Clean fill materials, as well as materials necessary for construction of the landfill cap, will be obtained from outside of the base and transported to the site via trucks. Disturbance of other lands on the base is not anticipated.

2.5 SITE SOILS

The soils covering Site 4 are mapped as PT or Pits, sand and gravel, according to the April 1989 Soil Survey of Monmouth County, New Jersey. A soils map for Site 4 is included in Appendix B.1. This unit consists of areas that have been excavated for sand and gravel. Typically, these areas consist of sandy material and differing amounts of gravel and fragments of iron-cemented sandstone. A few abandoned pits, such as the one at Site 4, have been used as landfills or dumps. The properties and characteristics of this map unit differ greatly from place to place.

Boring logs, completed during field activities at the site, indicate that the surface and shallow subsurface soil is comprised of silty, fine-grained sand with some clay. The soil's consistency is generally loose to medium dense and the soil is orange-brown to gray-brown in color.

The soil covering areas south and west of Site 4 belong to the Atsion and Lakewood series (USDA, 1989). Atsion series soils, mapped as Atsion sand, are nearly level, poorly drained soil in depressional areas and on broad flats. These soils formed in acid, sandy, Coastal Plain sediments. Permeability of the Atsion sand is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. Runoff is very slow and erosion is a slight hazard. Most areas with this soil are wooded. Common species of trees include pitch pine, black gum, and red maple. The surface layer of the Atsion series is approximately 8 inches thick. The layer contains 2 inches of partly decomposed organic material and roots and 6 inches of black sand. The subsurface soil is grayish brown sand 14 inches thick. These soil

characteristics generally correspond to the soil encountered during boring activities at Site 4. Atsion sand is a Type C/D soil based on the Soil Conservation Service's Hydrologic Soil Group Classifications.

The Lakewood series consists of excessively drained soils on uplands. These soils were also formed in acid, sandy, Coastal Plain sediments. The mapping unit identified within the Lakewood series adjacent to Site 4 is the Lakewood sand, 5 to 10 percent slopes (USDA, 1989). Permeability of this sand is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low and runoff is slow. The water erosion hazard is moderate, but the wind erosion hazard is severe. Most areas with this soil are wooded. Common species of trees found in Lakewood sand include pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine. The surface layer is 4 inches thick. The uppermost inch is dark, brown, matted, decomposed organic material, and below that is light brownish gray sand 10 inches thick. The subsurface soil of the Lakewood series is light brownish gray sand 10 inches thick. These soil characteristics generally correspond to the soil encountered during boring activities at Site 4. Lakewood sand is a Type A soil based on the Soil Conservation Service's Hydrologic Soil Group Classifications.

The areas north and east of Site 4 are classified as Udorthents (UA). This unit consists of areas of soils that have been altered by excavating or filling. Udorthents consist of well drained to somewhat poorly drained soils that have no horizonation. These soils formed in stratified or graded, sandy or loamy fill material that has as much as 35 percent gravel by volume. Slope ranges from 0 to 3 percent.

2.6 CRITICAL AREAS

Critical areas have potentially serious erosion problems due to the presence of steep slopes, poor vegetative cover, or runoff channels. Critical areas associated with Site 4 include steep slopes located on the southeast and eastern boundaries of the landfill cap. A permanent diversion (bench) will be constructed midway down the steep slope on the southeast corner of the landfill. During construction, this diversion will convey runoff to the sediment basins. This measure will minimize the amount of sediment which would reach the wetland area.

Additionally, the surface water drainage channel may be designated as a critical area due to the steep slope of the channel. Riprap will be placed atop a geotextile liner at critical sections of the surface water drainage channel to protect the surface soil from the erosive forces of water.

2.7 SOIL EROSION AND SEDIMENT CONTROL MEASURES

Soil erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications contained in *Standards for Soil Erosion and Sediment Control in New*

Jersey, 1987, and New Jersey Administrative Code, (NJAC 2:90-1.1 et seq.) unless otherwise noted in this plan and the construction documents. Design specifications for soil erosion and sediment control structures have been obtained from *Standards for Soil Erosion and Sediment Control in New Jersey*.

2.7.1 Structural Practices

The following structural practices will be utilized during construction activities at Site 4 to control erosion and sedimentation.

Diversion Bench - A diversion bench will be installed across the southeastern and eastern slope of the landfill midway down the slope. The diversion bench will redirect surface water and sediment from the slope to one of the two sediment basins. The bench will intercept flow over the steep portions of the cap (4H:1V) to minimize the possibility of erosional gullies forming.

Stone Construction Entrance - A temporary stone construction entrance will be installed to provide access to the site from Macassar Road. Construction vehicles will be cleaned before exiting the site.

Decontamination Pad - A temporary decontamination pad will be constructed near the stone construction entrance. Construction vehicles and other construction equipment will be cleaned prior to coming to the site and before exiting the site.

Sediment Barrier (Silt Fence) - Silt fence will be installed parallel to existing contours in the locations shown on the Erosion and Sediment Control Plan in order to intercept runoff from the disturbed areas. The fence will be installed prior to clearing, grubbing, or excavation activities.

Sediment Basin - Two temporary sediment basins will be constructed to minimize offsite sediment transport during construction activities. The sediment basins are designed to provide for sediment storage capacity during construction activities plus temporary storage for a 2-year, 24-hour, Type III storm event. Additionally, the sediment basins are designed to obtain 70 percent trap efficiency at the start of the basin's useful life.

Surface Water Drainage Channel - A channel will be installed around the northern, western, and southern boundaries of the landfill cap. The channel will divert surface water to one of two sediment basins. The channel is designed to safely convey the peak discharge rate for a 25-year, 24-hour, Type III storm event. The 25-year storm event is used to comply with New Jersey regulations for sanitary landfills (NJAC 7:26-2A.7g).

Riprap - Riprap will be placed atop a geotextile fabric at the critical sections of the surface water drainage channel (as identified in Appendix E). Riprap lining was chosen as it was found to be cost-effective compared to other forms of protection (e.g., vegetated lining topsoil with erosion mat). Because of the poor nature of the existing soils at the site, topsoil would need to be placed in vegetated ditches at Site 4.

Conduit Outlet Protection (Rock Apron) - The outlets from the sediment basins will be constructed to provide a stable area at the outlet of the conduit in which the exit velocity from the conduit is reduced to a velocity consistent with a stable condition in the downstream channel. Rock aprons will also be placed at the permanent outfall of the drainage channels to reduce the exit velocity from these channels.

Temporary Vegetative Cover for Soil Stabilization - All regraded areas which will be left dormant for extended periods of time shall be seeded with fast germinating temporary vegetation immediately following grading. Seeding will be done with the appropriate species of grass (i.e., Annual Ryegrass or Pearl Millet depending on the date of planting) and seeding rates (See Table 3.1-1 of the Standards).

Permanent Seeding - All regraded areas will be permanently seeded for long term protection. Seeding will be done with the appropriate species of grass (i.e., hard or Sheep Fescue or Perennial Ryegrass depending on the date of the planting) and seeding rates (See Table 3.2-1 of the Standards).

Mulching - All areas receiving temporary or permanent seeding will be mulched with an organic material to prevent erosion by protecting the soil surface from raindrop impact and reducing the velocity of overland flow.

Top Soiling - Areas which have soil types that cannot support vegetation even after fertilization will be amended with top soil. The top soil will improve the soil medium for plant establishment and maintenance.

2.7.2 Management Strategies

1. Unstabilized, disturbed areas will be minimized and construction activities will be staged.

2. Seeding or other stabilization measures will follow immediately after grading.

3. Areas which are not to be disturbed will be clearly marked by flags, signs, etc.

4. The construction superintendent will be responsible for ensuring the installation and maintenance of all erosion and sediment control practices.

5. Erosion and sediment control structures will be installed and/or constructed prior to the start of any earth disturbing activities.

6. Erosion and sediment control structures will remain in place until permanent vegetation has become established over disturbed surfaces.

2.8 PERMANENT STABILIZATION

All areas disturbed by the remedial action will be stabilized with permanent seeding following final grading. Seeding will be done with appropriate species of grass (See Table 3.2-1 of the Standards).

Because of potentially high surface water discharge rates and velocities, segments of the surface water drainage channel will require permanent stabilization by methods other than permanent seeding. Riprap will be used in all sections of the surface water drainage channel that exceed a flow velocity of 2.0 feet per second. The details of this analysis are presented in Appendix E. Permanent stabilization other than permanent seeding is not needed for the diversion bench.

2.9 STORMWATER RUNOFF CONSIDERATIONS

Calculations were performed to determine the peak stormwater discharge rates for each drainage area covering Site 4 for three scenarios: Pre-Construction, During Construction, and Post-Construction. Runoff calculations for the 2-, 10-, and 25-year, 24-hour, Type III storms were performed for each drainage area and scenario. This range of storms covers the range of criteria required to design the various soil erosion and sediment control structures for this project. Runoff calculations for Site 4 are included in Appendix B and the results are summarized in more detail in Section 3.10.

Calculations were performed using Quick TR-55™ by Haestad Methods, Inc. The software utilizes the identical procedures provided in the Soil Conservation Service's (SCS) Technical Release 55 (TR-55). TR-55 is recommended in the *Standards for Soil Erosion and Sediment Control in New Jersey* as an appropriate method for estimating peak discharge rates for small, urban watersheds.

Based on the existing topography there are 2 drainage areas for Site 4 that both discharge to the wetlands area located southeast of the landfill. During the regrading of the waste, three drainage areas will be created; two that discharge to the two sediment basins, and one that flows towards the wetlands. After,

cap construction is complete, there will be two drainage areas, but they differ slightly from Pre-Construction scenario in configuration, size, and area. The drainage areas delineated for each scenario are provided on figures included in Appendix B.

Calculations for the Pre-Construction scenario were completed to determine baseline flow rates from each drainage area under current conditions. Peak discharge rates for the During Construction scenario were necessary to determine the capacity of the sediment basins that will be in operation during construction. Peak stormwater runoff rates and erosion potential are generally highest for this scenario because the landfill construction area less the surface water drainage channel and sediment basins was assumed to be cleared and grubbed. After construction of the landfill, the site will be restored to a grassed condition. The calculated stormwater discharge rates for each drainage basin for this scenario was slightly less than the Pre-Construction rates which indicates that permanent stormwater management structures are not required. The peak flow rates dropped during the Post-Construction scenario primarily because by placing topsoil on the site, a better growth vegetation will be established over the landfill than presently exists.

2.10 CALCULATIONS

Runoff calculations for each Site 4 drainage area and scenario discussed above are summarized in Appendices B.2, B.3 and B.4. A summary of calculated peak discharge rates is provided in Appendix B.1. All assumptions made during the calculations are provided on the calculation sheets.

For the 2- to 25-year storm events, the calculated discharge rates range from 1 to 12 cubic feet per second (cfs) for the Pre-Construction scenario, from 1 to 17 cfs for the During-Construction scenario, and from 1 to 11 cfs for the Post-Construction Scenario. Because of the size of the areas to be disturbed during construction, it was determined that sediment basins in conjunction with silt fence are necessary for each Site 4 drainage area to control soil erosion and loss. In addition, because the peak discharge rates from each area decreased between the Pre- and Post-Construction scenarios, permanent stormwater management structures (i.e., detention basins) are not required for each area.

Calculations for determining the size and capacity of the temporary sediment basins required for Site 4 are included in Appendix C. The capacity of each basin is large enough to provide for sediment storage capacity during construction activities plus temporary storage for a 2-yr, 24-hour, Type III storm event. Additionally, the sediment basins are designed to obtain 70 percent trap efficiency at the start of the basin's useful life. The size and dimensions of each basin are shown on the erosion and sediment control

drawings which are part of the construction drawings. Appendix C also contains calculations for sizing the outlet structures for each of the sediment basins.

Hydraulic stability calculations for the surface water drainage channel and diversion benches are included in Appendix E. Throughout most of the surface water drainage channel, riprap is required to protect the surface of the channel. Riprap will be placed atop a geotextile filter layer. Two separate riprap sizes will be used within the channel. For the steeper-sloped sections of the channel, riprap with a median diameter of 9 inches will be used. For shallower-sloped sections, a 4-inch median diameter will be used. Riprap is not required within the diversion bench.

2.11 MAINTENANCE

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall event. Any required repairs will be made immediately. The following items will be checked in particular:

- The stone construction entrance will be maintained in a condition which will minimize tracking of sediment onto roads, including the addition of stone or other repairs.

- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition reaches half of the height of the fabric.

- Seeded areas will be checked regularly to ensure that a good stand is maintained. Areas shall be fertilized and reseeded as needed. The RAC is responsible for maintenance until formal acceptance by the Contracting Officer.

- Portions of the sediment basins that are embanked will be inspected for structural stability.

The sediment basins have been designed to contain the sediment erosion expected through the duration of construction activities; therefore, no maintenance of the basins is expected. However, the RAC will be responsible for inspecting the basins and removing sediment before sediment levels reach the bottom of the dewatering hole in the riser pipe.

2.12 SEQUENCE OF CONSTRUCTION

The proposed sequence of construction events are as follows. Throughout all construction events, the temporary and permanent controls shall be routinely inspected and properly maintained.

1. Construct the rock entrance from Macassar Road to the site and the decontamination pad.

2. Construct the perimeter soil erosion and sediment control devices.

3. Clear and grub a pathway to the proposed areas of both sediment basins. The pathway will follow along and include the area of the proposed surface water interception ditch.

4. Construct both sediment basins and excavate for the base of the surface water channels and cap termination in the locations shown on Design Drawing C-4, Erosion and Sediment Control Plan, Site 4, in accordance with applicable details. The base of the permanent surface water drainage channels and the base of the cap termination will serve as the temporary drainage channels until the cap is constructed.

5. Clear and grub the remainder of the site, taking care not to disturb ground beyond the construction work limits shown on the plans.

6. Excavate waste outside the planned perimeter of the landfill cap and consolidate within the footprint of the cap. Stabilize excavated areas with permanent vegetative cover.

7. Regrade waste.

8. Clean out sediment basins, if necessary, and distribute sediment over regraded waste.

9. Construct landfill cap. As landfill cap is constructed, install permanent channel linings.

10. Spread topsoil to bring the site to final contour. Sediment that collected against the silt fence during backfilling and capping operations is clean material and is to be distributed evenly over remaining disturbed areas prior to final stabilization.

11. Seed and mulch the site.

12. After vegetation/permanent stabilization is established, remove sediment basins and construct the drainage channel rock outlet aprons.

13. Revegetate sediment basin areas.

14. Remove remaining silt fences.

3.0 SITE 5 EROSION AND SEDIMENT CONTROL PLAN

3.1 PROJECT DESCRIPTION

A low permeability cap will be installed at Site 5 to reduce rainwater infiltration and associated leachate generation, promote surface water drainage, and provide isolation of the waste material from humans and the surrounding environment. Existing waste along the perimeter of the landfill will be excavated and consolidated within the footprint of the cap. In some areas, the landfill boundaries are adjacent to hillsides and excavation of wastes from specific areas will be required to allow installation of the cap and related drainage ditches along the perimeter. A drainage channel will be installed around three sides of Site 5. The channel will intercept upgradient surface water runoff, collect runoff from the landfill and the drainage layer in the cap, and convey the combined water flow around the landfill cap to discharge points west and east of the site. Runoff from the western side of the site will discharge directly to a wetland bordering the western site of the landfill. During construction rows of silt fence will be used as temporary measures to control sediment discharge.

3.2 EXISTING SITE CONDITIONS

The Site 5 landfill covers an aerial extent of approximately 8 acres. Figure 1-3 depicts the approximate boundary of the landfill. The boundary was determined by review of aerial photographs and a test pit investigation.

The closest surface water body is a tributary of Hockhockson Brook, located approximately 1,000 feet east of Site 5. The site is located on the border of the Hockhockson Brook and Pine Brook watersheds. A negligible amount of the landfill area drains to the east.

The topography of the site is relatively flat with approximate maximum and minimum elevations of 115 feet and 101 feet, respectively. The topography generally slopes from east to west and surface water from the northern, central and western portion of the site follows the topography and drains to the west. There is a depressional area with a minimum elevation of 104.6 feet along the south eastern corner of the site. Surface water from the southern and eastern portions of the site drain to this location. It is likely that the surface water that collects in this depression infiltrates into the sandy soil.

West of the landfill another depressional area exists that most of the western portion of the site drains to. This area has a minimum elevation of 97.0. Both of the depressional areas were excavated when the landfill was in operation to act as sediment/detention basins.

As shown on Figure 1-3, a trap/skeet shooting facility (Shooters Club) is located on top of the landfill at Site 5. The Shooters Club consists of concrete walkways to shooting stations, various small structures which house target throwing equipment, wooden light standards with the associated lights for night shooting, and other small ancillary items (gun racks, flagpole, etc.). The skeet shooting range encompasses approximately 2.5 acres of the Site 5. A majority of the skeet range is covered by grass and/or bare soil.

Also included at the facility is a clubhouse which consists of a mobile home ("Trailer" on Figure 1-3), approximately 60 feet by 12 feet and a wooden deck approximately the same size. Two large vaults are installed within the clubhouse and are used to store guns, ammunition, and related equipment used during shooting events.

Adjacent to the clubhouse is a gravel parking area. Gravel and dirt roads are located within the landfill boundary, including the road to the trap/skeet range which turns and continues to the EOD bunker, and an access road crossing the landfill from the northwest to southeast. The areas adjacent to the access road are wooded.

3.3 ADJACENT AREAS

The total drainage area encompassing Site 5 and the upgradient and downgradient areas is approximately 16 acres. The maximum and minimum elevations in the drainage area are approximately 137 feet and 100 feet, respectively.

Wetlands are located to the west of the landfill and a small area is located within the boundary of the landfill in the southeast corner of the landfill. The small wetland area in the south east corner (in the depressional area) will be eliminated during the remediation. As indicated by NJDEP personnel, this wetland will not need to be replaced or restored because it lies entirely within the landfill boundaries. A stand of woods currently buffers the landfill from the wetland to the southwest.

A band of woods and a railroad border Site 5 to the south. Surface water from the southern side of the railroad tracks is conveyed under the tracks by a 24-inch pipe. The outlet of the pipe discharges near the south western corner of the site, and discharges into the western depressional area. NWS Earle personnel who have been employed at the site while Site 5 was an active landfill indicated that both the depressional areas southeast and west of the site were excavated to act as sediment/detention ponds. A small wetland area has been identified in the western depressional area. This area was discussed with

NJDEP wetland personnel who indicated that since this area was originally excavated as a sediment basin, it could still be used as a sediment basin even though a wetland had formed over the years in the bottom of the depression. The NJDEP personnel indicated that they would prefer to see measures taken to minimize the amount of sediment affecting this area.

This area was also discussed with the Freehold Soil Conservation district which indicated that conceptually this area could be used as a sediment/detention basin, although there is no free drainage from the bottom of this depressional area. If water were to fill this depression, it would eventually rise to an elevation which would discharge water farther to the west into a larger wetland area. This existing overflow "channel" is considered to be the principal and emergency spillways from this depressional area. Standing water was not observed in this area during site investigations. It is likely that water draining to this area infiltrates into the ground relatively rapidly and this area does not completely fill with water.

The bottom of the existing depressional area is at elevation 97.0. The approximate groundwater table elevation is 90.0 based on monitoring well data in the vicinity of the depression, and the soils in the depression are predominantly sands. The presence of the relatively permeable sands, and the low groundwater table would support the observations that water does not lay in this area for any great period of time and likely infiltrates into the ground.

The EOD range is located north of Site 5 and the site falls within the safety distance arc for the EOD range. When work is being performed at the EOD range (approximately 1250 feet to the north) Site 5 must be vacated. Based on site reconnaissance, a small series of hills fall between the site to the north and the EOD range.

Open areas with spoils piles border the site along the northeast corner and to the east. The maximum elevation of the spoils pile is approximately 137 feet.

Flood insurance maps are not available for areas within the NWS Earle property boundary. Therefore, the proximity of floodplains to the site could not be determined. There are no major watercourses in close proximity to the site.

3.4 OFFSITE AREAS

Clean fill materials, as well as materials necessary for construction of the landfill cap, will be obtained from outside of the base and transported to the site via trucks. Disturbance of other lands, besides Sites 4 and 5 on the base, is not anticipated.

3.5 SITE SOILS

The soils covering Site 5 belong to four different series. The series include the Atsion, Keyport, Lakehurst, and Lakewood (SCS, USDA, 1989). A soils map for Site 5 is included in Appendix B.1. Each series and the appropriate mapping unit that covers Site 5 are described in detail below.

Boring logs, completed during field activities at the site, indicate that the surface and shallow subsurface soil is comprised of silty, fine-grained sand with some clay. The soil's consistency ranges from very loose to medium dense. The color of the surface and shallow subsurface soil varies between boring locations. Some soil is orange-brown to gray-brown in color, while others are dark brown to olive-brown.

Atsion series soils, mapped as Atsion sand, are nearly level, poorly drained soils in depressional areas and on broad flats. These soils formed in acid, sandy, Coastal Plain sediments. A minor portion of Site 5 is mapped as Atsion sand. Permeability of the sand is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. Runoff is very slow and erosion is a slight hazard. Most of the areas of this soil are wooded. Common species of trees include pitch pine, black gum, and red maple. The surface layer of the Atsion series is approximately 8 inches thick. The layer contains 2 inches of partly decomposed organic material and roots and 6 inches of black sand. The subsurface soil is grayish brown sand 14 inches thick. These soil characteristics generally correspond to the soil encountered during boring activities at Site 5. Atsion sand is a Type C/D soil based on the Soil Conservation Service's Hydrologic Soil Group classifications.

The Keyport series consists of moderately well drained soils on uplands. These soils formed in acid, clayey, Coastal Plain sediments. The mapping unit identified within the Keyport series at Site 5 is the Keyport sandy loam, 2 to 5 percent slopes (SCS, USDA, 1989). This unit covers a western portion of Site 5. It is a gently sloping, moderately well drained soil on low divides. Permeability of this soil is slow in the subsoil and the substratum. The available water capacity is high and runoff is medium. Erosion is a moderate hazard. The most common species of tree found in Keyport soil include yellow poplar, northern red oak, and American beech. Some areas of Keyport soil have pyritic clay in the substratum. If the clay is exposed during excavation and used as top soil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. The surface soil is brown sandy loam 8 inches thick and the subsurface soil is yellowish brown silty clay loam 18 inches thick. These soil characteristics generally correspond to the soil encountered during boring activities at Site 5. Keyport sandy loam is a Type C soil based on the Soil Conservation Service's Hydrologic Soil Group classifications.

The Lakehurst series consists of moderately well drained and somewhat poorly drained soils on uplands. These soils were formed in acid, sandy Coastal Plain sediments. The mapping unit identified within the Lakehurst series at Site 5 is the Lakehurst sand, 0 to 2 percent slopes (SCS, USDA, 1989). This unit covers a limited portion of Site 5. It is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Permeability of this sand is rapid in the subsoil and the substratum. The available water capacity is low and runoff is very slow. Water erosion hazard is slight, but wind erosion is a severe hazard. Most areas of this soil are woodland. The most common species of tree found in Lakehurst sand is the pitch pine. The surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand 6 inches thick. These soil characteristics generally do not correspond to the soil encountered during boring activities at Site 5. Lakehurst sand is a Type A soil based on the Soil Conservation Service's Hydrologic Soil Group classifications.

The Lakewood series consists of excessively drained soils on uplands. These soils were formed in acid, sandy, Coastal Plain sediments. The mapping unit identified within the Lakewood series at Site 5 is the Lakewood sand, 0 to 5 percent slopes (SCS, USDA, 1989). This unit covers a majority of Site 5. It is a nearly level and gently sloping, excessively drained soil on divides. Permeability of this sand is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low and runoff is very slow. Water erosion hazard is slight, but wind erosion is a severe hazard. Common species of trees found in Lakewood sand include pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine. The surface layer is 4 inches thick. The uppermost inch is dark brown, matted, decomposed organic material, and below that it is dark grayish brown sand. The subsurface soil of the Lakewood series is light brownish gray sand 10 inches thick. These soil characteristics generally correspond to the soil encountered during boring activities at Site 5. Lakewood sand is a Type A soil based on the Soil Conservation Service's Hydrologic Soil Group classifications.

3.6 CRITICAL AREAS

Critical areas have potentially serious erosion problems due to the presence of steep slopes, poor vegetative cover, or potentially high surface water velocities. For existing conditions the only potential critical areas at or adjacent to Site 5 are the spoils piles. Several of these piles have steep slopes and they are relatively unvegetated. Because the piles adjacent to the landfill have existed in this state for a number of years and the present design does not disturb these slopes, these areas were not designated as critical.

The existing depressional area to the west of the landfill (originally built as a sediment/detention pond) will be employed as a sediment/detention pond for the landfill during construction and as a detention pond

only after the cap is in place. A small area of wetlands has formed in the bottom of this pond (sediment/detention basin #1 as shown on Plan Sheet C-11), additional sediment control measures will be employed on the landfill surface during construction to further minimize the amount of sediment which reaches sediment/detention pond #1. This approach is consistent with the methodology that was verbally approved in principle by NJDEP wetland personnel and the Freehold Soil Conservation District.

During and after construction of the landfill cap, the appropriate soil erosion and sediment control measures will be employed, therefore eliminating the creation of any new critical areas. A discussion of these measures is provided below.

3.7 SOIL EROSION AND SEDIMENT CONTROL MEASURES

Soil erosion and sediment control measures will be implemented, installed, and maintained according to the standards and specifications contained in *Standards for Soil Erosion and Sediment Control in New Jersey*, 1987, and New Jersey Administrative Code, (NJAC 2:90-1.1 et seq.) unless otherwise noted in this plan and the construction documents. Design specifications for soil erosion and sediment control structures have been obtained from the *Standards for Erosion and Sediment Control in New Jersey*.

3.7.1 Structural Practices

The following structural practices will be utilized during construction activities at Site 5 to control erosion and sedimentation.

Stone Construction Entrance - A temporary stone construction entrance will be installed to provide access to the site from the access road. Construction vehicles will be cleaned before exiting the site.

Decontamination Pad. A temporary decontamination pad will be constructed near the stone construction entrance. Construction vehicles and other construction equipment will be cleaned prior to coming to the site and before exiting the site.

Culverts - Permanent culverts will be provided to carry water from the perimeter drainage channels under access roads on the cap.

Sediment Barrier (Silt Fence) - Silt fence will be installed parallel to existing contours in the locations shown on the Erosion and Sediment Control Plan in order to intercept runoff from the disturbed areas. The fence will be installed prior to any clearing, grubbing, or excavation activities at the site. Additional silt

fence will be placed and maintained on the landfill surface until permanent vegetation is established, in order to minimize the amount of sediment which may reach sediment/detention pond #1.

Sediment Basin - Three temporary sediment basins will be constructed to minimize transport of sediment offsite during construction activities. The sediment basins are designed to provide for sediment storage capacity during construction activities plus temporary storage for a 2-year, 24-hour, Type III storm event. Additionally, the sediment basins are designed to obtain 70 percent trap efficiency at the start of the basin's useful life. Sediment/detention basins 1 and 3 have been modified from a relatively standard sediment basin design to accommodate topographic constraints at the site. A standard design would consist of a conduit riser pipe with discharge barrel to function as the principal spillway with an emergency spillway channel located above the principal spillway in elevation. However, the very flat site topography and anticipated backwater conditions preclude free drainage and practical performance of a conventional conduit discharge system. Therefore, these two basins incorporate a single overflow weir to act as both the principal and emergency spillways. These basins would therefore be "wet" basins (i.e., no surface discharge from the basins would occur until the water elevation in the basins reached the overflow weir). Nevertheless, based on observations of the existing detention basins and the type of soils at the site it is anticipated that water within these basins would infiltrate fairly rapidly.

Detention Basin - The three temporary Site 5 sediment basins will be used as permanent detention basins after construction of the cap is completed. These basins are designed to have capacity for excess runoff from a 25-year, 24-hour, Type III storm event. It is not anticipated that any changes, other than cleaning out the accumulated sediment will be required to convert the sediment basins to detention basins.

Surface Water Drainage Channel. A channel will be installed around the northern, southern, and eastern boundaries of the landfill cap. The channel will convey surface water to one of three sediment/detention basins and is designed to safely convey the peak discharge rate for a 25-year, 24-hour, Type III storm event. The 25-year storm event is used in accordance with New Jersey regulations for sanitary landfills (NJAC 7:26-2A.7g).

Conduit Outlet Protection - The outlet from the sediment/detention basin 2 will be constructed to provide a stable area at the outlet of the conduit in which the exit velocity from the conduit is reduced to a velocity consistent with a stable condition in the downstream channel. Rock aprons will also be placed at the permanent channel outfalls into the detention basins to reduce scour from these flows.

Temporary Vegetative Cover for Soil Stabilization - All regraded areas which will be left dormant for extended periods of time shall be seeded with fast germinating temporary vegetation immediately

following grading. Seeding will be done with the appropriate species of grass (i.e., Annual ryegrass or pearl millet depending on the date of planting) and seeding rates (See Table 3.1-1 of the Standards).

Permanent Vegetative Cover for Soil Stabilization - All regraded areas will be permanently seeded for long term protection. Seeding will be done with appropriate species of grass (i.e., hard or sheep fescue or Perennial Rye grass depending on the date of planting) and seeding rates (See Table 3.2-1 of the Standards).

Mulching - All areas receiving temporary or permanent seeding will be mulched with an organic material to prevent erosion by protecting the soil surface from raindrop impact and reducing the velocity of overland flow.

Top Soiling - Areas which have soil types that cannot support vegetation even after fertilization will be amended with top soil. The top soil will improve the soil medium for plant establishment and maintenance.

3.7.2 Management Strategies

1. Unstabilized, disturbed areas will be minimized.

2. The regraded cover system configuration has been designed to minimize drainage (and attendant sediment transport) towards the western wetland area, to the maximum extent practicable.

3. Seeding or other stabilization measures will follow immediately after grading.

4. Areas which are not to be disturbed will be clearly marked by flags, signs, etc.

5. The construction superintendent will be responsible for ensuring the installation and maintenance of all erosion and sediment control practices.

6. Erosion and sediment control structures will be installed and/or constructed prior to the start of any earth disturbing activities.

7. Erosion and sediment control structures will remain in place until permanent vegetation has become established over disturbed surfaces.

8. Permanent detention basins will remain in place and will be maintained for the life of the cap.

9. The final grading configuration will employ relatively flat grades (3.5%). Because of the flat grades and because the cap will be covered with topsoil to establish a good stand of grass, it was judged that the potential for rills to form on the cap was minimal. Permanent diversions were therefore not incorporated into the design within the limits of the cap. In addition, the cap surface will be regularly inspected and maintained, so that if rills were to form in the cap surface, they would be repaired.

3.8 PERMANENT STABILIZATION

All areas disturbed by the remedial action will be stabilized with permanent seeding following final grading. Seeding will be done with appropriate species of grass (See Table 3.2-1 of the Standards).

In order to improve the soil texture and decrease the potential for erosion, the channels on the northern and southern boundaries of the landfill will be topsoiled prior to permanent stabilization via seeding. The remaining channel sections will be vegetated over the existing soils (assumed to be sand). See Appendix E for channel capacity and lining design calculations.

3.9 STORMWATER RUNOFF CONSIDERATIONS

Calculations were performed to determine the peak stormwater discharge rates for each drainage area covering Site 5 for three scenarios: Pre-Construction, During Construction, and Post-Construction. Runoff calculations for the 2-, 10-, and 25-year, 24-hour, Type III storms were performed for each drainage area and scenario. This range of storms covers the range of criteria required to design the various soil erosion and sediment control structures for this project. Runoff calculations for Site 5 are included in Appendix B and the results are summarized in more detail below in Section 3.10.

Calculations were performed using Quick TR-55™ by Haestad Methods, Inc. The software utilizes the identical procedures provided in the Soil Conservation Service's (SCS) Technical Release 55 (TR-55). TR-55 is recommended in the *Standards for Soil Erosion and Sediment Control in New Jersey* as an appropriate method for estimating peak discharge rates for small, urban watersheds.

Based on the existing topography there are 3 primary drainage areas for Site 5. Two of the drainage areas discharge offsite toward the west (to sediment/detention ponds 1 and 3). The topography for the other drainage area indicates that water from this area drains to a depression near the southeast corner of the cap (e.g., former detention pond) and it is assumed that the water infiltrates to the underlying aquifer. After regrading of the waste and cap construction are complete, there will still be three drainage areas, however, the corresponding discharge characteristics will be modified to better accommodate sediment

control and long-term stormwater detention. Under the existing conditions, a significant portion of the site drains to the depression near the southeast corner of the site. Since it is the intention of capping to improve runoff and limit infiltration into the landfill materials, this depression will be backfilled during the cap construction. Runoff which previously drained to this depression will be split with the majority of the flow directed to the west to sediment/detention basin 1. Nevertheless, because of space limitations at sediment/detention basin 1 (railroad tracks to the south, wetlands to the north and west, and the landfill to the east) the amount of runoff to sediment/detention basin 1 was minimized. To minimize this flow, sediment/detention basin 2 was incorporated into the design with its discharge point to the east. Since a negligible amount of area drains to the east from the site under existing conditions, it was assumed that the pre-construction discharge to the east was essentially 0 cfs. Sediment/detention basin 2 was designed to minimize the peak discharge to the east. As a result, the peak discharge to the east during the 25-yr, 24-hr storm event is less than 2 cfs. Since the area below the outfall from sediment/detention basin 2 is wide and flat, this area will be able to accept the additional 2 cfs without damage to the outfall channel. The drainage areas delineated for each scenario are provided on figures included in Appendix B.

Calculations for the Pre-Construction scenario were completed to determine baseline flow rates from each drainage area under their current conditions. Peak discharge rates for the During Construction scenario were necessary to determine the capacity of the sediment basins that will be in operation during construction. Peak stormwater runoff rates and erosion potential are generally highest for this scenario because the entire site was assumed to be cleared and grubbed. After construction of the landfill, the site will be restored to a grassed, pervious condition, except in the vicinity of the skeet range which will be paved. The calculated storm water discharge rates for each drainage basin for this scenario (excluding the impact of any proposed permanent detention structures) exceeded the Pre-Construction rates, which indicates that permanent stormwater management structures are required. These stormwater management structures were designed for a 25-year, 24-hour, Type III storm which is the required storm event for designing landfill stormwater management structures. The discharges from the detention structures 1 and 3 are less than the pre-construction conditions. Detention Basin 2 has a small increase as was discussed above.

3.10 CALCULATIONS

Runoff calculations for each Site 5 drainage area and scenario discussed above are summarized in Appendices B.5, B.6 and B.7. A summary of calculated peak discharge rates (prior to attenuation through the detention structures) is provided in Appendix B.1. Appendix D.1 presents a summary of the pre-construction discharge rages and the peak outflows from the detention ponds. All assumptions made during the calculations are provided on the calculation sheets.

For the 2 to 25-year storm events, the calculated discharge rates range from 1 to 12 cubic feet per second (cfs) for the Pre-Construction scenario, from 3 to 35 cfs for the During-Construction scenario prior to being routed through the detention ponds, and from 3 to 10 cfs for the Post-Construction Scenario prior to being routed through the detention ponds. Because of the size of the areas to be disturbed during construction, it was determined that sediment basins in conjunction with silt fence are necessary for each Site 5 drainage area to control soil erosion and loss. In addition, because the peak discharge rates from each area increased between the Pre- and Post-Construction scenarios, permanent stormwater management structures (i.e., detention basins) are required for each area.

The calculations completed to determine the size and capacity of the temporary sediment basins and the permanent detention basins required for Site 5 are included in Appendix D. For simplicity and to be conservative, only one size of basin was designed for each drainage area. The capacity of each basin is large enough to accommodate sediment and storm water for the During-Construction scenario and to store the required excess storm water runoff from the Post-Construction scenario. The dimensions of each basin are shown on the drawings.

Storm hydrographs were routed through each of the detention basins. For detention basins 1 and 3, the peak post-development peak outflow was less than the peak discharge for the 2, 10, and 25-year storm events. The peak post-development flow from detention basin 2 does increase slightly, but it is judged that this minimal flow can be managed effectively by the downstream channel. The peak elevation for each event did not overtop any of the detention basins. All post-development runoff will be routed through a detention basin.

3.11 MAINTENANCE

In general, all erosion and sediment control measures will be checked daily and after each significant rainfall event. Any required repairs will be made immediately. The following items will be checked in particular:

- The stone construction entrance will be maintained in a condition which will minimize tracking of sediment onto roads, including the addition of stone or other repairs.

- The silt fence will be checked regularly for undermining or deterioration of the fabric. Sediment will be removed when the level of sediment deposition reaches half of the height of the fabric. Silt fence

within the limits of the landfill cap will be removed and replaced to the extent practicable to allow grading operations. If an area is left undisturbed for 3 days or more, the silt fence shall be reinstalled.

- The sediment basins have been designed to contain the sediment erosion expected through the six-month construction process and to accommodate the runoff from a 2-yr storm event. Therefore, no maintenance of the sediment basins is expected.

- The seeded areas will be checked regularly to ensure that a good stand is maintained. Areas shall be fertilized, re-top soiled and re-seeded as needed. The RAC is responsible for maintenance until formal acceptance by the Contracting Officer.

- The permanent detention basins will require long-term inspection and maintenance. They should be inspected on a regular cycle and repaired as necessary. The RAC is responsible for maintenance until formal acceptance by the Contracting Officer.

3.12 SEQUENCE OF CONSTRUCTION

The proposed sequence of construction events are as follows. Throughout all construction events, the temporary and permanent controls shall be routinely inspected and properly maintained.

1. Construct the rock entrance from the access road to the site and a decontamination pad.

2. Construct the perimeter soil erosion and sediment control devices (i.e., silt fence).

3. Clear and grub a pathway to the proposed areas of the three sediment basins. The pathway will follow along and include the area of the proposed surface water channels.

4. Construct the sediment basins and excavate for the base of the surface water channel and cap termination in the locations shown on Drawing C-11 in accordance with applicable details. The base of the permanent drainage channels and the base of the cap termination will serve as the temporary drainage channels until the cap is constructed.

5. Install silt fence on landfill as shown on Drawing C-11.

6. Clear and grub the remainder of the site, taking care not to work beyond the limits of work shown on the plans.

7. Excavate waste outside the planned perimeter of the landfill cap and consolidate within the footprint of the cap. Stabilize excavated areas with permanent vegetative cover.

8. Regrade waste and remove and replace silt fence within the limits of the limits of the landfill cap.

9. Clean out sediment basins, if necessary, and distribute sediment over regraded waste.

10. Construct landfill cap, remove and replace silt fence on landfill cap to control sediment from cap, the roadways over the cap and the necessary culverts for the roadways. As the landfill cap is constructed install permanent channel linings.

11. Pave the skeet range.

12. Spread topsoil to bring the site to final grade. Replace silt fence within limits of landfill. Silt fence will now remain in place until vegetation is established. Sediment that collected against the silt fence or in the sediment basins during backfilling and capping operations is clean material and is to be distributed evenly over remaining disturbed areas prior to final stabilization.

13. Seed and mulch the site.

14. After vegetation/permanent stabilization is established, remove all temporary soil erosion and sediment control measures.

4.0 CONCLUSIONS

4.1 SITE 4 CONCLUSIONS

The following items summarize the soil erosion and sediment control measures that are required for Site 4 during the construction and after the construction of the cap. The limitations of the plan are also noted.

- Silt fence will be installed at the toe of slope between the two sediment basins along the southeast boundary of the limit of work during construction activities. The fence will serve to collect sediment that is not redirected by the diversion bench.

- Silt fence will be installed to the south of limit of work in the southwest corner of the landfill during construction activities.

- An upgradient surface water drainage channel will be installed to eliminate surface water runon to the cap from adjacent areas and to convey surface water runoff from the cap to the appropriate sediment basin. Critical sections of this channel will be lined with a geotextile fabric and riprap to protect the soil surface of the channel.

- The permanent diversion (bench) installed midway down the southeast slope of the final landfill cap will serve as an adequate permanent stormwater management appurtenance.

- Sediment basins will be used to minimize offsite sediment transport during construction activities. The size of the sediment basins will adequately trap sediment erosion expected during the 6-month construction period. Additionally, the basins have adequate size to detain peak run-off during a 2-year, 24-hour, Type III storm event.

- Site 4 post-development runoff will be less than pre-development runoff. Hence, a permanent detention basin will not be constructed.

4.2 SITE 5 CONCLUSIONS

The following items summarize the soil erosion and sediment control measures that are required for Site 5 during the construction and after the construction of the cap. The limitations of the plan are also noted.

- Silt fence is required along the outside of the limit of work in areas where surface water runoff exits the site. Silt fence is also required within the limits of the landfill to minimize the sediment load to sediment/detention basin #1.

- An upgradient surface water interceptor trench will be installed to eliminate surface water runon to the cap from adjacent areas and to convey surface water runoff from the cap to the appropriate sediment/detention basin. All drainage ditches will be vegetated.

- Due to the size of the areas to be cleared and grubbed at one time, three sediment basins are required during construction activities at Site 5.

- Because of the changes to the cover material during construction of the cap at the site, peak stormwater discharge rates will increase unless, permanent detention structures are incorporated. Therefore, permanent stormwater management devices (i.e., detention basins) are incorporated into the design. The detention basins reduce the post-development peak discharge below pre-development conditions for two of the three basins, and reduce the peak discharge (25 yr/24 hr event) from the third basin to less than 2 cfs.

REFERENCES

U.S. Department of Agriculture, Soil Conservation Service, 1986. "Technical Release 55 - Urban Hydrology for Small Watersheds."

New Jersey State Soil Conservation Committee and the New Jersey Department of Agriculture, Division of Rural Resources, 1987. "Standards for Soil Erosion and Sediment Control in New Jersey."

U.S. Department of Agriculture, Soil Conservation Service, 1989. "Soil Survey of Monmouth County."

Haestad Methods, Inc., 1989. "Quick TR-55, Urban Hydrology for Small Watersheds."

APPENDIX A

NEW JERSEY GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL

GUIDELINES

FOR SOIL EROSION AND SEDIMENT CONTROL

Effective soil erosion and sediment control planning requires careful evaluation of the following factors prior to developing the plans for the specific site. The key planning objective is to retain soil on the site and minimize delivery of sediment offsite:

I. Factors to be considered in planning:

a. erodibility of soils - information on soils characteristics may be found in the USDA "Soil Survey" available for most counties.
b. existing drainage patterns.
c. presence of steep slopes, stream corridors and other critical site factors.
d. quality of existing vegetation to act as a buffer during construction.
e. minimum area to be cleared.
f. protection of roadway access points from tracking sediments.
g. need for protecting conduit outlets with riprap.
h. stabilization of excess excavated materials to be deposited offsite.

When considering offsite impacts of the proposed project it must be demonstrated by an offsite stability analysis that a stable condition exists at all points of water discharge for the 2 and 10 year design storm. If the existing offsite conditions are currently unstable it must be demonstrated that the project will not aggravate such conditions. Where Infiltration Basins are proposed for stormwater management, a stable emergency discharge area must be provided.

II. Factors to be considered in erosion control plan design -

a. the grades, maximum slope and maximum area to be disturbed at one time should be based on:

1. soil erodibility
2. geology
3. rainfall data
4. proposed establishment of vegetation
5. proposed maintenance

b. the sequence of construction and the installation of erosion controls including:

1. site clearing
2. topsoil stripping
3. interim control installation
4. construction of structures/project phase
5. maintenance of controls, etc.

c. controls designed to achieve the following:

1. interception of runoff from long, sloping sites and delivery to stable area
2. stabilization by use of temporary vegetation
3. sediment filtration via preserving buffer strips
4. stabilized stockpiled soil
5. control soil losses at
   i. driveway entrances/exists
   ii. streams, rivers, natural drainage ways
   iii. large, cleared areas subject to wind erosion

III. Factors to be considered during construction:

a. implementation of erosion control plans in a timely manner
b. careful adherence to the construction sequence
c. frequent inspection and maintenance of erosion controls
d. timely removal of sediment from basins, removal of temporary structural controls and installation of permanent vegetation at project completion.

APPENDIX B

CALCULATIONS TO ESTIMATE STORM WATER RUNOFF RATES FROM SITES 4 AND 5

B.1 Preliminary Information for Sites 4 and 5

B.2 Pre-Construction Conditions for Site 4

B.3 During Construction Conditions for Site 4

B.4 Post-Construction Conditions for Site 4

B.5 Pre-Construction Conditions for Site 5

B.6 During Construction Conditions for Site 5

B.7 Post-Construction Conditions for Site 5

B.8 Area South of Railroad Tracks at Site 5

B.1 PRELIMINARY INFORMATION FOR SITES 4 AND 5

CALCULATION WORKSHEET Order No. 19116 (91-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

B-1

SITES 4 AND 5

PRELIMINARY INFORMATION

- OBJECTIVE
- APPROACH
- ASSUMPTIONS
- REFERENCES
- EXECUTIVE SUMMARY
- ESTIMATE OF SOIL TYPE & SCS HSG
- ESTIMATE OF RAINFALL DISTRIBUTION AND PRECIPITATION AMOUNTS

CLIENT	JOB NUMBER
NWSE - SITES 4 AND 5	7602/0104

SUBJECT: ESTIMATION OF PEAK DISCHARGE RATES

BASED ON	DRAWING NUMBER
TR-55 / TOPO	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JJB 8/26/97		

OBJECTIVE:

THE PURPOSE FOR COMPLETING THE FOLLOWING CALCULATIONS IS TO EVALUATE PRE-, DURING-, AND POST-CONSTRUCTION CONDITIONS AT SITES 4 AND 5 SO THAT PROPER EROSION AND SEDIMENT CONTROL PLANS CAN BE DEVELOPED FOR EACH SITE. THE PRIMARY GOAL OF THE CALCULATIONS IS TO ESTIMATE THE PEAK DISCHARGE RATES FROM INDIVIDUAL DRAINAGE AREAS AT SITES 4 AND 5. THE 1987 STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY (NJ) BY THE NJ STATE SOIL CONSERVATION COMMITTEE AND THE DIVISION OF RURAL RESOURCES NJ DEPT. OF AGRICULTURE. WILL BE USED.

APPROACH:

USE THE METHOD SPECIFIED IN THE SOIL CONSERVATION SERVICE'S TECHNICAL RELEASE 55 (TR-55), "URBAN HYDROLOGY FOR SMALL WATERSHEDS" JUNE 1986 TO ESTIMATE THE PEAK DISCHARGE RATES FROM THE INDIVIDUAL DRAINAGE AREAS AT SITES 4 AND 5. THIS METHOD IS APPLICABLE TO SMALL WATERSHEDS SUCH AS THOSE FOUND AT SITES 4 AND 5. IT USES SIMPLIFIED PROCEDURES FOR ESTIMATING RUNOFF AND PEAK DISCHARGES IN SMALL WATERSHEDS. THE METHOD INCLUDES THE FOLLOWING STEPS: (1) DETERMINE SOIL TYPE; (2) ESTIMATE BOUNDARIES AND SIZES OF EACH DRAINAGE AREA; (3) DETERMINE COVER TYPE AND AREAL COVERAGE; (4) DETERMINE WEIGHTED CURVE NUMBERS (CNs); (5) ESTIMATE TIME OF CONCENTRATIONS (Tc); (6) ESTIMATE STORM-SPECIFIC 24-HOUR RAINFALL AMOUNTS; AND (7) ESTIMATE

CLIENT	JOB NUMBER
NWSE - SITES 4 AND 5	7602/0104

SUBJECT: ESTIMATION OF PEAK DISCHARGE RATES

BASED ON	DRAWING NUMBER
TR-55 / TOPO	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	8/26/97		

PEAK DISCHARGE BY GRAPHICAL PEAK DISCHARGE METHOD.

ASSUMPTIONS:

- THE METHODS AND ASSUMPTIONS USED TO DEVELOP TR-55 ARE APPROPRIATE FOR THESE CALCULATIONS.
- 3 DESIGN STORMS WILL BE EVALUATED, THE 2-YR, 10-YR AND 25-YR. THESE STORMS WERE SELECTED BECAUSE OF THE DESIGN REQUIREMENTS SPECIFIED BY NJ REGS. FOR TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL STRUCTURES AND DETENSION BASINS.
- THE LIMITS OF THE EXISTING TOPOGRAPHY PROVIDE SUFFICIENT COVERAGE OF SITES 4 AND 5 TO ESTIMATE UNIQUE DRAINGE AREAS. AREAS OUTSIDE OF THESE LIMITS WERE NOT CONSIDERED TO CONTRIBUTE RUNOFF TO THE ONSITE DRAINAGE AREAS. RUNOFF FROM THESE OFF SITE AREAS WILL BE DIVERTED AROUND SEDIMENT / DETENSION BASINS.
- HAESTAD'S QUICK TR-55 COPYRIGHT © 1989 WILL BE USED IN LIEU OF MANUAL CALCULATIONS. THIS PROGRAM USES THE SAME EQUATIONS PROVIDED IN THE SCS TR-55 MANUAL.
- SITES 4 AND 5 ARE LOCATED IN MONMOUTH COUNTY NEW JERSEY.
- THE LOCATION OF SITE 4 FALLS WITHIN THE BOUNDARY OF THE MARLBORO USGS QUANDRANGLE.

CLIENT	JOB NUMBER
NWSE - SITES 4 AND 5	7602/0104

SUBJECT: ESTIMATION OF PEAK DISCHARGE RATES

BASED ON	DRAWING NUMBER
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CAR	JJB 8/26/97		

ASSUMPTIONS (CONT'D)

- THE LOCATION OF SITE 5 FALLS WITHIN THE BOUNDARY OF THE LONG BRANCH USGS QUADRANGLE.

- BASED ON TOPOGRAPHY SHOWN ON MARLBORO QUAD, SITE 4 FALLS WITHIN TWO MAJOR DRAINAGE BASINS. THESE BASINS ARE THE HOCKHOCKSON BROOK AND THE MINGAMAHONE BROOK. A MAJORITY OF THE SITE IS LOCATED IN THE HOCKHOCKSON BROOK DRAINAGE BASIN.

- BASED ON TOPOGRAPHY SHOWN ON LONG BRANCH QUAD, SITE 5 FALLS WITHIN, BUT CLOSE TO THE BOUNDARY OF, THE PINE BROOK DRAINAGE BASIN.

REFERENCES:

- HAESTAD METHODS, DECEMBER 1989, "QUICK TR-55, URBAN HYDROLOGY FOR SMALL WATERSHEDS."

- NEW JERSEY STATE SOIL CONSERVATION COMMITTEE AND THE DIVISION OF RURAL RESOURCES NEW JERSEY DEPT. OF AGRICULTURE, 1987, "STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY."

- SOIL CONSERVATION SERVICE, JUNE 1986, "TECHNICAL RELEASE 55 - URBAN HYDROLOGY FOR SMALL WATERSHEDS" US DEPT. OF AGRICULTURE.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NWSE - SITES 4 AND 5	JOB NUMBER: 7602/0104
SUBJECT: ESTIMATION OF PEAK DISCHARGE RATES	
BASED ON: TR-55 / TOPO	DRAWING NUMBER:
BY: CAR 8/29/97 / CHECKED BY: JJB 8/26/97	APPROVED BY: / DATE:

EXECUTIVE SUMMARY OF CALCULATIONS:

SITE 4:

SCENARIO	DRAINAGE AREA	STORM (YR) FREQUENCY	RAINFALL (IN)	RUNOFF (IN)	PEAK DISCHARGE (CFS)
PRE-CONSTRUCTION	1	2	3.4	0.57	3
		10	5.2	1.56	8
		25	6.0	2.09	12
	2	2	3.4	0.61	1
		10	5.2	1.64	4
		25	6.0	2.18	5
DURING-CONSTRUCTION	1	2	3.4	0.95	5
		10	5.2	2.19	13
		25	6.0	2.81	17
	2	2	3.4	0.84	2
		10	5.2	2.02	5
		25	6.0	2.62	6
	3	2	3.4	0.70	0
		10	5.2	1.79	1
		25	6.0	2.35	2
POST-CONSTRUCTION	1	2	3.4	0.49	2
		10	5.2	1.42	8
		25	6.0	1.92	11
	2	2	3.4	0.57	1
		10	5.2	1.56	4
		25	6.0	2.09	5

NSWE - Site 5
Estimation of Peak Discharge Rates

Scenario	Drainage Area	Storm Frequency (yr)	Rainfall (in)	Runoff (in)	Final Discharge (cfs)
PRE - CONSTRUCTION	1A(1)	2	3.4	0.49	1
		10	5.2	1.42	4
		25	6.0	1.92	6
	1B(1)	2	3.4	0.53	2
		10	5.2	1.49	7
		25	6.0	2.01	9
	2(2)	2	NA	NA	NA
		10	NA	NA	NA
		25	NA	NA	NA
	3	2	3.4	0.75	3
		10	5.2	1.87	9
		25	6.0	2.44	12
DURING - CONSTRUCTION	1	2	3.4	1.49	14
		10	5.2	2.97	28
		25	6.0	3.68	35
	2	2	3.4	1.49	3
		10	5.2	2.97	6
		25	6.0	3.68	7
	3	2	3.4	1.23	6
		10	5.2	2.61	12
		25	6.0	3.28	16
POST - CONSTRUCTION Prior to routing through detention basin	1	2	3.4	0.53	3
		10	5.2	1.49	8
		25	6.0	2.01	10
	2	2	3.4	1.63	3
		10	5.2	3.16	7
		25	6.0	3.88	8
	3	2	3.4	1.06	3
		10	5.2	2.35	7
		25	6.0	2.99	9

(1) The existing drainage areas 1A and 1B flow to the depression to the southeast and southwest portions of the landfills respectively. Runoff which could eventually fill the southwest depression would flow to the southeast depression. The intent of the landfill cap is to improve drainage from the site so during construction of the cap, the southeast depression will be eliminated. Areas 1A and 1B under existing conditions roughly corresponds to Area 1 During-Construction and Post-Construction.

(2) Under existing conditions only a negligible amount of area drains from the site to the east. Under the During-Construction scenario and the Post-Construction scenario, a small area is directed to flow to the east (Area 2). Therefore, under Pre-Construction conditions Area 2 does not exist and the discharges are listed as NA in the table. Area 2 During and Post-Construction conditions was directed to the east to minimize the additional flow to Drainage Area 1. This will also minimize the additional sediment loading to Sediment Basin 1 which has a wetland located within it (see main text). Therefore, under existing conditions the Drainage Area 2 has negligible flows, but During-Construction and Post-Construction discharges to the east do exist. These flows are minimized by use of a detention basin at this outfall.

CALCULATION WORKSHEET

Order No. 19116 (01-91)

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CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

ESTIMATE SOIL TYPES AND
SCS HYDROLOGIC SOIL GROUPS
FOR SITES 4 AND 5

CLIENT NWSE - NAVY CLEAN	JOB NUMBER 7602/0104
SUBJECT SITES 4 & 5 SOIL TYPES	
BASED ON SOIL SURVEY - MONMOUTH COUNTY	DRAWING NUMBER
BY CAR 7/22/97 / CHECKED BY JJB 8/7/97	APPROVED BY / DATE

PURPOSE:

DETERMINE THE SOIL TYPES AT SITES 4 & 5. USE THE SOIL SURVEY OF MONMOUTH COUNTY, APRIL 1989 VERSION. COPIES OF THE APPROPRIATE FIGURES FROM THE SURVEY ARE ATTACHED (SEE pp. 2-13)

① SITE 4

USING FIGURES 1-1 AND 1-2 FROM THE FS, THE LOCATION OF SITE 4 WAS APPROXIMATED ON THE APPROPRIATE FIGURES FROM THE SOIL SURVEY (SEE p. 4 OF 14; p. 5 OF 14; & p. 7 OF 14)

SITE 4 SOIL TYPE IS PT (SEE p. 7 OF 14)
FROM THE SOIL LEGEND: PT = PITS, SAND AND GRAVEL (SEE p. 6 OF 14 AND p. 13 OF 14)

② SITE 5

USING FIGURES 1-1 AND 1-3 FROM THE FS, THE LOCATION OF SITE 5 WAS APPROXIMATED ON THE APPROPRIATE FIGURES FROM THE SOIL SURVEY (SEE p. 4 OF 14; p. 5 OF 14; AND p. 7 OF 14)

SITE 5 SOIL TYPES INCLUDE LeB, KeB, LaA AND At (SEE p. 7 OF 14).

FROM THE SOIL LEGEND:

LeB = Lakewood Sand, 0 to 5 percent slopes (p. 6 of 14; p. 11 of 14; AND p. 12 of 14)
KeB = Keyport Sandy loam, 2 to 5 percent slopes (p. 6 of 14; p. 10 of 14; AND p. 11 of 14).
LaA = Lakehurst Sand, 0 to 2 percent slopes (p. 6 of 14; p. 11 of 14)
At = Atsion Sand (p. 6 of 14; p. 8 of 14 AND p. 9 of 1.

United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
New Jersey Agricultural
Experiment Station, Cook
College, Rutgers, The State
University; and the New
Jersey Department of
Agriculture, State Soil
Conservation Committee

Soil Survey of Monmouth County New Jersey

USDA, Soil Conservation Service
77 - 55 Schanck Road
Suite B-11
Freehold, NJ 07728

CAR
7/22/97

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LEGEND

1 KLEJ-KEYPORT-URBAN LAND: Nearly level to moderately steep, deep, somewhat poorly drained and moderately well drained, sandy and clayey soils and Urban land; on uplands

2 EVESBORO-KLEJ: Nearly level to steep, deep, excessively drained, moderately well drained, and somewhat poorly drained, sandy soils; on uplands

3 FREEHOLD-URBAN LAND-COLLINGTON: Nearly level to moderately steep, deep, well drained, loamy soils and Urban land; on uplands

4 SASSAFRAS-DOWNER-WOODSTOWN: Nearly level to steep, deep, well drained and moderately well drained, loamy soils; on uplands

5 LAKEWOOD-LAKEHURST-EVESBORO-KLEJ: Nearly level to moderately sloping, deep, excessively drained, moderately well drained, and somewhat poorly drained, sandy soils; on uplands

6 ATSION: Nearly level, deep, poorly drained, sandy soils; on upland flats

7 SULFAQUENTS SULFIHEMISTS HOOKSAN: Nearly level and gently sloping, deep, poorly drained, very poorly drained, and excessively drained, mucky and sandy soils; on coastal dunes and on tidal flats

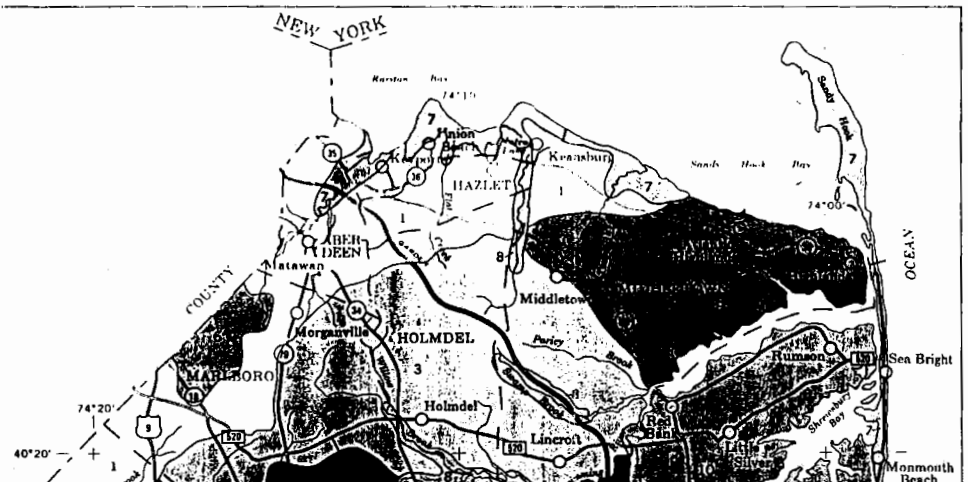
8 HUMAQUEPTS, FREQUENTLY FLOODED-MANAHAWKIN: Nearly level, deep, somewhat poorly drained to very poorly drained, mucky and sandy soils; on flood plains and on low lands

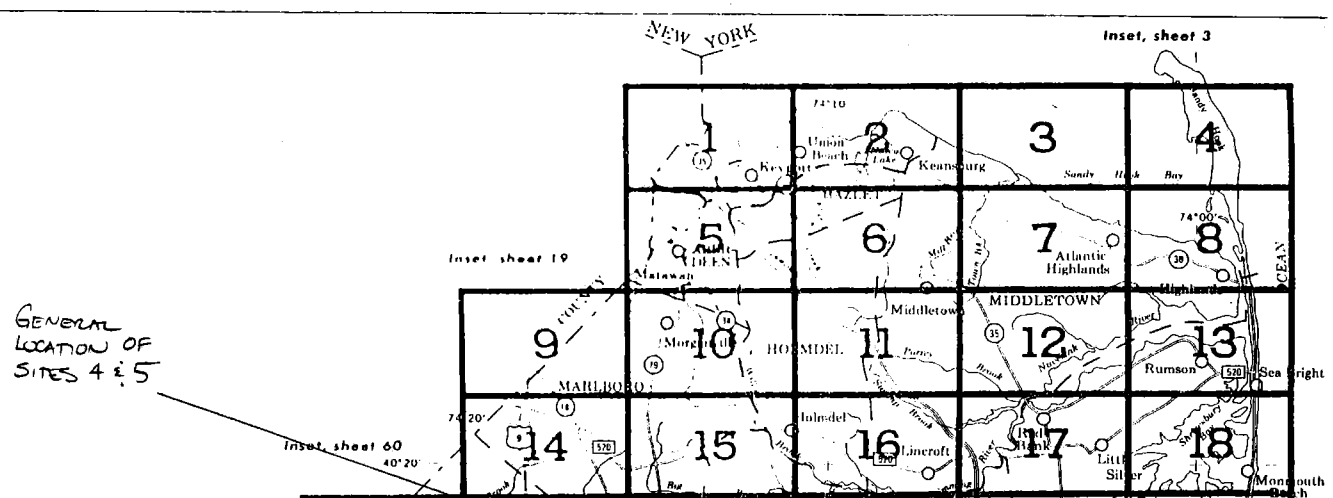
9 TINTON-PHALANX-URBAN LAND: Nearly level to steep, deep, well drained, loamy soils and Urban land; on uplands

10 FREEHOLD-URBAN LAND-HOLMDEL: Nearly level to steep, deep, well drained to somewhat poorly drained, loamy soils and Urban land; on uplands

11 TINTON-COLLINGTON-COLTS NECK: Nearly level to steep, deep, well drained, loamy soils; on uplands

12 FREEHOLD-SHREWSBURY-TINTON: Nearly level to steep, deep, well drained and poorly drained, loamy soils; on uplands





GENERAL LOCATION OF SITES 4 & 5

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

MONMOUTH COUNTY, NEW JERSEY

NEW JERSEY AGRICULTURAL EXPERIMENT STATION
COOK COLLEGE, RUTGERS AND THE STATE UNIVERSITY
THE NEW JERSEY DEPARTMENT OF AGRICULTURE
STATE SOIL CONSERVATION COMMITTEE

SOIL LEGEND

Publication symbols consist of letters or a combination of letters and numbers. The initial two letters represent the kind of soil. A capital letter of A, B, C, D or E following the first two letters indicates the class of slope. Symbols without a slope letter are for nearly level soils, soils named for higher categories or for miscellaneous areas. A number following the letter represents an eroded phase.

SYMBOL	NAME	SYMBOL	NAME
AeA	Adelphia loam, 0 to 2 percent slopes	KeA	Keyport sandy loam, 0 to 2 percent slopes
AeB	Adelphia loam, 2 to 5 percent slopes	KeB	Keyport sandy loam, 2 to 5 percent slopes
AtA	Adelphia loam - Urban land complex, 0 to 5 percent slopes	KeC	Keyport sandy loam, 5 to 10 percent slopes
At	Atsion sand	KeD	Keyport sandy loam, 10 to 15 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

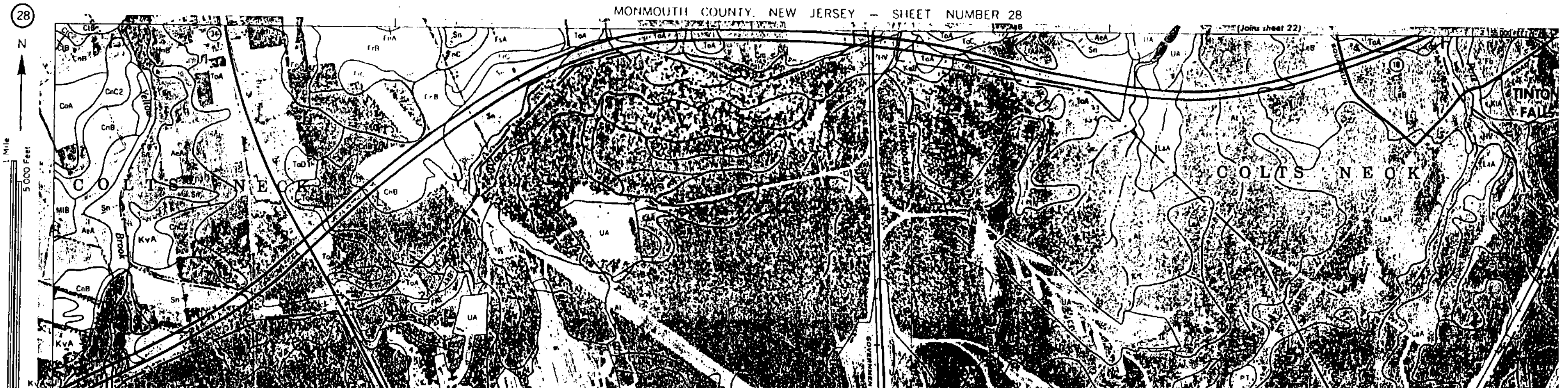
GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown)

28

MONMOUTH COUNTY, NEW JERSEY — SHEET NUMBER 28



swales, and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam 8 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam to a depth of 31 inches. Below that, it is mottled, strong brown sandy loam to a depth of 38 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown sandy loam that has thin lenses of sandy clay loam.

Included with this unit in mapping are Adelphia soils that have a sandy loam surface layer. This soil, which makes up a significant portion of the map unit, is similar to the Adelphia loam in use and management. Also included are areas of Holmdel and nearly level Adelphia soils. These soils, which make up about 45 percent of the unit, are similar to the gently sloping Adelphia loam in use and management. Also included are areas of Freehold, Collington, Marlton, and Shrewsbury soils. These soils, which make up as much as 15 percent of the unit, are dissimilar to the gently sloping Adelphia loam in use and management.

Permeability of the Adelphia soil is moderately slow or moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, white oak, yellow poplar, sweetgum, and red maple. The wetter areas are dominated by sweetgum and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, frost action potential, and shrinking and swelling.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

ALA—Adelphia loam-Urban land complex, 0 to 5 percent slopes. This map unit consists of nearly level and gently sloping, moderately well drained and somewhat poorly drained Adelphia loam and Urban land. Areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 25 to 75 acres in size.

Adelphia loam makes up about 45 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 25 percent.

Typically, the surface layer of the Adelphia soil is very dark grayish brown loam 8 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam to a depth of 31 inches. Below that, it is mottled, strong brown sandy loam to a depth of 38 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown sandy loam that has thin lenses of sandy clay loam.

Urban land unit consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Adelphia soils that have a sandy loam surface layer and Holmdel soils. These soils are similar to the Adelphia loam in use and management. Also included are areas of Udorthents and Freehold, Collington, Marlton, and Shrewsbury soils. These soils are dissimilar to the Adelphia loam in use and management. The similar and dissimilar soils make up as much as 25 percent of the complex.

Permeability of the Adelphia soil is moderately slow or moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April.

The open areas of this map unit are used for lawns, vacant wooded lots, gardens, and small parks.

The main limitations to use of the Adelphia soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, frost action potential, and shrinking and swelling.

This map unit is not assigned to a capability subclass; the woodland ordination symbol is 4A.

At—Atsion sand. This is a nearly level, poorly drained soil in depressional areas and on broad flats. Areas of this soil are irregular in shape and typically range from 10 to 75 acres in size.

Typically, the surface layer is 8 inches thick. The uppermost 2 inches is matted, partly decomposed organic material and roots, and below that, it is black sand. The subsurface layer is grayish brown sand 14 inches thick. The subsoil is 18 inches thick. It is dark reddish brown loamy sand to a depth of 30 inches.

Below that, it is mottled, brown sand to a depth of 40 inches. The substratum is mottled, yellowish brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Humaquepts and Manahawkin, Lakehurst, and Klej soils. Also included, in the vicinity of Holmeson and Turkey Swamp, are areas of soils that have a glauconitic substratum. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Atsion soil in use and management.

Permeability of the Atsion soil is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. The apparent seasonal high water table is between the surface and a depth of 1 foot from November to June. Runoff is very slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are wooded. A few acres is used for blueberries.

This soil is suited to specialty crops, such as blueberries. For blueberries drainage and land smoothing are needed. The major limitation for most other crops is the seasonal high water table.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, black gum, and red maple.

The main limitation to use of this soil as sites for dwellings and some other types of community development is the seasonal high water table.

This soil is in capability subclass Vw; the woodland ordination symbol is 7W.

Cm—Colemantown loam. This is a nearly level, poorly drained soil in depressional areas and on broad flats. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is very dark brown loam 9 inches thick. The subsoil is mottled, dark greenish gray clay loam 27 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, dark greenish gray stratified sandy clay loam, sandy loam, and sandy clay to a depth of 48 inches. Below that, it is dark greenish gray sandy clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Kresson and Shrewsbury soils. These soils, which make up about 35 percent of the map unit, are similar to the Colemantown soil in use and management. Also included are areas of Adelphia soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Colemantown soil in use and management.

Permeability of this Colemantown soil is slow in the subsoil and moderately slow in the substratum. The available water capacity is high. The perched seasonal high water table is between the surface and a depth of 1 foot from October to June. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate to high. The soil is subject to occasional flooding. In unlimed areas reaction is extremely acid or very strongly acid.

About half the acreage of this soil is farmed. A few acres is used for pasture. The rest of the acreage is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation is the seasonal high water table. The main management concern is providing drainage. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation of grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for pin oak is moderately high. During wet periods the use of equipment for harvesting trees is limited. The common species are pin oak, sweetgum, and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table and flooding.

This soil is in capability subclass IIIw; the woodland ordination symbol is 4W.

CnB—Collington sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington soils that have a loam surface layer and Freehold soils. These soils, which make up about 35 percent of the map unit, are similar to the Collington sandy loam. Also included are areas of Holmdel, Adelphia, and Marlton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to Collington sandy loam in use and management.

Permeability of this Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at

Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county, but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service (SCS) for information about the probable locations of this material. SCS can also provide information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitation to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, and the high frost action potential. If pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIw; the woodland ordination symbol is 6A.

KeB—Keyport sandy loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil on low divides. Areas of the soil are irregular in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Keyport soils that have a loam surface layer and Woodstown soils. Also included are areas of Keyport soils that have a loamy sand surface layer less than 20 inches thick. These soils, which make up about 40 percent of the map unit, are similar to the Keyport sandy loam in use and management. Also included are areas of Elkton soils and Klej soils that have a clayey substratum. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Keyport sandy loam in use and management.

Some areas of this Keyport soil have pyritic clay in the substratum. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service for information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The major limitation is the seasonal high water table. The main management concern is providing drainage and reducing runoff to control erosion. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, and the high frost action potential. If pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIe; the woodland ordination symbol is 6A.

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Included with this soil in mapping are areas of Marlton and Colemantown soils. These soils, which make up about 25 percent of the map unit, are similar to the Kresson soil in use and management. Also included are areas of Adelphia and Shrewsbury soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Kresson soil in use and management.

Permeability of this Kresson soil is slow in the subsoil and the substratum. The available water capacity is high. The perched seasonal high water table is at a depth of 1 foot to 1 1/2 feet from December to May. Runoff is slow to medium. Erosion is a slight to moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The clayey subsoil and substratum lower the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for sweetgum is high. The common species are sweetgum, white oak, pin oak, yellow poplar, and willow oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, slow percolation, and frost action.

This soil is in capability subclass IIIw; the woodland ordination symbol is 7W.

LaA—Lakehurst sand, 0 to 2 percent slopes. This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand 6 inches thick. The subsoil is 26 inches thick. It is brown loamy sand to a depth of 13 inches. In the next layer it is mottled, brownish yellow sand to a depth of 24 inches. Below that, it is mottled, pale brown sand to a depth of 36 inches. The substratum is mottled, light brownish gray sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Klej soils and soils that are similar to the Lakehurst soil but that have a bleached subsurface layer that is thinner than typical and that do not have a subsoil that in the upper part is distinct, thin, or darkened by an accumulation of organic matter. These soils, which make up about 30 percent of the map unit, are similar to the Lakehurst soil in use and management. Also included are areas of Lakewood and Atsion soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Lakehurst sand in use and management.

Permeability of this Lakehurst soil is rapid in the subsoil and the substratum. The available water capacity is low. The apparent seasonal high water table is at a depth of 1 1/2 to 3 1/2 feet from January to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid to strongly acid.

Most areas of this soil are woodland. A very small acreage is used for pasture and farming.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and the seasonal high water table. If the soil is farmed, in wet areas improved drainage is needed for certain crops. Other management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In the wetter areas improved drainage is needed.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The most common species is pitch pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, cutbanks caving, and sandiness.

This soil is in capability subclass IVw; the woodland ordination symbol is 6S.

LeB—Lakewood sand, 0 to 5 percent slopes. This is a nearly level and gently sloping, excessively drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 40 acres in size.

Typically, the surface layer is 4 inches thick. The uppermost inch is dark brown, matted, decomposed organic material, and below that it is dark grayish brown sand. The subsurface layer is light brownish gray sand 10 inches thick. The subsoil is 17 inches thick. It is dark brown loamy sand to a depth of 16 inches. Below that, it is brownish yellow sand to a depth of 31 inches. The substratum is brownish yellow gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Evesboro soils and soils that are similar to the Lakewood soil but that have a bleached subsurface layer that is thinner than typical or that does not have a dark brown subsoil. These soils, which make up as much as 30 percent of the map unit, are similar to the Lakewood soil in use and management. Also included are areas of Lakehurst, Klej, and Atsion soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Lakewood soil in use and management.

Permeability of this Lakewood soil is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this Lakewood soil are woodland. A very small acreage is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is moderately high. The common species are pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 5S.

LeC—Lakewood sand, 5 to 10 percent slopes. This is a moderately sloping, excessively drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is 4 inches thick. The uppermost inch is dark brown, matted, decomposed organic material, and below that it is dark grayish brown sand. The subsurface layer is light brownish gray sand 10 inches thick. The subsoil is 17 inches thick. It is dark brown loamy sand to a depth of 16 inches. Below that, it is brownish yellow sand to a depth of 31 inches. The substratum is brownish yellow gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Evesboro soils and soils that are similar to the Lakewood soil but that have a bleached subsurface layer that is thinner than typical or that do not have a dark brown subsoil. These soils, which make up as much as 30 percent of the map unit, are similar to the Lakewood soil in use and management. Also included are areas of Lakehurst and Klej soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Lakewood soil in use and management.

Permeability of this Lakewood soil is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Water erosion is a moderate hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are woodland. A very small acreage is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Cover crops and windbreaks help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is moderately high. The common species are pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, sandiness, and slope.

This soil is in capability subclass VIIs; the woodland ordination symbol is 5S.

Ma—Manahawkin muck. This is a nearly level and very poorly drained soil in wide depressional areas and on broad flats. Areas of the soil are irregular in shape and typically range from 15 to 30 acres in size.

Typically, the uppermost 30 inches is black and very dark gray muck. Below the muck, the substratum is mottled, dark gray loamy sand and sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Atsion and Elkton soils and Humaquepts. Also included are soils that have a layer of muck more than 51 inches thick over mineral material. Also included are soils that have thick layers of muck and a clayey textured substratum. These soils, which make up as much as 25 percent of the map unit, are dissimilar in use and management.

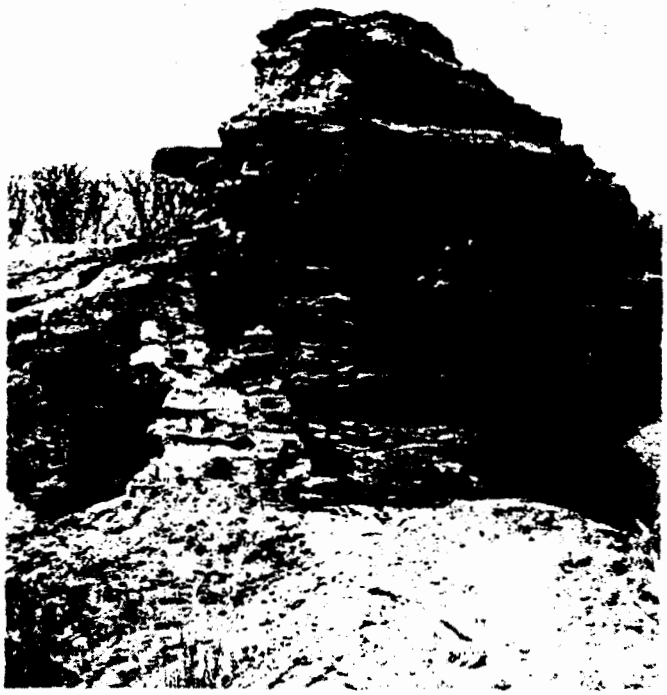


Figure 13.—An exposure of iron-cemented sandstone in an area of Phalanx loamy sand, 0 to 10 percent slopes.

Included with this soil in mapping are areas of Tinton, Evesboro, Colts Neck, Freehold, and Sassafras soils. Also included are soils that are similar to the Phalanx soil but that have layers of iron-cemented sandstone below a depth of 40 inches. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Phalanx soil in use and management.

Permeability of this Phalanx soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid to very rapid. Water erosion is a severe hazard. Organic matter content is low to moderate. In unlimed areas reaction is extremely acid or very strongly acid in the surface layer and in the upper part of the subsoil and strongly acid or very strongly acid in the lower part of the subsoil and the substratum.

Almost all areas of this Phalanx soil are wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. The main limitations are slope, the cemented pan, the restricted rooting depth, and iron-cemented sandstone channers and stones.

This soil is poorly suited to commercial woodland production. Potential productivity for chestnut oak is moderately high. The common species are chestnut oak, black oak, white oak, Virginia pine, and pitch pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, cutbanks caving, and slope.

This soil is in capability subclass VIIe; the woodland ordination symbol is 4S.

PT—Pits, sand and gravel. This map unit consists of areas that have been excavated for sand and gravel. The mapped areas are irregular in shape and typically range from 25 to 250 acres in size.

Typically, these areas consist of sandy material and differing amounts of gravel and fragments of iron-cemented sandstone. Some pits have large iron-cemented sandstone boulders that range from 2 to 15 feet in diameter. A few pits have been smoothed, and others have mounds of soil and steep escarpments. Some older pits have reverted to trees.

Included with this soil in mapping are small undisturbed areas of Evesboro, Downer, Sassafras, and Phalanx soils. A few abandoned pits have been used as dump sites.

The properties and characteristics of this map unit differ greatly from place to place. For most uses onsite investigation and evaluation are needed.

This map unit is not assigned to a capability subclass.

PW—Psamments, waste substratum. This map unit consists of reclaimed areas or areas used as sites for sanitary landfills. The mapped areas are generally rectangular in shape and typically range from 10 to 25 acres in size.

Typically, the landfills are areas where 24 to 48 inches of sandy fill material has been placed over refuse. The refuse consists of garbage, paper, plastic, glass, metal, rubber, building debris, and other materials.

Included with these soils in mapping are areas of Udorthents and soils that have not been covered with fill. Also included are small areas of sand and gravel pits.

The properties and characteristics of this map unit differ greatly from place to place. For most uses onsite investigation and evaluation are needed.

These soils are not assigned to a capability subclass.

SaB—Sassafras sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: TR-55 HYDROLOGIC SOIL GROUP

BASED ON	DRAWING NUMBER
SOIL SURVEY / TR-55 MANUAL	

BY	CHECKED BY	APPROVED BY	DATE
CAR 7/22/97	JJB 8/26/97		

USING THE SOIL TYPES ESTIMATED FROM THE MONMOUTH COUNTY SOIL SURVEY, DETERMINE THE HYDROLOGIC SOIL GROUP (HSG) FOR EACH SITE. THE HSG IS REQUIRED TO SELECT THE APPROPRIATE RUNOFF CURVE NUMBER FOR EACH COVER TYPE. INFORMATION FROM APPENDIX A OF THE TR-55 MANUAL WAS USED TO DETERMINE THE APPROPRIATE HSG.

SITE 4 - AN HSG IS NOT LISTED FOR SOIL TYPE PT. EXISTING BORING LOGS WERE REVIEWED. THE FOLLOWING DESCRIPTIONS WERE GIVEN IN THE BORING LOGS:

WESTON: 0-2' = SAND (FINE), SOME SILT, MEDIUM SAND

BIRE: 0-2' = SILTY, FINE GRAINED SAND (SOME CLAY)

USING THIS INFORMATION ALONG WITH THE HSG DESCRIPTIONS GIVEN ON p. A-1 OF APPENDIX A, IT WAS DETERMINED THAT A HSG = B IS THE MOST APPROPRIATE FOR SITE 4.

SITE 5 - THE FOLLOWING HSGS WERE FOUND IN APPENDIX A OF THE TR-55 MANUAL.

LAKEWOOD - A
LAKEHURST - A
KEYPORT - C
ATSION - C/D

BECAUSE OF THE DIFFERENT SOIL TYPES AND FOR EASE OF CALCULATION OF CN, ASSUME HSG = B IS THE AVERAGE SOIL TYPE FOR SITE 5.

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

ESTIMATE RAINFALL DISTRIBUTION TYPE
AND PRECIPITATION AMOUNTS FOR
SITES 4 AND 5

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: RAINFALL DISTRIBUTION TYPE AND PRECIP. AMOUNTS

BASED ON	DRAWING NUMBER
TR-55	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/14/97	JJB 8/26/97		

USING INFORMATION PROVIDED IN APPENDIX B OF TR-55 MANUAL, DETERMINE THE RAINFALL DISTRIBUTION TYPE AND THE APPROPRIATE 24-HOUR RAINFALL AMOUNTS FOR SITES 4 AND 5.

① RAINFALL DISTRIBUTION TYPE:

USING FIGURE B-2 FROM APPENDIX B IT WAS DETERMINED THAT THE ENTIRE STATE OF NEW JERSEY HAS A RAINFALL DISTRIBUTION TYPE OF III. (SEE ATTACHED FIGURE 1; p. 2 OF 5)

② PRECIPITATION AMOUNTS FOR 3 DESIGN STORMS

USING FIGURES B-3, B-5 AND B-6 FROM APPENDIX B THE FOLLOWING 24-HOUR RAINFALL AMOUNTS WERE ESTIMATED:

STORM FREQUENCY	FIGURE / PAGE	24-HOUR RAINFALL AMOUNT (IN)
2	2; p. 3 of 5	3.4
10	3; p. 4 of 5	5.2
25	4; p. 5 of 5	6.0

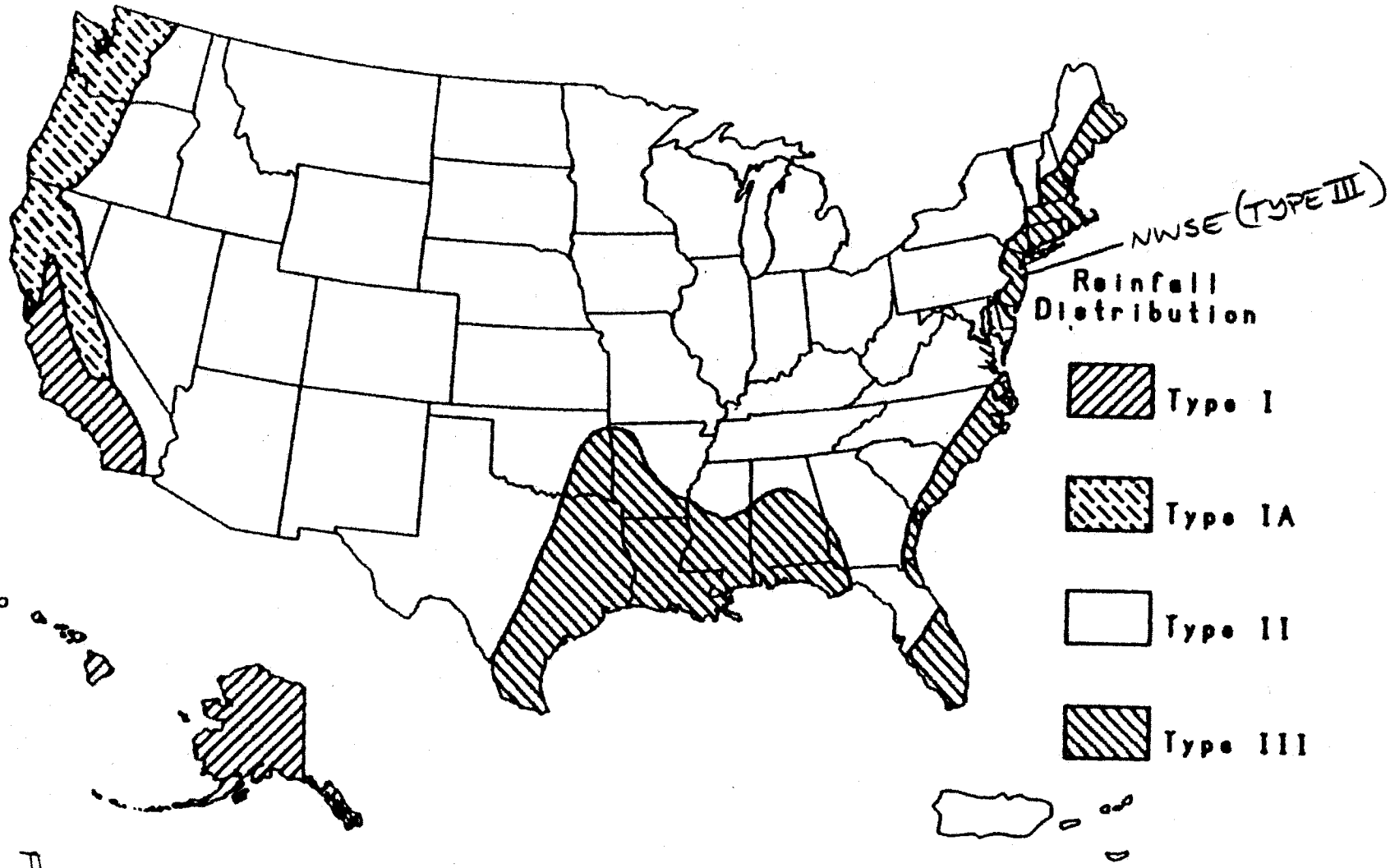


Figure B-2.—Approximate geographic boundaries for SCS rainfall distributions.

FIGURE 1

BY: CAC CHKD: JJB
DATE: 8/14/97 DATE: 8/26/97

2 of 5

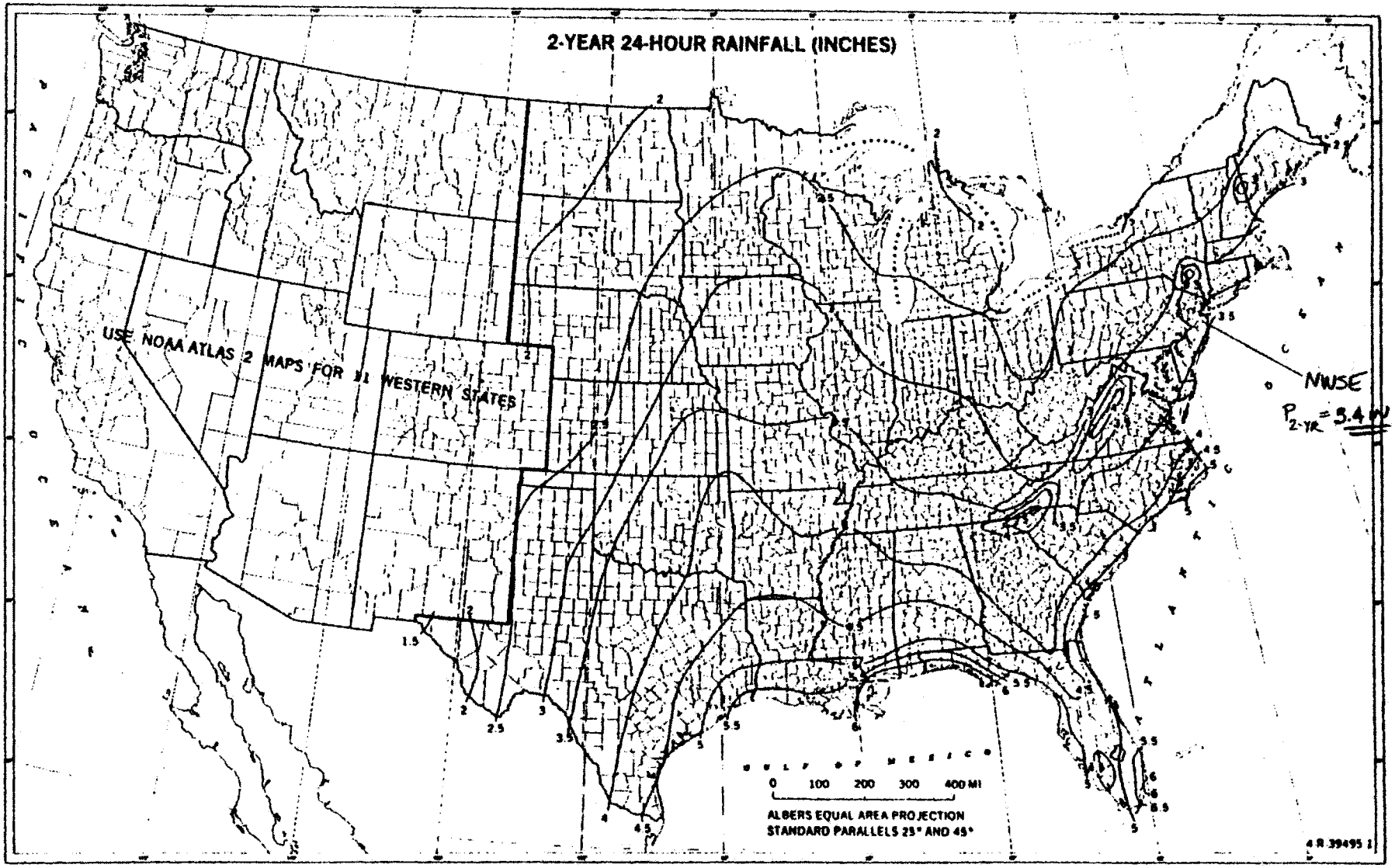


FIGURE 2

(210-VI-TR-55, Second Ed., June 1986)

BY: CAR CHKD: JJB

DATE: 8/14/97 DATE: 8/26/97

3 OF 5

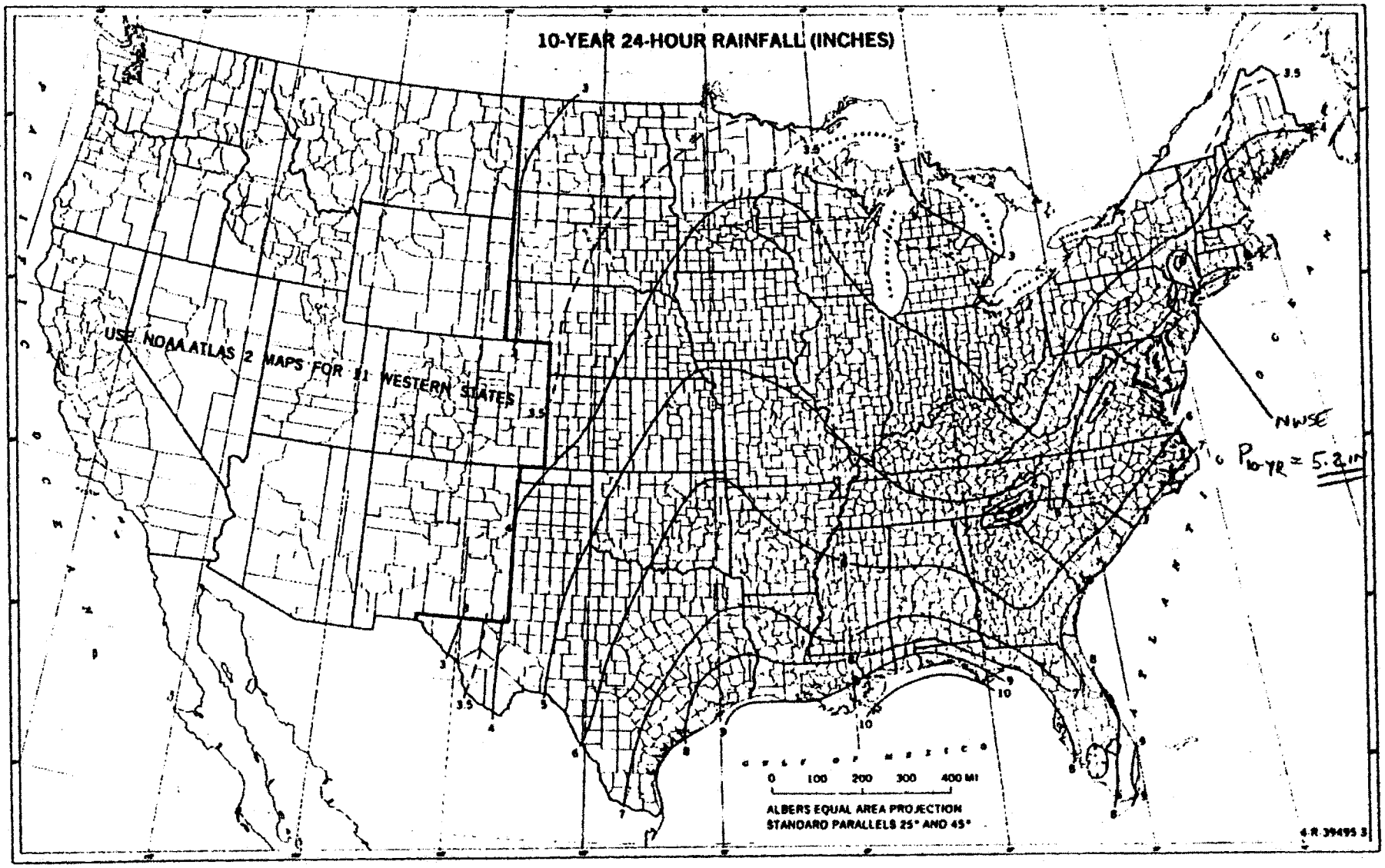


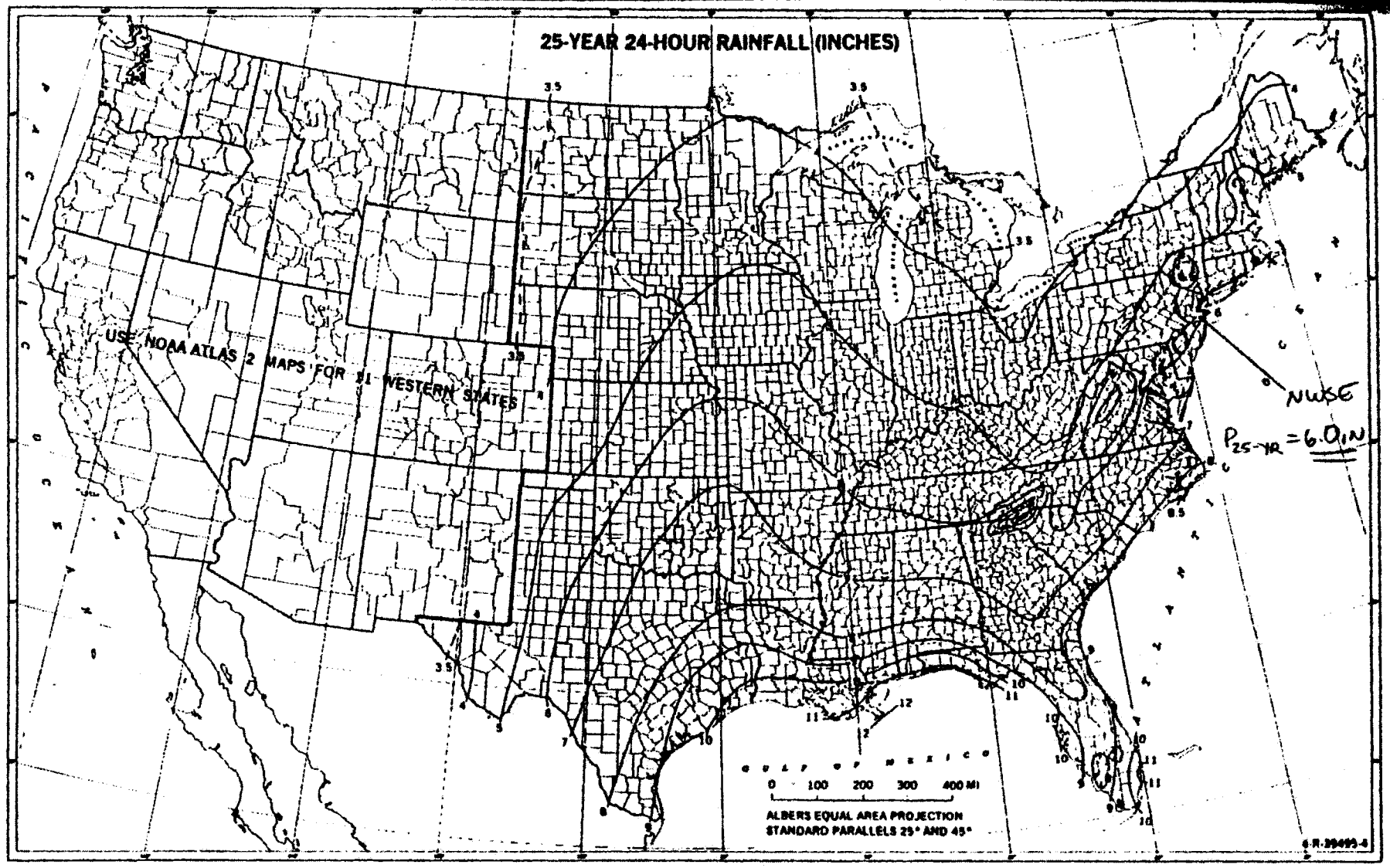
FIGURE 3

(210-VI-TR-55, Second Ed., June 1986)

BY: CAM CHKD: CJB

CHKD: 8/14/97 DATE: 8/26/97

4 of 5



(210-VI-TR-55, Second Ed., June 1986)

BY: CAR CHKD: HJB

CHKD: 8/14/97 DATE: 8/26/97

FIGURE 4

5 OF 5

Figure B-6.—Twenty-five-year, 24-hour rainfall.

B.2 PRE-CONSTRUCTION CONDITIONS FOR SITE 4

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

B.2

Determination of Site 4 Drainage Areas and Weighted Curve Numbers

Initial Conditions

CLIENT	JOB NUMBER
NSWE	7602/0104

SUBJECT: Drainage Areas / Weighted Curve Numbers - Pre-Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topography / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAN 8/22/97		

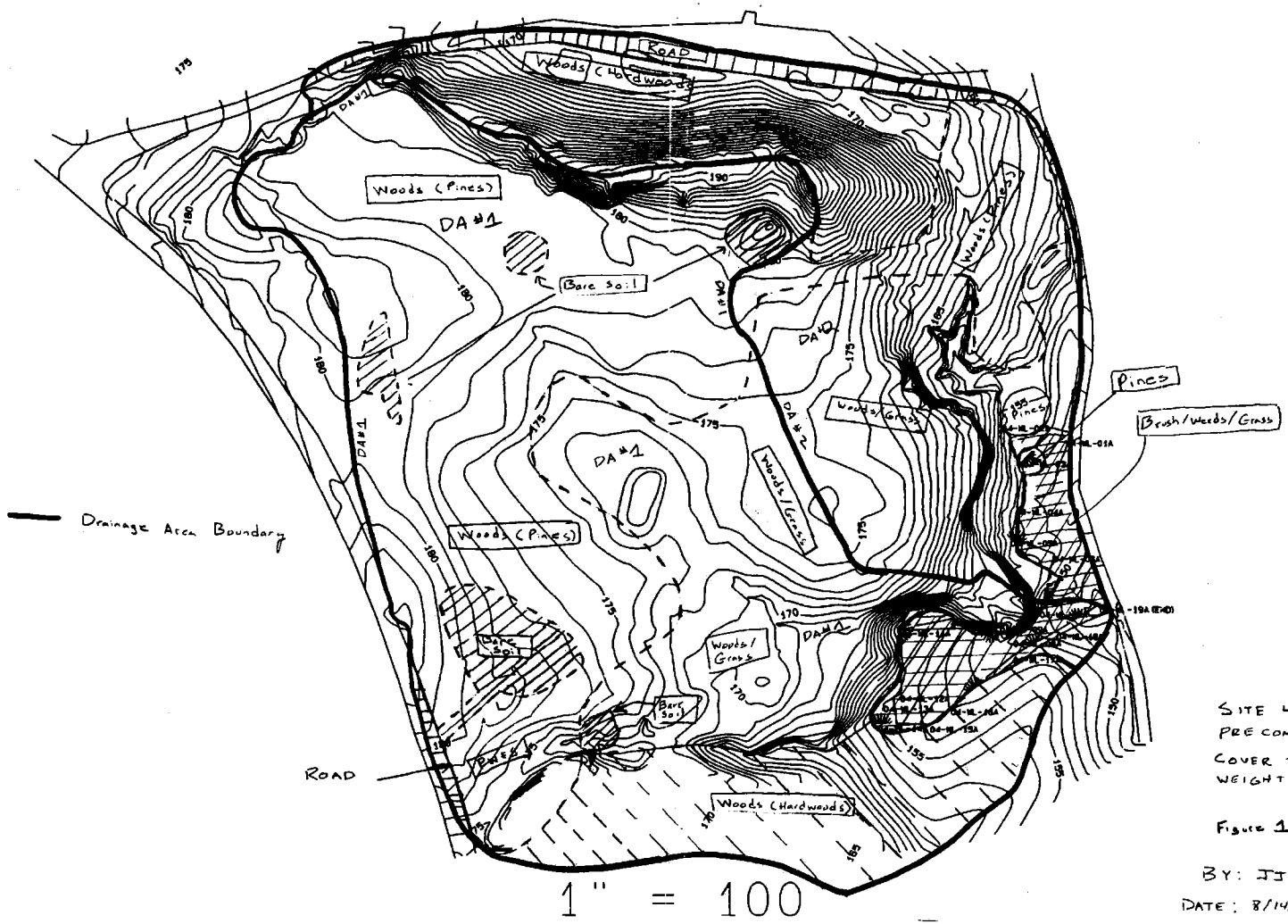
(1) The existing topography for Site 4 was used in conjunction with the Marlboro USGS Quadrangle to determine the boundaries of the drainage areas that cover Site 4. Two drainage areas were determined. They are shown on Figure 1 (p. 2 of 10)

The area of each drainage area was determined by planimeter. The measurements are shown on p. 7 of 10. The areas are summarized below.

Drainage Area	Area (acres)
1	7.55
2	3.65

(2) The type of cover material was then determined. Survey information, photographs, and personal observations were used to determine the appropriate cover type. The cover type information is summarized on Figure 1 (p. 2 of 10). The types of cover found at Site 4 include Bare soil, Dirt Roads, Woods (Pines & Hardwoods), Woods/Grassy Areas, Wetlands (Brush/Weeds/Grass).

SITE 4



1" = 100

SITE 4 - NWSE
PRE CONSTRUCTION CONDITIONS
COVER TYPE FOR ESTIMATING
WEIGHTED CURVE NUMBERS

Figure 1

BY: JJB CHKD: CAR
DATE: 8/14/97 DATE: 8/22/97

PAGE 2/10

CLIENT	JOB NUMBER
NSWE	7602 /0104

SUBJECT: Drainage Areas / Weighted Curve Numbers: Pre-construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topography / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/22/97		

(3) The Area of each cover type within each drainage area was then determined by planimeter. The measurements are shown on pp. 8 of 10 through 10 of 10. The areas are summarized below.

Drainage Area	Cover Type	Area (A) (acres)
1	Bare Soil	0.36
	Woods (Pine / Hardwoods)	5.05
	Brush / Weeds / Grass	0.28
	Dirt Roads	0.03
	Woods / Grass	1.83
		7.55 - Total
2	Bare Soil	0.00
	Woods (Pines / Hardwoods)	1.84
	Brush/Weeds / Grass	0.17
	Dirt Roads	0.21
	Woods / Grass	1.43
		3.65 - Total

Note:
(A) - The areas shown are the average of three measurements. If the individual measurements did not total to the measurement of the entire drainage basin, the variation was distributed, using a weighting factor, to each area.

CLIENT	JOB NUMBER
NSWE	7602 / 0104

SUBJECT: Drainage Area / Weighted Curve Numbers - Initial Conditions

BASED ON	DRAWING NUMBER
Existing Topo / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/22/97		

(4) Runoff curve numbers were determined for each cover type. The curve numbers were taken from tables 2-2a, 2-2b, and 2-2c of the TR-55 manual. The site 4 hydraulic soil type is B. (see calculations entitled "Estimate Soil Types + SCS Hydraulic Soil Groups for Sites 4 & 5.")

Cover Type	Soil Type	CN
Bare Soil	B	86
Woods (Pines / Hardwoods) - Fair	B	60
Woods / Grass - Fair	B	65
Brush / Weeds / Grass - FAIR	B	56
Dirt Road	B	82

(5) Weighted Runoff Curve numbers were calculated for each drainage area using the estimated areas of each cover type + the appropriate curve numbers. The Haestad Quick TR-55 Program was used to calculate the weighted Curve Numbers (see pp. 6 of 10) and to summarize the results (see p. 5 of 10).

Quick TR-55 Ver.5.46 S/N:
Executed: 15:49:00 08-22-1997

Initial Conditions - Site 4

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 1	7.55	62
Drainage Area 2	3.65	63

G11D

Quick TR-55 Ver.5.46 S/N:
Executed: 15:49:00 08-22-1997

Initial Conditions - Site 4

RUNOFF CURVE NUMBER DATA

::

Composite Area: Drainage Area 1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.36	86	
Woods (Pines/Hardwoods)	5.05	60	
Brush/Weeds/Grass	0.28	56	
Dirt Roads	0.03	82	
Woods/Grass	1.83	65	
COMPOSITE AREA --->	7.55	62.4	(62)

::

Composite Area: Drainage Area 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.00	86	
Woods (Pines/Hardwoods)	1.84	60	
Brush/Weeds/Grass	0.17	56	
Dirt Roads	0.21	82	
Woods/Grass	1.43	65	
COMPOSITE AREA --->	3.65	63.0	(63)

::

CLIENT	JOB NUMBER
NWSE	7002 - 010K

SUBJECT: MEASUREMENT OF AREAS (COVER TYPE) - SITE 4

BASED ON	DRAWING NUMBER
Existing Topo	

BY	CHECKED BY	APPROVED BY	DATE
CAR 7/24/97	JJB 8/7/97		

① PLANIMETER -

AREA 1 (See Figure 1, p. 2 of 10) (Area 1 was subdivided for planimetering)

	M1	M2	M3	AVG
A	55.6141	55.4901	55.6141	55.5728 IN^2
B	75.9967	75.9812	76.0277	76.0019 IN^2

TOTAL AREA ① = 7.55 ac

AREA 2 (see Figure 1, p. 2 of 10)

	M1	M2	M3	AVG
A	63.5346	63.4726	63.5656	63.5243

TOTAL AREA ② = 3.65 ac

CLIENT	JOB NUMBER
NWSE	7602 - 0104

SUBJECT: SITE 4 - Drainage Areas / Weighted Curve Nos. - Pre Construction

BASED ON	DRAWING NUMBER
Existing Topo	

BY	CHECKED BY	APPROVED BY	DATE
CAR 7/21/97	JJB 8/7/97		

PLANIMETER:

(2) BARE SOIL (DA #1 is the only area with bare soil. Each area is designated A through E).

AREA	M1	M2	M3		AVG
A	0.403	0.372	0.419	=	0.398
B	3.6735	3.6890	3.6735	=	3.6787
C	0.7285	0.7130	0.7130	=	0.7182
D	0.5425	0.5735	0.5580	=	0.5580
E	0.8370	0.8525	0.8525	=	0.8473

TOTAL AREA = 6.2002 IN^2
= 15,500.5 ft^2
= 0.3558 ac

(3) ROADWAYS

AREA	M1	M2	M3	AVG
1	0.4805	0.4340	0.4495	0.4547
2A	2.9760	2.9450	2.9295	2.9502
B	0.7285	0.7130	0.7285	0.7233

TOTAL AREA (2A + 2B) = 3.6735 IN^2
= 9183.75 ft^2
= 0.2108 ac

TOTAL AREA (1) = 0.4547 IN^2
= 1136.75 ft^2
= 0.0261 ac

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: SITE 4 - Drainage Areas / Weighted Curve No. - Pre Construction

BASED ON	DRAWING NUMBER
Existing Topo	

BY	CHECKED BY	APPROVED BY	DATE
CAR 7/24/97	JJB 8/7/97		

(4) WOODS

AREA 1

	M1	M2	M3	AVG
PINES (A)	45.0224	45.6424	45.6889	45.4512
(B)	20.8475	20.6925	20.6615	20.7338
HARDWOODS	21.8085	21.6535	21.4675	21.6432

TOTAL = 87.8282 IN^2
= 219,570.5 ft^2
= 5.04 ac

AREA 2

	M1	M2	M3	AVG
PINES (A)	10.8810	10.6950	10.8345	10.8035
(B)	0.6510	0.6200	0.6820	0.6510
(C)	0.2170	0.2790	0.2480	0.2480
HARDWOODS	20.7080	20.6770	20.8010	20.7287

TOTAL AREA = 32.4312 IN^2
= 81,078 ft^2
= 1.86 ac

(5) BRUSH/WEEDS/GRASS

AREA 1	M1	M2	M3	AVG
	4.8670	4.9445	5.0220	4.9445 IN^2
				0.28 ac

AREA 2	M1	M2	M3	AVG
	2.9140	2.9140	2.9140	2.9140 IN^2
				0.17 ac

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	7602 / 0104

SUBJECT: Site 4 - Drainage Areas / Weighted Curve No. - Pre Construct.

BASED ON	DRAWING NUMBER
Existing Topo	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/22/97		

(6) Woods / Grass

	M1	M2	M3	AVG (IN²)
Area 1	31.6356	32.0230	31.9146	31.8577
				= 79,644 FT²
				= 1.83 ACRES
Area 2	25.1721	25.2186	25.4201	25.2703 in²
				= 63,175.75 FT²
				= 1.45 ACRES

(7) Totals -

DA # 1 (Total Area = 7.55 ac)	Area (ac)	Corrected Area (ac)
Bare Soil	0.36	0.36
Woods (Pine / Hardwood)	5.04	5.05
Brush / Weeds / Grass	0.28	0.28
Dirt Road	0.03	0.03
Woods / Grass	1.83	1.83
	7.54	7.55

DA # 2 (Total Area = 3.65 ac)	Area (ac)	Corrected Area (ac)
Bare Soil	0.00	0.00
Woods (Pines / Hardwood)	1.86	1.84
Brush / Weeds / Grass	0.17	0.17
Dirt Road	0.21	0.21
Woods / Grass	1.45	1.43
	3.69	3.65

CALCULATION WORKSHEET Order No. 19116 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Determine Time of Concentrations for
Each Site 4 Drainage Area
Initial Conditions

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER		
NSWE	7602/0104		
SUBJECT: Travel Time (T_t) / Time of Concentration (T_c) - Pre Development Site 4			
BASED ON: Figure 1 / Existing Topo		DRAWING NUMBER	
BY: JJB 8/17/97	CHECKED BY: EAR 8/22/97	APPROVED BY	DATE

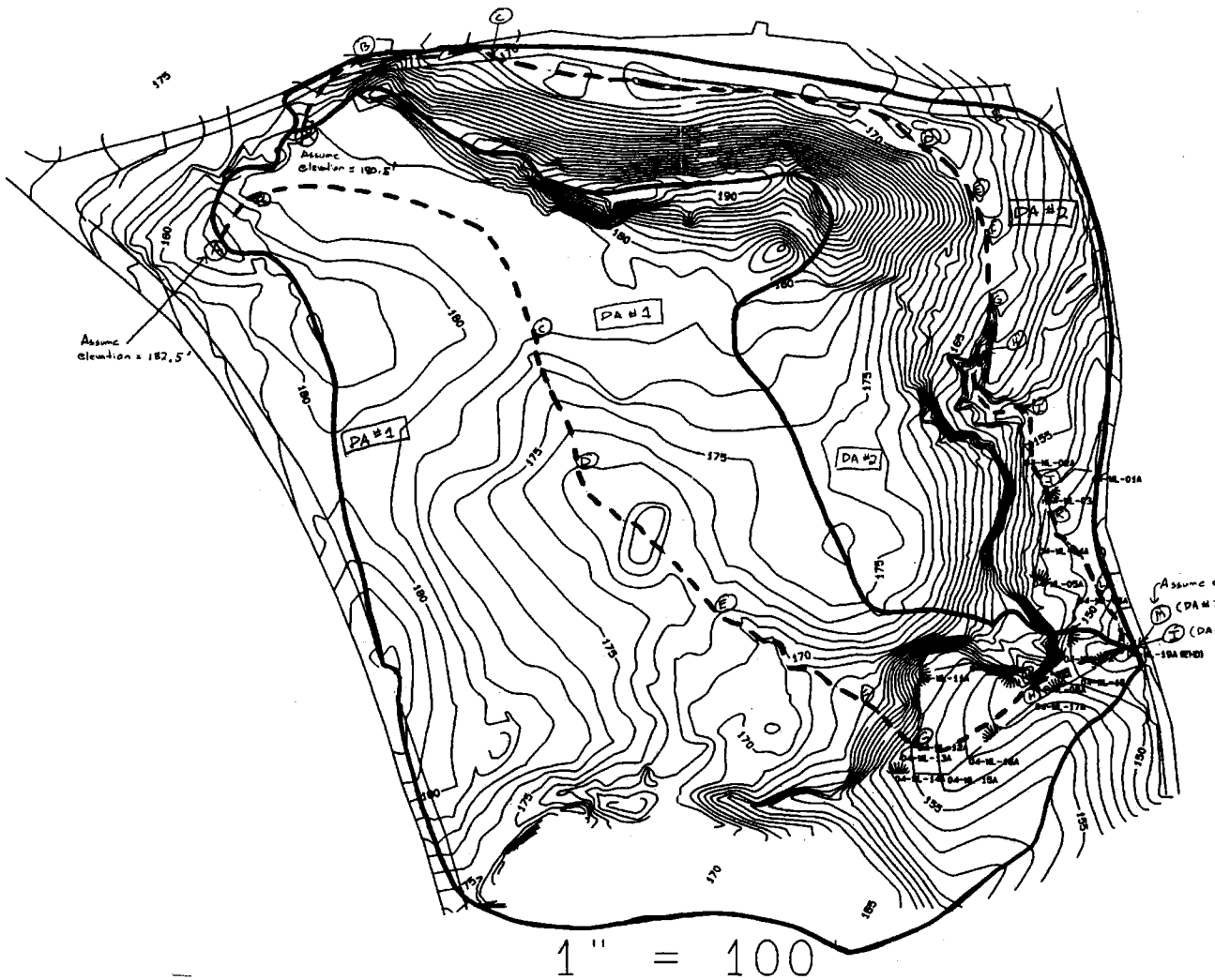
(1) A time of concentration (T_c) for each Drainage Area is required to calculate a peak discharge rate. T_c is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. Travel time (T_t) is a component of T_c and is defined as the time it takes to travel from one location to another in a watershed.

(2) By visual evaluation of each drainage area, the hydraulically most distant point and the discharge point for each drainage area were located. The flow path between these two points was then marked. The flow paths for drainage areas 1 and 2 are shown on Figure 1. Each flow path was then segmented using changes in slope as the guide for determining the end of each segment.

(3) The length and slope of each segment was then determined. These numbers are summarized on page 3 of 4.

(4) Flow types assumed for Site 4 Drainage areas were sheet flow and shallow concentrated flow. The USGS quad did not show any channels, so open channel flow was not evaluated. T_t and T_c calculations are on p. 4 of 4.

SITE 4



1" = 100

Site 4 - NWSE

PRECONSTRUCTION CONDITIONS

Flow Paths For T_t & T_c CALCULATIONS

Figure: 1

BY: JJB

DATE: 8/14/97

CHKD: CAR

DATE: 8/14/97

P. 2/4

CALCULATION WORKSHEET

Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NWSE	7602 10104

SUBJECT: TRAVEL TIME – DRAINAGE AREAS 1 & 2 – SITE 4

BASED ON	DRAWING NUMBER
TOPO MAP & TR-55 MANUAL	

BY	CHECKED BY	APPROVED BY	DATE
CAR 7/24/97	JJB 8/1/97		

DA #1

SEGMENT	DISTANCE	MAX ELEV	MIN ELEV	SLOPE	FLOW TYPE
1AB	40	182.5	179	0.088	SF
1BC	320	179	178	0.003	SCF
1CD	120	178	173	0.042	SCF
1DE	180	173	172	0.006	SCF
1EF	150	172	167	0.033	SCF
1FG	55	167	155	0.218	SCF
1GH	125	155	151	0.032	SCF
1HI	105	151	146.5	0.043	SCF
	1,095 ft	182.5 ft msl	146.5 ft msl		

DA #2

SEGMENT	DISTANCE	MAX ELEV	MIN ELEV	SLOPE	FLOW TYPE
2AB	76	180.5	174	0.086	SF
2BC	120	174	170	0.033	SCF
2CD	390	170	169	0.003	SCF
2DE	52	169	168	0.019	SCF
2EF	39	168	166	0.051	SCF
2FG	63	166	164	0.032	SCF
2GH	45	164	159	0.111	SCF
2HI	80	159	156	0.038	SCF
2IJ	78	156	153	0.038	SCF
2JK	44	153	151	0.045	SCF
2KL	70	151	150	0.014	SCF
2LM	62	150	146.5	0.056	SCF
	1,119 ft	180.5 ft msl	146.5 ft msl		

NOTE:

SF = SHEET FLOW

SCF = SHALLOW CONC. FLOW

Project: NWSE - Site 4 - Pre-development Conditions
Task: Estimation of Drainage Area Travel Time (Tt)/ Time of Concentration (Tc)
By: JJB **Chkd: CAR**
Date: 8/19/97 **Date: 8/19/97**

Drainage Area 1

	Segment	Distance	Slope	n[2]	P2	Tt
Sheet Flow[1]	AB	40	0.088	0.4	3.4	0.092

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow[1]	BC	320	0.003	Unpaved	0.884	0.101
	CD	120	0.042	Unpaved	3.307	0.010
	DE	180	0.006	Unpaved	1.250	0.040
	EF	150	0.033	Unpaved	2.931	0.014
	FG	55	0.218	Unpaved	7.533	0.002
	GH	125	0.032	Unpaved	2.886	0.012
	HI	105	0.043	Unpaved	3.346	0.009
					DA#1 Tc =	0.280

Drainage Area 2

	Segment	Distance	Slope	n[2]	P2	Tt
Sheet Flow[1]	AB	76	0.086	0.4	3.4	0.156

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow[1]	BC	120	0.033	Unpaved	2.931	0.011
	CD	390	0.003	Unpaved	0.884	0.123
	DE	52	0.019	Unpaved	2.224	0.006
	EF	39	0.051	Unpaved	3.644	0.003
	FG	63	0.032	Unpaved	2.886	0.006
	GH	45	0.111	Unpaved	5.375	0.002
	HI	80	0.038	Unpaved	3.145	0.007
	IJ	78	0.038	Unpaved	3.145	0.007
	JK	44	0.045	Unpaved	3.423	0.004
	KL	70	0.014	Unpaved	1.909	0.010
	LM	62	0.056	Unpaved	3.818	0.005
					DA#2 Tc =	0.340

(1) Formulas taken from Chapter 3 and Appendix F, TR-55 Manual, SCS, June 1986.
(2) Manning's coefficients taken from Table 3-1, Chapter 3, TR-55 Manual, SCS, June 1986.
- Woods (light under brush) n = 0.40

CALCULATION WORKSHEET

Order No. 19116 (01-91)

PAGE _____ OF _____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Calculation of Peak Discharge Rates
for Site 4 Drainage Areas Using the
TR-55 Graphical Peak Discharge Method
Initial Conditions

CLIENT	JOB NUMBER
NSWE	7602 - 0104

SUBJECT: Peak Discharge Rates - INITIAL CONDITIONS

BASED ON	DRAWING NUMBER
Quick TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/14/97	CAR 8/22/97		

(1) The Peak, Initial Conditions, Discharge Rates for the Site 4 Drainage Areas were calculated by the Peak Discharge Method. Haestad's Quick TR-55 Program was used to compile the calculations. Input for the program was summarized previously. (Note: No pond/swamp factor was used for the wetlands. Travel time through the wetlands was estimated by calculation. This is a conservative assumption (i.e. peak discharge rates are higher.))

(2) The peak Discharge Rates for the drainage areas are shown on the following pages. Discharge Rates for three storm events (2-yr, 10-yr, & 25-year storms) are shown for each drainage area. The results are summarized below.

(3) Summary

Area	Storm Frequency (Yr)	Peak Discharge Rate (CFS)
1	2	3
	10	8
	25	12
2	2	1
	10	4
	25	5

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1

CALCULATED
DISK FILE: NSWE4PR1.GPD

Drainage Area	(acres)	7.55	--->	0.0118 sq.mi.
Runoff Curve Number	(CN)	62		
Time of Concentration,Tc	(hrs)	.280		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.226	1.226	1.226
Ia/p Ratio	0.361	0.236	0.204
Unit Discharge, * qu (csm/in)	381	459	471
Runoff, Q (in)	0.57	1.56	2.09
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	3	8	12

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	391.828	510.030	510.030
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	339.353	435.376	435.376
* qu (csm)		381	459	471

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #2

CALCULATED
DISK FILE: NSWE4PR2.GPD

Drainage Area	(acres)	3.65	--->	0.0057 sq.mi.
Runoff Curve Number	(CN)	63		
Time of Concentration, Tc	(hrs)	0.340		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.175	1.175	1.175
Ia/p Ratio	0.345	0.226	0.196
Unit Discharge, * qu (csm/in)	368	432	442
Runoff, Q (in)	0.61	1.64	2.18
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	1	4	5

Summary of Computations for qu

Ia/p	#1	0.300	0.100	0.100
C0	#1	2.396	2.473	2.473
C1	#1	-0.512	-0.518	-0.518
C2	#1	-0.132	-0.171	-0.171
qu (csm)	#1	404.667	477.078	477.078
Ia/p	#2	0.350	0.300	0.300
C0	#2	2.355	2.396	2.396
C1	#2	-0.497	-0.512	-0.512
C2	#2	-0.120	-0.132	-0.132
qu (csm)	#2	364.318	404.667	404.667
* qu (csm)		368	432	442

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

B.3 DURING CONSTRUCTION CONDITIONS FOR SITE 4

CALCULATION WORKSHEET Order No. 19116 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

B.3

Determination of Site 4 Drainage
Areas and Weighted Curve Numbers
Construction Conditions

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	76002-0104

SUBJECT: Drainage Areas / weighted Curve Numbers - Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topo / TR-55 / Waste Regrade Plans	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/22/97		

(1) The boundaries of the drainage areas were determined by the regrade plans of the waste and the existing topography of the undisturbed areas. Three drainage areas were determined. They are illustrated on Figure 1 (p. 2 of 11).

The area of each drainage area was determined by planimeter. The measurements are shown on p. 9 of 11. The areas are summarized below.

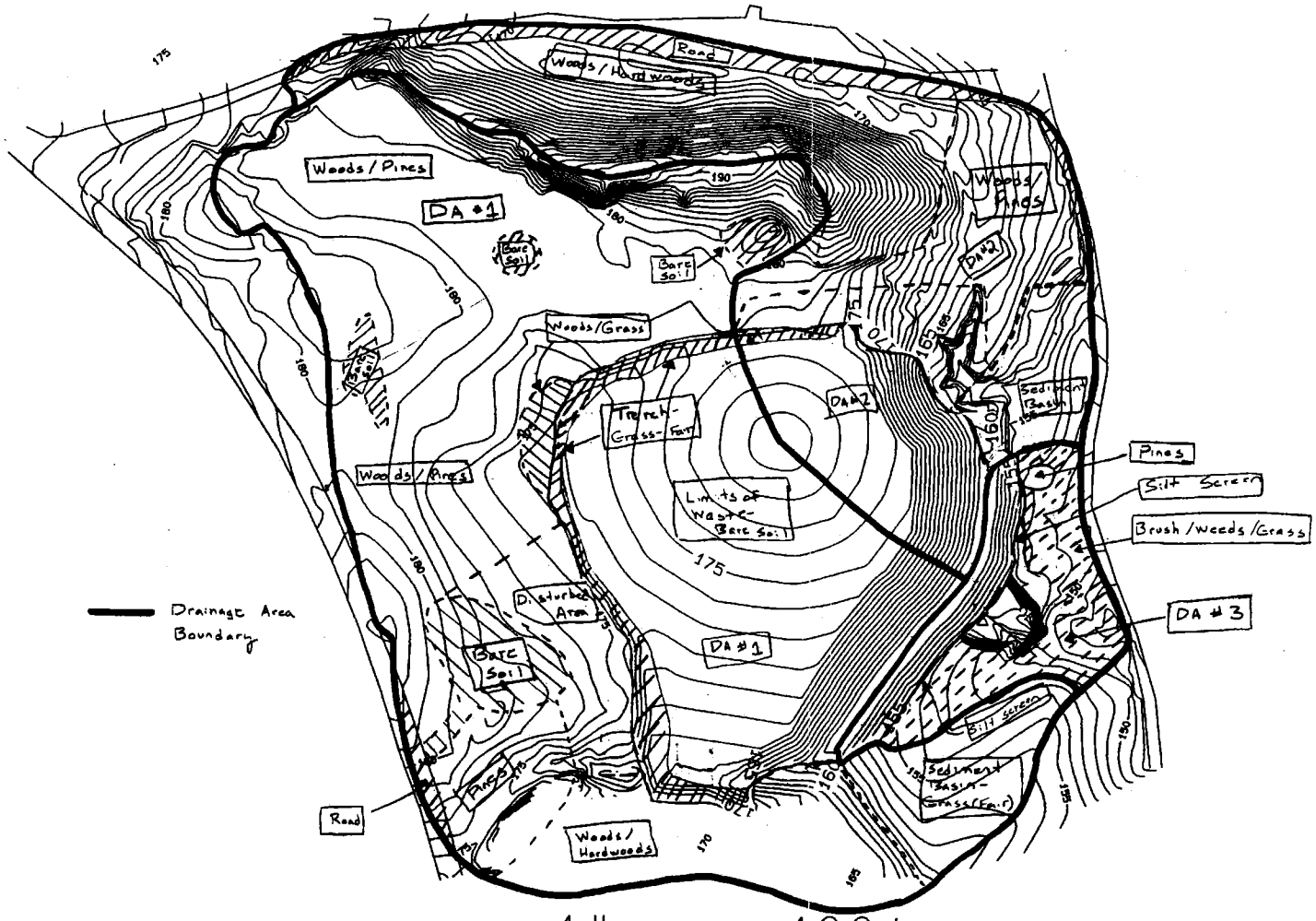
Drainage Area	Area (acres)
1	7.23
2	3.23
3	0.74
	11.20 - total

(2) The type of cover material was then determined. First, a construction sequence was assumed based on the following activities: 1) Construct Sediment Basins and surface water interception trench; 2) clear and grub remainder of landfill site, and 3) construct landfill. These calculations will estimate hydrologic conditions during the worst-case, sediment erosion scenario during construction activities. Cover types during the worst-case scenario will consist of:

1) exposed (bare) soil throughout the proposed area of cap and other disturbed areas
2) Grass (fair) seeded throughout the groundwater interception trench and sediment basin

Cover types outside of the disturbed area will remain as shown on the pre-construction calculations.

SITE 4



1" = 100'

Site 4
CONSTRUCTION CONDITIONS
COVER TYPE FOR ESTIMATING
WEIGHTED CURVE NUMBERS

Figure 1

BY: JJB CHKD: CAR
DATE: 8/21/97 DATE: 8/22/97

CLIENT	JOB NUMBER
NSWE	7602-0104
SUBJECT: Drainage / Weighted CNS - Construction - Site 4	
BASED ON: Existing Topo / Waste Regrade Plan	DRAWING NUMBER
BY: JJB 8/26/97	CHECKED BY: CAR 8/26/97
APPROVED BY	DATE

(3) Assumptions:

- An upgradient surface water interception trench is in place as shown on Figure 1 (p. 2 of 11). The trench drains to one of two sediment basins. The sediment basins serve as the erosion and sediment control devices for Drainage Areas 1 & 2.
- For Drainage Area 3, a silt fence will be placed along the toe of slope along the boundary of the drainage area for erosion and sediment control purposes.
- A trench will be constructed along the downgradient slope of the regraded landfill material. The trench will route runoff and sediment to the sediment basins. APPROX. TRENCH ELEV = 160 FT.
- The size of the total drainage basin is the same during construction activities as the size during the initial conditions.
- The length of construction activities is six months.
- Top soil will be brought from an offsite source to facilitate growth of grass within the trench and within the sediment basins.

CLIENT	JOB NUMBER
NSWE	7602-0104

SUBJECT: Drainage Areas / Weighted Curve Numbers - Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topo / Regrade Plan / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAH 8/22/97		

(4) The Area of each cover type within each drainage area was then determined by planimeter. The measurements are shown on pp. 9-11. The areas are summarized below.

Drainage Area	Cover Type	Area (A) (acres)
1	Bare Soil	2.59
	Woods (Pine/Hardwood)-Fair	3.87
	Woods/Grass - Fair	0.06
	Dirt Road	0.03
	Grass - Fair	0.68
		7.23 - total
2	Bare Soil	0.666
	Woods (Pine/Hardwood) - Fair	1.76
	Woods/Grass - Fair	0.28
	Dirt Road	0.21
	Grass - Fair	0.32
		3.23 - total
3	Bare Soil	0.21
	Brush/Weeds/Grass	0.53
		0.74 - total

Note:

(A) - The areas shown are the average of three measurements. If the individual measurements did not total to the measurement of the entire drainage area, the variation was distributed, using a weighting factor, to each area.

CLIENT	JOB NUMBER
NWSE	7602-0104

SUBJECT: Drainage Areas / Weighted Curve Nos - Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topo / TR-55 / Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB - 8/17/97	CAM 8/22/97		

(5) Runoff curve numbers were determined for each cover type. The curve numbers were taken from tables 2-2a, 2-2b, and 2-2c of the TR-55 manual. The site 4 hydraulic soil type is B. (see calculations entitled "Estimate Soil Types + SCS Hydraulic Soil Groups for Sites 4 & 5.")

Cover Type	Soil Type	CN
Bare Soil	B	86
Woods (Pines/Hardwoods) - Fair	B	60
Woods/Grass - Fair	B	65
Brush/Weeds/Grass - Fair	B	56
Dirt Road	B	82
Grass - Good	B	61
Grass - Fair	B	69

(6) Weighted Runoff Curve numbers were calculated for each drainage area using the estimated areas of each cover type + the appropriate curve numbers. The Haestad Quick TR-55 Program was used to calculate the weighted Curve Numbers (see pp. 7-8) and to summarize the results (p. 6).

Quick TR-55 Ver.5.46 S/N:
Executed: 08:44:29 08-22-1997

RUNOFF CURVE NUMBER SUMMARY

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 1	7.23	70
Drainage Area 2	3.23	68
Drainage Area 3	0.74	65

Quick TR-55 Ver.5.46 S/N:
Executed: 08:44:29 08-22-1997

RUNOFF CURVE NUMBER DATA

::

Composite Area: Drainage Area 1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	2.59	86	
Woods (Pines/Hardwoods) - Fair	3.87	60	
Brush/Weeds/Grass - Fair	0.00	56	
Dirt Roads	0.03	82	
Woods/Grass - Fair	0.06	65	
Grass - Fair	0.68	69	
COMPOSITE AREA --->	7.23	70.3	(70)

::

Composite Area: Drainage Area 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.66	86	
Woods (Pines/Hardwoods) - Fair	1.76	60	
Brush/Weeds/Grass - Fair	0.00	56	
Dirt Roads	0.21	82	
Woods/Grass - Fair	0.28	65	
Grass - Fair	0.32	69	
COMPOSITE AREA --->	3.23	68.1	(68)

::

Quick TR-55 Ver.5.46 S/N:
Executed: 08:44:29 08-22-1997

Composite Area: Drainage Area 3

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.21	86	
Brush/Weeds/Grass	0.53	56	
COMPOSITE AREA --->	0.74	64.5	(65)

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NSWE	JOB NUMBER: 7602-0104
SUBJECT: Drainage Areas / CNs - Construction - Site 4	
BASED ON: Existing Conditions / TR-55 / Regrade Plans	DRAWING NUMBER:
BY: JJB 8/17/97	CHECKED BY: CAL 8/22/97
APPROVED BY:	DATE:

(2) Planimeter Measurements (See Figure 1, page 2)

Total Area - Drainage Basin = 11.20 acres

(I)

Area	M1	M2	M3	AVG (IN²)
DA #1	31.8681	31.7593	31.6510	31.7595
DA #2	14.2114	14.1825	14.1670	14.1870
DA #3	3.2550	3.2705	3.2860	3.2705

Area	AVG (in²)	AVG (ft²)	AVG (acres)	AVG (Corrected)[1]
DA #1	31.7595	317,595	7.29	7.23
DA #2	14.1870	141,870	3.26	3.23
DA #3	3.2705	32,705	0.75	0.74
			11.30	11.20

Note: (1) Area was normalized to correspond with the measured basin area during the initial cond. calc.

(II) DA #1 Individual Cover Sub Areas

	M1	M2	M3	AVG (IN²)	
(A) Bare Soil					
- Disturbed Area	1.5345	1.5655	1.5345	1.5448	
- Cap	8.1220	8.1375	8.1220	8.1272	
- Bare Soil (from Pre Development) (1)	Use Area from Pre Development Calcs (0.34 acres)				
(B) Woods (Fair) (2)					
Pines - A	1.5190	1.5035	1.5035	1.5087	
Pines - B	7.0215	7.0060	7.0251	7.0175	
Pines - C	5.2855	5.2235	5.2545	5.2545	
Hardwoods	2.9140	2.9450	2.7951	2.9180	16.6937 - Total
(C) Woods / Grass	0.2635	0.2635	0.2635	0.2635	
(D) Road - Dirt	Use Area from Pre-Development Calcs (0.03 acres)				
(E) Grass (Fair)					
- Sed. Basin	1.7825	1.8290	1.7515	1.7877	
- Trench	1.1100	1.1160	1.1100	1.1120	2.8997

Notes:
1) This area does not include area E as measured in the pre-design calcs.
2) Woods (Fair) were subdivided to facilitate measurements.

CALCULATION WORKSHEET Order No. 19116 (01-81)

CLIENT	JOB NUMBER
NSWC	7602-0104

SUBJECT: Drainage Areas / CNS - Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Conditions / Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/19/97	CAR 8/22/97		

III DA # 1 - Average Total Area - Total Area = 7.23 acres

	AVG (IN²)	AVG (Ft²)	AVG (ac)	Corrected AVG (ac)
(A) Bare Soil	9.672	96,720	2.22 + 0.34 = 2.56	2.59
(B) Woods-Fair	16,6987	166,987	3.83	3.87
(C) Woods/Grass	0.2635	2,635	0.06	0.06
(D) Dirt Road			0.03	0.03
(E) Grass (Fair)	2.8997	28,997	0.67	0.68
			7.15	7.23

IV DA #2 - Individual Cover Subareas

	M1			AVG (IN²)	Total (IN²)
(A) Bare Soil - Cap	2.8365	2.8985	2.8210	2.8520	2.8520
(B) Woods-Fair					
- Pines	2.5040	2.5040	2.5885	2.5322	
- Hardwoods	5.0006	5.0685	5.0840	5.0510	7.5832
(C) Woods/Grass	1.2400	1.2245	1.1780	1.2142	1.2142
(D) Dirt Road	Use area from pre-development Calcs (0.2108 acres)				
(E) Grass (Fair)					
- Trench	0.1240	0.1395	0.1240	0.1292	
- Basin	1.2710	1.2865	1.2245	1.2607	1.3899

CALCULATION WORKSHEET Order No. 19118 (01-91)

CLIENT: NSWE	JOB NUMBER: 7602-0104
SUBJECT: Drainage Areas / CNs - Construction - Site 4	
BASED ON: Existing Conditions / Regrade Plan	DRAWING NUMBER:
BY: JJB 8/19/97	CHECKED BY: CAR 8/22/97
APPROVED BY:	DATE:

V DA #2 - Average Total Area - Total Area = 3.23 acres

	AVG(IN²)	AVG(FT²)	AVG (ac)	Corrected Average (ac)
(A) Bare Soil	2,8520	28,520	0.65	0.66
(B) Woods - Fair	7.5832	75,832	1.74	1.76
(C) Woods/Grass	1.2142	12,142	0.28	0.28
(D) Dirt Road	-	-	0.21	0.21
(E) Grass (Fair)	1.3899	1.3899	0.32	0.32
			3.20	3.23

VI DA #3 - Individual cover subareas

	M1	M2	M3	AVG (IN²)
(A) Bare Soil	0.9300	0.9455	0.9300	0.9352
(B) Brush/Weeds/Grass	2.3715	2.4335	2.3405	2.3638

VII DA #3 - Average Total Area - Total Area = 0.74 acres

	AVG (IN²)	AVG (FT²)	AVG (ac)	AVG corrected (ac)
(A) Bare Soil	0.9352	9,352	0.21	0.21
(B) Brush/Grass/Weeds	2.3638	23,638	0.54	0.53
			0.75	0.74

CALCULATION WORKSHEET

Order No. 19119 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Determine Time of Concentrations for Each
Site 4 Drainage Area
Construction Conditions

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	7602/0104

SUBJECT: Travel Time (T_t) / Time of Concentration (T_c) - Construction Conditions - Site

BASED ON	DRAWING NUMBER
Figure 1 / Existing Topo / Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CWM 8/26/97		

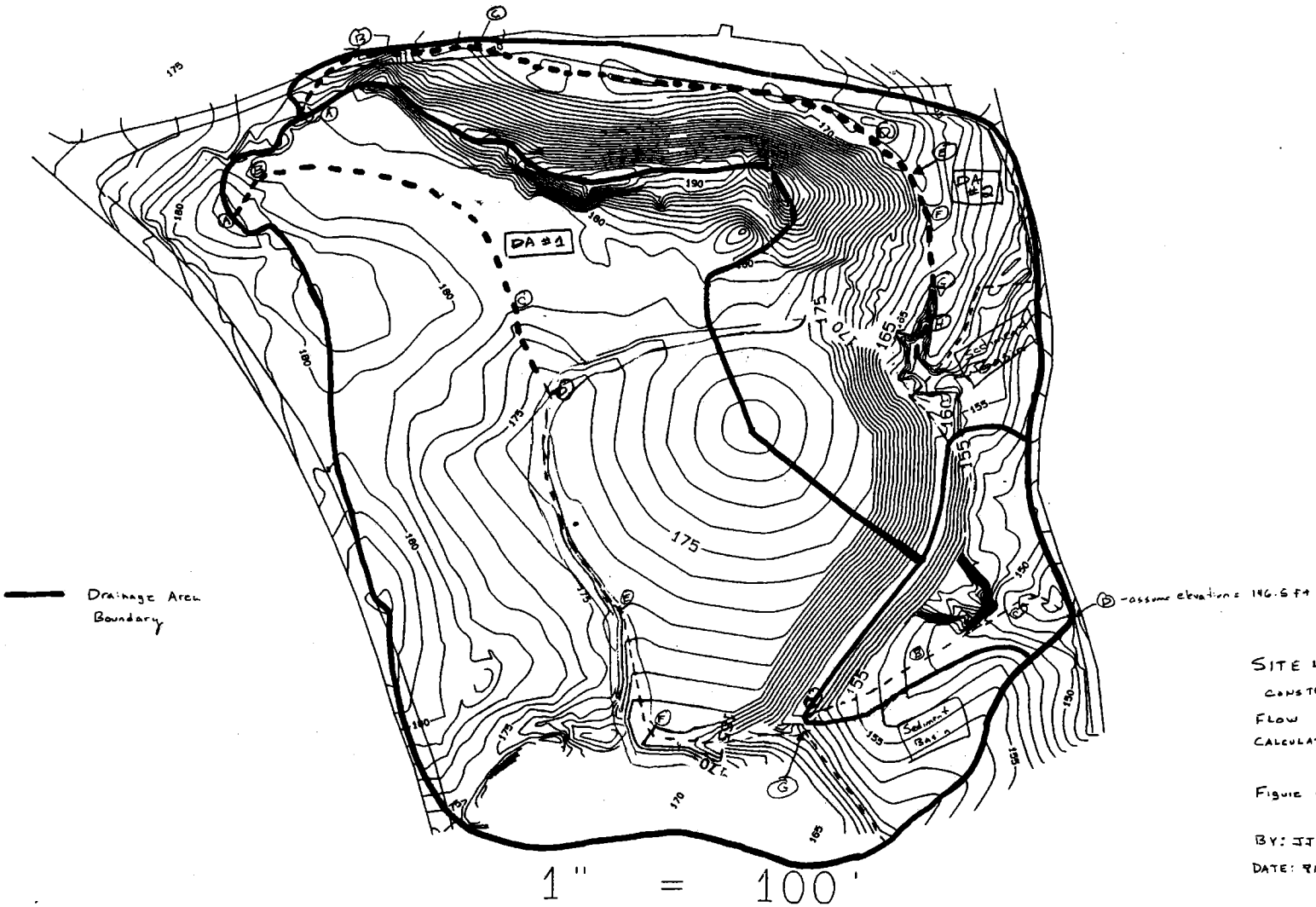
(1) A time of concentration (T_c) for each Drainage Area is required to calculate a peak discharge rate. T_c is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. Travel time (T_t) is a component of T_c and is defined as the time it takes to travel from one location to another in a watershed.

(2) By visual evaluation of each drainage area, the hydraulically most distant point and the discharge point for each drainage area were located. The flow path between these two points was then marked. The flow paths for drainage areas 1 & 2 & 3 are shown on Figure 1. Each flow path was then segmented using changes in slope as the guide for determining the end of each segment.

(3) The length and slope of each segment was then determined. These numbers are summarized on page 3.

(4) Flow types assumed for Site 4 Drainage areas were Sheet Flow, shallow concentrated flow, and open channel flow. Open channel flow is assumed through the surface water interception trench. Sheet flow is assumed for the first segment illustrated on figure 1 (page 2 of 4). T_t + T_c calculations are shown on p. 4 of 4. A trapezoidal channel with 4/1 side slopes and a 4 foot base is assumed for open channel flow. A sample open-channel flow calculation is provided on page 5 of 5.

SITE 4



SITE 4

CONSTRUCTION CONDITIONS

FLOW PATHS FOR T_t AND T_c CALCULATION

Figure 1

BY: JJB CHKD: CAR

DATE: 8/20/97 DATE: 8/26/97

p. 2/5

CALCULATION WORKSHEET

Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NWSE	

SUBJECT: TRAVEL TIME - DRAINAGE AREAS 1, 2, & 3 - Site 4 - Construction

BASED ON	DRAWING NUMBER
TOPO MAP & TR-55 MANUAL	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/26/97		

DA #1 SEGMENT	Distance	Max Elev.	Min Elev.	Slope	Flow Type
1 AB	40	182.5	179	0.088	SF
1 BC	320	179	178	0.003	SCF
1 CD	90	178	174	0.044	SCF
1 DE	225	174	172	0.009	OCF
1 EF	125	172	168	0.032	OCF
1 FG	145	168	160	0.055	OCF

DA #2 SEGMENT	Distance	Max Elev.	Min Elev.	Slope	Flow Type
2 AB	76	180.5	174	0.080	SF
2 BC	120	174	170	0.033	SCF
2 CD	390	170	169	0.003	SCF
2 DE	52	169	168	0.019	SCF
2 EF	39	168	166	0.051	SCF
2 FG	63	166	164	0.032	SCF
2 GH	45	164	159	0.111	SCF
2 HI	70	159	157	0.029	SCF

DA #3 Segment	Distance	Max Elev.	Min Elev.	Slope	Flow Type
3 AB	130	159	152	0.054	SF
3 BC	105	152	148	0.038	SCF
3 CD	60	148	146.5	0.025	SCF

Project: NWSE - Site 4 - Construction Conditions
Task: Estimation of Drainage Area Travel Time (Tt)/ Time of Concentration (Tc)
By: JJB **Chkd:** CAR
Date: 8/19/97 **Date:** 8/20/97

Drainage Area 1

	Segment	Distance	Slope	n[2]	P2	Tt
Sheet Flow[1]	AB	40	0.088	0.4	3.4	0.092

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow[1]	BC	320	0.003	Unpaved	0.884	0.101
	CD	90	0.044	Unpaved	3.384	0.007

Open Channel Flow[1][3]

Segment	Distance	Slope	Depth[4]	Area	Hyd. Rad.	n(2)	V	Q	Tt
DE	225	0.009	0.617	3.990756	0.4391279	0.025	3.267	13.036	0.019
EF	125	0.032	0.441	2.541924	0.3328616	0.025	5.121	13.016	0.007
FG	145	0.055	0.381	2.104644	0.2946935	0.025	6.190	13.027	0.007
								DA #1 Tc =	**0.233**

Drainage Area 2

	Segment	Distance	Slope	n[5]	P2	Tt
Sheet Flow[1]	AB	76	0.086	0.4	3.4	0.156

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow[1]	BC	120	0.033	Unpaved	2.931	0.011
	CD	390	0.003	Unpaved	0.884	0.123
	DE	52	0.019	Unpaved	2.224	0.007
	EF	39	0.051	Unpaved	3.644	0.003
	FG	63	0.032	Unpaved	2.886	0.006
	GH	45	0.111	Unpaved	5.375	0.002
	HI	70	0.029	Unpaved	2.748	0.007
					DA #2 Tc =	**0.315**

Drainage Area 3

	Segment	Distance	Slope	n[2]	P2	Tt
Sheet Flow[1]	AB	130	0.054	0.011	3.4	0.016

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow[1]	BC	105	0.038	Unpaved	3.145	0.009
	CD	60	0.025	Unpaved	2.551	0.007
					DA #3 Tc =	**0.032**

For calculation of the graphical peak discharge using Quick TR-55, valid Tc values range from 0.1 to 10. Because the Tc value for DA #3 is less than 0.1, a 0.1 value will be assumed.

(1) Formulas taken from Chapter 3 and Appendix F, TR-55 Manual, SCS, June 1986.
(2) Manning's coefficients taken from Table 3-1, Chapter 3, TR-55 Manual, SCS, June 1986.
- Woods (light under brush), n = 0.40
- Smooth surface (bare soil), n = 0.011
(3) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.
A sample open channel flow calculation is shown on the following page.
(4) Depth of water during peak flow, 10-yr storm, construction conditions. Peak flow = 13 cfs.
(5) Earth Channel (Chow, 1959)

CALCULATION WORKSHEET

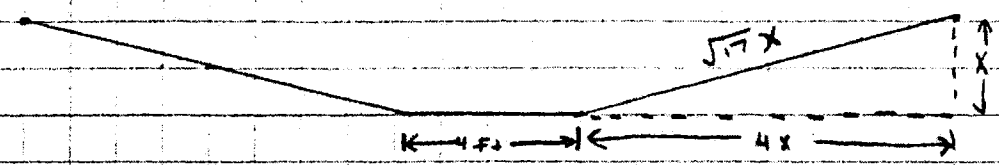
Order No. 19116 (01-01)

CLIENT	JOB NUMBER
NSWE	7602 - 0104

SUBJECT: Travel Time (T_t) / Time of Conc. (T_c) - Construction Conditions - Site 4

BASED ON	DRAWING NUMBER
Figure 1 / Existing Topo / Rough Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/21/97	CMR 8/26/97		



Velocity (V) (ft/s) = $\dfrac{1.49\,(r^{2/3})\,s^{1/2}}{n}$ — TR-55 eq. 3-4

Flow - Q (cfs) = V A

Cross sectional Area - A (ft^2) = $(4ft)(x) + 4x^2$

Wetted perimeter - p_w (ft) = $4\,ft + 2\sqrt{17}\,(x)$

hydraulic radius - r (ft) = A/p_w

Assumptions: n (manning's coefficent) = 0.025 (Chow, p.59)

s (slope) = 0.02 ft/ft

x (depth of water) = 0.5 ft

$A = (4)(0.5) + 4(0.5)^2 = 3\ ft^2$

$p_w = 4 + 2(\sqrt{17})(0.5) = 8.123\ ft$

$r = 3\,ft^2 / 8.123\,ft = 0.369\ ft$

$V = \dfrac{1.49\,(0.369\,ft)^{2/3}(0.067)^{1/2}}{0.025} = 7.941\ ft/s$

CALCULATION WORKSHEET

Order No. 19116 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Calculation of Peak Discharge Rates
For Site 4 Drainage Areas Using the
TR-55 Graphical Peak Discharge Method
Construction Conditions

CALCULATION WORKSHEET

Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	7602 - 0104
SUBJECT: Peak Discharge Rates - Construction Conditions	
BASED ON: Quick TR-55	DRAWING NUMBER
BY: JJB 8/18/97	CHECKED BY: CDM 8/26/97
APPROVED BY	DATE

(1) The Peak, initial Conditions, Discharge Rates for the Site 4 Drainage Areas were calculated by the Peak Discharge Method. Haestad's Quick TR-55 Program was used to compile the calculations. Input for the program was summarized previously.

(2) The peak Discharge Rates for the drainage areas are shown on the following pages. Discharge Rates for three storm events (2-yr, 10-yr, & 25-year storms) are shown for each drainage area. The results are summarized below.

(3) Summary

Area	Storm Frequency (Yr)	Peak Discharge Rate (CFS)
1	2	5
	10	13
	25	17
2	2	2
	10	5
	25	6
3	2	0
	10	1
	25	2

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS1.GPD

Drainage Area	(acres)	7.23	--->	0.0113 sq.mi.
Runoff Curve Number	(CN)	70		
Time of Concentration,Tc	(hrs)	.233		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.857	0.857	0.857
Ia/p Ratio	0.252	0.165	0.143
Unit Discharge, * qu (csm/in)	483	516	524
Runoff, Q (in)	0.95	2.19	2.81
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	5	13	17

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	540.518	540.518	540.518
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	464.724	464.724	464.724
* qu (csm)		483	516	524

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #2 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS2.GPD

Drainage Area	(acres)	3.23	--->	0.0050 sq.mi.
Runoff Curve Number	(CN)	68		
Time of Concentration,Tc	(hrs)	.315		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.941	0.941	0.941
Ia/p Ratio	0.277	0.181	0.157
Unit Discharge, * qu (csm/in)	425	460	469
Runoff, Q (in)	0.84	2.02	2.62
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	5	6

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	490.105	490.105	490.105
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	416.695	416.695	416.695
* qu (csm)		425	460	469

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #3 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS3.GPD

Drainage Area	(acres)	0.74	--->	0.0012 sq.mi.
Runoff Curve Number	(CN)	65		
Time of Concentration,Tc	(hrs)	0.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.077	1.077	1.077
Ia/p Ratio	0.317	0.207	0.179
Unit Discharge, * qu (csm/in)	578	627	636
Runoff, Q (in)	0.70	1.79	2.35
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	0	1	2

Summary of Computations for qu

Ia/p	#1	0.300	0.100	0.100
C0	#1	2.396	2.473	2.473
C1	#1	-0.512	-0.518	-0.518
C2	#1	-0.132	-0.171	-0.171
qu (csm)	#1	596.829	661.942	661.942
Ia/p	#2	0.350	0.300	0.300
C0	#2	2.355	2.396	2.396
C1	#2	-0.497	-0.512	-0.512
C2	#2	-0.120	-0.132	-0.132
qu (csm)	#2	539.846	596.829	596.829
* qu (csm)		578	627	636

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

B.4 POST-CONSTRUCTION CONDITIONS FOR SITE 4

CALCULATION WORKSHEET Order No. 19115 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

B-4

Determination of Site 4 Drainage
Areas and Weighted Curve Numbers
Post Construction Conditions
Final Cap

CALCULATION WORKSHEET

Order No. 19119 (91-91)

CLIENT	JOB NUMBER
NSWE	7602 - 0104

SUBJECT: Drainage Areas / CNs - Post Construction - Site 4

BASED ON	DRAWING NUMBER
CAP Existing Topo / Regrade Plan / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/20/97	CAR 8/23/97		

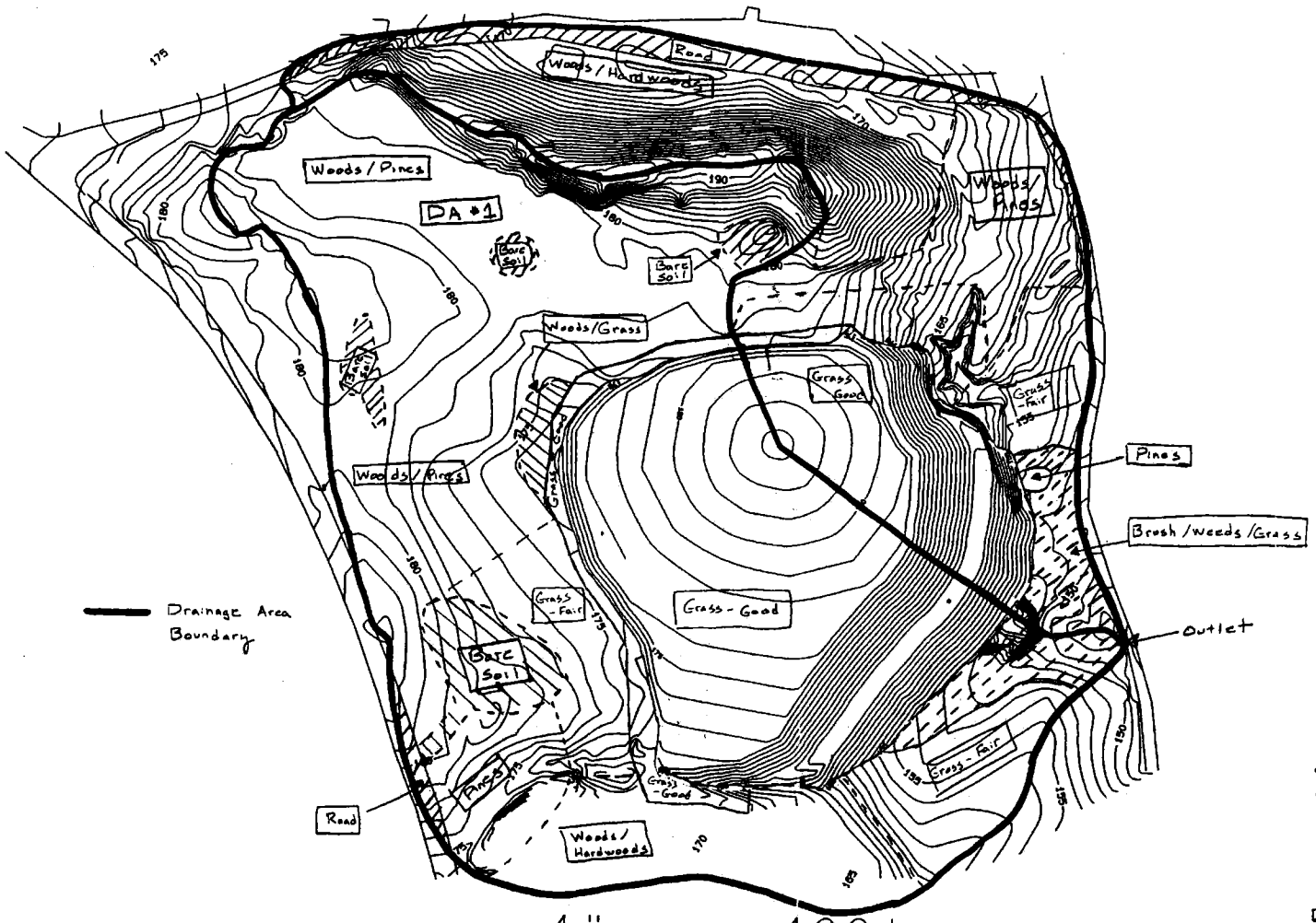
(1) The existing topography for Site 4 was used in conjunction with the Marlboro USGS quadrangle and the Final Cap Regrade Plan to determine the boundaries of the drainage areas that cover site 4. Two drainage areas were determined. They are shown on Figure 1 (p. 2 of 10).

The size of each drainage area was determined by planimeter. The measurements are shown on p. 8 of 10. The areas are summarized below.

Drainage Area	Area (acres)
1	7.65
2	3.55
	11.20 acres - Total

(2) The type of cover material was then determined. It was assumed that the landfill cap and trench would be seeded with grass (good). Additionally, disturbed areas outside of the landfill boundaries and the former sediment basins would be seed with grass (fair). All other areas will have the same cover type as indicated in the pre-construction calculations. Other assumptions are provided in Section 3.0.

SITE 4



1" = 100'

Site 4
POST CONSTRUCTION CONDITIONS - CAP
COVER TYPE FOR ESTIMATING
WEIGHTED CURVE NUMBERS

Figure 1

BY: JJB CHKD: CAR
DATE: 8/21/97 DATE: 8/23/97

CLIENT	JOB NUMBER
NSWE	7602-0104

SUBJECT: Drainage Areas / CNs - Post Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topo / Regrade Plan / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/20/97	CAR 8/23/97		

(3) Assumptions:

- Sediment basins have been removed & the areas that the basins occupied have been restored to their existing topography. This scenario represents the worst case drainage scenario & will produce results that can be compared to the peak runoff for pre-construction conditions.
- A trench will be constructed along the downgradient slope of the final landfill cover. The trench will route runoff to the sides of the slope.
- The size of the drainage basin is the same during post construction as the size during pre-construction.
- An upgradient surface water interception trench is in place as shown on figure 1 (p. 2 of 10). The trench routes runoff around the landfill cap.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NJWE	7602-0104
SUBJECT: Drainage Areas / CNs - Post Construction - Site 4	
BASED ON: Existing Topo / CAP Regrade Plan / TR-55	DRAWING NUMBER
BY: JJB 8/20/97 / CHECKED BY: CAR 8/23/97	APPROVED BY / DATE

(4) The area of each cover type within each drainage area was then determined by planimeter. The measurements are shown on pp. 8-10. The areas are summarized below.

Drainage Area	Cover Type	Area[A] (acres)
1	Bare Soil	0.34
	Woods - Fair	3.86
	Woods/Grass - Fair	0.06
	Dirt Road	0.03
	Grass - Fair	0.76
	Grass - Good	238
	Brush/Weeds/Grass - Fair	0.22
		7.65 - Total
2	Bare Soil	0.00
	Woods - Fair	1.75
	Woods/Grass - Fair	0.28
	Dirt Road	0.21
	Grass - Fair	0.29
	Grass - Good	0.82
	Brush/Weeds/Grass - Fair	0.20
		3.55 - Total

Note:
(A) - The areas shown are the average of three measurements. If the individual measurements did not total to the measurement of the entire drainage area, the variation was distributed using a weighting factor to each area.

CLIENT	JOB NUMBER
NSWE	7602 / 0104

SUBJECT: Drainage Area / Weighted Curve Numbers

BASED ON	DRAWING NUMBER
Existing Topo / TR-55 / Cap Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/23/97		

(5) Runoff curve numbers were determined for each cover type. The curve numbers were taken from tables 2-2a, 2-2b, and 2-2c of the TR-55 manual. The site 4 hydraulic soil type is B. (see calculations entitled "Estimate Soil Types + SCS Hydraulic Soil Groups for Sites 4 & 5.")

Cover Type	Soil Type	CN
Bare Soil	B	86
Woods (Pines / Hardwoods) - Fair	B	60
Woods / Grass - Fair	B	65
Brush / Weeds / Grass - FAIR	B	56
Dirt Road	B	82
Grass - Fair	B	69
Grass - Good	B	61

(6) Weighted Runoff Curve numbers were calculated for each drainage area using the estimated areas of each cover type + the appropriate curve numbers. The Haested Quick TR-55 Program was used to calculate the weighted Curve Numbers (see pp. 7 of 10) and to summarize the results (see p. 6 of 10.).

Quick TR-55 Ver.5.46 S/N:
Executed: 09:15:59 08-22-1997

RUNOFF CURVE NUMBER SUMMARY

::

Subarea Description	Area (acres)	CN (weighted)
Drainage Area 1	7.65	60
Drainage Area 2	3.55	62

Quick TR-55 Ver.5.46 S/N:
Executed: 09:15:59 08-22-1997

RUNOFF CURVE NUMBER DATA

::

Composite Area: Drainage Area 1

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.34	36	
Woods (Pines/Hardwoods) - Fair	3.86	60	
Brush/Weeds/Grass - Fair	0.22	56	
Dirt Roads	0.03	82	
Woods/Grass - Fair	0.06	65	
Grass - Good	2.38	61	
Grass - Fair	0.76	69	
COMPOSITE AREA --->	7.65	60.1	(60)

::

Composite Area: Drainage Area 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Bare Soil	0.00	86	
Woods (Pines/Hardwoods)	1.75	60	
Brush/Weeds/Grass - Fair	0.20	56	
Dirt Roads	0.21	82	
Woods/Grass - Fair	0.28	65	
Grass - Good	0.82	61	
Grass - Fair	0.29	69	
COMPOSITE AREA --->	3.55	62.4	(62)

::

CALCULATION WORKSHEET

Order No. 19118 (01-01)

CLIENT: NWSE	JOB NUMBER: 7602 - 0104
SUBJECT: Drainage Areas / CNs - Post Construction - Site 4	
BASED ON: Existing Topo / CAP Regrade Plan	DRAWING NUMBER:
BY: JJB 8/20/97 / CHECKED BY: CAR 8/23/97	APPROVED BY: / DATE:

Planimeter Measurements

(I)

Drainage Area	M1	M2	M3	AVG (IN²)
1	33.5716	33.4940	33.5011	33.5222
2	15.5310	15.5702	15.5460	15.5491

Drainage Area	AVG (IN²)	AV (FT²)	AVG (acres)	AVG (Corrected Calc)
1	33.5222	335,222	7.70	7.65
2	15.5491	15.5,491	3.57	3.55
			11.27	11.20

(II) DA #1 Sub Areas

	M1	M2	M3	AVG
(A) Bare Soil (1)	Use area	from pre-development	calcs	(0.34 acres)
(B) Woods - Fair	Use area	from construction	calcs	(3.86 acres)
(C) Woods/Grass	Use area	from construction	calcs	(0.06 acres)
(D) Road - Dirt	Use area	from pre-development	calcs	(0.03 acres
(E) Grass Fair				
- Dist. Area	Use area	from construction	calcs	(0.35 acres)
- Old Basin	Use area for sed. Basin	from constr.	calcs	(0.41 acres)
(F) Grass-Good				
- Trench + Cap	10.4935	10.4625	10.4935	10.4832
(G) Brush/Weeds/ Grass	0.9455	0.9765	0.9455	0.9658

Note: 1. This area does not include area E as measured in the pre-construction calcs.

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT	JOB NUMBER
NWSE	7602-0104

SUBJECT: Drainage Area / CNs - Post Construction - Site 4

BASED ON	DRAWING NUMBER
Existing Topo / Cap Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/20/97	CAM 8/23/97		

III DA#1 Sub Areas - Total Area = 7.65 ac.

	AVG (IN)²	AVG (FT²)	AVG (Acres)	Correct AVG (Ac)
(A) Bare Soil			0.34	0.34
(B) Woods-Fair			3.86	3.86
(C) Woods/Grass			0.06	0.06
(D) Road-Dirt			0.03	0.03
(E) Fair Grass			0.76	0.76
(F) Good Grass	10.4832	104,832	2.41	2.38
(G) Brush/weeds/Grass	0.9558	9,558	0.22	0.22
			7.68	7.65

IV DA #2

	M1	M2	M3	Avg (in²)
(A) Bare Soil				0
(B) Woods-Fair	use area from construction calcs			(1.76 acres)
(C) Woods/Grass	use area from construction calcs			(0.28 acres)
(D) Dirt Road	use area from construction calcs			(0.21 acres)
(E) Grass-Good Cap + Trench	3.5495	3.5495	3.5650	3.5547 in²
(F) Fair-Grass - Old Basin	use area from construction calcs			(0.29 acres)
(G) Brush/Weeds/Grass	0.8370	0.8990	0.8370	0.8577 in²

CALCULATION WORKSHEET

Order No. 19116 (91-91)

CLIENT: NWSE	JOB NUMBER: 7602-0104
SUBJECT: Drainage Areas / CNs - Post Construction - Site 4	
BASED ON: Existing Topo / Cap Regrade Plan	DRAWING NUMBER:
BY: JJB 8/20/97 / CHECKED BY: CAM 8/23/97	APPROVED BY: / DATE:

(V) DA #2 - Individual Cover Sub Areas - Total Area = 3.55

	AVG (in²)	AVG (ft²)	AVG (acres)	Corrected AVG (ac)
(A) Bare Soil			0	0
(B) Fair Woods			1.76	1.75
(C) Woods/Grass			0.28	0.28
(D) Dirt Roads			0.21	0.21
(E) Grass - Good	3.5547	35.547	0.82	0.82
(F) Grass Fair			0.29	0.29
(G) Brush/Weeds/Grass	0.8577	8.577	0.20	0.20
			3.56	3.55

CALCULATION WORKSHEET

Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Determine Time of Construction for
Each Site 4 Drainage Area
Post-Construction Conditions
Final Cap

CLIENT	JOB NUMBER
NSWE	7607 /0104

SUBJECT: Travel Time (T_t) / Time of Concentration (T_c) - Post Construction - Site

BASED ON	DRAWING NUMBER
Figure 1/ POST-Topo	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/17/97	CAR 8/23/97		

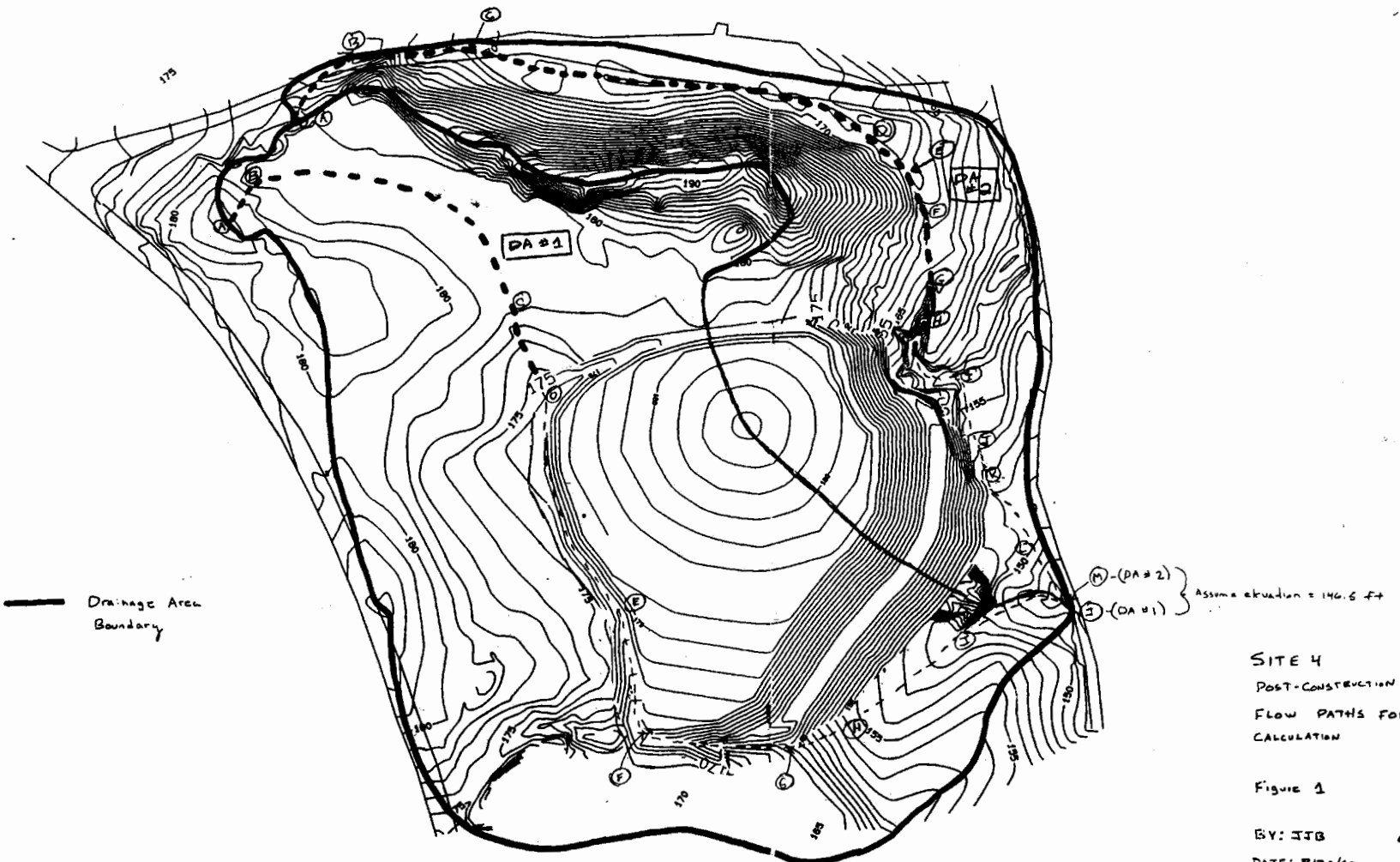
(1) A time of concentration (T_c) for each Drainage Area is required to calculate a peak discharge rate. T_c is defined as the time for runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. Travel time (T_t) is a component of T_c and is defined as the time it takes to travel from one location to another in a watershed.

(2) By visual evaluation of each drainage area, the hydraulically most distant point and the discharge point for each drainage area were located. The flow path between these two points was then marked. The flow paths for drainage areas 1 & 2 are shown on Figure 1. Each flow path was then segmented using changes in slope as the guide for determining the end of each segment.

(3) The length and slope of each segment was then determined. These numbers are summarized on page 3.

(4) Flow types assumed for Site 4 Drainage areas were sheet flow, shallow flow, and open channel flow. Open channel flow is assumed through the surface water interception trench. Sheet flow is assumed for the first segment illustrated on Figure 1 (page 2 of 4). T_t & T_c calculations are shown on p. 4 of 4. A trapezoidal channel with 4:1 side slopes and a four foot base is assumed for open channel flow. A sample open channel flow calculation is provided on page 5 of 5.

SITE 4



1" = 100'

SITE 4
POST-CONSTRUCTION CONDITIONS - CAP
FLOW PATHS FOR T_t AND T_c CALCULATION

Figure 1

BY: JJB CHKD: CAR
DATE: 8/20/97 DATE: 8/23/97

p. 2/5

CALCULATION WORKSHEET

Order No. 19116 (91-01)

CLIENT: NSWE	JOB NUMBER: 7602/0164
SUBJECT: Time of Concentration - Site 41 - Post Construction	
BASED ON: Figure 4 / Existing Topo	DRAWING NUMBER:
BY: JJB 8/20/97	CHECKED BY: CAR 8/23/97
APPROVED BY:	DATE:

DA #1	Segment	Distance	Max Elev.	Min Elev.	Slope	Flow Type
	AB	40	182.5	179	0.088	SF
	BC	320	179	174	0.003	SCF
	CD	90	178	173	0.055	SCF
	DE	225	174	172	0.009	OCF
	EF	125	172	168	0.032	OCF
	FG	145	168	164	0.028	OCF
	GH	60	164	156	0.1333	SCF
	HI	145	156	151	0.035	SCF
	IJ	115	151	146.5	0.039	SCF

DA #2	Segment	Distance	Max Elev	Min Elevation	Slope	Flow Type
	AB	76	180.5	174	0.086	SF
	BC	120	174	170	0.0333	SCF
	CD	340	170	169	0.003	SCF
	DE	52	169	168	0.019	SCF
	EF	39	168	166	0.051	SCF
	FG	63	166	164	0.032	SCF
	GH	45	164	159	0.111	SCF
	HI	80	159	156	0.038	SCF
	IJ	78	156	153	0.038	SCF
	JK	44	153	151	0.045	SCF
	KL	70	151	150	0.014	SCF
	LM	62	150	146.5	0.057	SCF

Project: NWSE - Site 4 - Post Construction Conditions
Task: Estimation of Drainage Area Travel Time (Tt)/ Time of Concentration (Tc)
By: JJB **Chkd:** CAR
Date: 8/22/97 **Date:** 8/25/97

Drainage Area 1

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow(1)	AB	40	0.088	0.4	3.4	0.092

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow(1)	BC	320	0.003	Unpaved	0.884	0.101
	CD	90	0.055	Unpaved	3.784	0.007
	GH	60	0.1333	Unpaved	5.891	0.003
	HI	145	0.035	Unpaved	3.018	0.013
	IJ	115	0.039	Unpaved	3.186	0.010

Open Channel Flow(1)(3)

Segment	Distance	Slope	Depth(4)	Area	Hyd. Rad.	n(5)	V	Q	Tt
DE	225	0.009	0.478	2.825936	0.3558356	0.025	2.839	8.023	0.022
EF	125	0.032	0.339	1.815684	0.2671905	0.025	4.423	8.030	0.008
FG	145	0.028	0.352	1.903616	0.2757798	0.025	4.225	8.044	0.010
								DA #1 Tc =	**0.265**

Drainage Area 2

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow(1)	AB	76	0.086	0.4	3.4	0.156

	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow(1)	BC	120	0.033	Unpaved	2.931	0.011
	CD	390	0.003	Unpaved	0.884	0.123
	DE	52	0.019	Unpaved	2.224	0.007
	EF	39	0.051	Unpaved	3.644	0.003
	FG	63	0.032	Unpaved	2.886	0.006
	GH	45	0.111	Unpaved	5.375	0.002
	HI	80	0.038	Unpaved	3.145	0.007
	IJ	78	0.038	Unpaved	3.145	0.007
	JK	44	0.045	Unpaved	3.423	0.004
	KL	70	0.014	Unpaved	1.909	0.010
	LM	62	0.057	Unpaved	3.852	0.005
					DA #2 Tc =	**0.340**

(1) Formulas taken from Chapter 3 and Appendix F, TR-55 Manual, SCS, June 1986.
(2) Manning's coefficients taken from Table 3-1, Chapter 3, TR-55 Manual, SCS, June 1986.
- Woods (light under brush) n = 0.40
(3) A trapezoidal channel is assumed with a 4 foot base, 4/1 side slopes.
A sample open channel flow calculation is shown on the following page.
(4) Depth of water during peak flow during 10-yr storm during post-construction conditions (8 cfs).
(5) EARTH CHANNEL (CHOW, 1959)

CALCULATION WORKSHEET

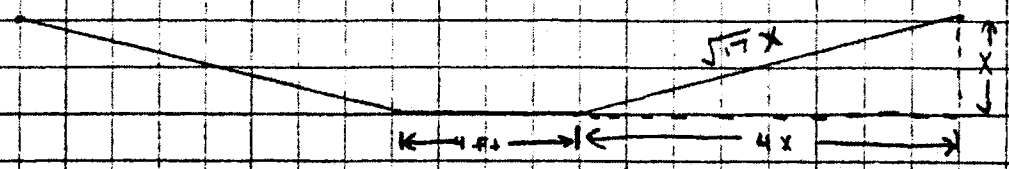
Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	7602 - 0104

SUBJECT: Travel Time (T_t) / Time of Conc. (T_c) - Post Const. Conditions - Site 4

BASED ON	DRAWING NUMBER
Figure 1 / Existing Topo / Regrade Plan	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/21/97	CAR 8/23/97		



Velocity (V) (ft/s) = $\frac{1.49\,(r^{2/3})\,s^{1/2}}{n}$ — TR-55 eq. 3-4

Flow - Q (cfs) = V A

Cross sectional Area - A (ft^2) = $(4\,ft)(x) + 4x^2$

Wetted perimeter - p_w (ft) = $4\,ft + 2\sqrt{17}\,(x)$

hydraulic radius - r (ft) = A / p_w

Assumptions: n (Manning's coefficient) = 0.025 (Chow, 1959)

s (slope) = 0.02 ft/ft

x (depth of water) = 0.5 ft

$A = (4)(0.5) + 4(0.5)^2 = 3\ ft^2$

$p_w = 4 + 2(\sqrt{17})(0.5) = 8.123\ ft$

$r = 3\,ft^2 / 8.123\,ft = 0.369\ ft$

$V = \frac{1.49\,(0.369\,ft)^{2/3}(0.067)^{1/2}}{0.025} = 7.941\ ft/s$

CALCULATION WORKSHEET

Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Calculation of Peak Discharge Rates
for Site 4 Drainage Areas Using the
TR-55 Graphical Peak Discharge Method
Post Construction Conditions -
Final CAP

CLIENT	JOB NUMBER
NSWE	7602-0104

SUBJECT: Peak Discharge Rates - Post Construction - Site 4

BASED ON	DRAWING NUMBER
Quick TR-55	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/22/97	CAR 8/23/97		

(1) The Peak Post-Construction Conditions Discharge Rates for the Site 4 Drainage Areas were calculated by the Peak Discharge Method. Haestad's Quick TR-55 Program was used to compile the calculations. Input for the program was summarized previously. (Note: No pond/swamp factor was used for the wetlands. Travel time through the wetlands was estimated by calculation. This is a conservative assumption (i.e. peak discharge rates are higher.)

(2) The peak Discharge Rates for the drainage areas are shown on the following pages. Discharge Rates for three storm events (2-yr, 10-yr, & 25-year storms) are shown for each drainage area. The results are summarized below.

(3) Summary

Area	Storm Frequency (Yr)	Peak Discharge Rate (CFS)
1	2	2
	10	8
	25	11
2	2	1
	10	4
	25	5

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1 - POST CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4PT1.GPD

Drainage Area	(acres)	7.65	--->	0.0120 sq.mi.
Runoff Curve Number	(CN)	60		
Time of Concentration,Tc	(hrs)	.265		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.333	1.333	1.333
Ia/p Ratio	0.392	0.256	0.222
Unit Discharge, * qu (csm/in)	354	461	473
Runoff, Q (in)	0.49	1.42	1.92
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	8	11

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	399.716	519.254	519.254
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	345.767	444.151	444.151
* qu (csm)		354	461	473

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #2 - POST CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4PT2.GPD

Drainage Area	(acres)	3.55	--->	0.0055 sq.mi.
Runoff Curve Number	(CN)	62		
Time of Concentration,Tc	(hrs)	0.34		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.226	1.226	1.226
Ia/p Ratio	0.361	0.236	0.204
Unit Discharge, * qu (csm/in)	354	428	439
Runoff, Q (in)	0.57	1.56	2.09
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	1	4	5

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	364.318	477.078	477.078
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	316.929	404.667	404.667
* qu (csm)		354	428	439

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

B.5 PRE-CONSTRUCTION CONDITIONS FOR SITE 5

CALCULATION WORKSHEET Order No. 19118 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

C.5

DETERMINATON OF SITE 5
DRAINAGE AREAS AND WEIGHTED
CURVE NUMBERS.

PRECONSTRUCTION SCENARIO

CLIENT NWSE	JOB NUMBER 7602/0104
SUBJECT DRAINAGE AREAS / WEIGHTED CURVE NUMBERS	
BASED ON EXISTING TOPOGRAPHY / TR-55	DRAWING NUMBER
BY CAR / CHECKED BY JJB 3/26/97	APPROVED BY / DATE Rev 12/29/97 CHF

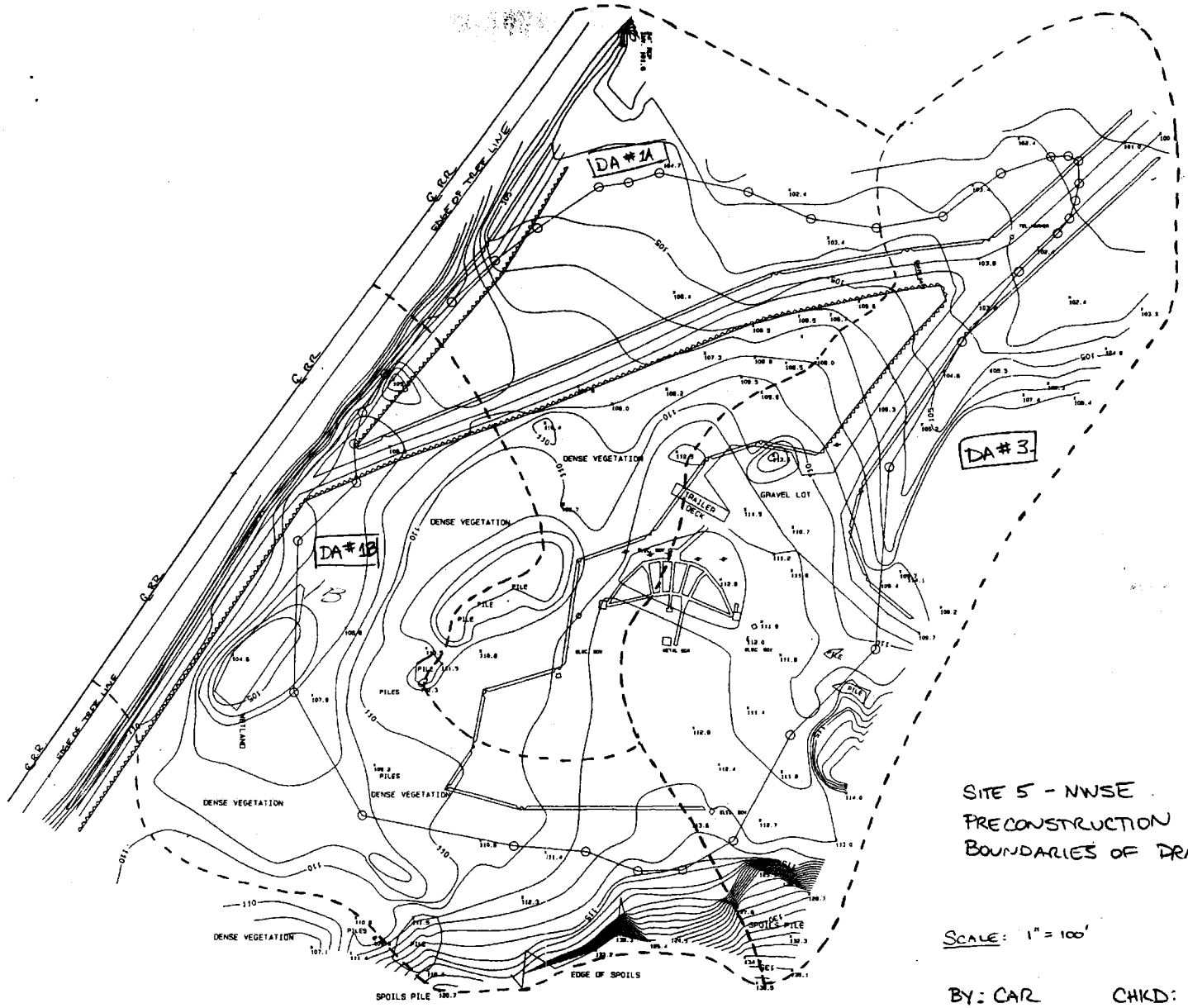
SITE 5 — DRAINAGE AREAS

(1) THE EXISTING TOPOGRAPHY FOR SITE 5 WAS USED IN CONJUNCTION WITH THE LONG BRANCH USGS QUADRANGLE TO DETERMINE THE BOUNDARIES OF THE DRAINAGE AREAS THAT COVER SITE 5. THREE DRAINAGE AREAS WERE DETERMINED. THEY ARE SHOWN ON FIGURE 1 (p. 2 of 11)

THE AREA OF EACH DRAINAGE AREA WAS DETERMINED BY PLANIMETER. THE MEASUREMENTS ARE SHOWN ON P. 9 OF 11. THE AREAS ARE SUMMARIZED BELOW.

DRAINAGE AREA	AREA (acres)
1-8	5.64
3	5.59
1A	4.88

(2) THE TYPE OF COVER MATERIAL AND ITS BOUNDARIES WERE THEN ESTIMATED. SURVEY INFORMATION, PHOTOGRAPHS AND PERSONAL OBSERVATIONS WERE USED TO DETERMINE THE APPROPRIATE COVER TYPE. THE COVER TYPE INFORMATION IS SUMMARIZED ON FIGURE 2 (p. 3 of 11). THE TYPES OF COVER FOUND AT SITE 5 INCLUDE WOODS, DIRT ROADS, GRASSY OPEN SPACE, GRAVEL AREAS (RAILROAD TRACKS AND PARKING LOT), BARE SOIL (SPOILS PILE) AND IMPERVIOUS AREAS (BUILDINGS / SKEET RANGE).

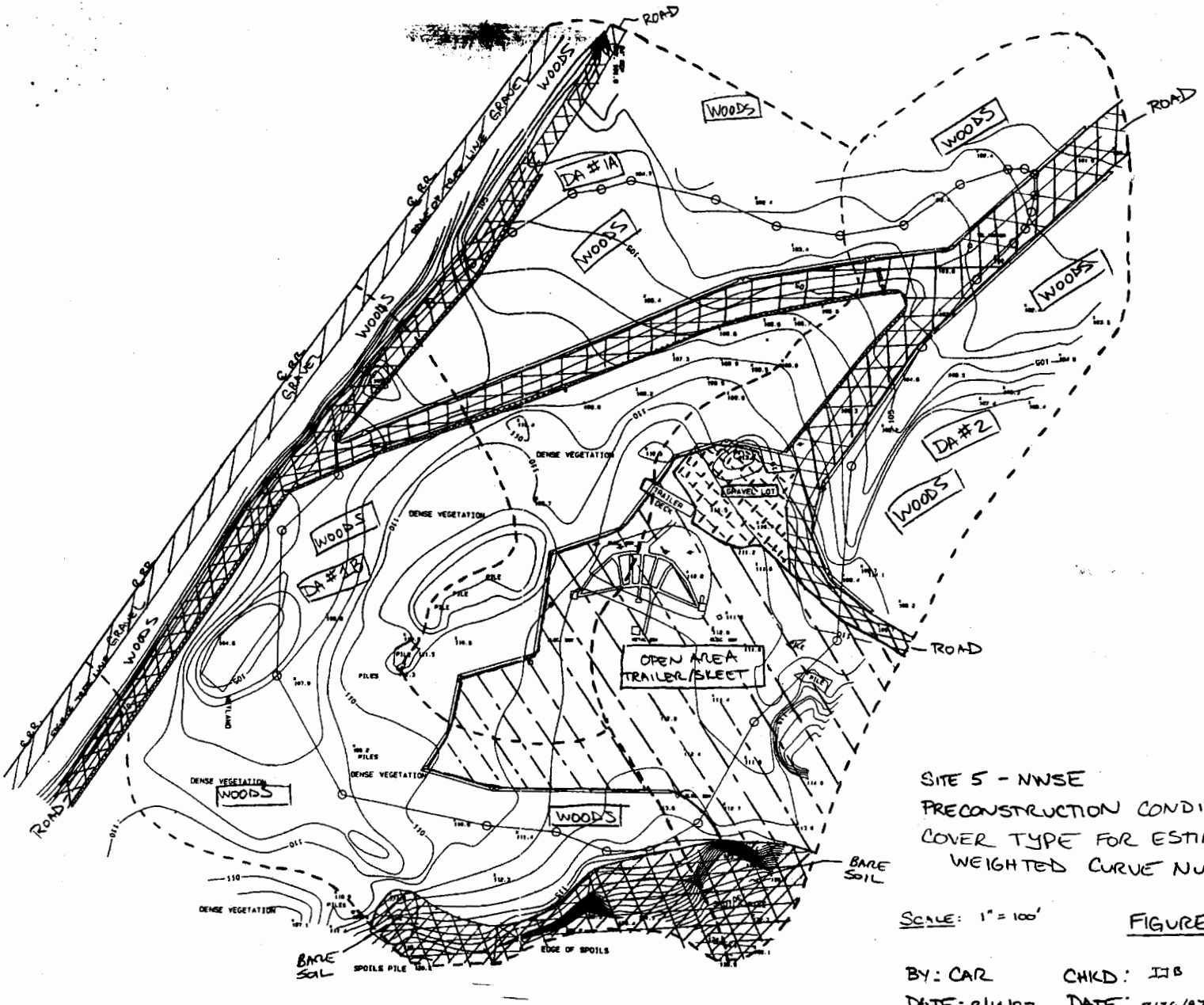


SITE 5 - NWSE
PRECONSTRUCTION CONDITIONS
BOUNDARIES OF DRAINAGE AREAS

SCALE: 1" = 100'

FIGURE 1

BY: CAR CHKD: JJB
DATE: 8/14/97 DATE: 8/26/97
Revised 12/29/97 CAF



SITE 5 - NWSE
PRECONSTRUCTION CONDITIONS
COVER TYPE FOR ESTIMATING
WEIGHTED CURVE NUMBERS

SCALE: 1" = 100'

FIGURE 2

BY: CAR CHKD: JJB
DATE: 8/14/97 DATE: 8/26/97

Rev 12/29/97 CSF

p 3 OF 11

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: DRAINAGE AREAS / WEIGHTED CURVE NUMBERS

BASED ON	DRAWING NUMBER
EXISTING TOPOGRAPHY / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
CAR	JJB 8/26/97		Rev 12/29/97 CAF

(3) THE AREA OF EACH COVER TYPE WITHIN EACH DRAINAGE AREA WAS THEN DETERMINED BY PLANIMETER. THE MEASUREMENTS ARE SHOWN ON pp. 9 OF 11 THROUGH 11 OF 11. THE AREAS ARE SUMMARIZED BELOW.

DRAINAGE AREA	COVER TYPE	AREA[A] (ACRES)
1B	OPEN SPACE	0.28
	ROAD	0.41
	GRAVEL AREA	0.23
	BARE SOIL	0.46
	WOODS	4.26
	IMPERVIOUS AREA	0.00
3	OPEN SPACE	1.63
	ROAD	0.75
	GRAVEL AREA	0.22
	BARE SOIL	0.28
	WOODS	2.65
	IMPERVIOUS AREA	0.06
1A	OPEN SPACE	0.43
	ROAD	0.55
	GRAVEL AREA	0.15
	BARE SOIL	0.00
	WOODS	3.73
	IMPERVIOUS AREA	0.02

NOTE:

(A) - THE AREAS SHOWN ARE THE AVERAGE OF THREE MEASUREMENTS. IN ADDITION, IF INDIVIDUAL MEASUREMENTS DID NOT TOTAL UP TO THE TOTAL MEASURED AREA, THE DIFF. WAS DISTRIBUTED USING A WEIGHTING FACTOR, TO EACH AREA.

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: DRAINAGE AREAS / WEIGHTED CURVE NUMBERS

BASED ON	DRAWING NUMBER
EXISTING TOPOGRAPHY / TR-55	

BY	CHECKED BY	APPROVED BY	DATE
CAR	JJB 8/26/97		

(4) RUNOFF CURVE NUMBERS WERE DETERMINED FOR EACH COVER TYPE. THE CURVE NUMBERS WERE TAKEN FROM TABLES 2-2a, 2-2b, and 2-2c OF THE TR-55 MANUAL. THE SITE 5 HYDROLOGIC SOIL TYPE IS B (SEE PREVIOUS CALCULATIONS)

COVER TYPE	SOIL TYPE	CN
OPEN SPACE (FAIR)	B	69
ROAD (DIRT)	B	82
GRAVEL AREA (RR & PKING LOT)	B	85
BARE SOIL (SPOILS PILE)	B	86
WOODS (GOOD)	B	55
IMPERVIOUS (TRAILER/SKEET AREA)	B	98

(5) WEIGHTED RUNOFF CURVE NUMBERS WERE CALCULATED FOR EACH DRAINAGE AREA USING THE ESTIMATED AREAS OF EACH COVER TYPE AND THE APPROPRIATE CURVE NUMBERS. THE HAESTAD QUICK TR-55 PROGRAM WAS USED TO CALCULATE THE WEIGHTED CURVE NUMBERS (SEE pp. 7 OF 11 AND 8 OF 11) AND TO SUMMARIZE THE RESULTS (SEE p. 6 OF 11).

Rev 12/29/97 CBF

Quick TR-55 Ver.5.46 S/N:
Executed: 16:31:31 08-01-1997

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104

RUNOFF CURVE NUMBER SUMMARY

::

Subarea Description	Area (acres)	CN (weighted)
DRAINAGE AREA 1B	5.64	61
DRAINAGE AREA 2 3	5.59	66
DRAINAGE AREA 3 1A	4.88	60

Rev 12/29/97 CHF

Quick TR-55 Ver.5.46 S/N:
Executed: 16:31:31 08-01-1997

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104

RUNOFF CURVE NUMBER DATA

Composite Area: DRAINAGE AREA 1B

SURFACE DESCRIPTION	AREA (acres)	CN	
B - OPEN SPACE (FAIR)	0.28	69	
B - ROAD (DIRT)	0.41	82	
B - GRAVEL AREA (RR & PKING LT)	0.23	85	
B - BARE SOIL (SPOILS PILE)	0.46	86	
B - WOODS (GOOD)	4.26	55	
B - TRAILER/SKEET AREA	0.00	98	
COMPOSITE AREA --->	5.64	61.4	(61)

Composite Area: DRAINAGE AREA ~~2~~ 3

SURFACE DESCRIPTION	AREA (acres)	CN	
B - OPEN SPACE (FAIR)	1.63	69	
B - ROAD (DIRT)	0.75	82	
B - GRAVEL AREA (RR & PKING LT)	0.22	85	
B - BARE SOIL (SPOILS PILE)	0.28	86	
B - WOODS (GOOD)	2.65	55	
B - TRAILER/SKEET AREA	0.06	98	
COMPOSITE AREA --->	5.59	65.9	(66)

Rev 12/29/97 CHF

Quick TR-55 Ver.5.46 S/N:
Executed: 16:31:31 08-01-1997

Composite Area: DRAINAGE AREA ~~3~~ 1A

SURFACE DESCRIPTION	AREA (acres)	CN	
B - OPEN SPACE (FAIR)	0.43	69	
B - ROAD (DIRT)	0.55	82	
B - GRAVEL AREA (RR & PKING LT)	0.15	85	
B - BARE SOIL (SPOILS PILE)	0.00	86	
B - WOODS (GOOD)	3.73	55	
B - TRAILER/SKEET AREA	0.02	98	
COMPOSITE AREA --->	4.88	60.4	(60)

::

CLIENT: NWSE	JOB NUMBER: 7602 /0104
SUBJECT: DRAINAGE AREAS/COVER TYPE PLANIMETER MEASUREM	
BASED ON: FIGURES 1 AND 2	DRAWING NUMBER:
BY: CAR 8/1/97 / CHECKED BY: JJB 8/26/97	APPROVED BY: / DATE: REV 12/29/97 CSF

(6) PLANIMETER MEASUREMENTS:

(I)

AREA	M1	M2	M3	AVG	TOTAL (IN^2)
1B-A	39.6026	39.6181	39.4631	39.5613	
-B	58.5126	59.1171	58.3576	58.6624	98.2237
3-A	45.4616	45.5236	45.5546	45.5133	
-B	51.7391	51.8631	51.8166	51.8063	97.3196
1A-A	28.3496	28.3650	28.3961	28.3702	
-B	56.7301	56.6371	56.6371	56.6681	85.0383

AREA	AVG (IN^2)	AVG (ft^2)	AVG (ac)
1B	98.2237	245,559	5.64
3	97.3196	243,299	5.59
1A	85.0383	212,596	4.88

($1 IN = 50 ft$; $1 IN^2 = 2500 ft^2$; $43,560 ft^2 = 1 ac$)

(II) AREA 1B – INDIVIDUAL SUBAREAS

	M1	M2	M3	AVG (IN^2)
(A) OPEN SPACE (FAIR) –	4.9600	4.8360	4.8980	4.8980
(B) ROAD (DIRT) –	7.0525	7.0835	6.9595	7.0318
(C) GRAVEL AREA (RR & PARKING LOT) –	3.9835	4.0765	4.0300	4.0300
(D) BARE SOIL (SPOILS PILE) –	8.0910	8.0135	8.1685	8.091
(E) WOODS (GOOD) (I) –	7.5795	7.6725	7.6570	7.6363
(II) –	3.007	3.007	2.9605	2.9915
(III) –	20.3515	20.5220	20.5220	20.4652
(IV) –	42.7646	42.2376	42.4081	42.4701

CLIENT NWSE	JOB NUMBER 7602/0104
SUBJECT DRAINAGE AREAS/COVER TYPE PLANIMETER MEASUREMENTS	
BASED ON FIGURES 1 AND 2	DRAWING NUMBER
BY CAR 8/1/97 / CHECKED BY JJB 8/1/97	APPROVED BY / DATE REV 12/29/97 CYF

III AREA 1B – AVG TOTAL AREAS

	AVG (IN²)	AVG (FT²)	AVG (ac)	CORRECTED AVG (ac)
A	4.8980	12,245.00	0.28	0.28
B	7.0318	17,579.50	0.40	0.41
C	4.0300	10,075.00	0.23	0.23
D	8.0910	20,227.50	0.46	0.46
E	73.5631	183,907.75	4.22	4.26
			5.59	5.64

(TOTAL AREA (5.64) – IND. AREA (5.59) = 0.05
DIST. AREA SO THAT IND. ADD TO TOTAL)

IV AREA 3 – INDIVIDUAL SUBAREAS

	M1	M2	M3	AVG (IN²)
A OPENSPACE (FAIR)	28.3186	28.6131	28.4891	28.4736
B ROAD (DIRT)	12.8650	13.0510	13.1130	13.0097
C GRAVEL AREA (RR & PARKING LOT)	3.8905	3.7975	3.8440	3.8440
D BARE SOIL (SPOILS PILE)	4.9910	4.8670	4.9290	4.9290
E WOODS (GOOD) I	6.7115	6.6340	6.7735	6.7063
II	14.6010	14.7250	14.6785	14.6682
III	24.0560	23.8235	23.9165	23.9320
IV	0.8835	0.8680	0.8990	0.8835
F TRAILER/SKEET AREA	—	—	—	1.085

V AREA 3 – AVG. TOTAL AREAS

	AVG (IN²)	AVG (FT²)	AVG (ac)	CORRECTED AVG (ac)
A	28.4736	71,184.00	1.63	1.63
B	13.0097	32,524.25	0.75	0.75
C	3.8440	9,610.00	0.22	0.22
D	4.9290	12,322.50	0.28	0.28
E	46.1900	115,475.00	2.65	2.65
F	1.085	2,712.50	0.06	0.06

5.59 ac = TOTAL (NO CORRECTION NECESSARY)

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: DRAINAGE AREAS / COVER TYPE PLANIMETER MEASUREMEN

BASED ON	DRAWING NUMBER
FIGURES 1 AND 2	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/1/97	JJB 8/26/97		RW 12/29/97 CSF

VI AREA 1A – INDIVIDUAL SUBAREAS

		M1	M2	M3	AVG (IN²)
A	OPEN SPACE (FAIR)	7.5640	7.5640	7.5485	7.5588
B	ROAD (DIRT)	3.7975	3.8285	3.9525	3.8495
		5.7660	5.7660	5.7970	5.7763
C	GRAVEL AREA (RR & PARKING LOT)	2.5420	2.5575	2.5110	2.5368
D	BARE SOIL (SPOILS PILE)	0.00	0.00	0.00	0.00
E	WOODS (GOOD) I	5.2855	5.3940	5.5180	5.3992
	II	38.0936	38.0681	38.0776	38.0578
	III	21.2350	21.3435	21.3280	21.3022
F	TRAILER / SKEET AREA	—	—	—	0.3620

VII AREA 1A – AVG. TOTAL AREAS

	AVG (IN²)	AVG (FT²)	AVG (ac)	CORRECTED AVG (ac)
A	7.5588	18,897.00	0.43	0.43
B	9.6358	24,089.50	0.55	0.55
C	2.5368	6,342.00	0.15	0.15
D	0.00	0.00	0.00	0.00
E	64.7592	161,898.00	3.72	3.73
F	0.3620	905.00	0.02	0.02
			4.87	4.88

CALCULATION WORKSHEET

Order No. 19116 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

DETERMINE TIME OF CONCENTRATIONS
FOR EACH SITE 5 DRAINAGE AREA

PRE CONSTRUCTION SCENARIO

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT	JOB NUMBER
NWSE	7602/0104

SUBJECT: TRAVEL TIME (T_t) / TIME OF CONCENTRATION (T_c)

BASED ON	DRAWING NUMBER
FIGURE 1 / EXISTING TOPO	

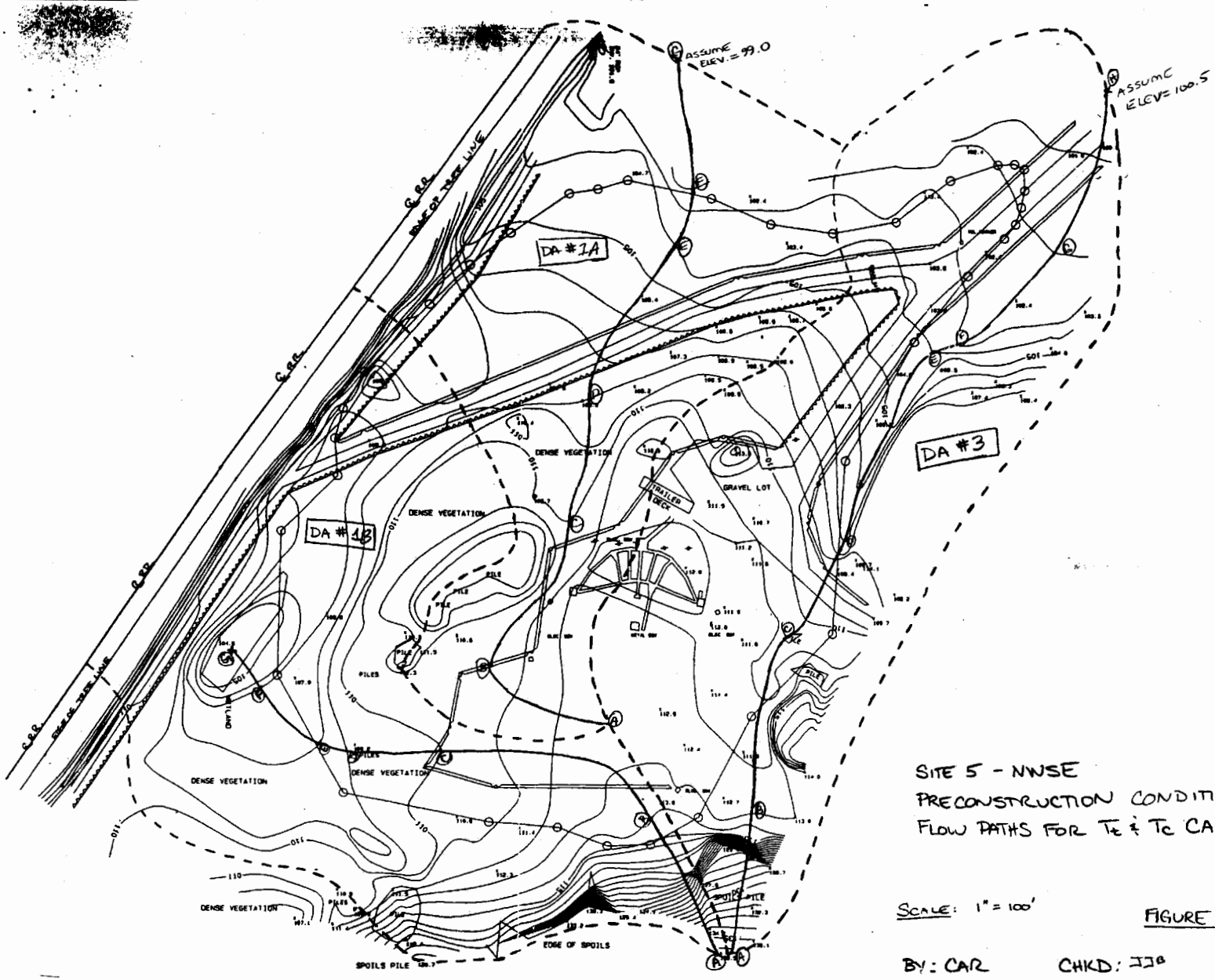
BY	CHECKED BY	APPROVED BY	DATE
CAR 8/14/97	JJB 8/26/97		RW 12/29/97 CAF

(1) A TIME OF CONCENTRATION (T_c) FOR EACH DRAINAGE AREA IS REQUIRED TO CALCULATE A PEAK DISCHARGE RATE. T_c IS DEFINED AS THE TIME FOR RUNOFF TO TRAVEL FROM THE HYDRAULICALLY MOST DISTANT POINT OF THE WATERSHED TO A POINT OF INTEREST WITHIN THE WATERSHED. TRAVEL TIME (T_t) IS A COMPONENT OF T_c AND IS DEFINED AS THE TIME IT TAKES TO TRAVEL FROM ONE LOCATION TO ANOTHER IN A WATERSHED.

(2) BY VISUAL EVALUATION OF EACH DRAINAGE AREA, THE HYDRAULICALLY MOST DISTANT POINT AND THE DISCHARGE POINT FOR EACH DRAINAGE AREA WERE LOCATED. THE FLOW PATH BETWEEN THESE TWO POINTS WAS THEN MARKED. THE FLOW PATHS FOR DRAINAGE AREAS 1A, 1B AND 3 ARE SHOWN ON FIGURE 1 (p. 2 OF 4). THE FLOW PATH WAS THEN SEGMENTED, USING CHANGES IN SLOPE AS THE GUIDE FOR DETERMINING THE END OF EACH SEGMENT.

(3) THE LENGTH AND SLOPE OF EACH SEGMENT WAS THEN DETERMINED. THESE NUMBERS ARE SUMMARIZED ON p. 3 OF 4.

(4) FLOW TYPES ASSUMED FOR SITE 5 DRAINAGE AREAS WERE SHEET FLOW AND SHALLOW CONCENTRATED FLOW. THE USGS QUAD DID NOT SHOW ANY CHANNELS, SO OPEN CHANNEL FLOW WAS NOT EVALUTED. T_t AND T_c CALCS ARE ON p. 4 OF 4.



SITE 5 - NWSE
PRECONSTRUCTION CONDITIONS
FLOW PATHS FOR T_t & T_c CALCULATIONS

SCALE: 1" = 100'

FIGURE 1

BY: CAR CHKD: JJB
DATE: 8/14/97 DATE: 8/26/97

Rev 12/19/97 CAF

p. 2 of 4

CLIENT NWSE	JOB NUMBER 7602/0104
SUBJECT TRAVEL TIME (T_t) / TIME OF CONCENTRATION (T_c)	
BASED ON FIGURE 1 / EXISTING TOPO	DRAWING NUMBER
BY CAR 8/14/97 / CHECKED BY JJB 8/26/97	APPROVED BY / DATE DRW 12/29/97 CBF

T_t / T_c ESTIMATION

DA #1B

SEGMENT	DISTANCE	MAX ELEV	MIN ELEV	SLOPE	FLOW TYPE
AB	159	136.5	114	0.144	SF
BC	248	114	110	0.016	SCF
CD	97	110	109	0.010	SCF
DE	35	109	108	0.029	SCF
EF	84	108	107	0.012	SCF
FG	47	107	104.5	0.053	SCF

DA #3

SEGMENT	DISTANCE	MAX ELEV	MIN ELEV	SLOPE	FLOW TYPE
AB	150	136.5	113	0.157	SF
BC	204	113	111	0.010	SCF
CD	109	111	107	0.037	SCF
DE	225	107	104	0.013	SCF
EF	25	104	103	0.040	SCF
FG	138	103	102	0.007	SCF
GH	185	102	100.5	0.008	SCF

DA #1A

SEGMENT	DISTANCE	MAX ELEV	MIN ELEV	SLOPE	FLOW TYPE
AB	123	113.2	110.7	0.020	SF
BC	175	110.7	110	0.004	SCF
CD	130	110	108	0.015	SCF
DE	183	108	104	0.022	SCF
EF	73	104	102	0.028	SCF
FG	178	102	99	0.017	SCF

Project: NWSE - Site 5
Task: Estimation of Drainage Area Travel Time (Tt)/Time of Concentration (Tc)
By: CAR **Chkd:** JJB Rev 12/29/97 CSF
Date: 8/14/97 **Date:** 8/26/97

Drainage Area 1B

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	120	0.171	0.011	3.4	0.010
	A'B'	39	0.056	0.4	3.4	0.108
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	248	0.016	Unpaved	2.041	0.034
	CD	97	0.01	Unpaved	1.613	0.017
	DE	35	0.029	Unpaved	2.748	0.004
	EF	84	0.012	Unpaved	1.767	0.013
	FG	47	0.053	Unpaved	3.714	0.004
					DA #1 Tc =	0.189

Drainage Area ~~2~~ 3

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	140	0.161	0.011	3.4	0.011
	A'B'	10	0.1	0.4	3.4	0.029
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	204	0.01	Unpaved	1.613	0.035
	CD	109	0.037	Unpaved	3.104	0.010
	DE	225	0.013	Unpaved	1.840	0.034
	EF	25	0.04	Unpaved	3.227	0.002
	FG	138	0.007	Unpaved	1.350	0.028
	GH	185	0.008	Unpaved	1.443	0.036
					DA #2 Tc =	0.185

Drainage Area ~~2~~ 1A

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	123	0.02	0.24	3.4	0.272
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	175	0.004	Unpaved	1.020	0.048
	CD	130	0.015	Unpaved	1.976	0.018
	DE	183	0.022	Unpaved	2.393	0.021
	EF	73	0.028	Unpaved	2.700	0.008
	FG	178	0.017	Unpaved	2.104	0.024
					DA #3 Tc =	0.390

(1) Formulas taken from Chapter 3 and Appendix F, TR-55 Manual, SCS, June 1986.
(2) Manning's coefficients taken from Table 3-1, Chapter 3, TR-55 Manual, SCS, June 1986.
- Smooth Surfaces (bare soil) n = 0.011
- Woods (light under brush) n = 0.40
- Dense Grass n = 0.24

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

CALCULATION OF PEAK DISCHARGE RATES
FOR SITE 5 DRAINAGE AREAS USING
THE TR-55 GRAPHICAL PEAK DISCHARGE METHOD

PRECONSTRUCTION SCENARIO

CLIENT NWSE	JOB NUMBER 7602/0104
SUBJECT PEAK DISCHARGE RATES (EXISTING CONDITIONS)	
BASED ON QUICK TR-55	DRAWING NUMBER
BY CAR / CHECKED BY JJB 8/26/97	APPROVED BY / DATE REV 12/29/97 CAF

① THE PEAK, EXISTING CONDITIONS, DISCHARGE RATES FOR THE THREE SITE 5 DRAINAGE AREAS WERE CALCULATED BY THE TR-55 GRAPHICAL PEAK DISCHARGE METHOD. HAESTAD'S QUICK TR-55 PROGRAM WAS USED TO COMPLETE THE CALCULATIONS. INPUT FOR THE PROGRAM WAS SUMMARIZED PREVIOUSLY.

② THE PEAK DISCHARGE RATES FOR DRAINAGE AREAS 1A, 1B AND 3 ARE SHOWN ON pp. 2 OF 4 THROUGH 3 OF 4. DISCHARGE RATES FOR THREE DESIGN STORMS (2, 10, 25) ARE SHOWN FOR EACH DRAINAGE AREA.

③ SUMMARY

AREA	STORM FREQUENCY (YR)	PEAK DISCHARGE RATE (CFS)
1B	2	2
	10	7
	25	9
3	2	3
	10	9
	25	12
1A	2	1
	10	4
	25	6

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1B

CALCULATED
DISK FILE: NWSEST51.GPD

Drainage Area	(acres)	5.64	--->	0.0088 sq.mi.
Runoff Curve Number	(CN)	61		
Time of Concentration,Tc	(hrs)	0.189		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.279	1.279	1.279
Ia/p Ratio	0.376	0.246	0.213
Unit Discharge, * qu (csm/in)	416	519	531
Runoff, Q (in)	0.53	1.49	2.01
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	7	9

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	448.621	573.957	573.957
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	385.411	498.204	498.204
* qu (csm)		416	519	531

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #~~2~~3

CALCULATED
DISK FILE: NWSEST52.GPD

Drainage Area	(acres)	5.59	--->	0.0087 sq.mi.
Runoff Curve Number	(CN)	66		
Time of Concentration,Tc	(hrs)	0.185		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.030	1.030	1.030
Ia/p Ratio	0.303	0.198	0.172
Unit Discharge, * qu (csm/in)	499	540	550
Runoff, Q (in)	0.75	1.87	2.44
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	3	9	12

Summary of Computations for qu

Ia/p	#1	0.300	0.100	0.100
C0	#1	2.396	2.473	2.473
C1	#1	-0.512	-0.518	-0.518
C2	#1	-0.132	-0.171	-0.171
qu (csm)	#1	501.617	577.278	577.278
Ia/p	#2	0.350	0.300	0.300
C0	#2	2.355	2.396	2.396
C1	#2	-0.497	-0.512	-0.512
C2	#2	-0.120	-0.132	-0.132
qu (csm)	#2	451.729	501.617	501.617
* qu (csm)		499	540	550

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Rev 12/20/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #~~3~~/A

CALCULATED
DISK FILE: NWSEST53.GPD

Drainage Area	(acres)	4.88	--->	0.0076 sq.mi.
Runoff Curve Number	(CN)	60		
Time of Concentration,Tc	(hrs)	0.390		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.333	1.333	1.333
Ia/p Ratio	0.392	0.256	0.222
Unit Discharge, * qu (csm/in)	308	399	411
Runoff, Q (in)	0.49	1.42	1.92
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	1	4	6

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	345.233	453.552	453.552
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	301.322	383.278	383.278
* qu (csm)		308	399	411

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

B.6 DURING CONSTRUCTION CONDITIONS FOR SITE 5

CALCULATION WORKSHEET Order No. 19116 (91-93)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

B.6

DETERMINATION OF SITE 5
DRAINAGE AREAS AND WEIGHTED
CURVE NUMBERS

DURING CONSTRUCTION SCENARIO
REGRADED WASTE.

CALCULATION WORKSHEET Order No. 19116 (01-91) PAGE 1 OF 13

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: DRAINAGE AREAS / CNs – POST CONSTRUCTION SITE 5

BASED ON	DRAWING NUMBER
EXISTING TOPO / WASTE REGRADE PLAN	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/23/97	JJB 8/27/97		

(I) THE EXISTING TOPOGRAPHY FOR SITE 5 AND THE FINAL WASTE REGRADE PLAN WERE USED TO DETERMINE THE BOUNDARIES OF THE DRAINAGE AREAS THAT COVER SITE 5. THREE DRAINAGE AREAS WERE DETERMINED. THEY ARE SHOWN ON FIGURE 1 (p. 3 OF 13)

THE SIZE OF EACH DRAINAGE AREA WAS DETERMINED BY PLANIMETER. THE MEASUREMENTS ARE SHOWN ON p. 4 OF 13. THE AREAS ARE SUMMARIZED BELOW.

DRAINAGE AREA	AREA (ac)
1	9.56
2	1.92
3	4.63

(II) ASSUMPTIONS:

- THE SEDIMENT / DETENTION BASINS ARE NOT WORKING. THE RESULTS OF THESE CALCULATIONS WILL BE USED TO DETERMINE THE SIZE OF THE BASINS.
- A TRENCH WILL BE CONSTRUCTED ALONG THE UPGRADIENT SIDE AND PARALLEL TO THE CAP TO CONVEY POTENTIAL SURFACE WATER RUNON AND RUNOFF TO THE PROPOSED SEDIMENT / DETENTION BASINS.
- THE OVERALL SIZE OF THE DRAINAGE BASIN IS THE SAME DURING CONSTRUCTION AS THE SIZE DURING PRE-CONSTRUCTION (EXISTING)
- DRAINAGE AREA 1 → FLOW FROM CULVERT UNDER RAILROAD WILL BE DIVERTED AROUND DETENSION BASIN.

CLIENT	JOB NUMBER
NWSE	7602/0106

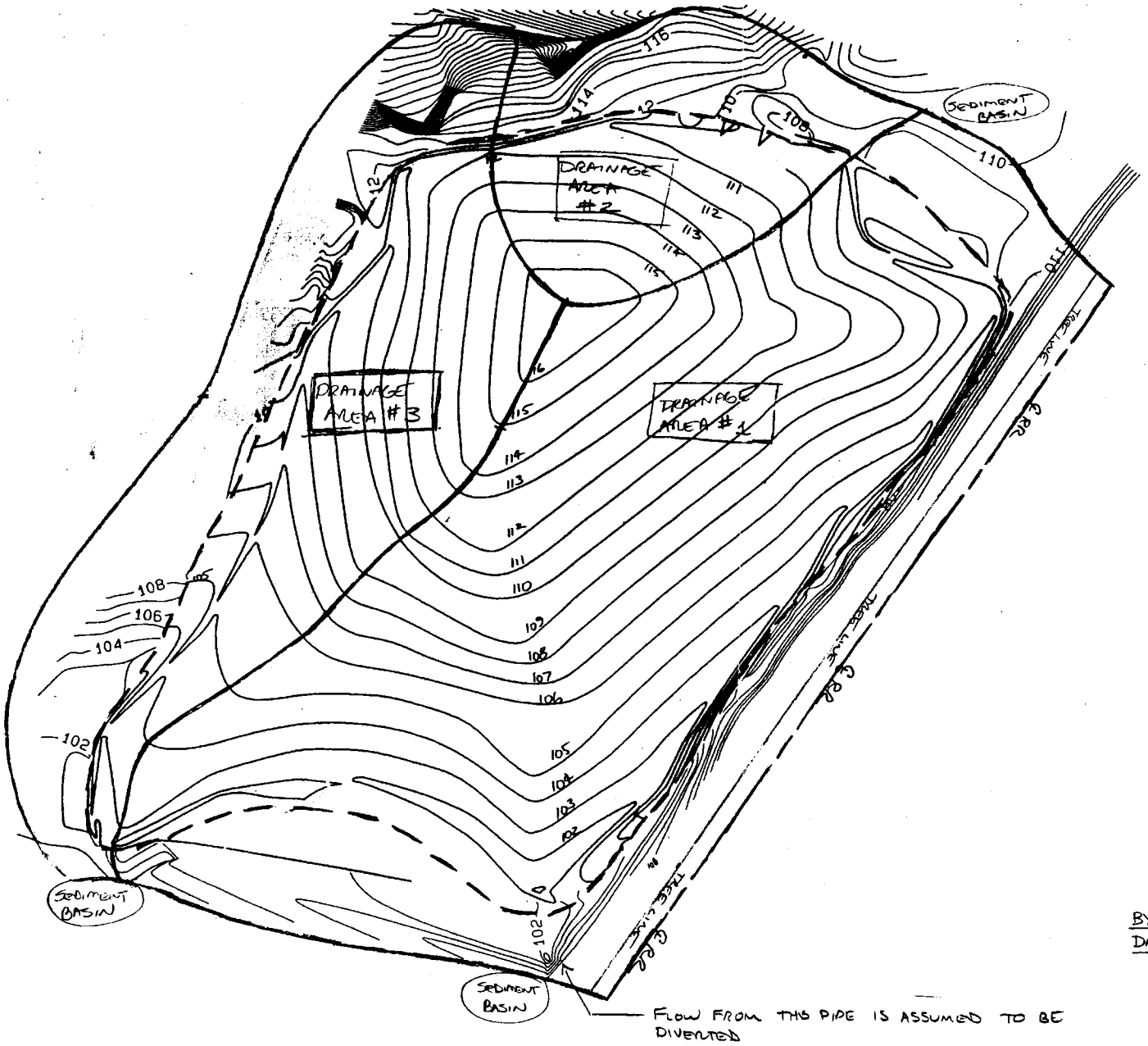
SUBJECT: DRAINAGE AREAS / CNs - CONSTRUCTION SITE 5

BASED ON	DRAWING NUMBER
EXISTING TOPO / WASTE REGRADE PLAN	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/23/97	JJB 8/27/97		

ASSUMPTIONS (CONT'D):

- DRAINAGE AREA 3 → THE OUTSIDE BOUNDARY OF THIS DRAINAGE AREA APPROXIMATELY FOLLOWS A SMALL RIDGE LINE. THE RIDGE LINE WAS DETERMINED BY VISUAL INSPECTION BY THE PROJECT MANAGER.
- THE WORKING COPY OF THE FINAL WASTE REGRADE WILL PROVIDE SUFFICIENT INFORMATION TO CALCULATE RUNOFF FROM EACH AREA.
- A MAJORITY OF THE WASTE WILL BE UNCOVERED, BARE SOIL. IT WAS ALSO ASSUMED THAT THE SEDIMENT / DETENSION BASINS WILL ALSO BE UNCOVERED, BARE SOIL.
- SEDIMENT BASINS WILL BE DESIGNED TO ACCOMODATE SEDIMENT LOADING AND TEMPORARY STORM WATER DETENSION FROM A 2-YR, 24-HOUR STORM. OR TO ACCOMODATE SEDIMENT CAPACITY FOR TRAP EFFICIENCY (WHICHEVER IS GREATER). A TOTAL OF 3 SEDIMENT BASINS WILL BE DESIGNED, ONE FOR EACH DRAINAGE BASIN.



LEGEND:

- - - LIMIT OF EXCAVATION

━━━ DRAINAGE AREA BOUNDARY

SCALE 1" = 100'

SITE 5

PROPOSED CONDITIONS – FINAL GRADE OF WASTE DRAINAGE AREAS

BY: CAR CHKD:

DATE: 8/21/97 DATE:

FIGURE 1

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: DRAINAGE AREAS FOR PROPOSED CONDITIONS - FINAL GRADE OF WASTE

BASED ON	DRAWING NUMBER
FINAL GRADING OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

PLANIMETER MEASUREMENTS:

III ESTIMATE THE SIZE OF THE DRAINAGE AREAS FOR SITE 5 UNDER THE PROPOSED GRADING CONDITIONS. USE FIGURE 1

DRAINAGE AREA	MEASUREMENTS (IN^2) M1	M2	M3	AVG
1	41.4006	41.2766	41.3541	41.3438
2	8.2925	8.3235	8.3700	8.3287
3	20.0880	19.9175	19.9795	19.9950

IV CONVERT TO ACRES: SCALE: 1" = 100'

AREA (IN^2)	AREA (FT^2)	AREA (ACRES)
41.3438	413,438	9.49
8.3287	83,287	1.91
19.9950	199,950	4.59

V ESTIMATE THE AMOUNT OF EACH DRAINAGE AREA THAT WILL BE DISTURBED DURING GRADING ACTIVITIES. THIS AREA IS DELINEATED AS THE LIMIT OF EXCAVATION ON FIGURE 1 (P. 3 OF 13)

DRAINAGE AREA	DISTURBED AREA	M1	M2	M3	AVG
1	1	29.0006	29.0316	29.0316	29.0213
2	2	4.7740	4.6190	4.6655	4.6862
3	3	10.9430	10.9275	11.0670	10.9792

CLIENT: NWSE	JOB NUMBER: 7602/0106
SUBJECT: DRAINAGE AREAS FOR PROPOSED CONDITIONS - FINAL GRADE OF WASTE	
BASED ON: FINAL GRADING OF WASTE	DRAWING NUMBER:
BY: CAR 8/21/97 / CHECKED BY: JJB 8/27/97	APPROVED BY: / DATE:

(VI) CONVERT TO ACRES SCALE: 1" = 100'

AREA (IN^2)	AREA (FT^2)	AREA (ACRES)
29.0213	290,213	6.66
4.6862	46,862	1.08
10.9792	109,792	2.52

(VII) COMPARE EXISTING CONDITIONS DRAINAGE AREAS VERSUS PROPOSED CONDITIONS DRAINAGE AREAS

EXISTING CONDITIONS		PROPOSED CONDITIONS	
DRAINAGE AREA	AREA (ACRES)	DRAINAGE AREA	AREA (ACRES)
1	5.64	1	9.49
2	5.59	2	1.91
3	4.88	3	4.59
	TOTAL = 16.11 acres		TOTAL = 15.99 acres

DIFF. IN AREA = 16.11 − 15.99 = 0.12 acres

∴ BECAUSE THE ENTIRE SITE 5 DRAINAGE AREA DID NOT CHANGE BECAUSE OF REGRADING, DISTRIBUTE THE DIFFERENCE PROPORTIONALLY TO EACH OF THE PROPOSED CONDITIONS DRAINAGE AREAS. THE FINAL AREAS ARE:

DA #1 = 9.56 ac
DA #2 = 1.92 ac
DA #3 = 4.63 ac

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: ESTIMATE WEIGHTED CURVE NUMBER FOR ALL DRAINAGE AREAS

BASED ON	DRAWING NUMBER
FINAL GRADING OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

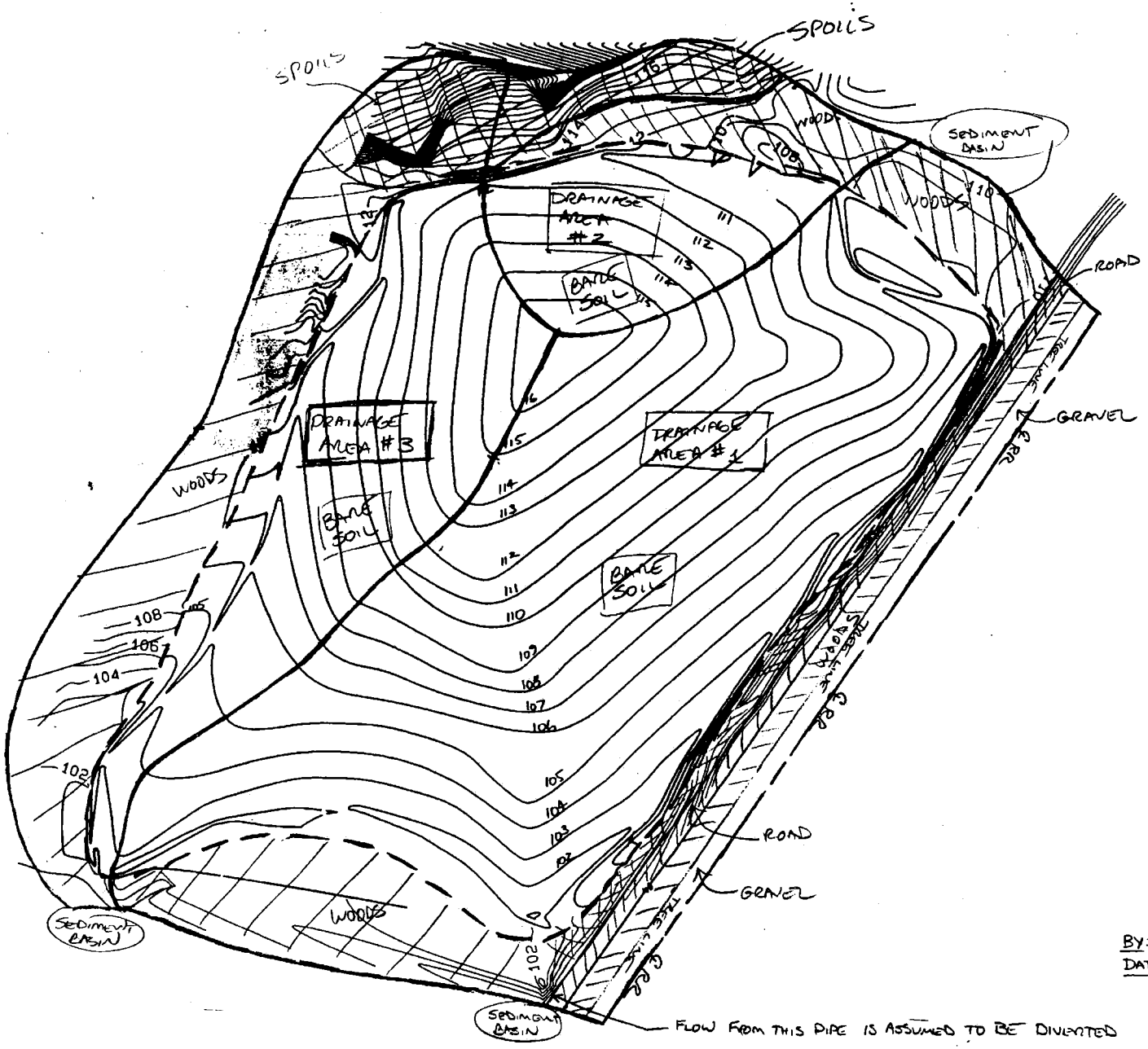
VIII THE COVER TYPES DURING GRADING ACTIVITIES AT SITE 5 INCLUDE THE FOLLOWING:

WOODS
BARE SOIL
SPOILS
GRAVEL
ROADS (DIRT)

IX THE BOUNDARIES OF EACH COVER TYPE ARE SHOWN ON FIGURE 2. CURVE NUMBERS FOR EACH COVER TYPE ARE SUMMARIZED BELOW. THE NUMBERS WERE TAKEN FROM TABLES 2a - 2c OF THE TR-55 MANUAL (SCS, JUNE 1986).

COVER TYPE	CN
WOODS (GOOD)	55
BARE SOIL	86
SPOILS	86
GRAVEL	85
ROADS (DIRT)	82

- ASSUME SOIL TYPE OF B (SAME AS WAS USED FOR EXISTING CONDITIONS).



LEGEND:

- - - LIMIT OF EXCAVATION

━━━ DRAINAGE AREA BOUNDARY

SCALE 1" = 100'

SITE 5

PROPOSED CONDITIONS – FINAL GRADE OF WASTE COVER TYPE

BY: CAR CHKD: JJB

DATE: 8/21/97 DATE: 8/27/97

FIGURE 2

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: DRAINAGE AREAS FOR PROPOSED CONDITIONS - FINAL GRADE OF WASTE

BASED ON	DRAWING NUMBER
FINAL GRADE OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

(X) WEIGHTED CURVE NUMBERS WERE CALCULATED FOR EACH DRAINAGE AREA. HAESTAD'S QUICK TR-55 PROGRAM WAS USED TO CALCULATE $\overline{CN}$s (SEE pp. 10 AND 11) AND TO SUMMARIZE THE $\overline{CN}$s (SEE p. 9).

(XI) AREAS OF EACH COVER TYPE WERE MEASURED BY PLANIMETER. THE MEASUREMENTS ARE SUMMARIZED ON pp. 12 AND 13.

(XII) THE WEIGHTED RUNOFF CURVE NUMBERS ESTIMATED IN THESE CALCULATIONS ARE APPLICABLE ONLY TO THE "DURING CONSTRUCTION" SCENARIO. THEY WILL BE USED TO ESTIMATE PEAK RUNOFF RATES FROM EACH DRAINAGE AREA FOR THE "DURING CONSTRUCTION SCENARIO", WHICH REPRESENTS THE WORST-CASE SEDIMENT EROSION SCENARIO.

Quick TR-55 Ver.5.46 S/N:
Executed: 13:03:10 08-21-1997

CAR 8/21/97 JJD 9/27/97

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0106
PROPOSED CONDITIONS - REGRADED WASTE

RUNOFF CURVE NUMBER SUMMARY

::

Subarea Description	Area (acres)	CN (weighted)
DRAINAGE AREA 1	9.49	79
DRAINAGE AREA 2	1.91	79
DRAINAGE AREA 3	4.52	75

Quick TR-55 Ver.5.46 S/N:
Executed: 13:03:10 08-21-1997

CAR 8/21/97

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0106
PROPOSED CONDITIONS - REGRADED WASTE

RUNOFF CURVE NUMBER DATA

Composite Area: DRAINAGE AREA 1

SURFACE DESCRIPTION	AREA (acres)	CN	
WOODS (GOOD)	2.15	55	
BARE SOIL (REGRADED AREA)	6.75	86	
BARE SOIL (SPOILS)	0.00	86	
GRAVEL (RAILROAD)	0.39	85	
ROADS (DIRT)	0.20	82	
COMPOSITE AREA --->	9.49	78.9	(79)

Composite Area: DRAINAGE AREA 2

SURFACE DESCRIPTION	AREA (acres)	CN	
WOODS (GOOD)	0.45	55	
BARE SOIL (REGRADED AREA)	1.10	86	
BARE SOIL (SPOILS)	0.36	86	
GRAVEL (RAILROAD)	0.00	85	
ROADS (DIRT)	0.00	82	
COMPOSITE AREA --->	1.91	78.7	(79)

Quick TR-55 Ver.5.46 S/N:
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CAR 8/21/97 JTB 8/27/97

Composite Area: DRAINAGE AREA 3

SURFACE DESCRIPTION	AREA (acres)	CN	
WOODS (GOOD)	1.61	55	
BARE SOIL (REGRADED AREA)	2.48	86	
BARE SOIL (SPOILS)	0.43	86	
GRAVEL (RAILROAD)	0.00	85	
ROADS (DIRT)	0.00	82	
COMPOSITE AREA --->	4.52	75.0	(75)

CALCULATION WORKSHEET Order No. 19118 (01-01)

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: ESTIMATE WEIGHTED CURVE NUMBER FOR ALL DRAINAGE AREAS

BASED ON	DRAWING NUMBER
FINAL GRADING OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

XIII ESTIMATE AREAS OF EACH COVER TYPE.
USE FIGURE 2 (P. 7) AND PLANIMETER.

DRAINAGE AREA	COVER TYPE	M1	M2	M3	AVG.
1	WOODS (GOOD)	9.0520	9.1605	9.4550	9.2225
	BARE SOIL	—	—	—	29.0213
	SPOILS	—	—	—	0
	GRAVEL	1.5810	1.7515	1.6275	1.6533
	ROADS (DIRT)	0.8035	0.9525	0.8990	0.8783
2	WOODS (GOOD)	1.7825	1.9685	2.046	1.9323
	BARE SOIL	—	—	—	4.6862
	SPOILS	1.5345	1.5655	1.5500	1.5500
	GRAVEL	—	—	—	0
	ROADS (DIRT)	—	—	—	0
3	WOODS (GOOD)	7.0525	7.3005	7.0525	7.1352
	BARE SOIL	—	—	—	10.9792
	SPOILS	1.9530	1.9220	1.9375	1.9375
	GRAVEL	—	—	—	0
	ROADS (DIRT)	—	—	—	0

CONVERT TO ACRES SCALE: 1" = 100'

DRAINAGE AREA	COVER TYPE	AREA (IN^2)	AREA (FT^2)	AREA (ACRE)
1	WOODS	9.2225	92,225	2.12
	BARE SOIL	29.0213	290,213	6.66
	SPOILS	0	0	0
	GRAVEL	1.6533	16,533	0.38
	ROADS	0.8783	8,783	0.20
2	WOODS	1.9323	19,323	0.44
	BARE SOIL	4.6862	46,862	1.08
	SPOILS	1.5500	15,500	0.36
	GRAVEL	0	0	0
	ROADS	0	0	0

CLIENT	JOB NUMBER
NWSE	7602 /0106

SUBJECT: ESTIMATE WEIGHTED CURVE NUMBER FOR ALL DRAINAGE AREA

BASED ON	DRAWING NUMBER
FINAL GRADING OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

CONVERT TO ACRES (CONT'D)

DRAINAGE AREA	COVER TYPE	AREA (IN²)	AREA (FT²)	AREA (ACRE)
3	WOODS	7.1352	71,352	1.64
	BARE SOIL	10.9792	109,792	2.52
	SPOILS	1.9375	19375	0.44
	GRAVEL	0	0	0
	ROADS	0	0	0

CORRECT AREAS SO THAT TOTAL AREA IS EQUAL TO MEASURED TOTAL AREA. DISTRIBUTE DIFFERENCE PROPORTIONALLY.

DRAINAGE AREA	MEASURED AREA (ac)	CORRECTED AREA (ac)
1	2.12	2.15
(TOTAL AREA = 9.49 ac)	6.66	6.75
	0	0
	0.38	0.39
	0.20	0.20
2	0.44	0.45
	1.08	1.10
(TOTAL AREA = 1.92 ac)	0.36	0.36
	0	0
	0	0
3	1.64	1.61
	2.52	2.48
(TOTAL AREA = 4.52 ac)	0.44	0.43
	0	0
	0	0

CALCULATION WORKSHEET Order No. 19119 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

DETERMINE TIME OF CONCENTRATIONS
FOR
SITE 5 DRAINAGE AREAS

DURING CONSTRUCTION
SCENARIO
REGRADED WASTE

CALCULATION WORKSHEET Order No. 10116 (01-91)

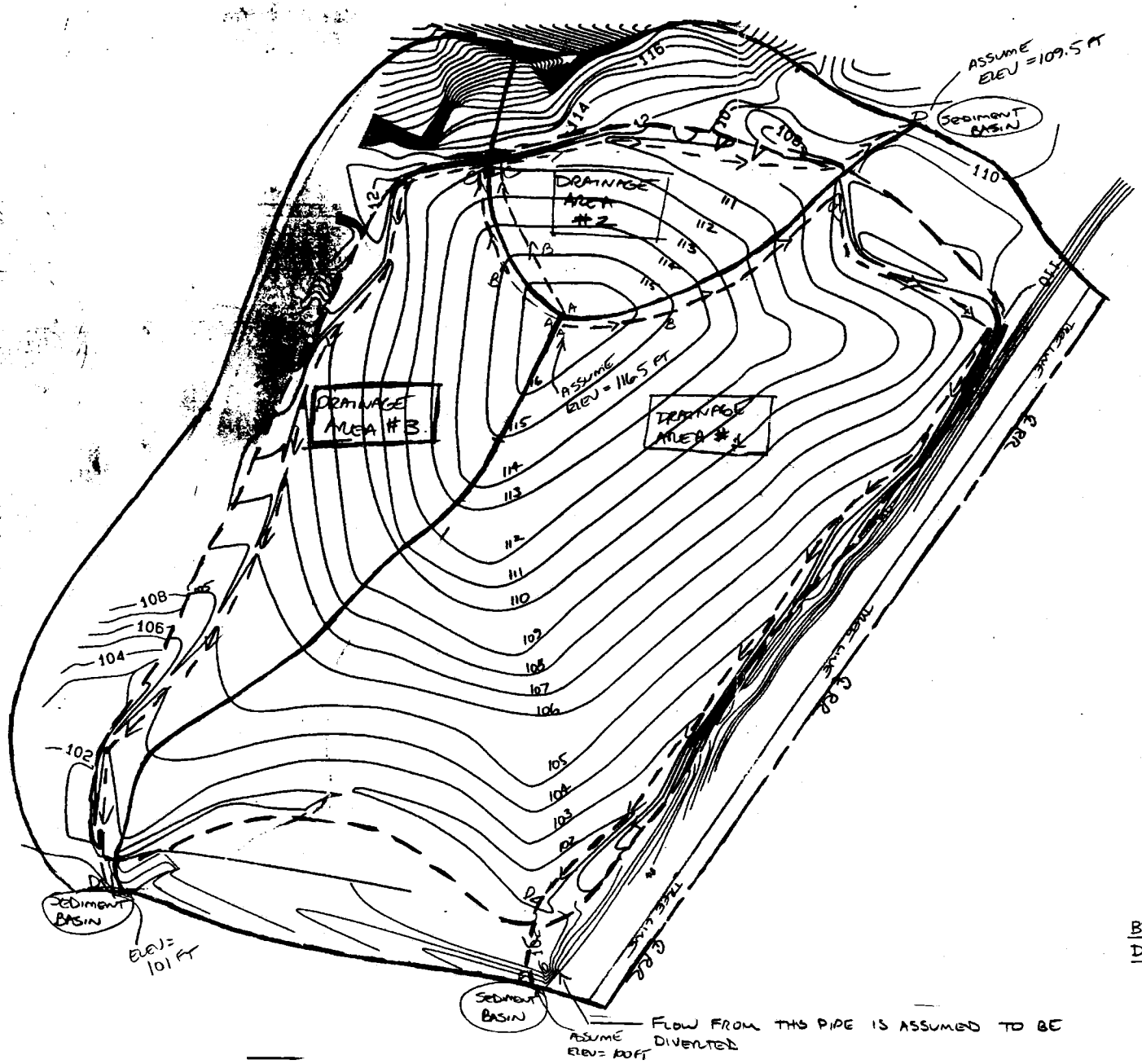
CLIENT: NWSE – SITE 5	JOB NUMBER: 7602/0106
SUBJECT: TRAVEL TIME (T_t) / TIME OF CONCENTRATION (T_c)	
BASED ON: FIGURE 1 / DURING CONSTRUCTION TOPO	DRAWING NUMBER:
BY: CAR 8/23/97	CHECKED BY: JJD 8/27/97
APPROVED BY:	DATE:

(1) A TIME OF CONCENTRATION (T_c) IS REQUIRED FOR EACH DRAINAGE AREA TO CALCULATE A PEAK DISCHARGE RATE. T_c IS DEFINED AS THE TIME FOR RUNOFF TO TRAVEL FROM THE HYDRAULICALLY MOST DISTANT POINT OF THE WATERSHED TO A POINT OF INTEREST WITHIN THE WATERSHED. TRAVEL TIME (T_t) IS A COMPONENT OF T_c AND IS DEFINED AS THE TIME IT TAKES TO TRAVEL FROM ONE LOCATION TO ANOTHER IN A WATERSHED.

(2) BY VISUAL EVALUATION OF EACH DRAINAGE AREA, THE HYDRAULICALLY MOST DISTANT POINT AND THE DISCHARGE POINT FOR EACH DRAINAGE AREA WERE LOCATED. THE FLOW PATH BETWEEN THESE TWO POINTS WAS THEN MARKED. THE FLOW PATHS FOR FOR DRAINAGE AREAS 1, 2 & 3 ARE SHOWN ON FIGURE 1. EACH FLOW PATH WAS THEN SEGMENTED USING CHANGES IN FLOW TYPE & SLOPE AS THE GUIDE FOR DETERMINING THE END OF EACH SEGMENT.

(3) THE LENGTH AND SLOPE OF EACH SEGMENT WAS THEN DETERMINED. THESE NUMBERS ARE SUMMARIZED ON P. 3.

(4) FLOW TYPES ASSUMED FOR SITE 5 WERE SHEET FLOW, SHALLOW CONCENTRATED FLOW, AND OPEN CHANNEL FLOW. OPEN CHANNEL FLOW IS ASSUMED THROUGH THE SURFACE WATER INTERCEPTOR TRENCHS. A TRAPEZOIDAL CHANNEL WAS ASSUMED FOR OPEN CHANNEL FLOW. DIMENSIONS OF THE CHANNEL ARE SHOWN ON P. 3.



LEGEND:

- - - LIMIT OF EXCAVATION

━━━ DRAINAGE AREA BOUNDARY

SCALE 1" = 100'

SITE 5

PROPOSED CONDITIONS – FINAL GRADE OF WASTE DRAINAGE AREAS

BY: CAR CHKD: JJB

DATE: 8/21/97 DATE: 8/27/97

FIGURE 1

CALCULATION WORKSHEET Order No. 19119 (91-01)

CLIENT	JOB NUMBER
NWSE	7602/0106

SUBJECT: TIME OF CONCENTRATION

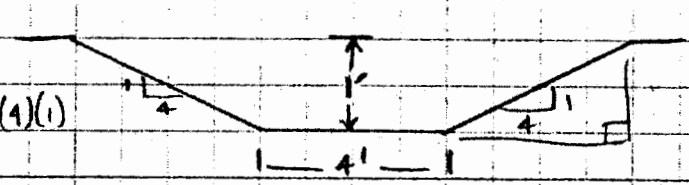
BASED ON	DRAWING NUMBER
FINAL GRADE OF WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/21/97	JJB 8/27/97		

DRAINAGE AREA	FLOW TYPE	SEGMENT	LENGTH (FT)	TOP ELEV	BOTTOM ELEV	SLOPE
1	SF	AB	120	116.5	115	0.013
	SCF	BC	215	115	109	0.028
	OCF	CD	960	109	101	0.008
	OCF	DE	85	101	100	0.012
2	SF	AB	65	116.5	115	0.023
	SCF	BC	100	115	112	0.030
	OCF	CD	445	112	109.5	0.006
3	SF	AB	85	116.5	115	0.018
	SCF	BC	105	115	112	0.029
	OCF	CD	870	112	101	0.013

SF = SHEET FLOW
SCF = SHALLOW CONC. FLOW
OCF = OPEN CHANNEL FLOW

ASSUME: FOR OPEN CHANNEL FLOW, THE CHANNEL WILL HAVE THE FOLLOWING DIMENSIONS



$A = 4(1) + 2(\frac{1}{2})(4)(1)$
$= 8\ ft^2$

$P = 12.25\ ft$

USE: $n = 0.025$ (EARTH CHANNEL CHOW, 1959)

(NTS)

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT T_t / T_c

BASED ON	DRAWING NUMBER
REGRADED WASTE	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/23/97	JJB 8/27/97		

THE HYDRAULIC INFORMATION WAS THEN USED WITH THE APPROPRIATE FORMULAS TO DETERMINE TIME OF CONCENTRATIONS. THE SPREADSHEET USED TO SUMMARIZE THE T_t & T_c CALCULATIONS IS SHOWN ON p. 5 of 5. THE CALCULATED T_cs ARE SUMMARIZED BELOW.

DRAINAGE AREA	T_c (hrs)
1	0.120
2	* 0.059 → 0.1
3	* 0.076 → 0.1

NOTE:

* — THE MINIMUM T_c USED IN TR-55 IS 0.1 HR. USE 0.1 HR INSTEAD OF ESTIMATED T_c.

Project: NWSE - Site 5 - FINAL GRADE OF WASTE
Task: Estimation of Drainage Area Travel Time (Tt)/Time of Concentration (Tc)
By: CAR **Chkd:** JJO
Date: 8/21/97 **Date:** 8/27/97

Drainage Area 1

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	120	0.013	0.011	3.4	0.027
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	215	0.028	Unpaved	2.700	0.022
	Segment	R	S	V	D	Tt
Open Channel Flow (1),3)	CD	0.653	0.008	4.012	960.000	0.066
	DE	0.653	0.012	4.913	85.000	0.005
					DA #1 Tc =	0.120

Drainage Area 2

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	65	0.023	0.011	3.4	0.013
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	100	0.03	Unpaved	2.795	0.010
	Segment	R	S	V	D	Tt
Open Channel Flow (1),3)	CD	0.653	0.006	3.474	445.000	0.036
					DA #2 Tc =	0.059

Drainage Area 3

	Segment	Distance	Slope	n(2)	P2	Tt
Sheet Flow (1)	AB	85	0.018	0.011	3.4	0.018
	Segment	Distance	Slope	Surface Type	V	Tt
Shallow Conc. Flow (1)	BC	105	0.029	Unpaved	2.748	0.011
	Segment	R	S	V	D	Tt
Open Channel Flow (1),3)	CD	0.653	0.013	5.114	870.000	0.047
					DA #3 Tc =	0.076

(1) Formulas taken from Chapter 3 and Appendix F, TR-55 Manual, SCS, June 1986.
(2) Manning's coefficients taken from Table 3-1, Chapter 3, TR-55 Manual, SCS, June 1986.
- Smooth Surfaces (bare soil) n = 0.011

(3) n = 0.025 (Chow, 1959)

CALCULATION WORKSHEET Order No. 19110 (01-01)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

DETERMINE PEAK DISCHARGE RATES

SITE 5

DURING CONSTRUCTION SCENARIO
REGRADED WASTE

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NWSE - SITE 5	JOB NUMBER: 7602/0106
SUBJECT: PEAK DISCHARGE RATES — "DURING CONSTRUCTION"	
BASED ON: QUICK TR-55	DRAWING NUMBER:
BY: CAR 8/23/97	CHECKED BY: JJB 8/27/97
APPROVED BY:	DATE:

(I) THE PEAK, DURING CONSTRUCTION CONDITIONS, DISCHARGE RATES FOR SITE 5 DRAINAGE AREAS WERE CALCULATED BY THE GRAPHICAL PEAK DISCHARGE METHOD. HATESTAD'S QUICK TR-55 PROGRAM WAS USED TO COMPILE THE CALCULATIONS. INPUT FOR THE PROGRAM WAS SUMMARIZED PREVIOUSLY.

(II) THE OUTPUT FROM QUICK-TR-55 IS SHOWN ON THE FOLLOWING PAGES. DISCHARGE RATES FOR THREE STORM EVENTS (2-YR 10-YR & 25-YR) ARE SHOWN FOR EACH DRAINAGE AREA. THE RESULTS ARE SUMMARIZED BELOW.

(III) SUMMARY:

AREA	STORM FREQUENCY (YR)	PEAK DISCHARGE RATE (CFS)
1	2	14
	10	28
	25	35
2	2	3
	10	6
	25	7
3	2	6
	10	12
	25	16

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0106
DRAINAGE AREA 1 - REGRADED WASTE

CALCULATED
DISK FILE: NWSEPG51.GPD

Drainage Area	(acres)	9.56	--->	0.0149 sq.mi.
Runoff Curve Number	(CN)	79		
Time of Concentration,Tc	(hrs)	0.120		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0.0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.532	0.532	0.532
Ia/p Ratio	0.156	0.102	0.089
Unit Discharge, * qu (csm/in)	620	639	639
Runoff, Q (in)	1.49	2.97	3.68
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	14	28	35

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	639.364	639.364	639.364
Ia/p	#2	0.300	0.300	0.100
C0	#2	2.396	2.396	2.473
C1	#2	-0.512	-0.512	-0.518
C2	#2	-0.132	-0.132	-0.171
qu (csm)	#2	569.446	569.446	639.364
* qu (csm)		620	639	639

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0106
DRAINAGE AREA 2 - REGRADED WASTE

CALCULATED
DISK FILE: NWSEPG52.GPD

Drainage Area	(acres)	1.92	--->	0.0030 sq.mi.
Runoff Curve Number	(CN)	79		
Time of Concentration,Tc	(hrs)	0.100		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0.0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.532	0.532	0.532
Ia/p Ratio	0.156	0.102	0.089
Unit Discharge, * qu (csm/in)	644	661	662
Runoff, Q (in)	1.49	2.97	3.68
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	3	6	7

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	661.942	661.942	661.942
Ia/p	#2	0.300	0.300	0.100
C0	#2	2.396	2.396	2.473
C1	#2	-0.512	-0.512	-0.518
C2	#2	-0.132	-0.132	-0.171
qu (csm)	#2	596.829	596.829	661.942
* qu (csm)		644	661	662

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 5 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0106
DRAINAGE AREA 3 - REGRADED WASTE

CALCULATED
DISK FILE: NWSEPG53.GPD

Drainage Area	(acres)	4.63	--->	0.0072 sq.mi.
Runoff Curve Number	(CN)	75		
Time of Concentration,Tc	(hrs)	0.100		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0.0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.667	0.667	0.667
Ia/p Ratio	0.196	0.128	0.111
Unit Discharge, * qu (csm/in)	631	653	658
Runoff, Q (in)	1.23	2.61	3.28
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	6	12	16

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	661.942	661.942	661.942
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	596.829	596.829	596.829
* qu (csm)		631	653	658

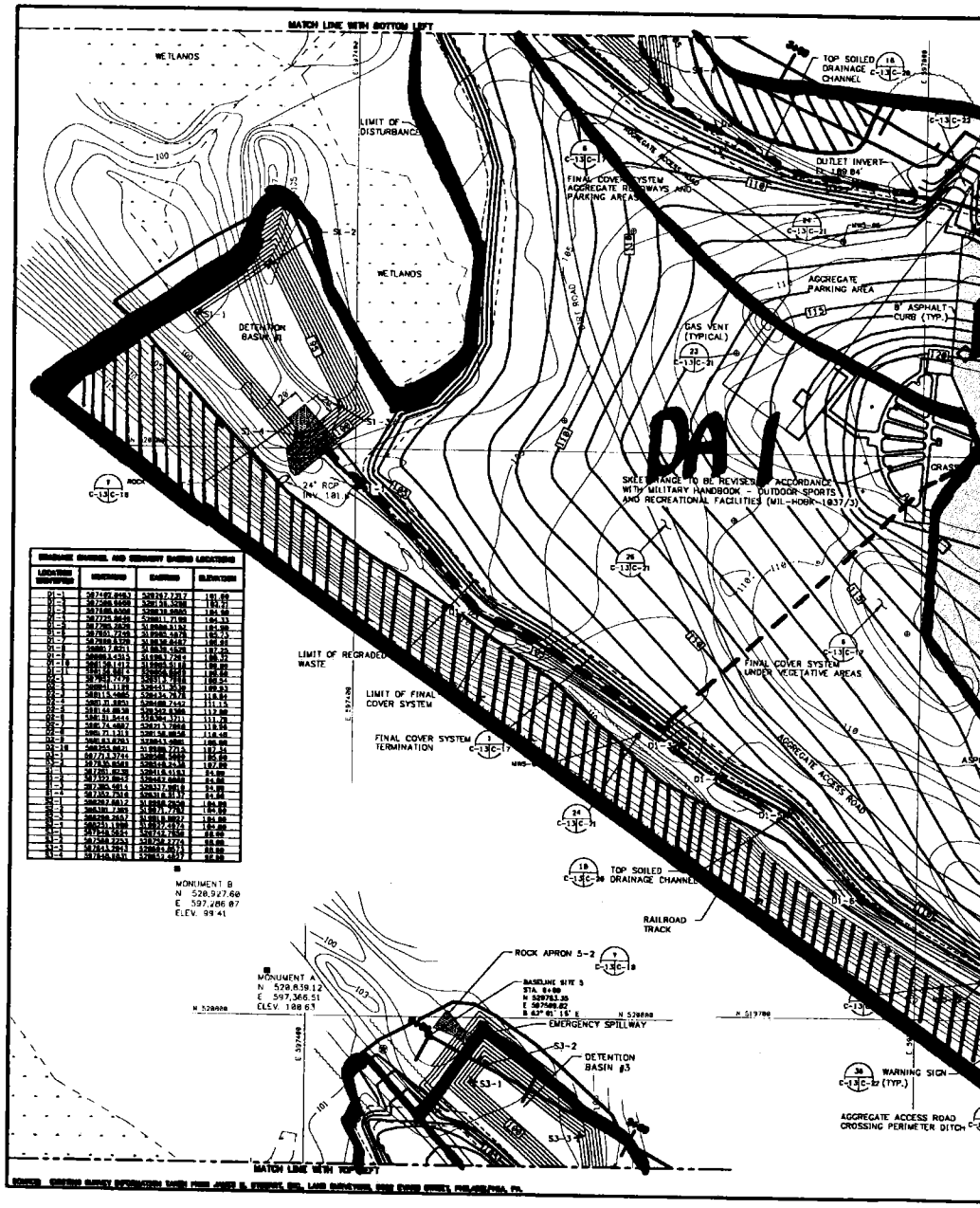
* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

B.7 POST-CONSTRUCTION CONDITIONS FOR SITE 5

B.7.1 POST-DEVELOPMENT DRAINAGE MAP



DRAINAGE CHANNEL AND SEDIMENT BASIN LOCATIONS			
LOCATION IDENTIFIER	NORTHING	EASTING	ELEVATION
D1-1	527492.8483	528267.7217	181.60
D1-2	527588.6600	528138.3088	181.21
D1-3	527688.6008	528038.8885	184.66
D1-4	527735.8658	528011.7198	184.33
D1-5	527788.3829	527984.4182	184.00
D1-6	527885.7238	527885.6475	183.33
D1-7	527988.6328	527786.6412	180.81
D1-8	528081.8271	527688.5629	177.42
D1-9	528081.4315	527681.7241	188.32
D1-10	528138.1012	527581.5118	190.00
D1-11	528181.8815	527484.8863	190.00
D2-1	527981.7475	528171.7818	188.54
D2-2	528011.1118	528143.3638	189.53
D2-3	528115.4468	528135.7638	118.84
D2-4	528138.8870	528088.7442	111.15
D2-5	528148.8838	528143.6388	113.00
D2-6	528181.8418	528362.3721	111.70
D2-7	528174.4887	528213.7862	118.56
D2-8	528171.1311	528138.8858	118.48
D2-9	528181.8781	528043.4884	188.00
D2-10	528358.8818	527988.7213	187.41
D3-1	527713.9741	528588.5882	185.00
D3-2	527835.8588	528618.8435	187.00
D3-3	527181.8238	528018.4181	24.00
D3-4	527222.8837	528463.6888	24.00
D3-5	527305.8814	528317.8818	24.00
D3-6	527305.7818	528318.8777	24.00
D3-7	528387.8812	528818.7828	184.00
D3-8	528381.7388	528717.7381	184.00
D3-9	528398.3817	528818.8837	184.00
D3-10	528231.1388	528837.8874	184.00
D3-11	527828.5581	528733.7828	88.00
D3-12	527388.3383	528733.2774	88.00
D3-13	527811.2813	528863.2813	88.00
D3-14	527818.1888	528853.4837	88.00

SOURCE: GROUND SURVEY INFORMATION TAKEN FROM JOHN B. STEWART, INC. LAND SURVEYORS, 2000 EVERY STREET, PHILADELPHIA, PA.

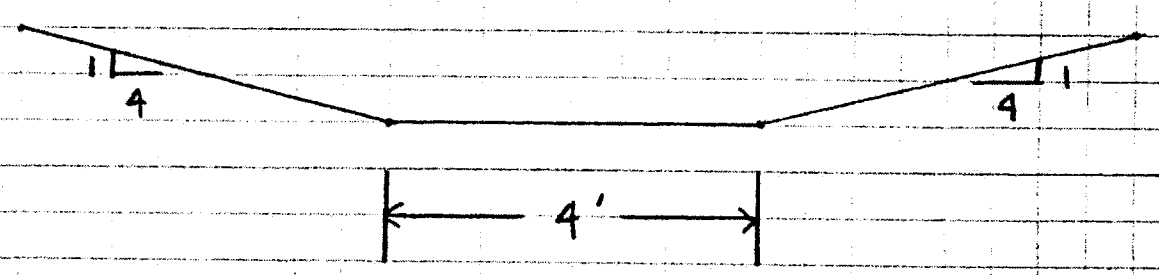
8.7.2 SITE 5 - TIME OF CONCENTRATION

CLIENT: NWSE - SITE 5	JOB NUMBER: 7602 / 0106
SUBJECT: TIME OF CONCENTRATION (Tc)	
BASED ON: FIGURE 1 - POST-DEVELOPMENT TOPO	DRAWING NUMBER:
BY: BER / CHECKED BY: DCW 12/29/97	APPROVED BY: / DATE: 12/18/97

(1) A TIME OF CONCENTRATION (Tc) IS REQUIRED FOR EACH DRAINAGE AREA TO CALCULATE A PEAK DISCHARGE. Tc IS DEFINED AS THE TIME FOR RUNOFF TO TRAVEL FROM THE HYDRAULICALLY MOST DISTANT POINT OF THE WATERSHED TO A POINT OF INTEREST WITHIN THE WATERSHED.

(2) BY VISUAL EVALUATION OF EACH DRAINAGE AREA, THE HYDRAULICALLY MOST DISTANT POINT AND THE DISCHARGE POINT FOR EACH DRAINAGE AREA WERE CALCULATED. THE FLOW PATH BETWEEN THESE TWO POINTS WAS THEN DELINEATED. THE FLOW PATHS FOR DRAINAGE AREAS 1, 2, + 3 ARE SHOWN ON FIGURE 1. EACH FLOW PATH WAS SEGMENTED BASED ON CHANGES IN FLOW TYPE.

(3) FLOW TYPES ASSUMED FOR SITE 5 WERE SHEET FLOW, SHALLOW CONCENTRATED FLOW, AND OPEN CHANNEL FLOW. OPEN CHANNEL FLOW WAS ASSUMED THROUGH THE SURFACE WATER INTERCEPTOR TRENCHES. OPEN CHANNEL FLOW WAS BASED ON THE FOLLOWING TRAPEZOIDAL CHANNEL.



CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106
SUBJECT: TIME OF CONCENTRATION (Tc)	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 12/29/97		12/18/97

(4) THE HYDRAULIC INFORMATION WAS THEN INPUTTED TO HAESTAD'S QUICK TR-55 PROGRAM TO DETERMINE Tc. THE INPUT PARAMETERS AND OUTPUT FROM THE PROGRAM IS SHOWN ON PAGES THROUGH . THE CALCULATED Tc'S ARE SUMMARIZED BELOW:

DRAINAGE AREA	Tc (HRS)
1	0.36
2	0.13
3	0.15

CHK'D DWJ 12/29/9

Quick TR-55 Ver.5.46 S/N:
Executed: 16:52:27 12-18-1997 POST-DA1.TCT

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1

Tc COMPUTATIONS FOR: DA #1

SHEET FLOW (Applicable to Tc only)

Segment ID		1	
Surface description		Grass	
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	3.400	
Land slope, s	ft/ft	0.0100	

$$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$$ hrs 0.30 = 0.30

SHALLOW CONCENTRATED FLOW

Segment ID		2	
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	270.0	
Watercourse slope, s	ft/ft	0.0520	

$$Avg.V = Csf * (s)^{0.5}$$ ft/s 3.6792

where: Unpaved Csf = 16.1345
Paved Csf = 20.3282

T = L / (3600*V) hrs 0.02 = 0.02

CHANNEL FLOW

Segment ID		3	
Cross Sectional Flow Area, a	sq.ft	8.00	
Wetted perimeter, Pw	ft	12.24	
Hydraulic radius, r = a/Pw	ft	0.654	
Channel slope, s	ft/ft	0.0082	
Manning's roughness coeff., n		0.0350	

$$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$$ ft/s 2.9033

Flow length, L ft 385

T = L / (3600*V) hrs 0.04 = 0.04

::

TOTAL TIME (hrs) 0.36

CHK'D DCW
12/29/97

Quick TR-55 Ver.5.46 S/N:
Executed: 16:48:54 12-18-1997 POST-DA2.TCT

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #2

Tc COMPUTATIONS FOR: DA #2

SHEET FLOW (Applicable to Tc only)

Segment ID		1	
Surface description		GRASS	
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	3.400	
Land slope, s	ft/ft	0.1900	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.09	= 0.09

SHALLOW CONCENTRATED FLOW

Segment ID		2	
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	45.0	
Watercourse slope, s	ft/ft	0.1300	
$Avg.V = Csf * (s)^{0.5}$	ft/s	5.8174	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		3	
Cross Sectional Flow Area, a	sq.ft	8.00	
Wetted perimeter, Pw	ft	12.24	
Hydraulic radius, r = a/Pw	ft	0.654	
Channel slope, s	ft/ft	0.0082	
Manning's roughness coeff., n		0.0350	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	2.9033	
Flow length, L	ft	370	
T = L / (3600*V)	hrs	0.04	= 0.04

::

TOTAL TIME (hrs) 0.13

Quick TR-55 Ver.5.46 S/N:
Executed: 17:09:29 12-18-1997 POST-DA3.TCT

CHK'D DCW 12/24/97

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3

Tc COMPUTATIONS FOR: DA 3

SHEET FLOW (Applicable to Tc only)

Segment ID		1	
Surface description		GRASS	
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	3.400	
Land slope, s	ft/ft	0.1700	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.10	= 0.10

SHALLOW CONCENTRATED FLOW

Segment ID		2	
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	60.0	
Watercourse slope, s	ft/ft	0.1100	
$Avg.V = Csf * (s)^{0.5}$	ft/s	5.3512	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.00	= 0.00

CHANNEL FLOW

Segment ID		3	
Cross Sectional Flow Area, a	sq.ft	8.00	
Wetted perimeter, Pw	ft	12.24	
Hydraulic radius, r = a/Pw	ft	0.654	
Channel slope, s	ft/ft	0.0120	
Manning's roughness coeff., n		0.0350	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	3.5122	
Flow length, L	ft	640	
T = L / (3600*V)	hrs	0.05	= 0.05

::

TOTAL TIME (hrs) 0.15

B.7.3 WEIGHTED CURVE NUMBERS

CLIENT NWSE - SITE 5	JOB NUMBER 7602/0106
SUBJECT WEIGHTED CURVE NUMBERS / DRAINAGE AREAS	
BASED ON FIGURE 1	DRAWING NUMBER
BY BER / CHECKED BY DCW 12/29/97	APPROVED BY / DATE 12/19/97

(1) THE FINAL GRADING PLAN WAS USED TO DETERMINE THE DRAINAGE BOUNDARIES FOR POST-DEVELOPMENT CONDITIONS AT SITE 5. THE SIZE OF EACH DRAINAGE AREA IS SUMMARIZED BELOW:

DRAINAGE AREA	AREA (ACRES)
1	9.90
2	2.60
3	3.61

(2) ASSUMPTIONS:

- THE PROPOSED SEDIMENT/DETENTION BASINS WERE USED AS THE POINT OF INTEREST FOR EACH DRAINAGE AREA.
- A TRENCH WILL BE CONSTRUCTED ALONG THE UPGRADIENT SIDE AND PARALLEL TO THE CAP TO CONVEY POTENTIAL SURFACE WATER RUNOFF TO THE PROPOSED SEDIMENT/DETENTION BASIN.
- THE OUTSIDE BOUNDARY OF DRAINAGE AREA 3 APPROXIMATELY FOLLOWS A SMALL RIDGE LINE. THE RIDGE LINE WAS DETERMINED BY VISUAL INSPECTION BY THE PROJECT MANAGER.
- THE MAJORITY OF THE CAP WILL BE COVERED WITH GRASS. THE TRENCH AND BASINS WILL ALSO BE GRASS COVERED.

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT NUWSE - SITE 5	JOB NUMBER 7602/0106
SUBJECT WEIGHTED CURVE NUMBERS / DRAINAGE AREAS	
BASED ON FIGURE 1	DRAWING NUMBER
BY BER / CHECKED BY DCW 12/29/97	APPROVED BY / DATE 12/19/97

- A PORTION OF EACH DRAINAGE AREA WILL BE PAVED.

- THE EXISTING DIRT ROADS WILL BE REPLACED WITH GRAVEL IN POST-DEVELOPMENT.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NWSE - SITE 5	JOB NUMBER:
SUBJECT: WEIGHTED CURVE NUMBERS / DRAINAGE AREAS	
BASED ON: FIGURE 1	DRAWING NUMBER:
BY: BER	CHECKED BY: DLW 12/29/97
APPROVED BY:	DATE: 12/19/97

DA #1 :

Cover Type	Areas (acres)	CN
WOODS (Good)	1.96	55
GRAVEL	0.54	85
OPEN SPACE	7.32	61
IMPERVIOUS	0.08	98

$CN_W = (1.96 \times 55) + (0.54 \times 85) + (7.32 \times 61) + (0.08 \times 98) / 9.90$

$CN_W = 61$

DA #2 :

Cover Type	Areas (acres)	CN
WOODS (Good)	0.34	55
IMPERVIOUS	1.25	98
OPEN SPACE	0.65	61
SPOILS PILE	0.36	86

$CN_W = (0.34 \times 55) + (1.25 \times 98) + (0.65 \times 61) + (0.36 \times 86) / 2.60$

$CN_W = 81$

DA #3 :

Cover Type	Areas (acres)	CN
WOODS (Good)	0.30	55
IMPERVIOUS	0.64	98
OPEN SPACE	1.88	61
GRAVEL	0.34	85
SPOILS PILE	0.45	86

$CN_W = (0.30 \times 55) + (0.64 \times 98) + (1.88 \times 61) + (0.34 \times 85) + (0.45 \times 86) / 3.61$

$CN_W = 72$

B.7.4 PEAK DISCHARGES

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NWSE - SITE 5	JOB NUMBER
SUBJECT PEAK DISCHARGES - POST-DEVELOPMENT CONDITIONS	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 12/29/97		12/19/97

(1) THE POST-DEVELOPMENT PEAK DISCHARGES WERE CALCULATED BY HAESTAD'S QUICK TR-55. A HYDROGRAPH WAS CALCULATED FOR EACH DRAINAGE AREA FOR THE 2, 10, AND 25-YEAR STORM EVENTS BASED ON THE Tc, AREA, AND WEIGHTED CURVE NUMBER.

(2) THE POST-DEVELOPMENT PEAK DISCHARGES TO EACH DETENTION BASIN ARE SUMMARIZED BELOW:

DRAINAGE AREA	STORM EVENT (YR)	PEAK DISCHARGE (CFS)
1	2	3
	10	8
	25	10
2	2	3
	10	7
	25	8
3	2	3
	10	7
	25	9

CHK'D
DCW
12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:22:28
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.90	61.0	0.40	0.30	3.40	0.53	.38	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.36	0.40	0.30	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Chr'd DC
12/29/97

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.90	61.0	0.40	0.30	5.20	1.49	.25	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.36	0.40	0.30	No	--

* Travel time from subarea outfall to composite watershed outfall point.

CHK'D 12/29/

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.90	61.0	0.40	0.30	6.00	2.01	.21	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 10 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.36	0.40	0.30	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CHK'D DC
12/29/98

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 2	2.60	81.0	0.10	0.20	3.40	1.63	.14	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.13	0.13	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

CHK'D DCW
12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:54:12
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	2.60	81.0	0.10	0.20	5.20	3.16	.09	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 7 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.13	0.13	0.10	0.20	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

DCW
CHK'D 12/?

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 2	2.60	81.0	0.10	0.20	6.00	3.88	.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.13	0.13	0.10	0.20	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

CHK'D
DCW
12/29/9

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	3.61	72.0	0.10	0.20	3.40	1.06	.23	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

CHK'D
12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	3.61	72.0	0.10	0.20	5.20	2.35	.15	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 7 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

CHK'D DCW 12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	3.61	72.0	0.10	0.20	6.00	2.99	.13	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 9 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

B.8 Area South of Railroad Tracks at Site 5

CALCULATION WORKSHEET Order No. 19116 (01-01)

CLIENT NWSE	JOB NUMBER 7624
SUBJECT PEAK DISCHARGE FROM WATERSHED AREA UPGRADIENT OF SITE 5	
BASED ON URBAN HYDROLOGY FOR SMALL WATERSHEDS	DRAWING NUMBER
BY KMS 10/31/97 / CHECKED BY BER 11/3/97	APPROVED BY / DATE
REV. DCW 12/31/97 BER 12/31/97	

OBJECTIVE: TO DETERMINE THE 2, 10, AND 25-YR PEAK DISCHARGE FROM THE WATERSHED AREA SOUTH OF THE R.R. TRACK AT SITE 5.

APPROACH: The TR-55 MODEL will be used to determine the DISCHARGE HYDROGRAPHS

Assumptions:
- BASED ON AERIAL PHOTOGRAPHS (SEE PAGE 3 OF 15), THE COVER DESCRIPTION IS ASSUMED TO BE WOODS IN GOOD CONDITION. ✓
- BASED ON PREVIOUS CALCULATION THE RAINFALL FOR A 2 YEAR STORM EVENT IS 3.4 inches and FOR A 25 YEAR STORM EVENT IS 6 inches. ✓ A 10 YEAR STORM EVENT IS 5.2 INCHES

CALCULATIONS:

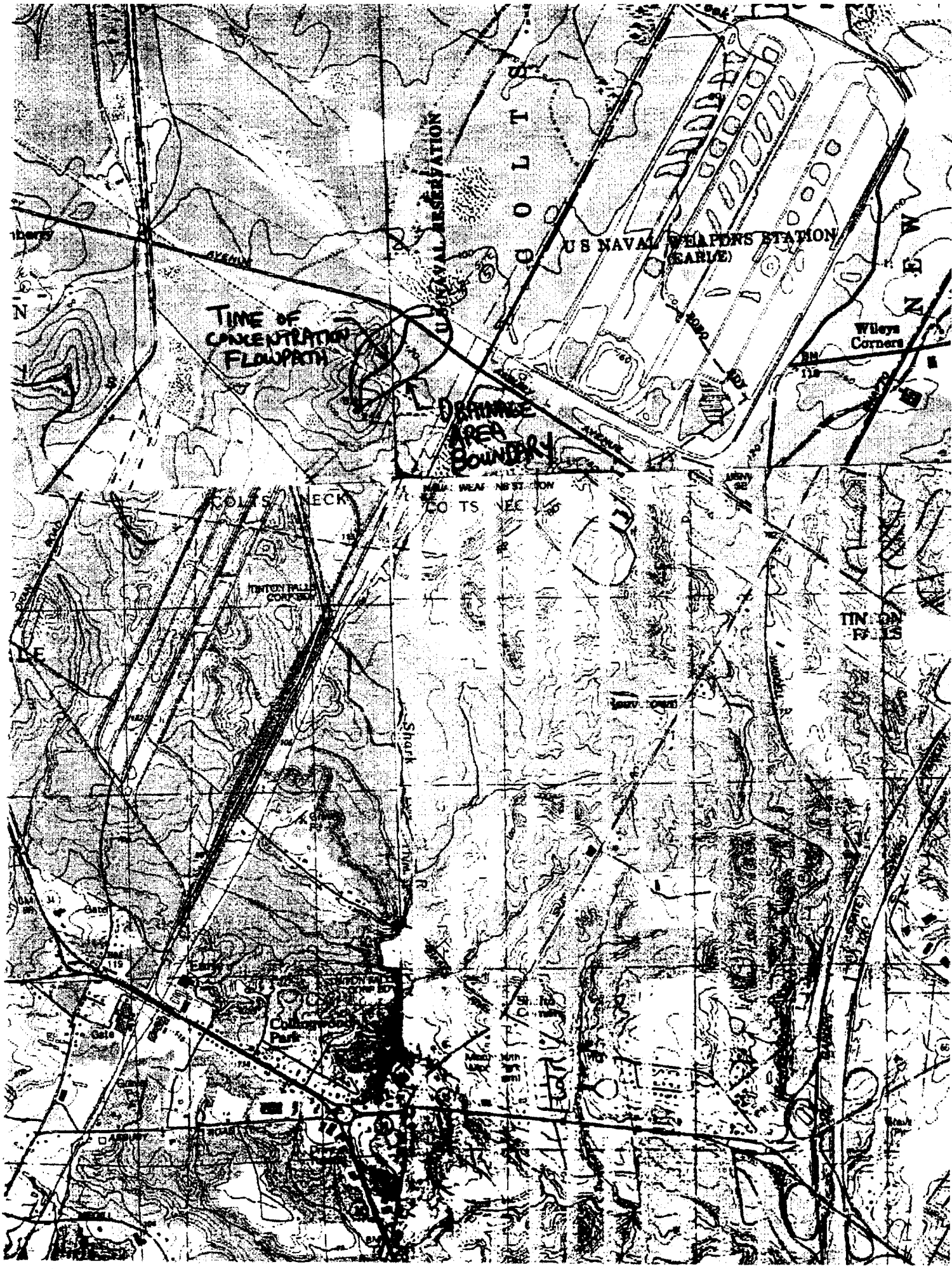
A. WATERSHED AREA

BASED ON USGS MAP (see page 2 of 15)
SCALE 1" = 2000'

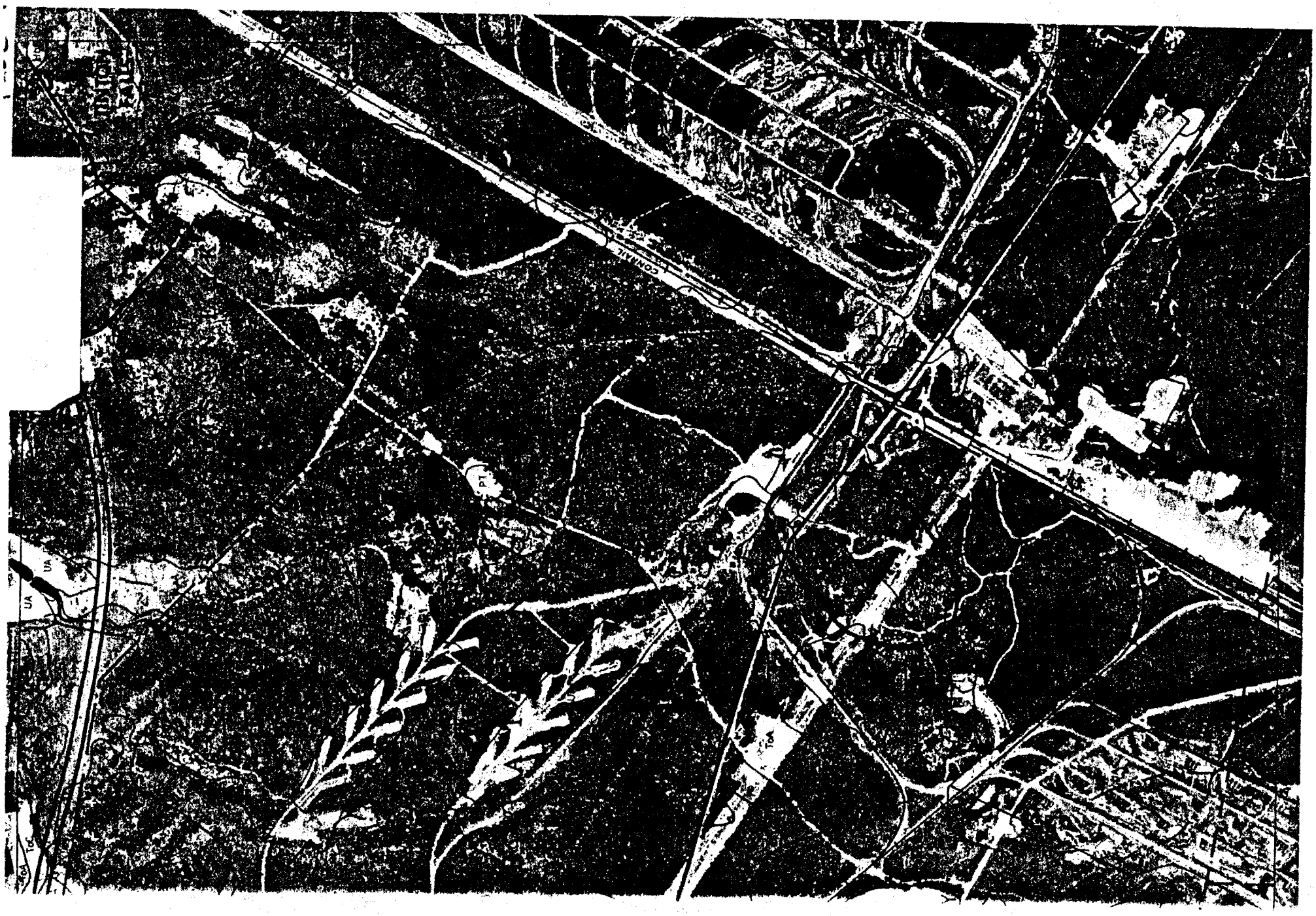
AREA 0.465 m^2 = 42.7 ACRES ✓

B. SOIL TYPES

BASED ON SOIL SURVEY OF Monmouth County New Jersey (see page 4 of 15)


US NAVAL WEAPONS STATION
(EARLE)
TIME OF
CONCENTRATION
FLOWPATH
DRAINAGE
AREA
BOUNDARY
Wileys
Corners
COLTS NECK
Shark
Park

600 0 600 1200 Feet


CONRAIL
UA
UA
TOA

CLIENT NWSE	JOB NUMBER
SUBJECT PEAK DISCHARGE	
BASED ON TR-55	DRAWING NUMBER
BY KMS 10/31/97 / CHECKED BY BER 11/3/97	APPROVED BY / DATE

B. Soil types con't

		HYDROLOGIC GROUP
LaA	Lakehurst Sand	= A ✓
En	Elkton Loam	= C/D (Assume D) ✓
EvD	Evesboro Sand	= A ✓
Av	–	ASSUME D ✓

Approximately: 32 acres of hydrologic group A
10.7 acres of hydrologic group D

C. CALCULATE RUNOFF CURVE NUMBER

BASED ON the assumed cover type the CN for each area is:

CN = 30 for Group A
77 for Group D
(see page 6 OF 15 Table 2-2)

CN weighted is Determined in Worksheet 2 (page 7 OF 15)

CN (weighted) = 42 ✓

D. RUNOFF FOR 25-YEAR STORM

DETERMINED ON WORKSHEET 2 (page 7)

Q = 0.6 in ✓

By: KMS DATE: 10/31/97
Checked: BER DATE: 11/3/97

Table 2-2c.—Runoff curve numbers for other agricultural lands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing.[2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element.[3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	[4]30	48	65	73
Woods—grass combination (orchard or tree farm).[5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods.[6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	[4]30	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

[1]Average runoff condition, and $I_a = 0.2S$.

[2]*Poor:* <50% ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: >75% ground cover and lightly or only occasionally grazed.

[3]*Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

[4]Actual curve number is less than 30; use CN = 30 for runoff computations.

[5]CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

[6]*Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

REFERENCE 2

Worksheet 2: Runoff curve number and runoff

Project NWSE By KMS Date 10/31/97

Location STE 5 Checked BER Date 11/3/97

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	CN 1/ Fig. 2-3	CN 1/ Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
Sand, A	Woods, good cond.	30			32	960
Loam, D	Woods, good cond.	77			10.7	823.9
				Totals =	42.7	1783.9

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{1783.9}{42.7} = 41.7$; Use CN = 42

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency ..... yr	25		
Rainfall, P (24-hour) ..... in	6.0		
Runoff, Q ..... in (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	0.6		

REFERENCE 2

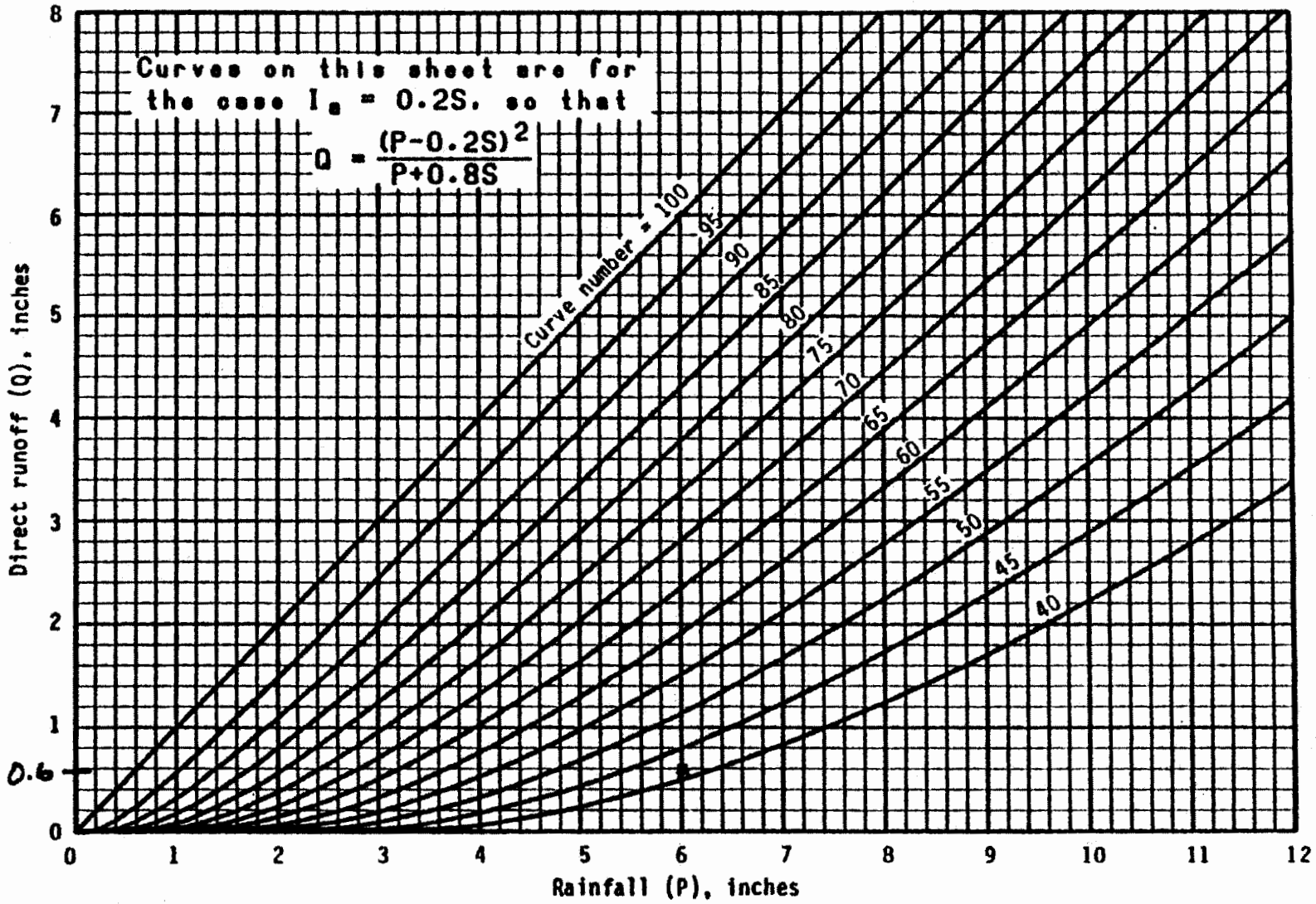


Figure 2-1.—Solution of runoff equation.

REFERENCE 2

BY: KMS DATE: 10/31/97
CHECKED: BCR DATE: 11/3/97

CLIENT NWSE	JOB NUMBER
SUBJECT PEAK DISCHARGE	
BASED ON TR-55	DRAWING NUMBER
BY KMS 10/31/97 / CHECKED BY BER 11/3/97	APPROVED BY / DATE

~~REV. DCW 12/31/97 BER 12/31/97~~

E. CALCULATE Time of Concentration (T_c)

BASED ON THE USGS MAP (page 2 of 15) the shallow, sheet and channel flow of the segments are calculated on Worksheet 3 (page 10/11 of 15)

T_c = 0.33 hours ✓

F. CALCULATE PEAK Discharge

SEE ATTACHED PRINTOUTS FROM TR-55 MODEL

CONCLUSION THE PEAK DISCHARGE RATES ARE AS FOLLOWS

$Q_2 = 0$ CFS
$Q_{10} = 5$ CFS
$Q_{25} = 8$ CFS

REFERENCES:

1. Soil Survey of Monmouth County, New Jersey

2. Urban Hydrology for Small Watersheds, United States Department of Agriculture, 2nd edition June 1986. (TR-55)

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project NWSE By KMS Date 10/31/97

Location SITE 5 Checked BER Date 11/3/97

Circle one: (Present) Developed

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
	AB				
1. Surface description (table 3-1)	Woods light				
2. Manning's roughness coeff., n (table 3-1) ..	0.4				
3. Flow length, L (total L ≤ 300 ft) ..... ft	100				
4. Two-yr 24-hr rainfall, P_2 ..... in	3.4				
5. Land slope, s ..... ft/ft	0.1				
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t ..... hr	0.18	+	0	=	0.18

Shallow concentrated flow	Segment ID				
	BC		CD		
7. Surface description (paved or unpaved)	Unpaved		Unpaved		
8. Flow length, L ..... ft	~~1000~~ 600		1000		
9. Watercourse slope, s ..... ft/ft	0.13		0.06		
10. Average velocity, V (figure 3-1) ..... ft/s	5.8		4		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	0.03	+	0.07	=	0.1

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					0.33

REFERENCE 2

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project NWSE By KMS Date 10/31/97

Location SITE 5 Checked BER Date 11/3/97

Circle one: Present Developed

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID				
1. Surface description (table 3-1)					
2. Manning's roughness coeff., n (table 3-1) ..					
3. Flow length, L (total L $\leq$ 300 ft) ..... ft					
4. Two-yr 24-hr rainfall, P_2 ..... in					
5. Land slope, s ..... ft/ft					
6. $T_t = \frac{0.007\ (nL)^{0.8}}{P_2^{0.5}\ s^{0.4}}$ Compute T_t ..... hr		+		=	

Shallow concentrated flow	Segment ID				
	DE				
7. Surface description (paved or unpaved)	Unpaved				
8. Flow length, L ..... ft	400				
9. Watercourse slope, s ..... ft/ft	0.02				
10. Average velocity, V (figure 3-1) ..... ft/s	2.25				
11. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr	0.05	+		=	0.05

Channel flow	Segment ID				
12. Cross sectional flow area, a ..... ft^2					
13. Wetted perimeter, p_w ..... ft					
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ..... ft					
15. Channel slope, s ..... ft/ft					
16. Manning's roughness coeff., n					
17. $V = \frac{1.49\ r^{2/3}\ s^{1/2}}{n}$ Compute V ..... ft/s					
18. Flow length, L ..... ft					
19. $T_t = \frac{L}{3600\ V}$ Compute T_t ..... hr		+		=	
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) ..... hr					

REFERENCE 2

By: KMS DATE: 10/31/97
Checked: BER DATE: 11/3/97

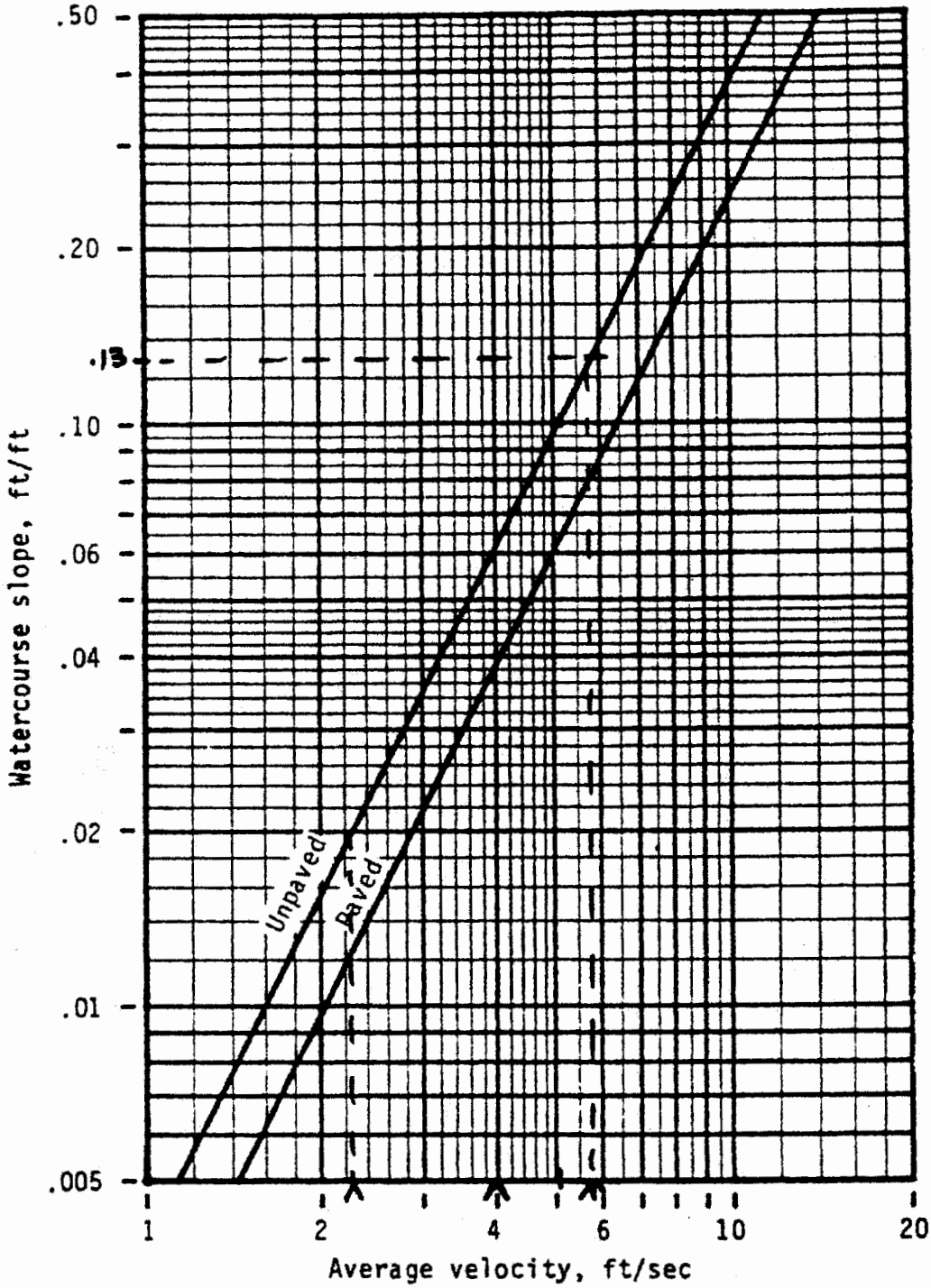


Figure 3-1.—Average velocities for estimating travel time for shallow concentrated flow.

REFERENCE 2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:12
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	3.40	0.03	.81	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:12
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	0	0.0
Composite Watershed	0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:12
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:12
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	0	16.1	0
12.4	0	16.2	0
12.5	0	16.3	0
12.6	0	16.4	0
12.7	0	16.5	0
12.8	0	16.6	0
12.9	0	16.7	0
13.0	0	16.8	0
13.1	0	16.9	0
13.2	0	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:12
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:35
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	5.20	0.37	.53	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:35
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	5	12.8
Composite Watershed	5	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:35
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	2	3	4	5	4	4	3	3	2
Total (cfs)	2	3	4	5	4	4	3	3	2

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	2	2	2	2	2	2	1	1	1
Total (cfs)	2	2	2	2	2	2	1	1	1

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	1	1	1	1	0
Total (cfs)	1	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:35
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	2
11.1	0	14.9	2
11.2	0	15.0	2
11.3	0	15.1	2
11.4	0	15.2	2
11.5	0	15.3	2
11.6	0	15.4	2
11.7	0	15.5	2
11.8	0	15.6	2
11.9	0	15.7	2
12.0	0	15.8	2
12.1	0	15.9	2
12.2	0	16.0	2
12.3	0	16.1	2
12.4	1	16.2	2
12.5	2	16.3	1
12.6	3	16.4	1
12.7	4	16.5	1
12.8	5	16.6	1
12.9	4	16.7	1
13.0	4	16.8	1
13.1	4	16.9	1
13.2	4	17.0	1
13.3	4	17.1	1
13.4	3	17.2	1
13.5	3	17.3	1
13.6	3	17.4	1
13.7	2	17.5	1
13.8	2	17.6	1
13.9	2	17.7	1
14.0	2	17.8	1
14.1	2	17.9	1
14.2	2	18.0	1
14.3	2	18.1	1
14.4	2	18.2	1
14.5	2	18.3	1
14.6	2	18.4	1
14.7	2	18.5	1

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:35
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:58
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	6.00	0.62	.46	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:58
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	8	12.8
Composite Watershed	8	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:58
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	3	5	7	8	7	6	5	4	4
Total (cfs)	3	5	7	8	7	6	5	4	4

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	4	4	3	3	3	3	2	2	2
Total (cfs)	4	4	3	3	3	3	2	2	2

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	2	1	1	1	0
Total (cfs)	2	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:58
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	3
11.1	0	14.9	3
11.2	0	15.0	3
11.3	0	15.1	3
11.4	0	15.2	3
11.5	0	15.3	3
11.6	0	15.4	3
11.7	0	15.5	3
11.8	0	15.6	3
11.9	0	15.7	3
12.0	0	15.8	3
12.1	0	15.9	3
12.2	0	16.0	3
12.3	0	16.1	3
12.4	1	16.2	3
12.5	3	16.3	2
12.6	5	16.4	2
12.7	7	16.5	2
12.8	8	16.6	2
12.9	8	16.7	2
13.0	7	16.8	2
13.1	6	16.9	2
13.2	6	17.0	2
13.3	6	17.1	2
13.4	5	17.2	2
13.5	5	17.3	2
13.6	4	17.4	2
13.7	4	17.5	2
13.8	4	17.6	2
13.9	4	17.7	2
14.0	4	17.8	2
14.1	4	17.9	2
14.2	4	18.0	2
14.3	4	18.1	2
14.4	4	18.2	2
14.5	3	18.3	2
14.6	3	18.4	2
14.7	3	18.5	2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 16:42:58
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

APPENDIX C

CALCULATIONS TO SIZE SEDIMENT BASINS FOR SITE 4

C.1 Summary of Site 4 Sediment Basins Compliance with New Jersey Regulations

C.2 Preliminary Calculations for Determining Capacity and Size of Sediment Basins

C.3 Overview and Summary of Final Calculations for Determining Capacity and Size of Sediment Basins

C.4 Basin Inflow Hydrographs

C.5 Elevation-Storage Matrix

C.6 Outlet Structure Design

C.7 Hydrograph Routings and Outflow Calculations

C.8 Anti-Seep Collar Design

C.1 Summary of Site 4 Sediment Basins Compliance with New Jersey Regulations

CALCULATION WORKSHEET Order No. 19110 (01-91)

CLIENT: NJSWE	JOB NUMBER:
SUBJECT: Site 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER:
BY: CSF	CHECKED BY: DCW 12/30/97
APPROVED BY:	DATE: 12/30/97

Summary of Site 4 Sediment Basin Compliance with State Regulations

1. Each Sed Basin must achieve 70% trap efficiency to the crest of the emergency spillway: (p 35)

Sed Basin	70% Trap Efficiency Equivalent Volume (ft^3)	Available Volume to ES Crest (ft^3)	
1	14750	16117	OK
2	6692	6970	OK

2. Each Sed Basin must achieve 50% trap efficiency to crest of the 4-in orifice in the primary outlet structure: (p 36-38)

Sed Basin	50% Trap Efficiency Equivalent Volume (ac-ft)	Available Volume to 4-in hole (ac-ft)	
1	0.126	0.16	OK
2	0.0565	0.06	OK

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	
SUBJECT: Site 4 - Seal Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	DCW 12/30/97		12/30/97

3. Minimum capacity of the emergency spillway must be capable of handling the 10-yr, 24-hr storm volume: (p 38-71)

Seal Basin	Max water elevation of 10-yr storm in Seal Basin	Crest of Seal Basin Emergency Spillway	
1	161.47 ft	162.0 ft	OK
2	159.09 ft	159.75 ft	OK

4. Maximum flow velocity from the emergency spillway must be < 4 ft/s (p 72-73)

Seal Basin	Maximum Computed flow velocity of 10-yr storm discharge through the emergency spillway	
1	1.0 ft/s	OK
2	0.7 ft/s	OK

5. Available seal Basin volume between crest of principal spillway & crest of emergency spillway must be capable of containing the 2-yr, 24-hr storm event (p 73-74)

Seal Basin	Required Storage	Available Storage	
1	0.09 ac-ft	0.11 ac-ft	OK
2	0.02 ac-ft	0.06 ac-ft	OK

C.2 PRELIMINARY CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF SEDIMENT BASINS

CALCULATION WORKSHEET

Order No. 19110 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

SITE 4

CALCULATION FOR CAPACITY
AND SIZE OF SEDIMENT BASINS
BASED ON NJ REGULATIONS

CALCULATION WORKSHEET Order No. 10116 (01-01)

CLIENT	JOB NUMBER
NSWE	7602-0106

SUBJECT: CAPACITY of SEDIMENT BASINS – Summary of CALCULATIONS

BASED ON	DRAWING NUMBER
Sedimedent Basin Standards – NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/25/97	CAR 8/26/97		

Based on the standards for Sediment Basin Design, the volume in the sediment basins (Sediment Basins #1 & 2) below the crest elevation of the emergency spillway shall be the larger of:

① The volume necessary to obtain 70% trap efficiency at the start of it's useful life, or

② The volume necessary to provide for sediment storage capacity and for temporary stormwater runoff storage for a 2-yr, 24 hour type III storm.

Calculations were completed for ① and ②. The capacities estimated by 1 & 2 are summarized below.

Drainage Area	① Trap Efficiency	② Sediment + Runoff Storage	Required Storage
1	0.33 ac·ft	0.14 ac·ft	0.33 ac·ft
2	0.15 ac·ft	0.09 ac·ft	0.15 ac·ft

∴ Use the required storage capacities to complete the design calculations for the site 4 Sediment Basins (#1 & 2).

CALCULATION WORKSHEET

Order No. 19118 (01-91)

CLIENT: NSWE	JOB NUMBER: 7602-0106
SUBJECT: Capacity of Sediment Basins - Site 4	
BASED ON: Trap Efficiency - NJ Regs	DRAWING NUMBER:
BY: JJJ 8/24/97	CHECKED BY: CAR 8/26/97
APPROVED BY:	DATE:

Estimate the sizes of sediment basins that have an adequate volume below the crest of the emergency spillway to have an actual trap efficiency of at least 70% at the start of its useful life. Use curve 4.4-1 where:

C = Total capacity of the sediment basin up to the crest elevation of the emergency spillway (ac. ft)

I = Average annual surface runoff from Figure 41, 41-1 converted to ac. ft.

- Assume that the incoming sediment is sand; therefore, use a trap efficiency of 75% for curve 4.4-1

From curve 4.4-1 (see p. 3): $\frac{C}{I} = 0.025$

From Figure 41-1 (see page 3): R = 22.1 in.

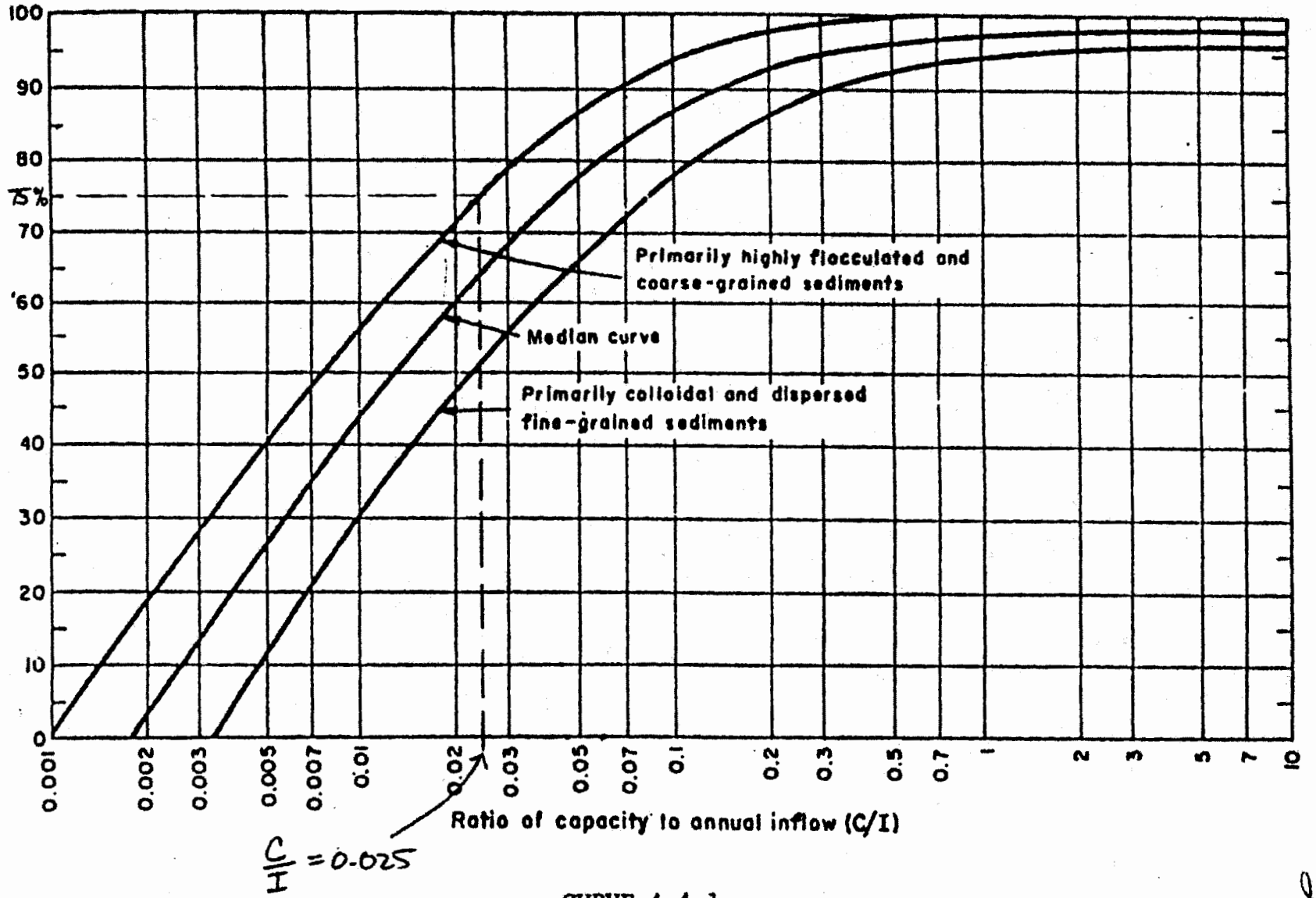
$$I_{DAM\,1} = \frac{(22.1\text{ in})(7.23\text{ ac})}{(12\text{ in/ft})} = 13.315\text{ ac. ft}$$

$$I_{DAM\,2} = \frac{(22.1\text{ in})(3.23)}{(12\text{ in/ft})} = 5.949\text{ ac. ft}$$

Calculate C

$$C_{DAM\,1} = (0.025)(13.315) = 0.33\text{ ac. ft}$$

$$C_{DAM\,2} = (0.025)(5.949) = 0.15\text{ ac. ft}$$



BY: CAC
DATE: 8/22/97
CHKD: JJB
DATE: 8/25/97

CURVE 4.4-1

TRAP EFFICIENCY OF RESERVOIRS

Reference: Brune, Gunnar M., "Trap Efficiency of Reservoirs", Trans. AGU, Vol. 34, No.3, pp 407-418, June 1953.

2 of 3

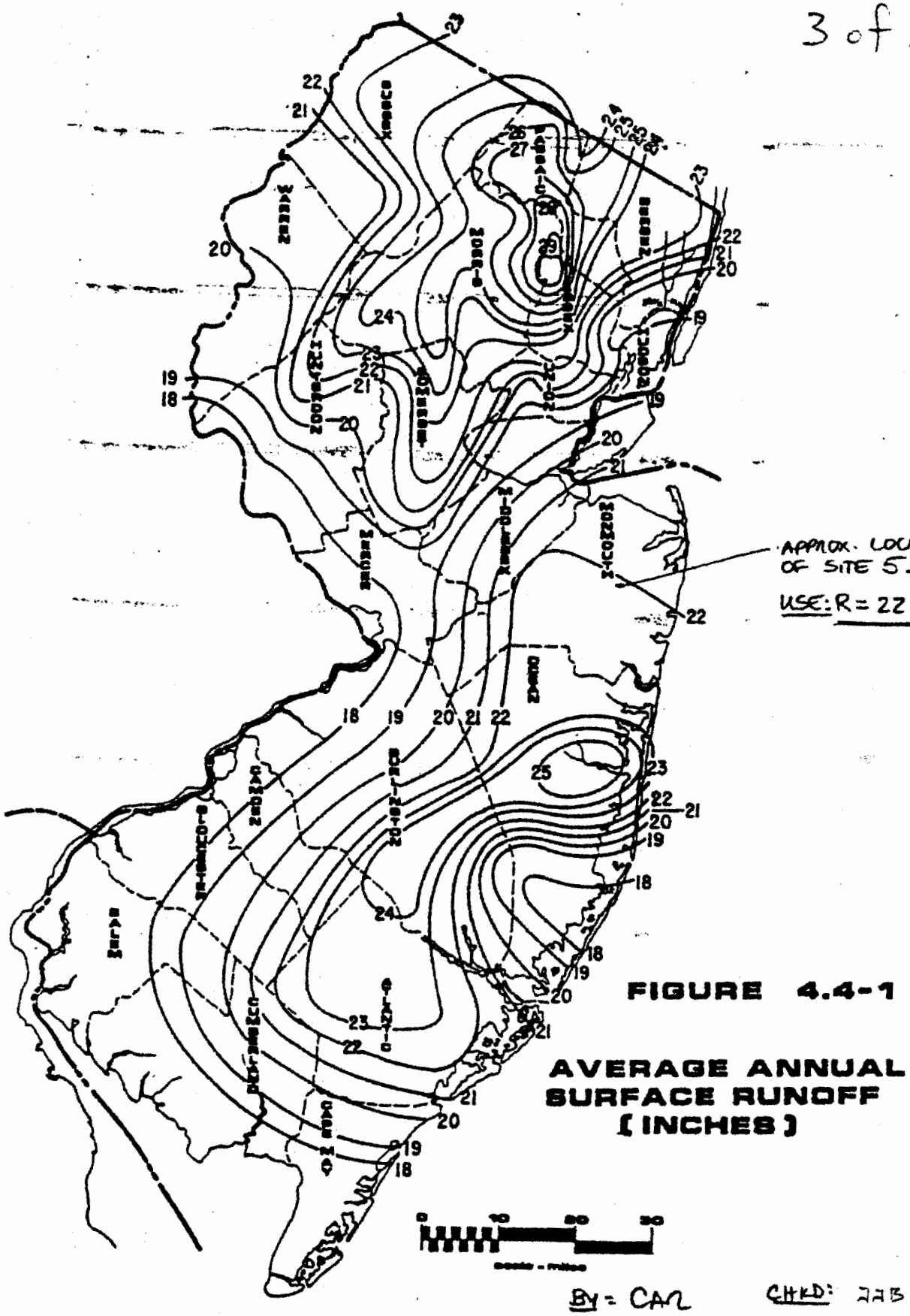


FIGURE 4.4-1

AVERAGE ANNUAL SURFACE RUNOFF (INCHES)

BY: CAR CHKD: JJB
DATE: 8/22/97 DATE: 8/25/97

CALCULATION WORKSHEET

CLIENT	JOB NUMBER
NWSE	7602 - 0106

SUBJECT: Estimation of Sediment Basin Storage Capacity

BASED ON	DRAWING NUMBER
Standard for Sediment Basin - NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
JB 8/25/97	CAR 8/26/97		

Sediment Storage Capacity

Use approach and equations specified in "Standard for Sediment Basin," Section 4.4, Revised April 1987, to determine Site 4 Sediment Basin Size.

Assumptions

- Construction activities will occur over a six month period.
- Sedimen Basin #1 will serve as the Esc device for DA #1. Sediment Basin #2 will serve as the Esc device for DA #2.
- DA #3 does not contribute to the sediment loading of Sediment Basins 1 & 2. Silt Fence will be used to control Sediment loading from DA #3.

CALCULATION WORKSHEET Order No. 19110 (01-01)

CLIENT: NSWE	JOB NUMBER: 7602/01060
SUBJECT: Estimation of Sediment Basin Capacity	
BASED ON: Standard for Sediment Basin - NJ Regs	DRAWING NUMBER:
BY: JJB 8/22/97	CHECKED BY: CAM 8/26/97
APPROVED BY:	DATE:

(II) Estimate required sediment capacity by method #2

$$V = (DA)(A)(DR)(TE)(1/\gamma_s)(2000)(1/43560)$$

V = Vol. of Sediment
DA = Total drainage area
A = Average Annual Erosion
DR = Delivery Ratio
TE = Trap Efficiency
γ_s = Submerged Sediment Density
γ_a = Aerated Density

(A) Determine A (Avg. Anual Erosion). Assume 3 cover types: 1) wooded areas, 2) grass areas, and 3) construction areas. From Table on p. 4.4.3

A_{grass} = 1.0 ton/ac/yr
A_{wood} = 0.2 ton/ac/yr
A_{const} = 50 ton/ac/yr

(B) Determine Total drainage Area (DA) during construction activities. From previous measurements

DA_1 = 7.23 ac = 0.0113 sq. miles
$DA_{1(wood)}$ = 3.93 ac
$DA_{1(const)}$ (1) = 2.62 ac
$DA_{1(grass)}$ = 0.68 ac

DA_2 = 3.23 ac = 0.005 sq miles
$DA_{2(wood)}$ = 2.04 ac
$DA_{2(const)}$ (1) = 0.87 ac
$DA_{2(grass)}$ = 0.32 ac

Note: 1) The DA_1 during construction consists of bare soil, disturbed areas, and dirt road

CLIENT	JOB NUMBER
NSWE	7602 - 0100
SUBJECT: Estimation of Sediment Basin Storage Capacity	
BASED ON: Standards for Sediment Basin - NJ Regs	DRAWING NUMBER
BY: JJB 8/22/97 / CHECKED BY: CAR 8/26/97	APPROVED BY / DATE

(C) Determine the total sediment load for each drainage area.

DA #1: $DA_{1(wood)}$ A_{wood} = (3.93 ac)(0.2 ton/ac/yr) = 0.786 ton/yr
$DA_{1(const)}$ A_{const} = (2.62 ac)(50 ton/ac/yr) = 132 ton/yr
$DA_{1(grass)}$ A_{grass} = (0.68 ac)(1.0 ton/ac/yr) = 0.68 ton/yr

DA #2: $DA_{2(wood)}$ A_{wood} = (2.04 ac)(0.2 ton/ac/yr) = 0.408 ton/yr
$DA_{2(const)}$ A_{const} = (0.87 ac)(50 ton/ac/yr) = 43.5 ton/yr
$DA_{2(grass)}$ A_{grass} = (0.32 ac)(1.0 ton/ac/yr) = 0.32 ton/yr

Total DA 1 = 132.5 ton/yr
Total DA 2 = 44.2 ton/yr

(D) Determine the Delivery Ratio (DA) using Figure 4.4-2, p. 4.4.10 (see page 4 of 11)

DA #1 = 37 %
DA #2 = 37 %

Assumptions:

- The trap efficiency for both areas is 70 %
- Sediments will be mainly sand and will be typically dry.
- Aerated density (γ_a) = 90 lbs/ft^3

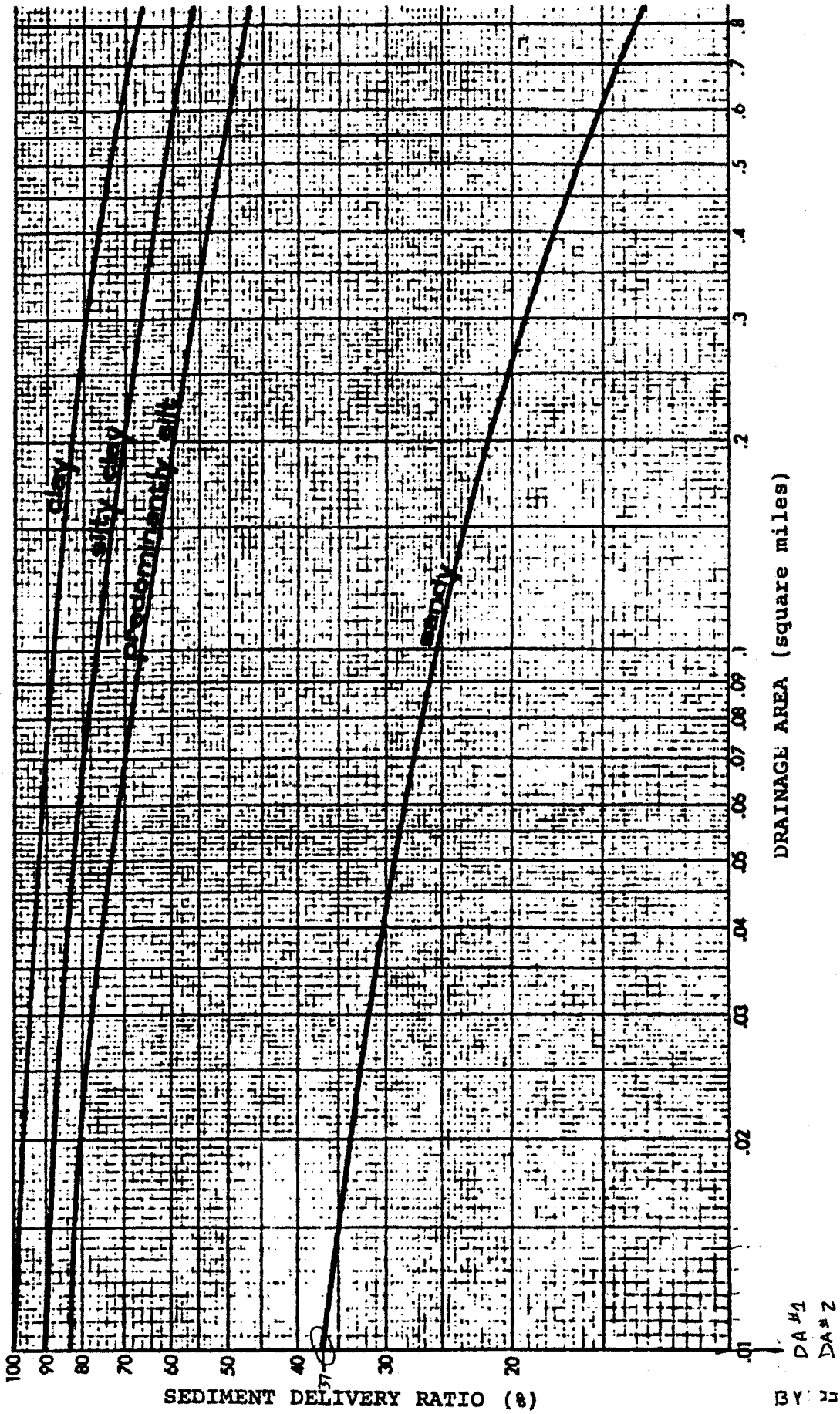


FIGURE 4.4-2
SEDIMENT DELIVERY RATIO VS. DRAINAGE AREA

BY: JJB CHKD: CAHL
DATE: 8/25/97 DATE: 8/26

CALCULATION WORKSHEET Order No. 19118 (01-91)

CLIENT: NWSE	JOB NUMBER: 76002 / 01060
SUBJECT: Estimate Sediment Basin Storage Capacity	
BASED ON: Standard for Sediment Basin - NJ Regs	DRAWING NUMBER:
BY: JJB 8/22/97	CHECKED BY: CAR 8/26/97
APPROVED BY:	DATE:

(E) Calculate Volume of Trapped Sediment

$$V_1 = (132.5 \text{ ton/yr})(0.37)(0.70)\left(\frac{1}{90 \text{ lb/ft}^3}\right)(2000)\left(\frac{1}{43,560}\right)\left(\frac{6 \text{ months}}{12 \text{ months/yr}}\right)$$

$$= 0.01 \text{ ac·ft}$$

$$V_2 = (44.2 \text{ ton/yr})(0.37)(0.70)\left(\frac{1}{90 \text{ lb/ft}^3}\right)(2000)\left(\frac{1}{43,560}\right)\left(\frac{6 \text{ months}}{12 \text{ months/yr}}\right)$$

$$= 0.003 \text{ ac·ft}$$

(F) Determine total volume of storage for 2-yr storm

(1) Determine total runoff volume from each drainage basin during the 2-yr storm for during construction conditions.

DA #1: $R_{2\text{-}yr} = 0.95$ in (see page 6 of 11)
Area = 7.23 acres

$$V_{R\text{-}2YR} = (0.95 \text{ in})\left(\frac{1 \text{ ft}}{12 \text{ in}}\right)(7.23 \text{ acres}) = 0.572 \text{ ac·ft}$$

DA #2: $R_{2\text{-}yr} = 0.84$ in (see page 7 of 11)
Area = 3.23 ac.

$$V_{R\text{-}2YR} = (0.84/12)(3.23) = 0.226 \text{ ac·ft}$$

DA #3: $R_{2\text{-}YR} = 0.70$ in (see page 8 of 11)
= 0.74 ac

$$V_{R\text{-}2YR} = (0.70/12)(0.74) = 0.043 \text{ ac·ft}$$

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS1.GPD

Drainage Area	(acres)	7.23	--->	0.0113 sq.mi.
Runoff Curve Number	(CN)	70		
Time of Concentration,Tc	(hrs)	.233		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.857	0.857	0.857
Ia/p Ratio	0.252	0.165	0.143
Unit Discharge, * qu (csm/in)	483	516	524
Runoff, Q (in)	0.95	2.19	2.81
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	5	13	17

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	540.518	540.518	540.518
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	464.724	464.724	464.724
* qu (csm)		483	516	524

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #2 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS2.GPD

Drainage Area	(acres)	3.23	--->	0.0050 sq.mi.
Runoff Curve Number	(CN)	68		
Time of Concentration,Tc	(hrs)	.315		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	0.941	0.941	0.941
Ia/p Ratio	0.277	0.181	0.157
Unit Discharge, * qu (csm/in)	425	460	469
Runoff, Q (in)	0.84	2.02	2.62
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	5	6

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	490.105	490.105	490.105
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	416.695	416.695	416.695
* qu (csm)		425	460	469

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #3 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS3.GPD

Drainage Area	(acres)	0.74	--->	0.0012 sq.mi.
Runoff Curve Number	(CN)	65		
Time of Concentration,Tc	(hrs)	0.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.077	1.077	1.077
Ia/p Ratio	0.317	0.207	0.179
Unit Discharge, * qu (csm/in)	578	627	636
Runoff, Q (in)	0.70	1.79	2.35
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	0	1	2

Summary of Computations for qu

Ia/p	#1	0.300	0.100	0.100
C0	#1	2.396	2.473	2.473
C1	#1	-0.512	-0.518	-0.518
C2	#1	-0.132	-0.171	-0.171
qu (csm)	#1	596.829	661.942	661.942
Ia/p	#2	0.350	0.300	0.300
C0	#2	2.355	2.396	2.396
C1	#2	-0.497	-0.512	-0.512
C2	#2	-0.120	-0.132	-0.132
qu (csm)	#2	539.846	596.829	596.829
* qu (csm)		578	627	636

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

CLIENT	JOB NUMBER
NSWF	7602 - 0104

SUBJECT: Estimate Sed. Basin. Storage - Capacity

BASED ON: Standard for Sediment Basin - NJ Ross

DRAWING NUMBER:

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/25/97	CMR 8/26/97		

(2) Determine q_o/q_i

Peak Discharges for these same areas and storms:

STORM	DA	Q (cfs)
2-yr	1	5
	2	2
	3	0

From Pre-construction Conditions, the estimated Peak Discharge Rates are:

STORM	DA	Q (cfs)
2-yr	1	3
	2	1

Regrading of waste alters the drainage patterns of site 4 and creates 3 DAs from the initial 2 DAs. However, for the purposes of calculating q_o/q_i, it is assumed that DA #1 (pre-const) corresponds to DA #1 (const) & DA #2 (pre-const) corresponds to DA #2 (const).

Assume: $q_{o\ DA\#1} = 3$ $q_{i\ DA\#1} = 5$

$q_{o\ DA\#2} = 1$ $q_{i\ DA\#2} = 2$

DA #1: $\frac{q_o}{q_i} = 3/5 = 0.6$

DA #2: $\frac{q_o}{q_i} = 1/2 = 0.5$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWE	7602-0106

SUBJECT: Estimation of Sediment Basin Storage Capacity

BASED ON	DRAWING NUMBER
Standard for Sed. Basin - NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
JJB - 8/25/97	CAR 8/26/97		

(B) Determine V_s

Using Figure 6-1 from Chapter 6 of the TR-55 manual and the calculated q_o/q_i values, determine the required volume of storage for each drainage basin.

DA #1

$q_o/q_i = 0.6 \Rightarrow V_s/V_R = 0.24$

$V_{s-2YR} = (0.24)(0.577 \text{ ac.ft}) = 0.14 \text{ ac.ft}$

DA #2

$q_o/q_i = 0.5 \Rightarrow V_s/V_R = 0.28$

$V_{s-2YR} = (0.28)(0.226 \text{ ac.ft}) = 0.06 \text{ ac.ft}$

(C) Volume of Storage for Sediment and 2-yr Storm

$V_{Total} = V_s$ (see section II.E) $+ V_{s-2YR}$ (see section II.F)

$V_{Total-DA\#1} = (0.003 + 0.14) \text{ ac.ft} = 0.14 \text{ ac.ft}$

$V_{Total-DA\#2} = (0.03 + 0.06) \text{ ac.ft} = 0.09 \text{ ac.ft}$

Input requirements and procedures

Use figure 6-1 to estimate storage volume (V_s) required or peak outflow discharge (q_o). The most frequent application is to estimate V_s, for which the required inputs are runoff volume (V_r), q_o, and peak inflow discharge (q_i). To estimate q_o, the required inputs are V_r, V_s, and q_i.

Estimating V_s

Use worksheet 6a to estimate V_s, storage volume required, by the following procedure.

1. Determine q_o. Many factors may dictate the selection of peak outflow discharge. The most common is to limit downstream discharges to a desired level, such as predevelopment discharge. Another factor may be that the outflow device has already been selected.
2. Estimate q_i by procedures in chapters 4 or 5. Do not use peak discharges developed by any other procedure. When using the Tabular Hydrograph method to estimate q_i for a subarea, only use

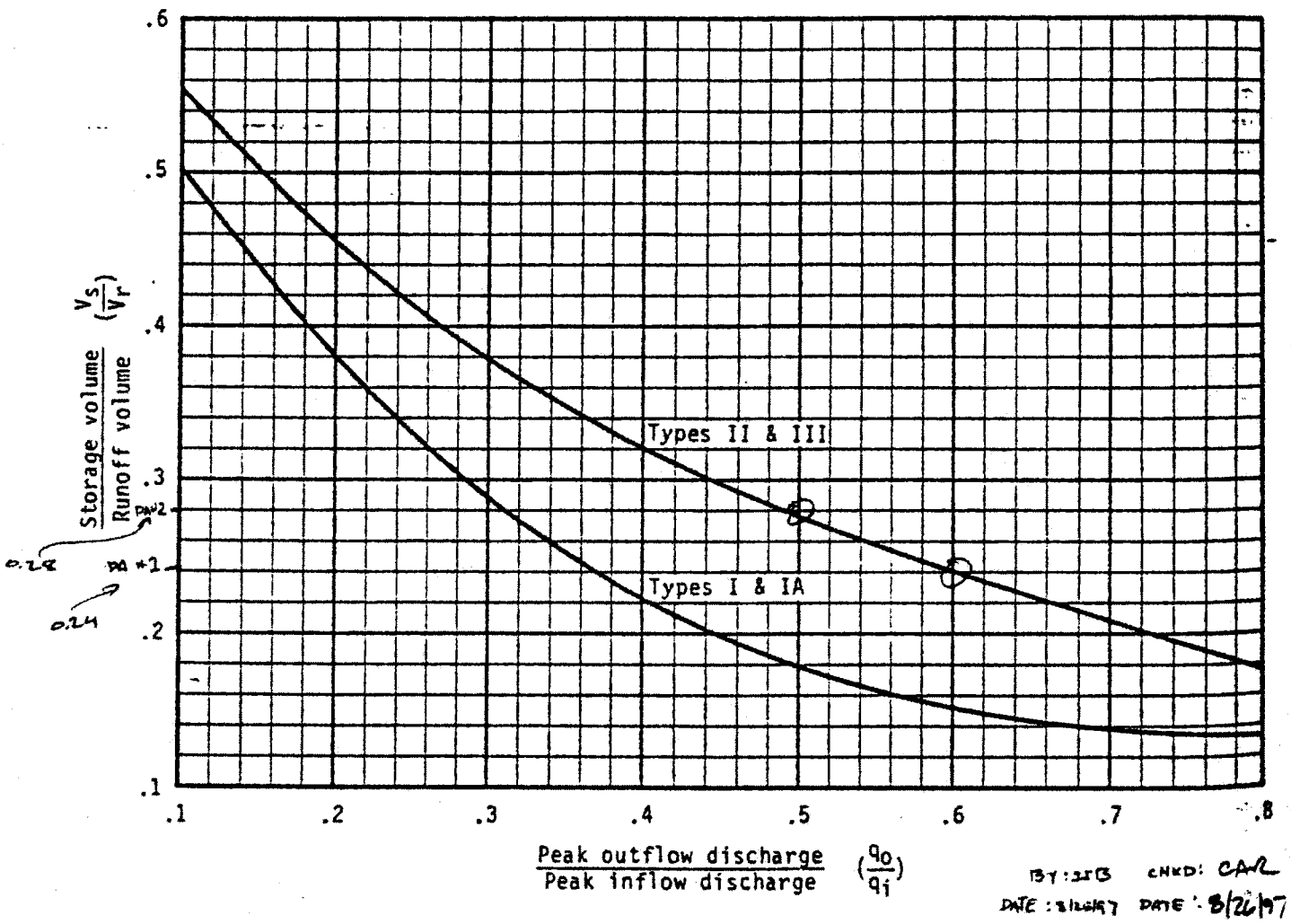


Figure 6-1.—Approximate detention basin routing for rainfall types I, IA, II, and III.

CALCULATION WORKSHEET

Order No. 19110 (91-01)

CLIENT	JOB NUMBER		
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Determine Dimensions of Site 4
Sediment Basins # 1 + 2

CALCULATION WORKSHEET

CLIENT: NSWE	JOB NUMBER: 7602-0106
SUBJECT: Determine Size and Depth of Sediment Basin #1 & 2 - Site 4	
BASED ON: Sediment Capacity Calculations / NJ Regs	DRAWING NUMBER:
BY: JJB 8/25/97	CHECKED BY: CAR 8/27/97
APPROVED BY:	DATE:

Determine the size and depth of the sediment basins based on the following NJ criteria & design parameters calculated previously.

1. $W = 10\sqrt{Q_s}$ where

   W = width (ft)

   Q_s = peak discharge from a five-yr storm

2. $L \geq 2W$ where L = length (ft)
3. $D \geq 4$ ft where D = depth (ft.)
4. $V_{s\text{-}DA\#1} = 0.33$ ac. ft = 14,375 ft^3 ; $V_{s\text{-}DA\#2} = 0.15$ ac. ft = 6,534 ft^3

(I) Estimate Q_s

- From Figure 1 (page 2 of 11), Rainfall, 24-hr interval, 5-year storm = 4.4 in

DA #1

From previous calculations: $T_L = 0.233$ hr
CN = 70
DA = 7.23 acres

∴ Q = 9 cfs (see page 3 of 11)

DA #2

From previous calculations: $T_L = 0.315$ hr
CN = 68
DA = 3.23 acres

∴ Q = 3 cfs (see page 4 of 11)

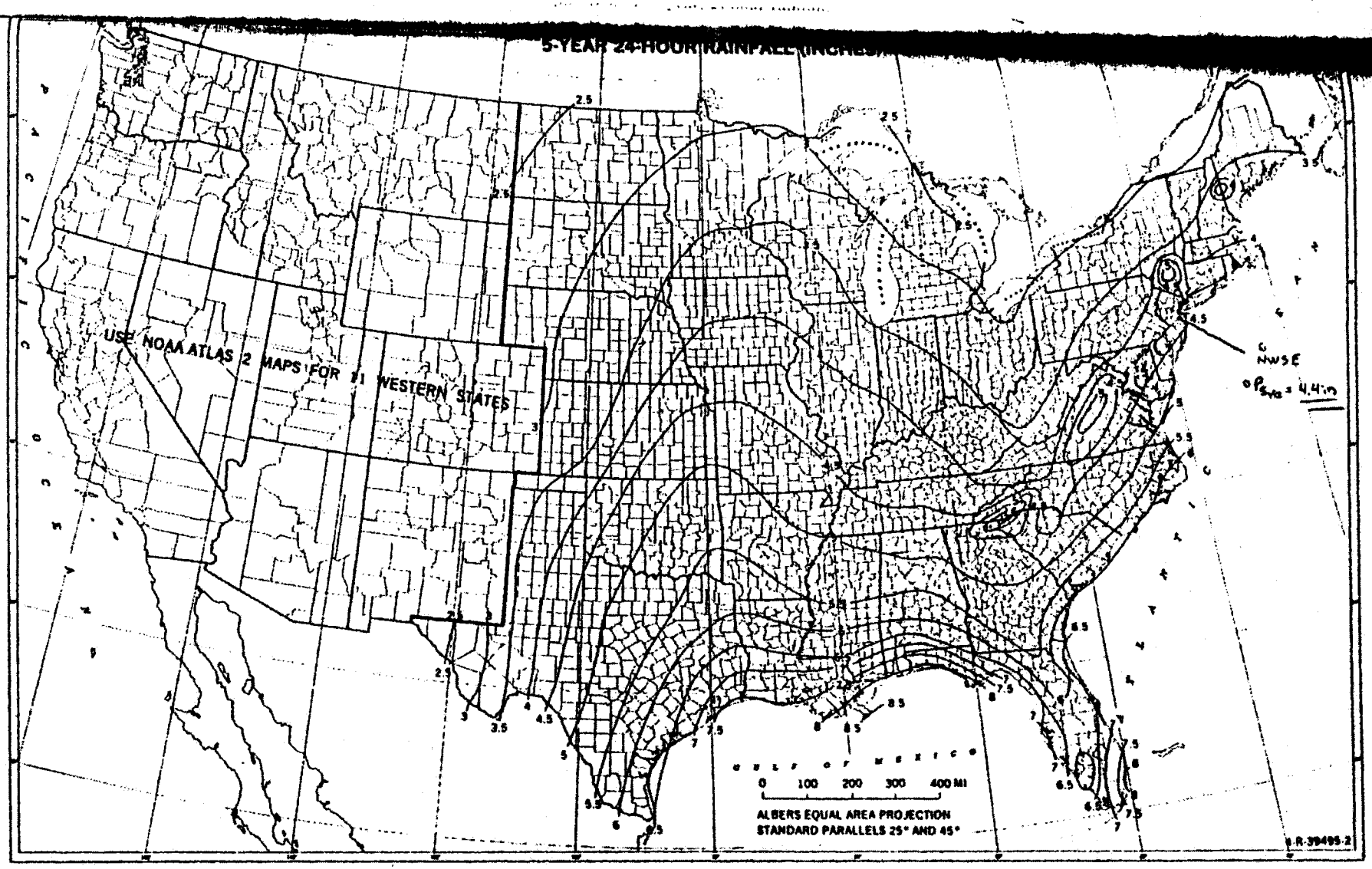


Figure B-4.--Five-year, 24-hour rainfall.

Figure 1:

BY: JJB CHKD: [illegible] B-5

DATE: 8/25/97 DATE: 8/27/97

2/11

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #1 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS1.GPD

Drainage Area	(acres)	7.23	--->	0.0113 sq.mi.
Runoff Curve Number	(CN)	70		
Time of Concentration,Tc	(hrs)	.233		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	5	10	25
Rainfall, P, 24-hr (in)	4.4	5.2	6.0
Initial Abstraction, Ia (in)	0.857	0.857	0.857
Ia/p Ratio	0.195	0.165	0.143
Unit Discharge, * qu (csm/in)	505	516	524
Runoff, Q (in)	1.60	2.19	2.81
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	9	13	17

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	540.518	540.518	540.518
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	464.724	464.724	464.724
* qu (csm)		505	516	524

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

BY: JJB CHKD: CAL
DATE: 8/26/97 DATE: 8/27/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWSE - SITE 4 LANDFILL
COLTSNECK, NEW JERSEY
CTO 289 - 7602/0104
DRAINAGE AREA #2 - CONSTRUCTION CONDITIONS

CALCULATED
DISK FILE: NSWE4CS2.GPD

Drainage Area	(acres)	3.23	--->	0.0050 sq.mi.
Runoff Curve Number	(CN)	68		
Time of Concentration,Tc	(hrs)	.315		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	5	10	25
Rainfall, P, 24-hr (in)	4.4	5.2	6.0
Initial Abstraction, Ia (in)	0.941	0.941	0.941
Ia/p Ratio	0.214	0.181	0.157
Unit Discharge, * qu (csm/in)	448	460	469
Runoff, Q (in)	1.47	2.02	2.62
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	3	5	6

Summary of Computations for qu

Ia/p	#1	0.100	0.100	0.100
C0	#1	2.473	2.473	2.473
C1	#1	-0.518	-0.518	-0.518
C2	#1	-0.171	-0.171	-0.171
qu (csm)	#1	490.105	490.105	490.105
Ia/p	#2	0.300	0.300	0.300
C0	#2	2.396	2.396	2.396
C1	#2	-0.512	-0.512	-0.512
C2	#2	-0.132	-0.132	-0.132
qu (csm)	#2	416.695	416.695	416.695
* qu (csm)		448	460	469

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

BY: JJB CHKD: CAR
DATE: 8/22/97 DATE: 8/27/97

CLIENT	JOB NUMBER
NSWE	7602-0106

SUBJECT	
Determine Size & Depth of Sediment Basin #1 & 2	

BASED ON	DRAWING NUMBER
Sediment Capacity / NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
JJB 8-25-97	CDR 8/27/97		

II Calculate min width

DA #1: $W_1 = 10\sqrt{Q_5} = 10\sqrt{9\,cfs} = 30$ ft

DA #2: $W_1 = 10\sqrt{3\,cfs} = 17.3$ ft

III Determine Dimensions of Basin

Assumptions

- The sediment basin is rectangular in shape
- The downgradient (headwall) sideslope of the basin is 2:1
- The remaining sideslopes are 3:1
- The cross section of the sediment basins are as presented in Figures 2 - 4 (page 6 of 11 and 7 of 11)
- Both sediment basins will be constructed partially by excavation (upgradient end of basin) and partially by construction of barriers or dams (downgradient end). The sediment basin will be classified as "Embankment Sediment Basins" as defined in the NJ Regs.
- The minimum top width of the embankment will be 10 ft.
- A 10% freeboard will be added to the embankment height

A Drainage Area #1 - Sediment Basin #1

Assumptions:

- $W_1 > 30$ ft
- Assume Depth < 5 ft so as not to trip the NJ regulations for dams > 5 ft
- $L_0 = 100$ (due to space limitations)

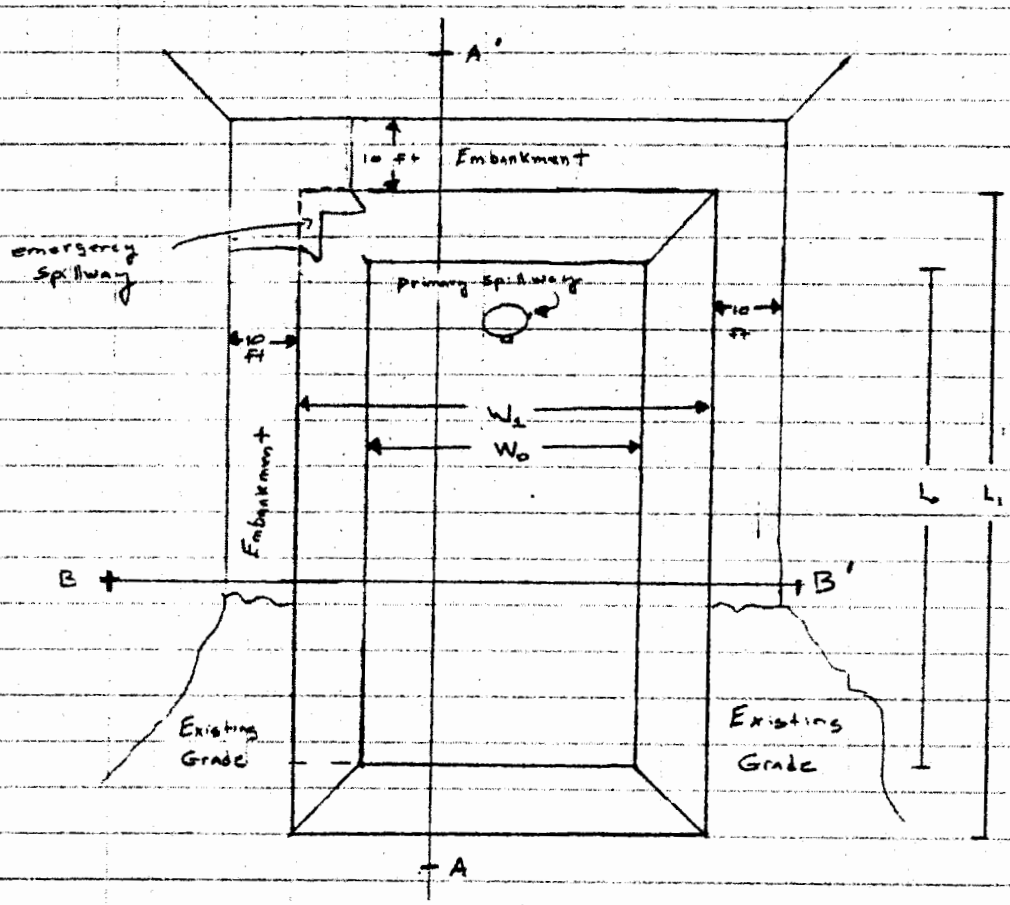
CALCULATION WORKSHEET

Order No. 19116 (91-01)

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Determine Size + Depth of Sediment Basin's #1 & #2	
BASED ON: Sediment Capacity Calcs / NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JJB 8/20/97	CAM 8/27/97		

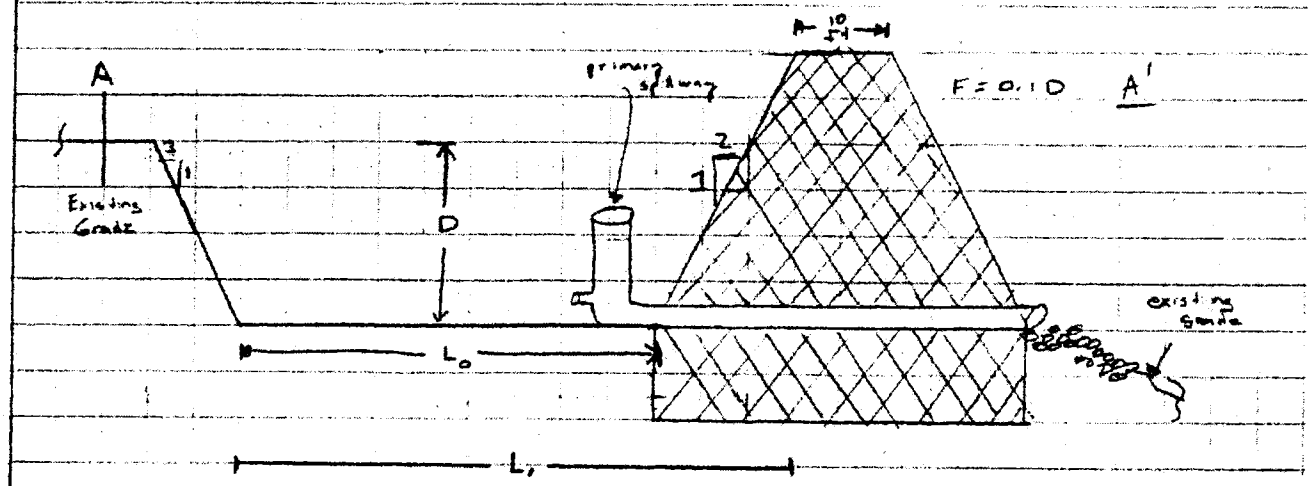
Figure 2 - Plan View



Not to scale

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Determine Size & Depth of Sediment Basin #1 & 2	
BASED ON: Sed. Capacity Calcs, NJ Regs	DRAWING NUMBER
BY: JJB 8/26/97 / CHECKED BY: GAM 8/27/97	APPROVED BY / DATE

Figure 3 - Cross Section A-A'

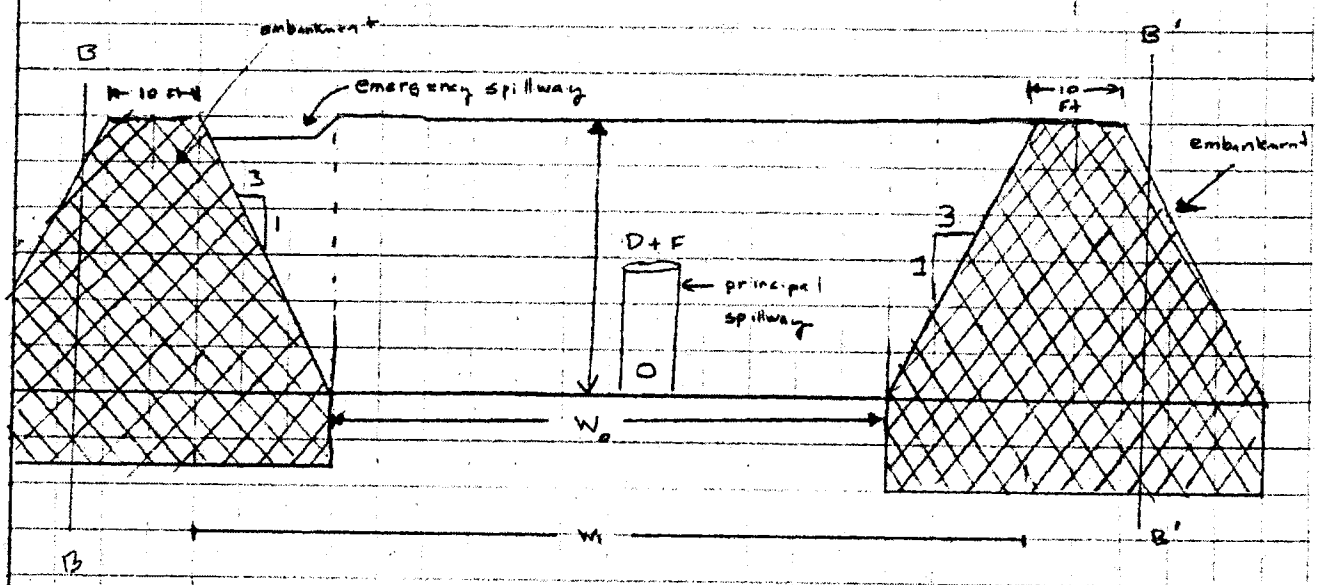


$L_1 = L_o + 6D$

Not to Scale

Figure 4

Cross section B-B'



$W_1 = W_o + 6D$

Not to Scale

CLIENT	JOB NUMBER
NSWE	7602-0100
SUBJECT: Determine Size + Depth of Sediment Basins #1 + 2	
BASED ON: Sediment Capacity / NJ Regs	DRAWING NUMBER
BY: JJB 8/26/97 / CHECKED BY: CAR 8/27/97	APPROVED BY / DATE

III. A (continued)

Given the cross section shown on pages 6 + 7, the storage capacity for a given depth is as follows.

$$V = \left(\frac{L_0 + L_1}{2}\right)\left(\frac{W_0 + W_1}{2}\right)(D)$$

The spreadsheet on the following page illustrates volume capacity for a given depth.

The required $V = 14{,}375\ ft^3$; therefore, the design criteria for sediment basin #1 is as follows.

$W_0 = 17\ ft$
$W_1 = 43.4\ ft$
$D = 4.4\ ft$
$F = 0.44\ ft$
$L_0 = 100\ ft$
$L_1 = 122\ ft$
$V = 14{,}750\ ft^3$

(B) Drainage Area #2 - Sediment Basin #2

Assumptions

- $4\ ft \leq D \leq 5\ ft$
- $V \geq 6{,}534\ ft^3$
- $L_0 = 60\ ft$
- $W_1 > 17.3\ ft$

The spreadsheet on page 9 of 11 illustrates volume capacity for a given depth.

NSWE
Site 4
Sediment Basin #1

W_o = 17 ft
L_o = 100 ft

D (ft)	L_1 (ft)	W_1 (ft)	L_{avg}	W_{avg}	V (cfs)
0.2	101	18.2	100.5	17.6	354
0.4	102	19.4	101	18.2	735
0.6	103	20.6	101.5	18.8	1,145
0.8	104	21.8	102	19.4	1,583
1	105	23	102.5	20	2,050
1.2	106	24.2	103	20.6	2,546
1.4	107	25.4	103.5	21.2	3,072
1.6	108	26.6	104	21.8	3,628
1.8	109	27.8	104.5	22.4	4,213
2	110	29	105	23	4,830
2.2	111	30.2	105.5	23.6	5,478
2.4	112	31.4	106	24.2	6,156
2.6	113	32.6	106.5	24.8	6,867
2.8	114	33.8	107	25.4	7,610
3	115	35	107.5	26	8,385
3.2	116	36.2	108	26.6	9,193
3.4	117	37.4	108.5	27.2	10,034
3.6	118	38.6	109	27.8	10,909
3.8	119	39.8	109.5	28.4	11,817
4	120	41	110	29	12,760
4.2	121	42.2	110.5	29.6	13,737
4.3	121.5	42.8	110.75	29.9	14,239
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.6	123	44.6	111.5	30.8	15,797
4.8	124	45.8	112	31.4	16,881
5	125	47	112.5	32	18,000
5.2	126	48.2	113	32.6	19,156
5.4	127	49.4	113.5	33.2	20,348
5.6	128	50.6	114	33.8	21,578

BY: JJB
DATE: 8/26/97

CHKD: CAR
DATE: 8/27/97

NSWE
Site 4
Sediment Basin #2

W_o = 10 ft
L_o = 60 ft

D (ft)	L_1 (ft)	W_1 (ft)	L_{avg}	W_{avg}	V (cfs)
0.2	61	11.2	60.5	10.6	128
0.4	62	12.4	61	11.2	273
0.6	63	13.6	61.5	11.8	435
0.8	64	14.8	62	12.4	615
1	65	16	62.5	13	813
1.2	66	17.2	63	13.6	1,028
1.4	67	18.4	63.5	14.2	1,262
1.6	68	19.6	64	14.8	1,516
1.8	69	20.8	64.5	15.4	1,788
2	70	22	65	16	2,080
2.2	71	23.2	65.5	16.6	2,392
2.4	72	24.4	66	17.2	2,724
2.6	73	25.6	66.5	17.8	3,078
2.8	74	26.8	67	18.4	3,452
3	75	28	67.5	19	3,848
3.2	76	29.2	68	19.6	4,265
3.4	77	30.4	68.5	20.2	4,705
3.6	78	31.6	69	20.8	5,167
3.8	79	32.8	69.5	21.4	5,652
4	80	34	70	22	6,160
4.4	82	36.4	71	23.2	7,248
4.6	83	37.6	71.5	23.8	7,828
4.8	84	38.8	72	24.4	8,433
4.9	84.5	39.4	72.25	24.7	8,744
5	85	40	72.5	25	9,063
5.2	86	41.2	73	25.6	9,718
5.4	87	42.4	73.5	26.2	10,399
5.6	88	43.6	74	26.8	11,106

BY: JJB CKKD: CAR
DATE: 8/26/97 DATE: 8/27/97

CALCULATION WORKSHEET

Order No. 19116 (91-91)

CLIENT: NSWE	JOB NUMBER: 7602-0106
SUBJECT: Determine Size & Depth of Sediment Basin #1 & 2 - Site 4	
BASED ON: Sediment Capacity Calcs / NJ Regs	DRAWING NUMBER:
BY: JAB 8/25/97	CHECKED BY: CAR 8/27/97
APPROVED BY:	DATE:

III. B (Continued)

The design criteria for sediment Basin #2 is as follows:

W_0 = 10 ft

W_1 = 35.2 ft

L_0 = 60 ft

L_1 = 81 ft

D = 4.2 ft

V = 6,692 ft^3

F = 0.42 ft

C.3 OVERVIEW AND SUMMARY OF FINAL CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF SEDIMENT BASINS

CALCULATION WORKSHEET Order No. 19116 (01-81)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

Site 4

SEDIMENT BASIN DESIGN
BASED ON NJ REGULATIONS

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	NSWE
JOB NUMBER	7602-0106
SUBJECT	Site 4 - Sed Basin Design
DRAWING NUMBER	
BASED ON	NJ Regs
BY	CBF
CHECKED BY	BER 11/6/97
APPROVED BY	
DATE	11/4/97

PAGE Summary OF

SUMMARY OF SEDIMENT BASIN Design for Site 4

Sed Basin	Top Elevation	Bottom Elevation	Available Volume
1	162 ft	155.5 ft	0.50 ac-ft
2	160 ft	153.75 ft	0.23 ac-ft

Sed Basin	Trapezoidal Weir Crest Elev	Trap Weir Crest width	Riser Pipe Crest Elev	Riser Pipe Diameter	4-in Orifice Elevation
1	161 ft	15 ft	160 ft	18 in	159 ft
2	159 ft	10 ft	158 ft	12 in	157 ft

Sed Basin	Peak Inflow 10-yr Storm	Peak Outflow 10-yr Storm	Peak Storage 10-yr Storm	Peak Elevation 10-yr Storm
1	14 cfs	8.62 cfs	0.43 ac-ft	161.50 ft
2	5 cfs	3.29 cfs	0.17 ac-ft	159.09 ft

* Bottom width of sed basin 2 (6.5 ft) does not conform with the NJ Regulation minimum width requirement of 10 ft.

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Site 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER
BY: CSF / CHECKED BY: BER 11/6/97	APPROVED BY / DATE: 11/4/97

REGULATIONS GOVERNING SED BASIN DESIGN

Sediment basins sized for Site 4 must satisfy the following requirements as given in the New Jersey regulations (Revised April 1987):

1. Available volume in Sed basin #1 & #2 below the crest elevation of the emergency spillway must achieve 70% trap efficiency at the start of its useful life.

From calculations prepared earlier (pg 1 of 1, 8/25/97) these values are:

Sed Basin	Trap Efficiency	Equiv Volume
1	0.33 ac ft	14750 ft^3
2	0.15 ac ft	6692 ft^3

2. Crest of the principal spillways for sed basins 1 & 2 must be located at the lesser of:

a) 1 ft below the emergency spillway crest

b) an elevation that provides between the crest of the principal spillway & the crest of the emergency spillway the required temporary floodwater storage for a 2-yr, 24-hr Type III storm

CLIENT	JOB NUMBER		
NSWE	7602 - 0106		
SUBJECT: Site 4 - Sed Basin Design			
BASED ON: NJ Regs		DRAWING NUMBER	
BY: CSF	CHECKED BY: BER 11/6/97	APPROVED BY	DATE: 11/4/97

From earlier calcs (pg 6 of 11 & pg 7 of 11, 8/25/97) the following data is given:

Drainage Area	Peak Discharge (2-yr, 24-hr)	Rainfall
1	5 cfs	3.4 (in)
2	2 cfs	3.4 (in)

3. From the crest of the principal spillway:

a) the average sed basin depth ≥ 4 ft

b) min sed basin width ≥ $10\sqrt{Q_5}$
Q_5 = peak discharge 5-yr storm

c) minimum sed basin length ≥ 2 x sed basin width

From earlier calcs (pg 3 of 11, pg 4 of 11, 8/25/97) the following data is given:

Drainage Area	Peak Discharge (5yr-24hr)	Rainfall	Min Basin Width (ft)
1	9 cfs	4.4 in	30
2	3 cfs	4.4 in	17

CLIENT	JOB NUMBER
NSWC	7602-0106
SUBJECT: Site 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CJF	BER 11/6/97		11/4/97

4. Minimum capacity of the emergency spillway for each sed basin will be capable of accommodating peak flow generated for a 10-yr, 24-hr storm**

From earlier calcs (pg 7 of 11, pg 8 of 11, 8/27/97) the following data were found:

Drainage Area	Peak Discharge (10-yr, 24-hr)	Rainfall
1	13 cfs	5.2 in
2	5 cfs	5.2 in

** Less any reduction creditable to conduit discharge + detention storage

5. Maximum flow velocity from the emergency spillway must be ≤ 4 ft/sec

6. Maxim sed basin sideslope is 2:1 with a minimum 10 ft bottom width

7. Minimum diameter for a stick up pipe used for the primary sed basin outlet:

8 in - CMP
6 in - smooth walled

CLIENT NSWE	JOB NUMBER 7602-0106
SUBJECT Site 4 - Sed Basin Design	
BASED ON NJ Regs	DRAWING NUMBER
BY CSF / CHECKED BY BER 11/6/97	APPROVED BY / DATE 11/4/97

8. A maximum 4-in diameter hole must be located in the stick-up to promote sed basin drainage.

The vertical location of the drainage hole on the stick-up will allow for 50% drop efficiency with regards to sediment capture

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Site 4- Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER
BY: CSF / CHECKED BY: BER 11/6/97	APPROVED BY / DATE: 11/4/97

SEDIMENT BASIN SIZING BASED ON
PRECEEDING REGULATIONS

- Use Haestad Methods TR-55 and Pond-2 modeling packages to evaluate runoff flow through the sediment ponds proposed for Site 4 and to size outlet structures.

- Using TR-55, the hydrographs for the 2-yr and 10-yr storms are calculated (see pp 6 → 30)

TR-55 Hydrograph Computation Summary

Sed Basin	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
1 - 2yr Storm	5	12.3
1 - 10yr storm	14	12.3
2 - 2y storm	2	12.4
2 - 10yr storm	5	12.4

C.4 BASIN INFLOW HYDROGRAPHS

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:17:51
Watershed file: --> DA1-2YR .WSD
Hydrograph file: --> DA1-2YR .HYD

Hydrograph for 2yr, 24hr storm through Drainage Area 1
of Site 4.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
Drainage Area 1	7.23	70.0	0.20	0.00	3.40	0.95	.25	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 7.23 acres or 0.01130 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 1	0.23	0.00	0.20	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:17:51
Watershed file: --> DA1-2YR .WSD
Hydrograph file: --> DA1-2YR .HYD

Hydrograph for 2yr, 24hr storm through Drainage Area 1
of Site 4.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 1	5	12.3
Composite Watershed	5	12.3

Quick TR-55 Version: 5.46 S/N:

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:17:51
Watershed file: --> DA1-2YR .WSD
Hydrograph file: --> DA1-2YR .HYD

Hydrograph for 2yr, 24hr storm through Drainage Area 1
of Site 4.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 1	0	0	0	0	1	1	3	5	5
Total (cfs)	0	0	0	0	1	1	3	5	5

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 1	4	3	2	2	1	1	1	1	1
Total (cfs)	4	3	2	2	1	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
Drainage Area 1	1	1	1	1	1	0	0	0	0
Total (cfs)	1	1	1	1	1	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:17:51
Watershed file: --> DA1-2YR .WSD
Hydrograph file: --> DA1-2YR .HYD

Hydrograph for 2yr, 24hr storm through Drainage Area 1
of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	0	15.3	1
11.6	0	15.4	1
11.7	0	15.5	1
11.8	0	15.6	1
11.9	0	15.7	1
12.0	1	15.8	0
12.1	1	15.9	0
12.2	3	16.0	0
12.3	5	16.1	0
12.4	5	16.2	0
12.5	4	16.3	0
12.6	3	16.4	0
12.7	2	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0

14.7	1	18.5	0	10

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:17:51
Watershed file: --> DA1-2YR .WSD
Hydrograph file: --> DA1-2YR .HYD

Hydrograph for 2yr, 24hr storm through Drainage Area 1
of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:11:56
Watershed file: --> DA110YR .WSD
Hydrograph file: --> DA110YR .HYD

Hydrograph for 10-yr, 24-hr event within Drainage Area 1
of Site 4.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
Drainage Area 1	7.23	70.0	0.20	0.00	5.20	2.19	.16	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 7.23 acres or 0.01130 sq.mi
Peak discharge = 14 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 1	0.23	0.00	0.20	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:11:56
Watershed file: --> DA110YR .WSD
Hydrograph file: --> DA110YR .HYD

Hydrograph for 10-yr, 24-hr event within Drainage Area 1
of Site 4.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 1	14	12.3
Composite Watershed	14	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:11:56
Watershed file: --> DA110YR .WSD
Hydrograph file: --> DA110YR .HYD

Hydrograph for 10-yr, 24-hr event within Drainage Area 1
of Site 4.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 1	1	1	1	3	4	6	11	14	12
Total (cfs)	1	1	1	3	4	6	11	14	12

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 1	9	7	5	3	2	2	2	1	1
Total (cfs)	9	7	5	3	2	2	2	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
Drainage Area 1	1	1	1	1	1	1	1	1	0
Total (cfs)	1	1	1	1	1	1	1	1	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:11:56
Watershed file: --> DA110YR .WSD
Hydrograph file: --> DA110YR .HYD

Hydrograph for 10-yr, 24-hr event within Drainage Area 1
of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	1	14.8	1
11.1	1	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	2	15.5	1
11.8	2	15.6	1
11.9	3	15.7	1
12.0	4	15.8	1
12.1	6	15.9	1
12.2	11	16.0	1
12.3	14	16.1	1
12.4	12	16.2	1
12.5	9	16.3	1
12.6	7	16.4	1
12.7	5	16.5	1
12.8	3	16.6	1
12.9	2	16.7	1
13.0	2	16.8	1
13.1	2	16.9	1
13.2	2	17.0	1
13.3	2	17.1	1
13.4	2	17.2	1
13.5	2	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0

14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:11:56
Watershed file: --> DA110YR .WSD
Hydrograph file: --> DA110YR .HYD

Hydrograph for 10-yr, 24-hr event within Drainage Area 1
of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:20:12
Watershed file: --> DA2-2YR .WSD
Hydrograph file: --> DA2-2YR .HYD

Hydrograph for 2-yr, 24 hr storm in Drainage Area 2
for Site 4.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
Drainage Area 2	3.23	68.0	0.30	0.00	3.40	0.84	.28	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.23 acres or 0.00505 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 2	0.31	0.00	0.30	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:20:12
Watershed file: --> DA2-2YR .WSD
Hydrograph file: --> DA2-2YR .HYD

Hydrograph for 2-yr, 24 hr storm in Drainage Area 2
for Site 4.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 2	2	12.4
Composite Watershed	2	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:20:12
Watershed file: --> DA2-2YR .WSD
Hydrograph file: --> DA2-2YR .HYD

Hydrograph for 2-yr, 24 hr storm in Drainage Area 2
for Site 4.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 2	0	0	0	0	0	0	1	1	2
Total (cfs)	0	0	0	0	0	0	1	1	2

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 2	2	2	1	1	1	0	0	0	0
Total (cfs)	2	2	1	1	1	0	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
Drainage Area 2	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:20:12
Watershed file: --> DA2-2YR .WSD
Hydrograph file: --> DA2-2YR .HYD

Hydrograph for 2-yr, 24 hr storm in Drainage Area 2
for Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	1	16.0	0
12.3	1	16.1	0
12.4	2	16.2	0
12.5	2	16.3	0
12.6	2	16.4	0
12.7	1	16.5	0
12.8	1	16.6	0
12.9	1	16.7	0
13.0	1	16.8	0
13.1	0	16.9	0
13.2	0	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0

14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:20:12
Watershed file: --> DA2-2YR .WSD
Hydrograph file: --> DA2-2YR .HYD

Hydrograph for 2-yr, 24 hr storm in Drainage Area 2
for Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:13:58
Watershed file: --> DA210YR .WSD
Hydrograph file: --> DA210YR .HYD

Hydrograph for 10-yr,24-hr storm event for Drainage Area 2
of Site 4.

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
Drainage Area 2	3.23	68.0	0.30	0.00	5.20	2.02	.18	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.23 acres or 0.00505 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
Drainage Area 2	0.31	0.00	0.30	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:13:58
Watershed file: --> DA210YR .WSD
Hydrograph file: --> DA210YR .HYD

Hydrograph for 10-yr,24-hr storm event for Drainage Area 2 of Site 4.

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
Drainage Area 2	5	12.4
Composite Watershed	5	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:13:58
Watershed file: --> DA210YR .WSD
Hydrograph file: --> DA210YR .HYD

Hydrograph for 10-yr,24-hr storm event for Drainage Area 2 of Site 4.

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
Drainage Area 2	0	0	0	1	1	2	3	4	5
Total (cfs)	0	0	0	1	1	2	3	4	5

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
Drainage Area 2	5	4	3	2	1	1	1	1	1
Total (cfs)	5	4	3	2	1	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
Drainage Area 2	1	0	0	0	0	0	0	0	0
Total (cfs)	1	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
Drainage Area 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:13:58
Watershed file: --> DA210YR .WSD
Hydrograph file: --> DA210YR .HYD

Hydrograph for 10-yr,24-hr storm event for Drainage Area 2 of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	1	15.6	0
11.9	1	15.7	0
12.0	1	15.8	0
12.1	2	15.9	0
12.2	3	16.0	0
12.3	4	16.1	0
12.4	5	16.2	0
12.5	5	16.3	0
12.6	4	16.4	0
12.7	3	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0

14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 10-31-1997 09:13:58
Watershed file: --> DA210YR .WSD
Hydrograph file: --> DA210YR .HYD

Hydrograph for 10-yr,24-hr storm event for Drainage Area 2 of Site 4.

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

C.5 ELEVATION-STORAGE MATRIX

CLIENT	JOB NUMBER
NSWC	7602 - 0106
SUBJECT: Site 4 Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 11/6/97		11/4/97

SEDIMENT BASIN SIZING

- Assume the following preliminary sed basin dimensions:

Sed Basin	Elev Basin Top (ft)	Elev Basin Bottom (ft)	Basin Volume
1	162	155.50	0.50 ac-ft 21780 ft³
2	160	153.75	0.23 ac-ft 10020 ft³

- Berm width along the top of each sed basin will be 10 ft

- Use Pond-2 to calculate incremental sed basin volumes at 1 ft vertical intervals within each basin
  See Pond-2 volume calculations (p 32 & 33)

POND-2 Version: 5.17
S/N:

32

Computes available storage volume in Detention Pond 1 for Site 4.

CALCULATED 10-31-1997 11:10:45
DISK FILE: DA1 .VOL

Planimeter scale: 1 inch = 0.083333 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
155.50	0.00	0.00	0.00	0.00	0.00
156.00	183,648.00	0.03	0.03	0.00	0.00
157.00	279,702.00	0.04	0.11	0.04	0.04
158.00	385,858.00	0.06	0.16	0.05	0.09
159.00	502,115.00	0.08	0.21	0.07	0.16
160.00	628,476.00	0.10	0.27	0.09	0.25
161.00	764,936.00	0.12	0.33	0.11	0.37
162.00	911,501.00	0.15	0.40	0.13	0.50

AVG 0.31

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

* 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

POND-2 Version: 5.17
S/N:

Computes available storage volume in Detention Pond 2 of Site 4.

CALCULATED 11-02-1997 17:06:43
DISK FILE: DA2 .VOL

Planimeter scale: 1 inch = 0.083333 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
153.75	0.00	0.00	0.00	0.00	0.00
154.00	36,331.00	0.01	0.01	0.00	0.00
155.00	96,566.00	0.02	0.03	0.01	0.01
156.00	156,571.00	0.02	0.06	0.02	0.03
157.00	227,088.00	0.04	0.09	0.03	0.06
158.00	307,296.00	0.05	0.13	0.04	0.10
159.00	399,600.00	0.06	0.17	0.06	0.16
160.00	501,552.00	0.08	0.22	0.07	0.23

$$IA = (sq.rt(Area1) + ((Ei-E1)/(E2-E1))*(sq.rt(Area2)-sq.rt(Area1)))^2$$

where: E1, E2 = Closest two elevations with planimeter data
Ei = Elevation at which to interpolate area
Area1,Area2 = Areas computed for E1, E2, respectively
IA = Interpolated area for Ei

* 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

C.6 OUTLET STRUCTURE DESIGN

CLIENT NSWE	JOB NUMBER 7602-0106
SUBJECT Site 4 - Sed Basin Design	
BASED ON NJ Regs	DRAWING NUMBER
BY CSF / CHECKED BY BER 11/6/97	APPROVED BY / DATE 11/4/97

OUTLET STRUCTURE SIZING

Assume the location of the crest of the principal spillways for sed basin 1 & 2 are located 1ft below the crest of emergency spillways.

Assume:

Sed Basin	Principal Spillway Type*	Size (in)*	Elev (ft)
1	smooth riser	18 dia	160
2	smooth riser	12 dia	158

Sed Basin	Emergency Spillway Type	Size (ft)	Elev (ft)
1	Trapez. (3:1 sideslope)	15 bottom	161
2	Trapez (3:1 sideslope)	10 bottom	159

- According to requirement #8 (p 4) a 4-in drainage hole must be installed in each primary spillway riser pipe

Sed Basin	Drainage Hole Size	Elev (ft)
1	4 in dia	159
2	4 in dia	157

* Use same size & type of pipe to convey stormwater to wetlands outlet

CLIENT	JOB NUMBER
NSWC	7602 - 0106

SUBJECT: S-6 4 - Sed Basin Design

BASED ON	DRAWING NUMBER
NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
C&F	BER 11/6/97		11/4/97

CHECK EACH SED. BASIN DESIGN (p 5 → 34)
FOR COMPLIANCE WITH LISTED REGULATIONS (p 1 → 4)

1. Each sed basin must achieve 70% trap efficiency to crest of emergency spillway (regulation #1 p 1)

From p 1 of earlier calculations (p 1 of 1 8/24/97)

Sed Basin	70% Trap Efficiency Equivalent Volume (ft³)
1	14750
2	6692

From Pond-2 Storage Volume Calc (see p 32 & 33)

Sed Basin	Elev to Emergency Spillway Crest (ft)	Available Volume to E.S. Crest (ft³)	
1	161	16117	OK
2	159	6970	OK

CLIENT: NSWC	JOB NUMBER: 7602-0006
SUBJECT: S:6 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER:
BY: CSF / CHECKED BY: BER 11/6/97	APPROVED BY: / DATE: 11/4/97

2. Each sed basin must achieve 50% trap efficiency to crest of 4-in orifice (regula #8 p

- Calculate the elevation of the 4-in diameter drainage hole to provide sufficient sed basin volume to achieve 50% trap efficiency

- Following guidance of earlier calcs (p 1 of 3, 8/24/97) use equation:

$$\text{Trap efficiency} = C/I$$

From earlier calcs (p 1 of 3, 8/24/97)

$$I_{DA_1} = 13.315 \text{ ac-ft}$$

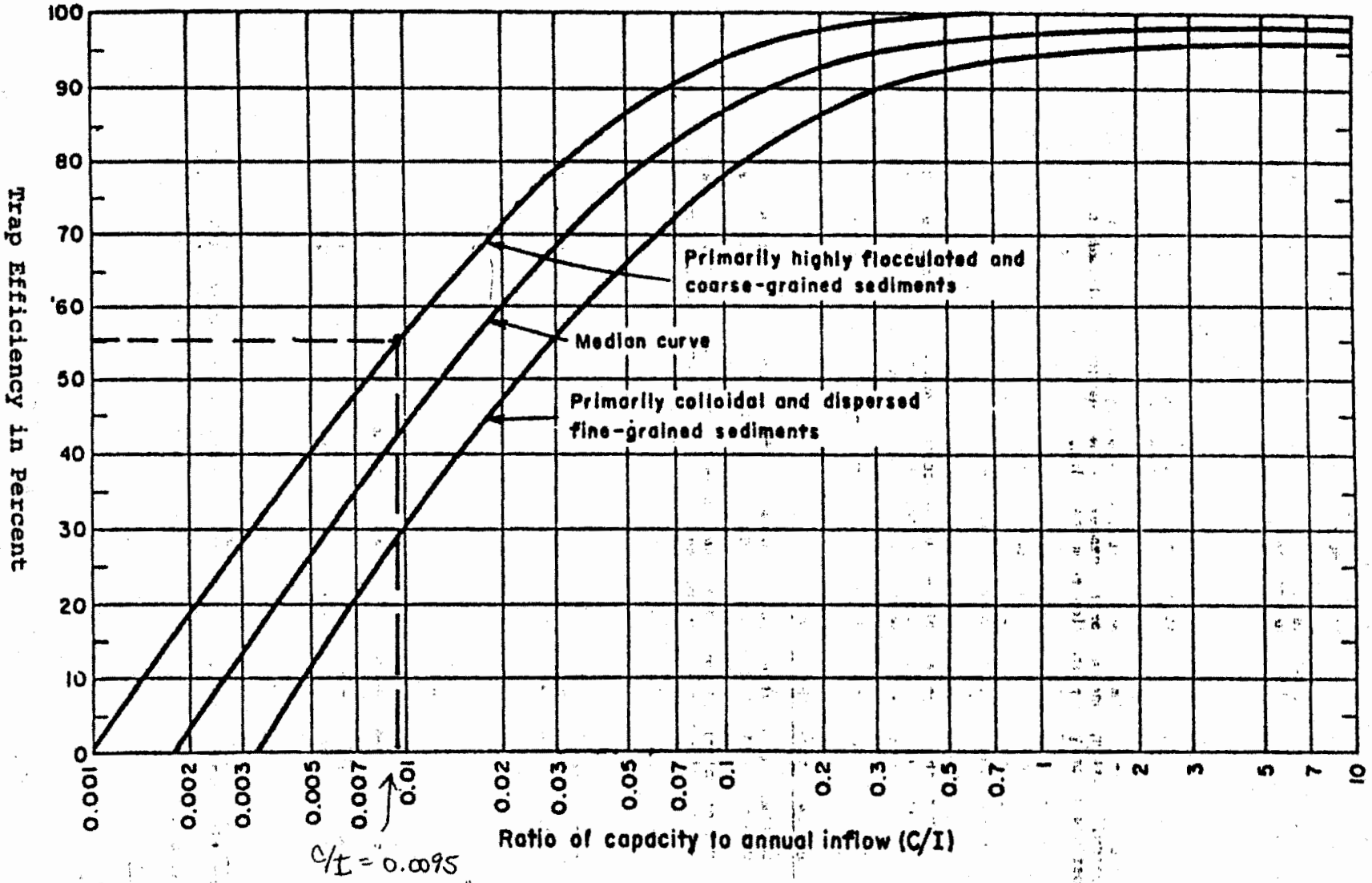
$$I_{DA_2} = 5.949 \text{ ac-ft}$$

From curve 4.4-1 (see p 37)

$$\text{Trap efficiency}_{55\%} = C/I = 0.0095 \checkmark$$

$$\Rightarrow C_{DA_1} = (0.0095)(13.315 \text{ ac-ft}) = 0.126 \text{ ac-ft} = 5510 \text{ ft}^3 \checkmark$$

$$\Rightarrow C_{DA_2} = (0.0095)(5.949 \text{ ac-ft}) = 0.0565 \text{ ac-ft} = 2462 \text{ ft}^3 \checkmark$$



CURVE 4.4-1

TRAP EFFICIENCY OF RESERVOIRS

Reference: Brune, Gunnar M., "Trap Efficiency of Reservoirs", Trans. AGU, Vol. 34, No.3, pp 407-418, June 1953.

CLIENT	JOB NUMBER
NSWE	7602 - 0106
SUBJECT: Site 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER
BY: CSF / CHECKED BY: BER 11/6/97	APPROVED BY / DATE: 11/4/97

- Examine POND-2 volume calcs to find corresponding sed basin elevation that will provide the required 50% trap efficiency volume:

Sed Basin	Required Volume 50% Trap Efficiency	Sed Basin Volume	Corresponding Sed Basin Elev
1	0.126 Ac-ft (p 36)	0.16 Ac-ft (p 32)	159 ft OK
2	0.0565 Ac-ft (p 36)	0.06 Ac-ft (p 33)	157 ft OK

3. The minimum capacity of the emergency spillway must be capable of handling 10-yr, 24 hr storm (including discharge from primary spillways) (reg #4 p 3)

- Use POND-2 to produce composite outflow summaries for the outflow structures proposed for each sed basin (p 41 → 54)

- Use POND-2 to route 10-yr, 24-hr storm hydrographs (p 12 → 17, 25 → 30) through proposed sediment ponds & outlet structures (p 55 → 70)

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2 for Site 4.

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
153.75	0.0	
154.75	0.0	
155.75	0.0	
156.75	0.0	
157.75	0.4	1
158.00	0.4	2 +1
158.75	1.8	2 +1
159.00	2.5	3 +2 +1
159.75	8.9	3 +2 +1
160.00	0.0	

NOTE: Composite outflow calcs reflect rectangular cross-section for emergency spillway as required by POND-2 model. Trapezoidal spillway will offer greater capacity.

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

Outlet Structure File: DA2 .STR
Planimeter Input File: DA2 .VOL
Rating Table Output File: DA2 .PND

Min. Elev.(ft) = 153.75 Max. Elev.(ft) = 160 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *
159 158

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	3		->	3
STAND PIPE	2		->	2
ORIFICE	1		->	1

Outflow rating table summary was stored in file:
DA2 .PND

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	159
E2 elev.(ft)?	160
Weir coefficient?	.6
Weir elev.(ft)?	159
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE
Stand Pipe with weir or orifice flow

E1 elev.(ft)? 158
E2 elev.(ft)? 160
Crest elev.(ft)? 158
Diameter (ft)? 1.0
Weir coefficient? .6
Orifice coefficient? .73
Start transition elev.(ft) @ ?
Transition height (ft)? 1

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	157.00
E2 elev.(ft)?	160
Orifice coeff.?	.61
Invert elev.(ft)?	157
Datum elev.(ft) ?	157
Orifice area (sq ft)?	0.0873

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
153.75	0.0	E < Inv.El.= 159
154.75	0.0	E < Inv.El.= 159
155.75	0.0	E < Inv.El.= 159
156.75	0.0	E < Inv.El.= 159
157.75	0.0	E < Inv.El.= 159
158.00	0.0	E < Inv.El.= 159
158.75	0.0	E < Inv.El.= 159
159.00	0.0	H =0.0
159.75	3.8	H =.750
160.00	0.0	E = or > E2=160

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (159 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
153.75	0.0	E < Inv.El.= 158
154.75	0.0	E < El=158
155.75	0.0	E < El=158
156.75	0.0	E < El=158
157.75	0.0	E < El=158
158.00	0.0	Weir: H =0.0
158.75	1.2	Weir: H =.750
159.00	1.9	Weir: H =1.0
159.75	4.4	Weir: H =1.75
160.00	0.0	E = or > E2=160

Weir Cw = .6 Weir length = 3.141593 ft
Orifice Co = .73 Orifice area = .7853982 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
Transition interpolated between elev. 159.9409 and 160.9409 ft
Weir equation = Orifice equation @ elev.= 160.4409 ft

Outlet Structure File: DA2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 2
for Site 4.

****

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
153.75	0.0	E < E1=157.00
154.75	0.0	E < E1=157.00
155.75	0.0	E < E1=157.00
156.75	0.0	E < E1=157.00
157.75	0.4	H =.750
158.00	0.4	H =1.0
158.75	0.6	H =1.75
159.00	0.6	H =2.0
159.75	0.7	H =2.75
160.00	0.0	E = or > E2=160

C = .61 A = .0873 sq.ft.
H (ft) = Table elev. - Datum elev. (157 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1 for Site 4.

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
155.50	0.0	
156.50	0.0	
157.50	0.0	
158.50	0.0	
159.50	0.3	1
160.00	0.4	2 +1
160.50	1.5	2 +1
161.00	3.4	3 +2 +1
161.50	9.0	3 +2 +1
162.00	17.6	3 +2 +1

NOTE: Composite outflow calcs reflect rectangular cross-section for emergency spillway as required by POND-2 model. Trapezoidal spillway will offer greater available capacity.

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

Outlet Structure File: DA1 .STR
Planimeter Input File: DA1 .VOL
Rating Table Output File: DA1 .PND

Min. Elev.(ft) = 155.5 Max. Elev.(ft) = 162 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *
161.0 160.0

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	3		->	3
STAND PIPE	2		->	2
ORIFICE	1		->	1

Outflow rating table summary was stored in file:
DA1 .PND

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)? 161
E2 elev.(ft)? 162.001
Weir coefficient? .6
Weir elev.(ft)? 161
Length (ft)? 15
Contracted/Suppressed (C/S)? C

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE
Stand Pipe with weir or orifice flow

E1 elev.(ft)? 160
E2 elev.(ft)? 162.001
Crest elev.(ft)? 160
Diameter (ft)? 1.5
Weir coefficient? 0.6
Orifice coefficient? 0.73
Start transition elev.(ft) @ ?
Transition height (ft)? 1

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	159.0
E2 elev.(ft)?	162.001
Orifice coeff.?	.61
Invert elev.(ft)?	159.0
Datum elev.(ft) ?	159.0
Orifice area (sq ft)?	0.0873

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
155.50	0.0	E < Inv.El.= 161
156.50	0.0	E < Inv.El.= 161
157.50	0.0	E < Inv.El.= 161
158.50	0.0	E < Inv.El.= 161
159.50	0.0	E < Inv.El.= 161
160.00	0.0	E < Inv.El.= 161
160.50	0.0	E < Inv.El.= 161
161.00	0.0	H =0.0
161.50	3.2	H =.5
162.00	8.9	H =1.0

C = .6 L (ft) = 15
H (ft) = Table elev. - Invert elev. (161 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
155.50	0.0	E < Inv.El.= 160
156.50	0.0	E < El= 160
157.50	0.0	E < El= 160
158.50	0.0	E < El= 160
159.50	0.0	E < El= 160
160.00	0.0	Weir: H =0.0
160.50	1.0	Weir: H =.5
161.00	2.8	Weir: H =1.0
161.50	5.2	Weir: H =1.5
162.00	8.0	Weir: H =2.0

Weir Cw = .6 Weir length = 4.712389 ft
Orifice Co = .73 Orifice area = 1.767146 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
Transition interpolated between elev. 163.1614 and 164.1614 ft
Weir equation = Orifice equation @ elev.= 163.6614 ft

Outlet Structure File: DA1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****
Multi drainage outlet design calculations for Settlement Pond 1
for Site 4.

****

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
155.50	0.0	E < E1=159.0
156.50	0.0	E < E1=159.0
157.50	0.0	E < E1=159.0
158.50	0.0	E < E1=159.0
159.50	0.3	H =.5
160.00	0.4	H =1.0
160.50	0.5	H =1.5
161.00	0.6	H =2.0
161.50	0.7	H =2.5
162.00	0.7	H =3.0

C = .61 A = .0873 sq.ft.
H (ft) = Table elev. - Datum elev. (159 ft)
Q (cfs) = C * A * sqr(2g * H)

C.7 HYDROGRAPH ROUTINGS AND OUTFLOW CALCULATIONS

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:33:44


```
*********************************************************************
*                                                                   *
* Multi drainage outlet design calculations for Settlement Pond 1   *
*                          for Site 4.                              *
*                                                                   *
*                                                                   *
*                                                                   *
*********************************************************************
```

Inflow Hydrograph: DA110YR .HYD
Rating Table file: DA1 .PND

----INITIAL CONDITIONS----
Elevation = 155.50 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
155.50	0.0	0.000	0.0	0.0
156.50	0.0	0.021	5.2	5.2
157.50	0.0	0.066	15.9	15.9
158.50	0.0	0.127	30.8	30.8
159.50	0.3	0.207	50.2	50.5
160.00	0.4	0.255	61.7	62.1
160.50	1.5	0.308	74.4	75.9
161.00	3.4	0.366	88.5	91.9
161.50	9.0	0.430	104.0	113.0
162.00	17.6	0.499	120.8	138.4

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:33:44

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	1.00	-----	0.0	0.0	0.00	155.50
11.100	1.00	2.0	2.0	2.0	0.00	155.89
11.200	1.00	2.0	4.0	4.0	0.00	156.28
11.300	1.00	2.0	6.0	6.0	0.00	156.58
11.400	1.00	2.0	8.0	8.0	0.00	156.76
11.500	1.00	2.0	10.0	10.0	0.00	156.95
11.600	1.00	2.0	12.0	12.0	0.00	157.14
11.700	2.00	3.0	15.0	15.0	0.00	157.41
11.800	2.00	4.0	19.0	19.0	0.00	157.71
11.900	3.00	5.0	24.0	24.0	0.00	158.04
12.000	4.00	7.0	31.0	31.0	0.00	158.51
12.100	6.00	10.0	40.7	41.0	0.16	159.02
12.200	11.00	17.0	57.0	57.7	0.36	159.81
12.300	14.00	25.0	77.5	82.0	2.22	160.69
12.400	12.00	26.0	90.5	103.5	6.49	161.28
12.500	9.00	21.0	94.3	111.5	8.62	161.47
12.600	7.00	16.0	93.7	110.3	8.29	161.44
12.700	5.00	12.0	91.6	105.7	7.07	161.33
12.800	3.00	8.0	88.7	99.6	5.44	161.18
12.900	2.00	5.0	85.9	93.7	3.87	161.04
13.000	2.00	4.0	83.6	89.9	3.17	160.94
13.100	2.00	4.0	81.8	87.6	2.89	160.87
13.200	2.00	4.0	80.5	85.8	2.68	160.81
13.300	2.00	4.0	79.5	84.5	2.52	160.77
13.400	2.00	4.0	78.7	83.5	2.39	160.74
13.500	2.00	4.0	78.1	82.7	2.30	160.71
13.600	1.00	3.0	76.8	81.1	2.11	160.66
13.700	1.00	2.0	75.2	78.8	1.85	160.59
13.800	1.00	2.0	73.9	77.2	1.64	160.54
13.900	1.00	2.0	72.9	75.9	1.49	160.50
14.000	1.00	2.0	72.0	74.9	1.42	160.46
14.100	1.00	2.0	71.3	74.0	1.35	160.43
14.200	1.00	2.0	70.8	73.3	1.29	160.41
14.300	1.00	2.0	70.3	72.8	1.25	160.39
14.400	1.00	2.0	69.8	72.3	1.21	160.37
14.500	1.00	2.0	69.5	71.8	1.18	160.35
14.600	1.00	2.0	69.2	71.5	1.15	160.34
14.700	1.00	2.0	69.0	71.2	1.12	160.33
14.800	1.00	2.0	68.7	71.0	1.10	160.32
14.900	1.00	2.0	68.6	70.7	1.09	160.31
15.000	1.00	2.0	68.4	70.6	1.07	160.31
15.100	1.00	2.0	68.3	70.4	1.06	160.30
15.200	1.00	2.0	68.2	70.3	1.05	160.30
15.300	1.00	2.0	68.1	70.2	1.04	160.29
15.400	1.00	2.0	68.0	70.1	1.04	160.29

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:33:44

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	1.00	2.0	68.0	70.0	1.03	160.29
15.600	1.00	2.0	67.9	70.0	1.03	160.28
15.700	1.00	2.0	67.9	69.9	1.02	160.28
15.800	1.00	2.0	67.8	69.9	1.02	160.28
15.900	1.00	2.0	67.8	69.8	1.02	160.28
16.000	1.00	2.0	67.8	69.8	1.01	160.28
16.100	1.00	2.0	67.8	69.8	1.01	160.28
16.200	1.00	2.0	67.7	69.8	1.01	160.28
16.300	1.00	2.0	67.7	69.7	1.01	160.28
16.400	1.00	2.0	67.7	69.7	1.01	160.28
16.500	1.00	2.0	67.7	69.7	1.01	160.28
16.600	1.00	2.0	67.7	69.7	1.00	160.27
16.700	1.00	2.0	67.7	69.7	1.00	160.27
16.800	1.00	2.0	67.7	69.7	1.00	160.27
16.900	1.00	2.0	67.7	69.7	1.00	160.27
17.000	1.00	2.0	67.7	69.7	1.00	160.27
17.100	1.00	2.0	67.7	69.7	1.00	160.27
17.200	1.00	2.0	67.7	69.7	1.00	160.27
17.300	0.00	1.0	66.8	68.7	0.92	160.24
17.400	0.00	0.0	65.3	66.8	0.78	160.17
17.500	0.00	0.0	64.0	65.3	0.65	160.11
17.600	0.00	0.0	62.9	64.0	0.55	160.07
17.700	0.00	0.0	61.9	62.9	0.46	160.03
17.800	0.00	0.0	61.1	61.9	0.40	159.99
17.900	0.00	0.0	60.4	61.1	0.39	159.96
18.000	0.00	0.0	59.6	60.4	0.39	159.93
18.100	0.00	0.0	58.8	59.6	0.38	159.89
18.200	0.00	0.0	58.1	58.8	0.37	159.86
18.300	0.00	0.0	57.4	58.1	0.37	159.83
18.400	0.00	0.0	56.6	57.4	0.36	159.80
18.500	0.00	0.0	55.9	56.6	0.35	159.77
18.600	0.00	0.0	55.2	55.9	0.35	159.73
18.700	0.00	0.0	54.6	55.2	0.34	159.70
18.800	0.00	0.0	53.9	54.6	0.34	159.68
18.900	0.00	0.0	53.2	53.9	0.33	159.65
19.000	0.00	0.0	52.6	53.2	0.32	159.62
19.100	0.00	0.0	51.9	52.6	0.32	159.59
19.200	0.00	0.0	51.3	51.9	0.31	159.56
19.300	0.00	0.0	50.7	51.3	0.31	159.54
19.400	0.00	0.0	50.1	50.7	0.30	159.51
19.500	0.00	0.0	49.5	50.1	0.29	159.48
19.600	0.00	0.0	48.9	49.5	0.29	159.45
19.700	0.00	0.0	48.4	48.9	0.28	159.42
19.800	0.00	0.0	47.9	48.4	0.27	159.39
19.900	0.00	0.0	47.3	47.9	0.26	159.37
20.000	0.00	0.0	46.8	47.3	0.25	159.34

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:33:44

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	46.3	46.8	0.24	159.31
20.200	0.00	0.0	45.9	46.3	0.24	159.29
20.300	0.00	0.0	45.4	45.9	0.23	159.26
20.400	0.00	0.0	45.0	45.4	0.22	159.24
20.500	0.00	0.0	44.5	45.0	0.22	159.22
20.600	0.00	0.0	44.1	44.5	0.21	159.20
20.700	0.00	0.0	43.7	44.1	0.20	159.18
20.800	0.00	0.0	43.3	43.7	0.20	159.16
20.900	0.00	0.0	42.9	43.3	0.19	159.14
21.000	0.00	0.0	42.6	42.9	0.18	159.12
21.100	0.00	0.0	42.2	42.6	0.18	159.10
21.200	0.00	0.0	41.9	42.2	0.17	159.08
21.300	0.00	0.0	41.5	41.9	0.17	159.06
21.400	0.00	0.0	41.2	41.5	0.16	159.04
21.500	0.00	0.0	40.9	41.2	0.16	159.03
21.600	0.00	0.0	40.6	40.9	0.15	159.01
21.700	0.00	0.0	40.3	40.6	0.15	159.00
21.800	0.00	0.0	40.0	40.3	0.14	158.98
21.900	0.00	0.0	39.7	40.0	0.14	158.97
22.000	0.00	0.0	39.4	39.7	0.14	158.95
22.100	0.00	0.0	39.2	39.4	0.13	158.94
22.200	0.00	0.0	38.9	39.2	0.13	158.92
22.300	0.00	0.0	38.7	38.9	0.12	158.91
22.400	0.00	0.0	38.4	38.7	0.12	158.90
22.500	0.00	0.0	38.2	38.4	0.12	158.89
22.600	0.00	0.0	38.0	38.2	0.11	158.88
22.700	0.00	0.0	37.8	38.0	0.11	158.86
22.800	0.00	0.0	37.5	37.8	0.11	158.85
22.900	0.00	0.0	37.3	37.5	0.10	158.84
23.000	0.00	0.0	37.1	37.3	0.10	158.83
23.100	0.00	0.0	36.9	37.1	0.10	158.82
23.200	0.00	0.0	36.8	36.9	0.09	158.81
23.300	0.00	0.0	36.6	36.8	0.09	158.80
23.400	0.00	0.0	36.4	36.6	0.09	158.79
23.500	0.00	0.0	36.2	36.4	0.09	158.78
23.600	0.00	0.0	36.1	36.2	0.08	158.78
23.700	0.00	0.0	35.9	36.1	0.08	158.77
23.800	0.00	0.0	35.8	35.9	0.08	158.76
23.900	0.00	0.0	35.6	35.8	0.08	158.75
24.000	0.00	0.0	35.5	35.6	0.07	158.74
24.100	0.00	0.0	35.3	35.5	0.07	158.74
24.200	0.00	0.0	35.2	35.3	0.07	158.73
24.300	0.00	0.0	35.0	35.2	0.07	158.72
24.400	0.00	0.0	34.9	35.0	0.06	158.71
24.500	0.00	0.0	34.8	34.9	0.06	158.71
24.600	0.00	0.0	34.7	34.8	0.06	158.70

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:33:44

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	34.6	34.7	0.06	158.70
24.800	0.00	0.0	34.4	34.6	0.06	158.69
24.900	0.00	0.0	34.3	34.4	0.06	158.68
25.000	0.00	0.0	34.2	34.3	0.05	158.68
25.100	0.00	0.0	34.1	34.2	0.05	158.67
25.200	0.00	0.0	34.0	34.1	0.05	158.67
25.300	0.00	0.0	33.9	34.0	0.05	158.66
25.400	0.00	0.0	33.8	33.9	0.05	158.66
25.500	0.00	0.0	33.7	33.8	0.05	158.65
25.600	0.00	0.0	33.6	33.7	0.04	158.65
25.700	0.00	0.0	33.6	33.6	0.04	158.64
25.800	0.00	0.0	33.5	33.6	0.04	158.64
25.900	0.00	0.0	33.4	33.5	0.04	158.64

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 155.50 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 14.00 cfs
Peak Outflow = 8.62 cfs
Peak Elevation = 161.47 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.43 ac-ft

Total Storage in Pond = 0.43 ac-ft

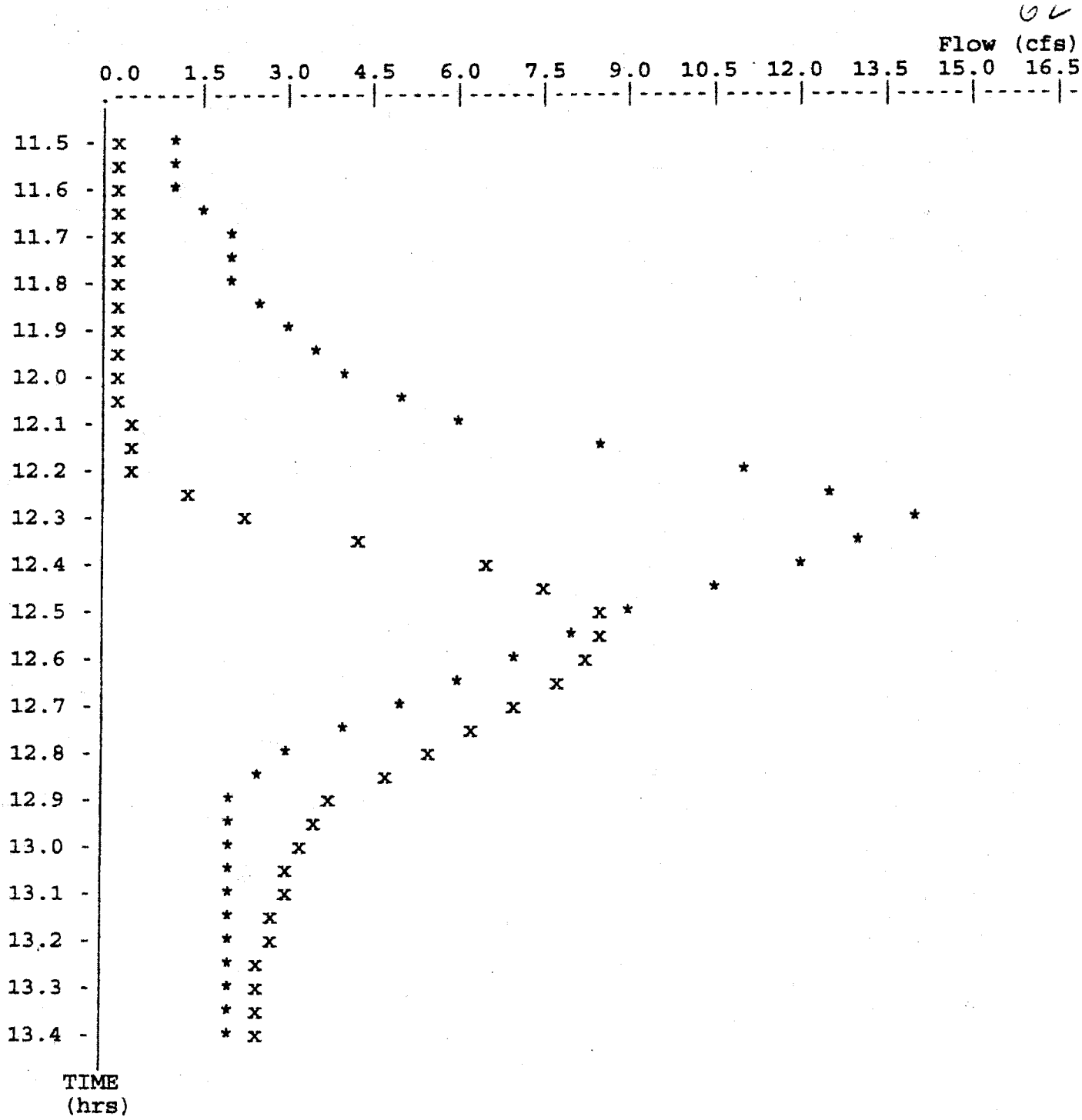
Warning: Inflow hydrograph truncated on left side.

POND-2 Version: 5.17 S/N:

Pond File: DA1 .PND
Inflow Hydrograph: DA110YR .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 11-03-1997
13:33:44

Peak Inflow = 14.00 cfs
Peak Outflow = 8.62 cfs
Peak Elevation = 161.47 ft



* File: DA110YR .HYD Qmax = 14.0 cfs
x File: OUT .HYD Qmax = 8.6 cfs

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:35:03

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*********************************************************************
*                                                                   *
* Multi drainage outlet design calculations for Settlement Pond 2   *
*                          for Site 4.                              *
*                                                                   *
*                                                                   *
*                                                                   *
*********************************************************************
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Inflow Hydrograph: DA210YR .HYD
Rating Table file: DA2 .PND

----INITIAL CONDITIONS----
Elevation = 153.75 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
153.75	0.0	0.000
154.75	0.0	0.007
155.75	0.0	0.025
156.75	0.0	0.052
157.75	0.4	0.092
158.00	0.4	0.104
158.75	1.8	0.144
159.00	2.5	0.160
159.75	8.9	0.212

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
1.7	1.7
6.0	6.0
12.7	12.7
22.2	22.6
25.1	25.5
34.9	36.7
38.6	41.1
51.3	60.2

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
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Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	153.75
11.100	0.00	0.0	0.0	0.0	0.00	153.75
11.200	0.00	0.0	0.0	0.0	0.00	153.75
11.300	0.00	0.0	0.0	0.0	0.00	153.75
11.400	0.00	0.0	0.0	0.0	0.00	153.75
11.500	0.00	0.0	0.0	0.0	0.00	153.75
11.600	0.00	0.0	0.0	0.0	0.00	153.75
11.700	0.00	0.0	0.0	0.0	0.00	153.75
11.800	1.00	1.0	1.0	1.0	0.00	154.32
11.900	1.00	2.0	3.0	3.0	0.00	155.05
12.000	1.00	2.0	5.0	5.0	0.00	155.52
12.100	2.00	3.0	8.0	8.0	0.00	156.05
12.200	3.00	5.0	13.0	13.0	0.01	156.78
12.300	4.00	7.0	19.4	20.0	0.29	157.49
12.400	5.00	9.0	26.9	28.4	0.76	158.20
12.500	5.00	10.0	33.2	36.9	1.82	158.76
12.600	4.00	9.0	36.5	42.2	2.86	159.04
12.700	3.00	7.0	36.9	43.5	3.29	159.09
12.800	2.00	5.0	36.4	41.9	2.76	159.03
12.900	2.00	4.0	35.6	40.4	2.38	158.96
13.000	1.00	3.0	34.4	38.6	2.10	158.86
13.100	1.00	2.0	32.9	36.4	1.76	158.73
13.200	1.00	2.0	31.8	34.9	1.57	158.63
13.300	1.00	2.0	30.9	33.8	1.43	158.55
13.400	1.00	2.0	30.2	32.9	1.32	158.50
13.500	1.00	2.0	29.8	32.2	1.24	158.45
13.600	1.00	2.0	29.4	31.8	1.18	158.42
13.700	1.00	2.0	29.1	31.4	1.14	158.40
13.800	1.00	2.0	28.9	31.1	1.10	158.38
13.900	1.00	2.0	28.7	30.9	1.08	158.36
14.000	1.00	2.0	28.6	30.7	1.06	158.35
14.100	1.00	2.0	28.5	30.6	1.04	158.34
14.200	0.00	1.0	27.7	29.5	0.91	158.27
14.300	0.00	0.0	26.4	27.7	0.68	158.15
14.400	0.00	0.0	25.3	26.4	0.51	158.06
14.500	0.00	0.0	24.5	25.3	0.40	157.99
14.600	0.00	0.0	23.7	24.5	0.40	157.92
14.700	0.00	0.0	22.9	23.7	0.40	157.85
14.800	0.00	0.0	22.1	22.9	0.40	157.78
14.900	0.00	0.0	21.4	22.1	0.38	157.70
15.000	0.00	0.0	20.7	21.4	0.35	157.63
15.100	0.00	0.0	20.0	20.7	0.32	157.56
15.200	0.00	0.0	19.4	20.0	0.30	157.49
15.300	0.00	0.0	18.9	19.4	0.27	157.43
15.400	0.00	0.0	18.4	18.9	0.25	157.38

POND-2 Version: 5.17 S/N: .
EXECUTED: 11-03-1997 13:35:03

Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	17.9	18.4	0.23	157.33
15.600	0.00	0.0	17.5	17.9	0.21	157.28
15.700	0.00	0.0	17.1	17.5	0.19	157.24
15.800	0.00	0.0	16.8	17.1	0.18	157.20
15.900	0.00	0.0	16.4	16.8	0.16	157.16
16.000	0.00	0.0	16.1	16.4	0.15	157.13
16.100	0.00	0.0	15.8	16.1	0.14	157.10
16.200	0.00	0.0	15.6	15.8	0.13	157.07
16.300	0.00	0.0	15.4	15.6	0.12	157.04
16.400	0.00	0.0	15.1	15.4	0.11	157.02
16.500	0.00	0.0	14.9	15.1	0.10	157.00
16.600	0.00	0.0	14.8	14.9	0.09	156.98
16.700	0.00	0.0	14.6	14.8	0.08	156.96
16.800	0.00	0.0	14.4	14.6	0.08	156.94
16.900	0.00	0.0	14.3	14.4	0.07	156.93
17.000	0.00	0.0	14.2	14.3	0.07	156.91
17.100	0.00	0.0	14.0	14.2	0.06	156.90
17.200	0.00	0.0	13.9	14.0	0.06	156.89
17.300	0.00	0.0	13.8	13.9	0.05	156.88
17.400	0.00	0.0	13.7	13.8	0.05	156.87
17.500	0.00	0.0	13.7	13.7	0.04	156.86
17.600	0.00	0.0	13.6	13.7	0.04	156.85
17.700	0.00	0.0	13.5	13.6	0.04	156.84
17.800	0.00	0.0	13.4	13.5	0.03	156.83
17.900	0.00	0.0	13.4	13.4	0.03	156.83
18.000	0.00	0.0	13.3	13.4	0.03	156.82
18.100	0.00	0.0	13.3	13.3	0.03	156.81
18.200	0.00	0.0	13.2	13.3	0.02	156.81
18.300	0.00	0.0	13.2	13.2	0.02	156.80
18.400	0.00	0.0	13.1	13.2	0.02	156.80
18.500	0.00	0.0	13.1	13.1	0.02	156.80
18.600	0.00	0.0	13.1	13.1	0.02	156.79
18.700	0.00	0.0	13.0	13.1	0.02	156.79
18.800	0.00	0.0	13.0	13.0	0.01	156.79
18.900	0.00	0.0	13.0	13.0	0.01	156.78
19.000	0.00	0.0	13.0	13.0	0.01	156.78
19.100	0.00	0.0	12.9	13.0	0.01	156.78
19.200	0.00	0.0	12.9	12.9	0.01	156.78
19.300	0.00	0.0	12.9	12.9	0.01	156.77
19.400	0.00	0.0	12.9	12.9	0.01	156.77
19.500	0.00	0.0	12.9	12.9	0.01	156.77
19.600	0.00	0.0	12.8	12.9	0.01	156.77
19.700	0.00	0.0	12.8	12.8	0.01	156.77
19.800	0.00	0.0	12.8	12.8	0.01	156.77
19.900	0.00	0.0	12.8	12.8	0.01	156.76
20.000	0.00	0.0	12.8	12.8	0.01	156.76

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:35:03

Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	12.8	12.8	0.00	156.76
20.200	0.00	0.0	12.8	12.8	0.00	156.76
20.300	0.00	0.0	12.8	12.8	0.00	156.76
20.400	0.00	0.0	12.8	12.8	0.00	156.76
20.500	0.00	0.0	12.8	12.8	0.00	156.76
20.600	0.00	0.0	12.8	12.8	0.00	156.76
20.700	0.00	0.0	12.7	12.8	0.00	156.76
20.800	0.00	0.0	12.7	12.7	0.00	156.76
20.900	0.00	0.0	12.7	12.7	0.00	156.76
21.000	0.00	0.0	12.7	12.7	0.00	156.76
21.100	0.00	0.0	12.7	12.7	0.00	156.76
21.200	0.00	0.0	12.7	12.7	0.00	156.75
21.300	0.00	0.0	12.7	12.7	0.00	156.75
21.400	0.00	0.0	12.7	12.7	0.00	156.75
21.500	0.00	0.0	12.7	12.7	0.00	156.75
21.600	0.00	0.0	12.7	12.7	0.00	156.75
21.700	0.00	0.0	12.7	12.7	0.00	156.75
21.800	0.00	0.0	12.7	12.7	0.00	156.75
21.900	0.00	0.0	12.7	12.7	0.00	156.75
22.000	0.00	0.0	12.7	12.7	0.00	156.75
22.100	0.00	0.0	12.7	12.7	0.00	156.75
22.200	0.00	0.0	12.7	12.7	0.00	156.75
22.300	0.00	0.0	12.7	12.7	0.00	156.75
22.400	0.00	0.0	12.7	12.7	0.00	156.75
22.500	0.00	0.0	12.7	12.7	0.00	156.75
22.600	0.00	0.0	12.7	12.7	0.00	156.75
22.700	0.00	0.0	12.7	12.7	0.00	156.75
22.800	0.00	0.0	12.7	12.7	0.00	156.75
22.900	0.00	0.0	12.7	12.7	0.00	156.75
23.000	0.00	0.0	12.7	12.7	0.00	156.75
23.100	0.00	0.0	12.7	12.7	0.00	156.75
23.200	0.00	0.0	12.7	12.7	0.00	156.75
23.300	0.00	0.0	12.7	12.7	0.00	156.75
23.400	0.00	0.0	12.7	12.7	0.00	156.75
23.500	0.00	0.0	12.7	12.7	0.00	156.75
23.600	0.00	0.0	12.7	12.7	0.00	156.75
23.700	0.00	0.0	12.7	12.7	0.00	156.75
23.800	0.00	0.0	12.7	12.7	0.00	156.75
23.900	0.00	0.0	12.7	12.7	0.00	156.75
24.000	0.00	0.0	12.7	12.7	0.00	156.75
24.100	0.00	0.0	12.7	12.7	0.00	156.75
24.200	0.00	0.0	12.7	12.7	0.00	156.75
24.300	0.00	0.0	12.7	12.7	0.00	156.75
24.400	0.00	0.0	12.7	12.7	0.00	156.75
24.500	0.00	0.0	12.7	12.7	0.00	156.75
24.600	0.00	0.0	12.7	12.7	0.00	156.75

POND-2 Version: 5.17 S/N:
EXECUTED: 11-03-1997 13:35:03

Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	12.7	12.7	0.00	156.75
24.800	0.00	0.0	12.7	12.7	0.00	156.75
24.900	0.00	0.0	12.7	12.7	0.00	156.75
25.000	0.00	0.0	12.7	12.7	0.00	156.75
25.100	0.00	0.0	12.7	12.7	0.00	156.75
25.200	0.00	0.0	12.7	12.7	0.00	156.75
25.300	0.00	0.0	12.7	12.7	0.00	156.75
25.400	0.00	0.0	12.7	12.7	0.00	156.75
25.500	0.00	0.0	12.7	12.7	0.00	156.75
25.600	0.00	0.0	12.7	12.7	0.00	156.75
25.700	0.00	0.0	12.7	12.7	0.00	156.75
25.800	0.00	0.0	12.7	12.7	0.00	156.75
25.900	0.00	0.0	12.7	12.7	0.00	156.75

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 153.75 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 5.00 cfs
Peak Outflow = 3.29 cfs
Peak Elevation = 159.09 ft

***** Summary of Approximate Peak Storage *****

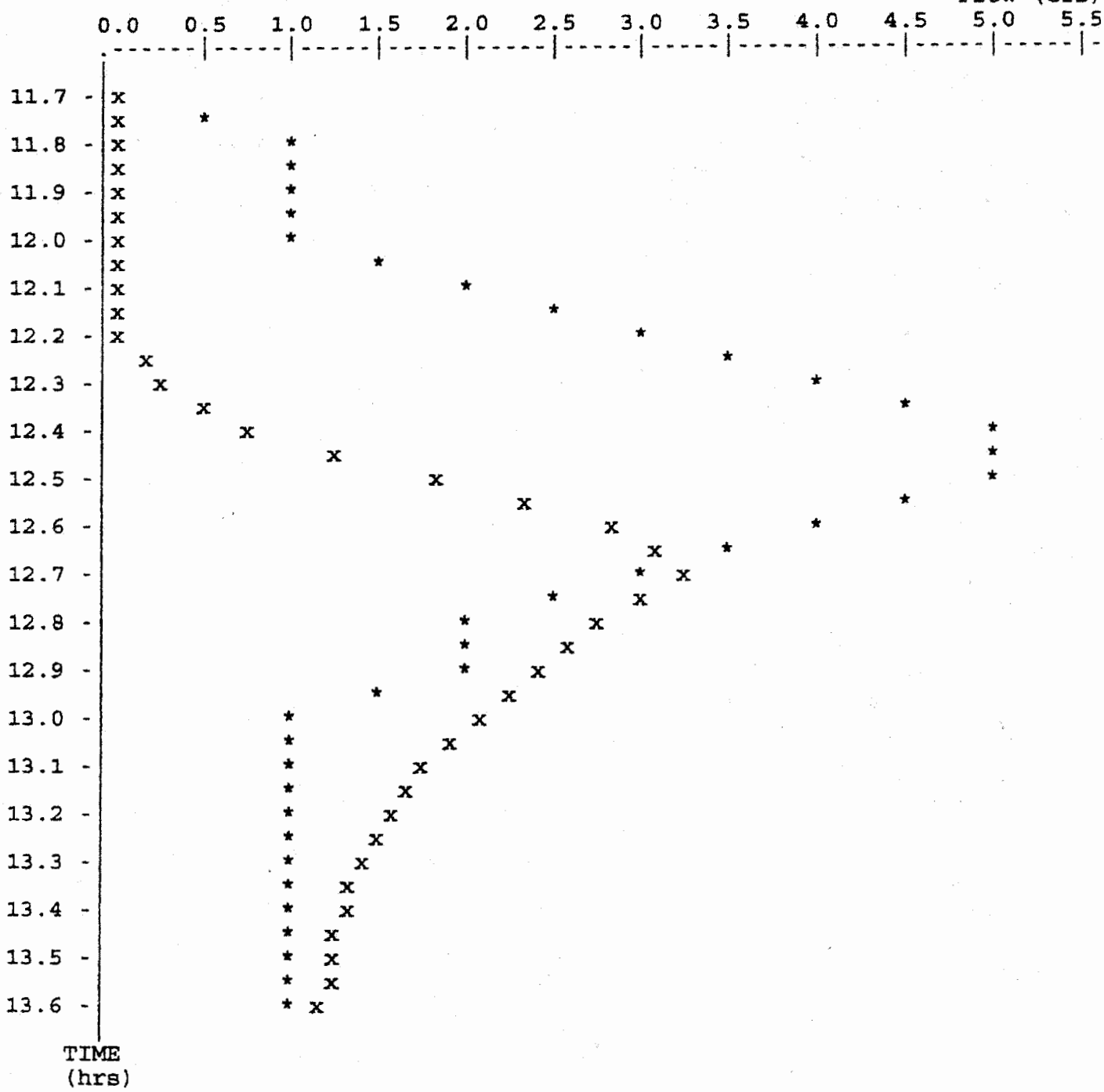
Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.17 ac-ft

Total Storage in Pond = 0.17 ac-ft

Pond File: DA2 .PND
Inflow Hydrograph: DA210YR .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 11-03-1997
13:35:03

Peak Inflow = 5.00 cfs
Peak Outflow = 3.29 cfs
Peak Elevation = 159.09 ft



* File: DA210YR .HYD Qmax = 5.0 cfs
x File: OUT .HYD Qmax = 3.3 cfs

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Site 4 - Seal Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 11/6/97		11/4/97

- From p 60 & 68 of the POND-2 routing calculations for the 10-yr storm:

Seal Basin	Peak Inflow	Peak Outflow*	Peak Elev*	Peak Storage
1	14 cfs	8.62 cfs	161.47 ft	0.43 ac-ft
2	5 cfs	3.29 cfs	159.09 ft	0.17 ac-ft

- Compare this data to composite outflow data (p 39 & 47)

Seal Basin	Peak Composite Outflow*	Elev to top of Emergency Spillway	
1	17.6 cfs	162 ft	OK
2	8.9 cfs	159.75 ft	OK

* Assuming rectangular cross-section shape for emergency spillway as required by POND-2 model. Trapezoidal spillway will actually offer more available capacity

CLIENT	JOB NUMBER
NSWC	7602-0106

SUBJECT: Site 4 - Sed Basin Design

BASED ON: NJ Regs | DRAWING NUMBER:

BY	CHECKED BY	APPROVED BY	DATE
C&F	BER 11/6/97		11/4/97

4. The maximum flow velocity from the energy spillway must be < 4 ft/s (Reg # 5 p 3)

From the PHWD-2 hydrograph routing calcs for the 10-yr, 24-hr storm:

Sed Basin	Peak Outflow (cfs)	Peak Elevation (ft)
1	8.62	161.47
2	3.29	159.09

- Calculating the cross-section area for each trapezoidal energy spillway up to peak elevation:

Sed Basin	Spillway Bottom width (ft)	*Wetted Spillway Area (1 ft high) (3:1 side slopes)
1	15 @ Elev 161	8.91 ft²
2	10 @ Elev 159	5.27 ft²

* Use $A = \frac{1}{2}(a+b)h$

$A_1 = \frac{1}{2}\{15 + ([161.47-161] \times 2 \times 3)\}(1) = 8.91\ ft^2$

$A_2 = \frac{1}{2}\{10 + ([159.09-159] \times 2 \times 3)\}(1) = 5.27\ ft^2$

CLIENT	JOB NUMBER
NSUE	7602-0106
SUBJECT: Site 4 - Sed Basin Design	
BASED ON: NJ Regs	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 11/6/97		11/4/97

- Assuming entire peak outflow is passed through the emergency spillway:

$V_1 = Q_1/A_1 = 8.62\ ft^3/s / 8.91\ ft^2 \cong 1\ ft/s < 4\ ft/s$ OK

$V_2 = Q_2/A_2 = 3.29\ ft^3/s / 5.27\ ft^2 \cong 0.7\ ft/s < 4\ ft/s$ OK

5. The available sed basin volume between the crest of the principal spillway and the crest of the emergency spillway must be capable of containing the 2-yr, 24-hrs storm event. (reg #2 p 1)

- Assume spillway locations (outlet calcs p 34):

Sed Basin	Basin top Elev	Prin Spill Elev	Emergency Spillway Elev
1	162 ft	160 ft	161 ft
2	160 ft	158 ft	159 ft

CLIENT	JOB NUMBER
NSWE	

SUBJECT: Site 4 - Sed Basin Design

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	DCW 12/27/97		Rev 12/24/97

- Using the routing data generated for the 10-yr storm, determine the outflow condition at the primary spillway when NO flow is passing through the emergency spillway:

Sed Basin	P.S. Outflow	Corresponding Water Elev
1	2.8 cfs	161 ft (p 53)
2	1.9 cfs	159 ft (p 45)

- Use PWD-2 to calculate the storage requirements generated by a 2-yr, 24-hr storm event, given the above-listed outflow condition

Sed Basin	Max Hydrograph Inflow	Required Storage
1	5.0 cfs (p 7)	0.09 ac-ft (p 75)
2	2.0 cfs (p 19)	0.02 ac-ft (p 77)

Compare Required Storage to Available incremental sed basin storage between crest of prim spillway and crest of emergency spillway for each basin:

Sed Basin	Required Storage	Available Incremental Storage
1	0.09 ac-ft	0.37 - 0.25 = 0.11 ac-ft (p 32) OK
2	0.02 ac-ft	0.16 - 0.10 = 0.06 ac-ft (p 33) OK

POND-2 Version: 5.17 S/N:

75
Rev 12/24/97
C&F
CHK'D DCW
12/27/97

>>>>> OUTFLOW HYDROGRAPH ESTIMATOR <<<<<

Inflow Hydrograph: DA1-2YR .HYD
Qpeak = 5.0 cfs

Estimated Outflow: ESTIMATE.EST
Qpeak = 2.8 cfs

Approximate Storage Volume
(computed from t= 11.90 to 12.62 hrs)

0.1 acre-ft

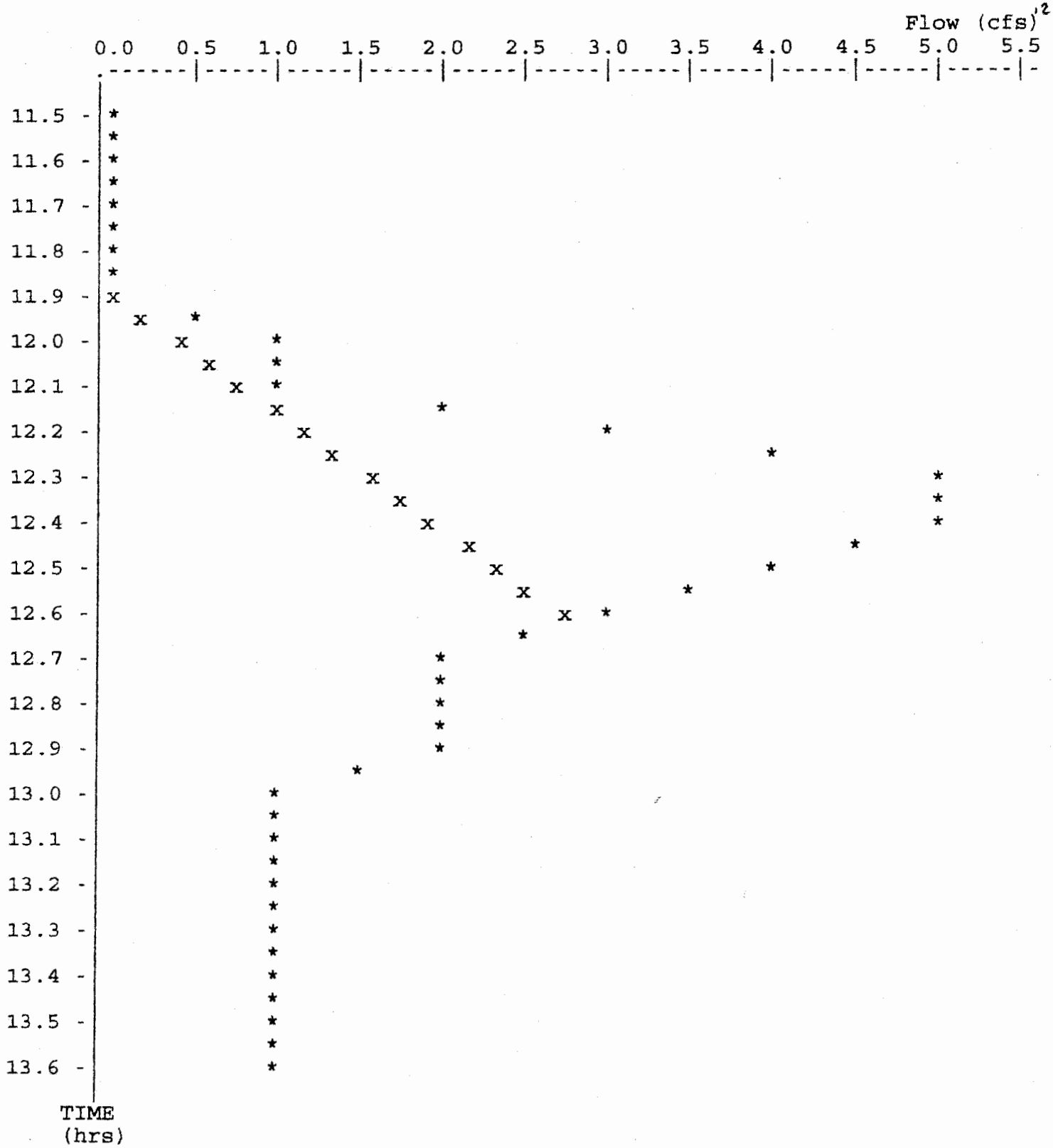
ROUNDED value by printer ↑

Actual screen-displayed value = 0.09 ac-ft

POND-2 Version: 5.17 S/N:
Plotted: 12-24-1997

10

Rev 12/24/97
CHK'D DCW 12/27/97



* File: DA1-2YR .HYD Qmax = 5.0 cfs
x File: ESTIMATE.EST Qmax = 2.8 cfs

POND-2 Version: 5.17 S/N:

77
Rev 12/24/97
CSF
CHK'D DCW
12/27/97

>>>>> OUTFLOW HYDROGRAPH ESTIMATOR <<<<<

Inflow Hydrograph: DA2-2YR .HYD
Qpeak = 2.0 cfs

Estimated Outflow: ESTIMATE.EST
Qpeak = 1.9 cfs

Approximate Storage Volume
(computed from t= 12.10 to 12.61 hrs)

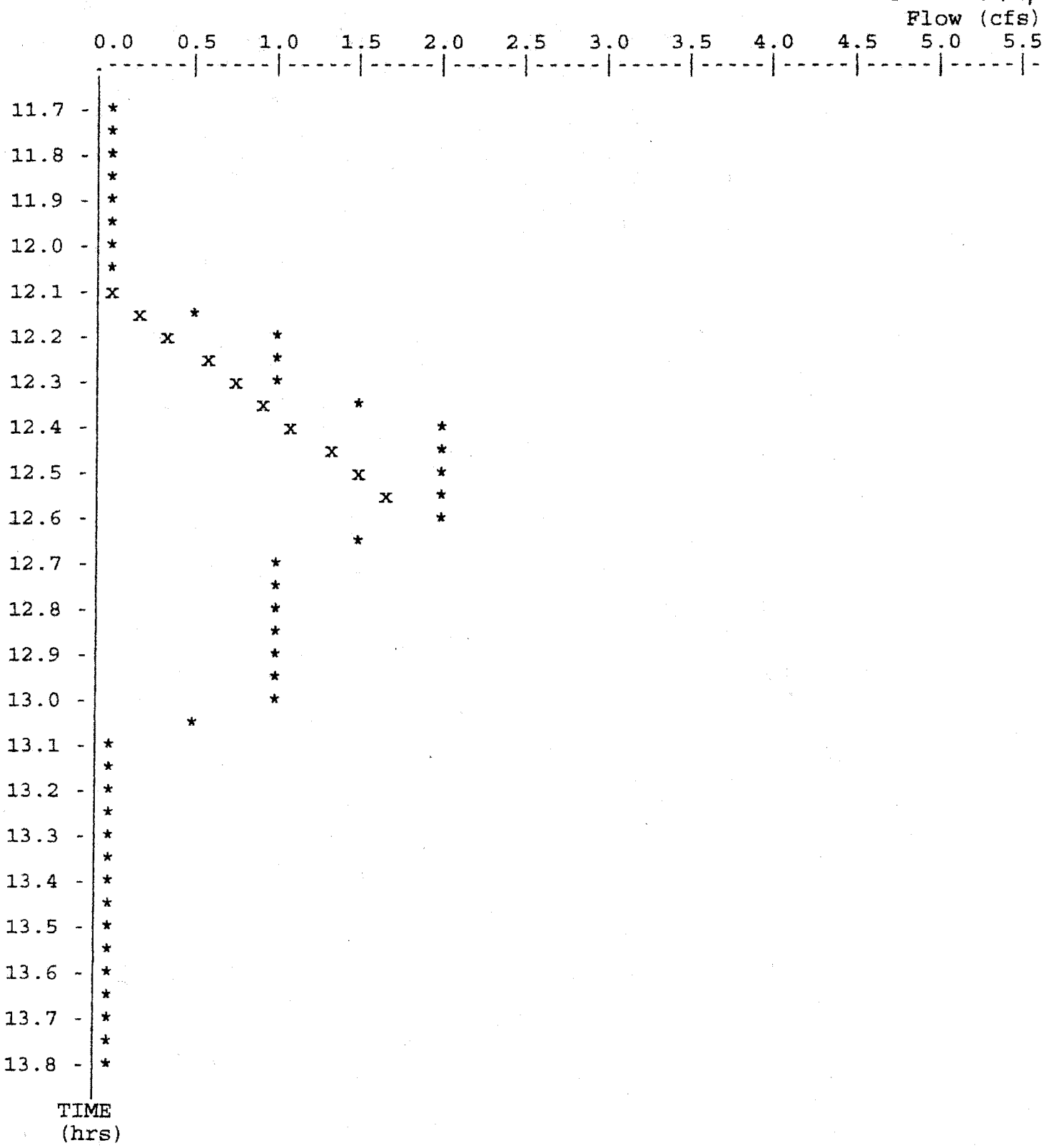
0.0 acre-ft

Rounded value by printer

Actual screen-displayed value = 0.02 ac-ft

POND-2 Version: 5.17 S/N:
Plotted: 12-24-1997

Rev 12/24/97
CHK'D 12/27/97



* File: DA2-2YR .HYD Qmax = 2.0 cfs
x File: ESTIMATE.EST Qmax = 1.9 cfs

CLIENT	JOB NUMBER
NSWC	7602 - 0106

SUBJECT: Site 4 - Sed Basin Design

BASED ON	DRAWING NUMBER
NJ Regs	

BY	CHECKED BY	APPROVED BY	DATE
C&F	BER 11/6/97		11/4/97

6. From crest of principal spillway (a through c below):

a) Avg sed basin depth ≥ 4 ft (reg 3 p 2)
b) min sed basin width ≥ 10 $\sqrt{Q5}$ (reg 3 p 2)
c) min sed basin length ≥ 2 x sed basin width (reg 3 p 2
d) max sed basin sideslope = 2:1 (reg 6 p 3)
e) min sed basin bottom width = 10 ft (reg 6 p 3)
f) min diameter for spillway riser pipe = 6 in (reg 7 p 3)

- From the enclosed sizing calculations:

Sed Basin	Bottom Sed Basin	Top Riser Pipe	Depth	Riser Pipe Diameter
1	155.50 (p 31)	160 (p 34)	4.5 ft OK	18 in (p 34) OK
2	153.75 (p 31)	158 (p 34)	4.25 ft OK	12 in (p 34) OK

- Scaling from the design drawings:

Sed Basin	Basin Width @ Riser	Basin Length @ Riser	Sed Basin Bottom Width	Max Sideslope
1	37 ft OK	103 ft OK	14 ft OK	3:1 OK
2	33 ft OK	77 ft OK	6.5 ft NO	3:1 OK

CLIENT	JOB NUMBER
NWSE - EARLE	

SUBJECT: SEDIMENT BASIN #1 AND #2 OUTFALL CULVERTS - SITE 4

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	CSF 12/30/97		12/27/97

OBJECTIVE : TO PROVE THAT THE OUTFALL CULVERT FOR EACH SEDIMENT BASIN CAN CONVEY THE BASIN OUTFLOW.

APPROACH : USE THE FLOWMASTER PROGRAM BY HAESTAD'S METHODS TO SOLVE FOR THE DEPTH OF FLOW IN THE CULVERT.

THE INPUT QUANTITIES FOR EACH CULVERT ARE SUMMARIZED BELOW :

SB #1 OUTFALL CULVERT

MANNING'S n = 0.012
Culvert Slope = 0.0093 FT/FT
Culvert Diameter = 18"
Q OUTFLOW = 8.62 CFS (Qmax for 10-yr storm Yp 61)

SB #2 OUTFALL CULVERT

MANNING'S n = 0.012
Culvert Slope = 0.0125 FT/FT
Culvert Diameter = 12"
Q OUTFLOW = 3.29 CFS (Qmax for 10-yr storm Yp 69)

CONCLUSIONS : BASED ON THE OUTPUT (PAGES 2 AND 3 OF 3), THE CALCULATED DEPTH = 1.00 FEET WHICH IS LESS THAN THE DIAMETER OF THE OUTFALL CULVERT FOR SEDIMENT BASIN #1. THE CALCULATED DEPTH FOR SEDIMENT BASIN #2 OUTFALL CULVERT = 0.65 FEET WHICH IS LESS THAN THE DIAMETER. THEREFORE, BOTH OUTFALL CULVERTS CAN CONVEY THE BASIN OUTFLOW.

EARLE - SITE 4 : SB #1 OUTFALL CULVERT
Worksheet for Circular Channel

Project Description	
Project File	untitled
Worksheet	4-sb1
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.012	
Channel Slope	0.009300	ft/ft
Diameter	1.50	ft
Discharge	8.62	ft^3/s

Results		
Depth	1.00	ft
Flow Area	1.25	ft^2
Wetted Perimeter	2.87	ft
Top Width	1.41	ft
Critical Depth	1.14	ft
Percent Full	66.77	%
Critical Slope	0.006736	ft/ft
Velocity	6.88	ft/s
Velocity Head	0.73	ft
Specific Energy	1.74	ft
Froude Number	1.29	
Maximum Discharge	11.80	ft^3/s
Full Flow Capacity	10.97	ft^3/s
Full Flow Slope	0.005739	ft/ft
Flow is supercritical.		

EARLE - SITE 4 : SB#2 OUTFALL CULVERT
Worksheet for Circular Channel

Project Description	
Project File	untitled
Worksheet	4-sb2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.012	
Channel Slope	0.012500	ft/ft
Diameter	1.00	ft
Discharge	3.29	ft^3/s

Results		
Depth	0.65	ft
Flow Area	0.54	ft^2
Wetted Perimeter	1.88	ft
Top Width	0.95	ft
Critical Depth	0.78	ft
Percent Full	65.36	%
Critical Slope	0.008085	ft/ft
Velocity	6.05	ft/s
Velocity Head	0.57	ft
Specific Energy	1.22	ft
Froude Number	1.41	
Maximum Discharge	4.64	ft^3/s
Full Flow Capacity	4.32	ft^3/s
Full Flow Slope	0.007267	ft/ft
Flow is supercritical.		

C.8 ANTI-SEEP COLLAR DESIGN

CLIENT	JOB NUMBER
NSWE	7602-0106
SUBJECT: Site 4 - Seal Basin Design	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF Rev 12/31/97	BER 11/6/97		11/4/97

REV. CHK'D DCW 12/31/97

- Find the size & number of antiseep collars for seal basin 1 and 2 of Site 4

- Use equation:

$$L_s = y\,(z + 4)\left[1 + \frac{\text{pipe slope}}{0.25\text{-pipe slope}}\right]$$

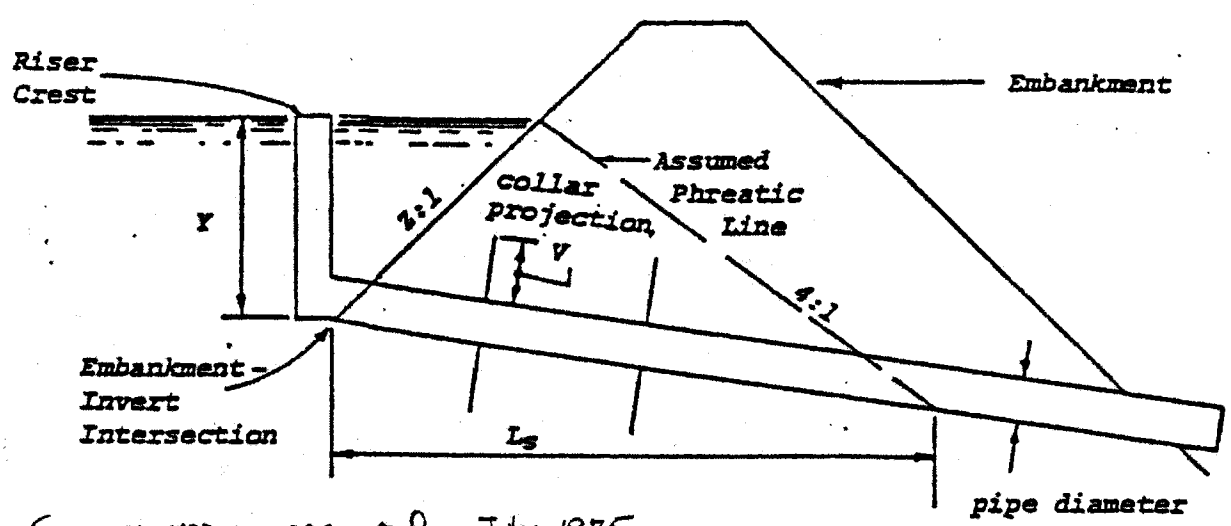
where: L_s = length of pipe in the saturated zone (ft.)

y = distance in feet from upstream invert of pipe to highest normal water level expected to occur during the life of the structure, usually the top of the riser.

z = slope of upstream embankment as a ratio of z ft. horizontal to one ft. vertical.

pipe slope = slope of pipe in feet per foot.

This procedure is based on the approximation of the phreatic line as shown in the drawing below:



Source: USDA-SCS-MD, July 1975

RECEIVED

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NSWC	7602 - 0106

SUBJECT: S:64 - Sed Basin Design

BASED ON: | DRAWING NUMBER:

BY	CHECKED BY	APPROVED BY	DATE
CBF	BER 11/6/97		11/4/97

REV. CHK'D 12/31/97

- Measuring from drawings:

Sed Basin	y	z	Base Riser Elev	Invert Outlet Elev	Slope
1	4.5 ft	3	155.5 ft	155.0 ft	0.0093
2	4.25 ft	3	153.75 ft	153.0 ft	0.0125

$$Ls_1 = 4.5 \times (3+4)\left[1 + \frac{0.0093}{0.25 - 0.0093}\right] \cong 33 \text{ ft out of 54 ft run}$$

$$Ls_2 = 4.25 \times (3+4)\left[1 + \frac{0.0125}{0.25 - 0.0125}\right] \cong 31 \text{ ft out of 40 ft run}$$

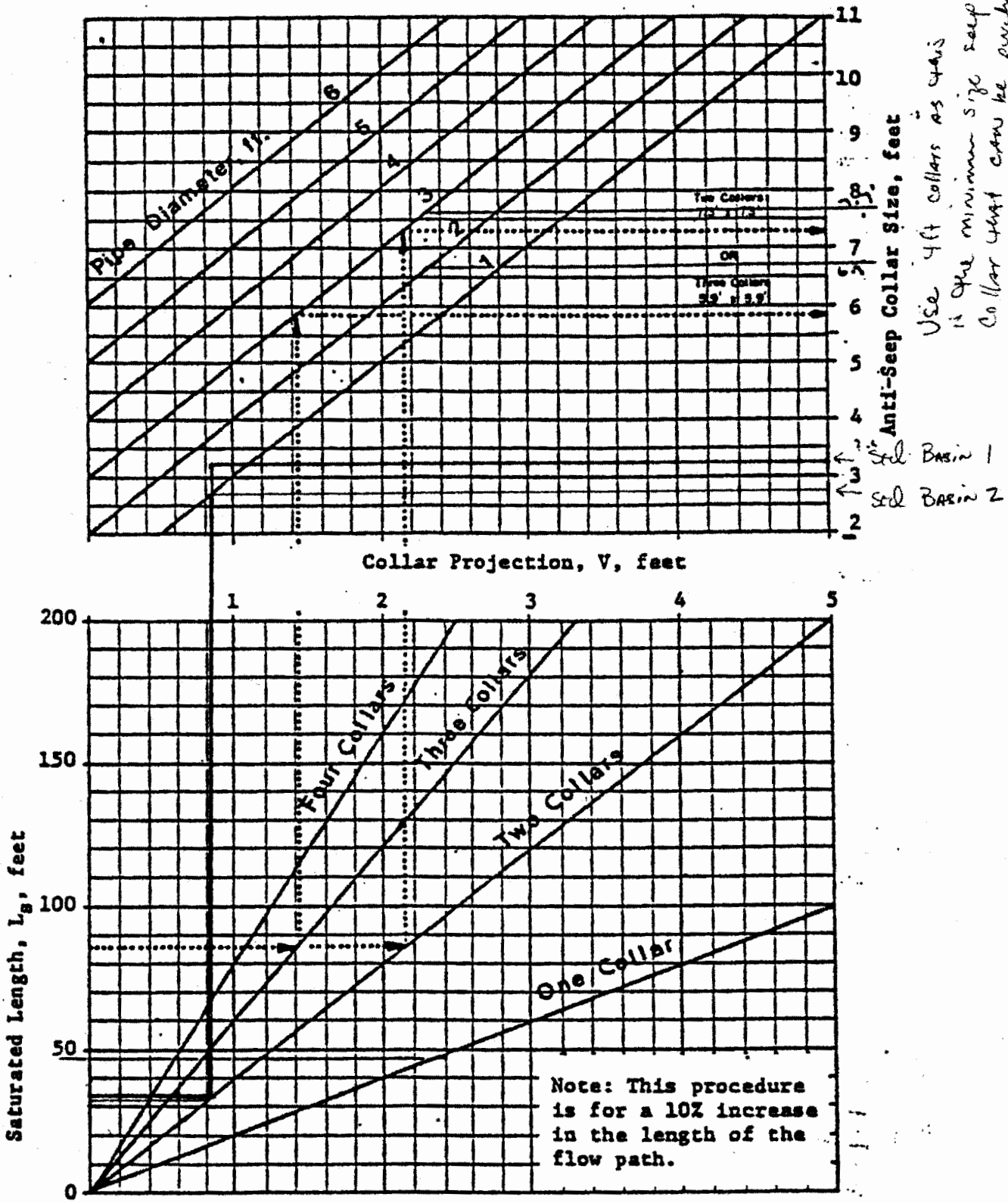
- Using the figure on p A-19.24 below & assuming 2 collars / basin

Sed Basin	Ls ft	Collar Size **
1	33 ft	4 ft
2	31 ft	4 ft

** Use 2 collars / basin as 1 collar requirement is larger than can be purchased

CHKD DCW 12/31/97

ANTI-SEEP COLLAR DESIGN



Use 4ft collars as this is the minimum size seep collar that can be purchased.

Sed Basin 1

Sed Basin 2

APPENDIX D

CALCULATIONS TO SIZE SEDIMENT/DETENTION BASINS FOR SITE 5

D.1 Overview/Conclusions

D.2 Preliminary Calculations for Determining Capacity and Size of Sediment/Detention Basins

D.3 Basin Inflow Hydrographs

D.4 Elevation-Storage Matrix

D.5 Outlet Structure Design

D.6 Hydrograph Routings

D.7 Emergency Spillway Calculations

D.8 Anti-Seep Collar Design

Appendix D

Calculations To Size Sediment/Detention Basins For Site 5

D.1 Overview/Conclusions

D.2 Preliminary Calculations For Determining Capacity And Size of Sediment/ Detention Basins

D.3 Basin Inflow Hydrographs

D.3.1 Sediment/Detention Basin #1

- 2-Year Pre-Development Hydrograph (ex-sum2) to existing basin: combination of existing on-site (ex-1a-2) and off-site (off-2) hydrographs
- 10-Year Pre-Development Hydrograph (ex-sum10) to existing basin: combination of existing on-site (ex-1a-10) and off-site (off-10) hydrographs
- 25-Year Pre-Development Hydrograph (ex-sum25) to existing basin: combination of existing on-site (ex-1a-25) and off-site (off-25) hydrographs
- 2-Year During Construction Hydrograph (dc1-sum2) to the sediment basin : combination of during construction on-site (dc1-2) and off-site (off-2) hydrographs
- 2-Year Post-Development Hydrograph (pd-2) to the detention basin : combination of post-development on-site (da1-2) and off-site (off-2) hydrographs
- 10-Year Post-Development Hydrograph (pd-10) to the detention basin : combination of post-development on-site (da1-10) and off-site (off-10) hydrographs
- 25-Year Post-Development Hydrograph (pd-25) to the detention basin : combination of post-development on-site (da1-25) and off-site (off-25) hydrographs

D.3.2 Sediment/Detention Basin #2

- 2-Year During Construction Hydrograph (sb2-2) to the sediment basin
- 2-Year Post-Development Hydrograph (da2-2) to the detention basin
- 10-Year Post-Development Hydrograph (da2-10) to the detention basin
- 25-Year Post-Development Hydrograph (da2-25) to the detention basin

D.3.2 Sediment/Detention Basin #3

- 2-Year Post-Development Hydrograph to the detention basin
- 10-Year Post-Development Hydrograph to the detention basin
- 25-Year Post-Development Hydrograph to the detention basin

D.4 Elevation-Storage Matrix

D.4.1 Sediment/Detention Basin #1

- Existing Basin (ex-sb1)
- Sediment Basin (sb1-test)
- Detention Basin (sb1-sum2)

D.4.2 Sediment/Detention Basin #2

- Sediment Basin (sb2-test)
- Detention Basin (sb2)

D.4.3 Sediment/Detention Basin #3

- Sediment/Detention Basin (e-s5-sb3)

D.5 Outlet Structure Design

D.5.1 Sediment/Detention Basin #1

- Existing Basin (ex-sb1)
- Sediment Basin (sb1-test)
- Detention Basin (sb1-sum2)

D.5.2 Sediment/Detention Basin #2

- Sediment Basin (sb2-test)
- Detention Basin (sb2)

D.5.3 Sediment/Detention Basin #3

- Sediment/Detention Basin

D.6 Hydrograph Routings

D.6.1 Sediment/Detention Basin #1

- 2-Year Pre-Development for Existing Basin
- 10-Year Pre-Development for Existing Basin
- 25-Year Pre-Development for Existing Basin
- 2-Year During Construction for Sediment Basin
- 2-Year Post-Development for Detention Basin
- 10-Year Post-Development for Detention Basin
- 25-Year Post-Development for Detention Basin

D.6.2 Sediment/Detention Basin #2

- 2-Year During Construction for Sediment Basin
- 2-Year Post-Development for Detention Basin
- 10-Year Post-Development for Detention Basin
- 25-Year Post-Development for Detention Basin

D.6.3 Sediment/Detention Basin #3

- 2-Year During Construction for Sediment Basin
- 2-Year Post-Development for Detention Basin
- 10-Year Post-Development for Detention Basin
- 25-Year Post-Development for Detention Basin

D.7 Emergency Spillway Calculations

D.7.1 Sediment/Detention Basin #1

D.7.2 Sediment/Detention Basin #2

D.7.3 Sediment/Detention Basin #3

D.8 Anti-Seep Collar Calculations

D.1 Overview/Conclusions

CLIENT	JOB NUMBER
U.S. NAVY - EARLE	
SUBJECT: SED BASIN #3 - Stormwater Calcs - Site 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 12/30/97		12/22/97

OBJECTIVE: Verify the following conditions for Sed Basin #3

1. A combination of accumulated sediment and the 2-yr, 24-hr storm, under construction conditions, does not exceed Elev 103.0 (the Emergency/Principal spillway) in Sed Basin #3.

2. A combination of accumulated sediment and the 10-yr, 24hr storm, under construction conditions, does not exceed Elev 104.0 or the capacity of the Emergency/Principal Spillway in Sed Basin #3.

3. The peak outflow for the 2-yr, 10-yr and 25-yr storm events, under post-construction conditions do not exceed the peak outflow conditions during preconstruction - conditions. The 25-yr, post-construction event should not exceed Elev 104.0. (Exceed the capacity of the principal/Emergency spillway)

4. THAT THE MINIMUM STORAGE REQUIREMENT WAS MET.

CLIENT	JOB NUMBER
US NAVY - EARLE	

SUBJECT: SED BASIN #3 - Stormwater Calcs - Site 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 12/30/97		12/22/97

To verify condition #1:

From pp 5-11 of earlier calculations (Estimation of Sediment Basin Storage Capacity During Construction 8/24/97)

Volume of sediment generated in Drainage Area #3:

0.010 Ac-ft

Volume of runoff generated during 2-yr, 24-hr storm:

0.13 Ac-ft

Total peak volume generated during construction:

0.010 Ac-ft + 0.13 Ac-ft = 0.14 Ac-ft

Compare to Sed Basin #3 volume calculations provided in earlier calcs (Appendix D.4 Calculations to Size Sediment/Detention Basins for Site 5 11/1/97, copy Enclosed)

Total Available Sed Basin #3 Volume @ Elev 103.0:

0.63 Ac-ft

vs

0.14 Ac-ft Condition #1 OK

CLIENT US NAVY - EARLE	JOB NUMBER
SUBJECT Sed Basin #3 - Stormwater Calcs - Site 5	
BASED ON	DRAWING NUMBER
BY CSF / CHECKED BY BER 12/30/97	APPROVED BY / DATE 12/22/97

To verify condition #2:

From earlier calc (p2), volume of sediment generated during construction:

0.010 ac-ft

Because of the more significant size of the 10-yr rainfall event, examine storage capacity by routing 10-yr, 24-hr storm through adjusted/modified sed basin #3 outlet structure → use weir as only outlet structure @ Elev 103.0 ft (See p DS.3 for modified sed basin outlet)

Route 10-yr, 24-hr storm through modified sed basin #3 with sediment volume deducted

From the routing info (pSed Basin 3 Routing D6)

Peak Inflow : 11.0 cfs
Peak Outflow : 1.0 cfs
Peak Elevation : 103.30 ft
Peak Storage from Storm: 0.69 ac-ft

∴ the principal/emergency spillway can handle the 10-yr, during construction flow

Total Required Storage = 0.69 ac-ft

COMPARE to total available sed basin #3 storage = 0.84 ac-ft @ Elev 104.0 (pp 3) CONDITION 2 OK

CLIENT	JOB NUMBER
U.S. NAVY - EARLE	

SUBJECT: Sed Basin #3 - Stormwater Calcs - Site 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
CSF	BER 12/30/97		12/22/97

To Verify Condition #3:

Create Post-Construction Hydrographs for the 2-yr, 10-yr, 25-yr, 24-hr Storms.

Route each Storm through Det Basin #3 and modified outlet structure:

No retained sediment considered in this set of calculations as per initial assumptions

Based on the enclosed routing calcs for:
2-yr, 24-hr storm (: Site 5 Sed Basin Routing D6)
10-yr, 24-hr storm (5.6 5 Sed Basin Routing D6)
25 yr, 24-hr storm (5.4 5 Sed Basin Routing D6)

The following results are obtained:

STORM EVENT	PEAK INFLOW (cfs)	PEAK OUTFLOW (cfs)	PEAK ELEV. (ft)	PEAK POND STORAGE (AC-ft)
2-yr	3.0	0.0	100.07	0.18
10-yr	7.0	0.0	102.79	0.59
25-yr	9.0	0.82	103.27	0.68

Compare post-const peak elev for 3 storms to max det basin #3 elevation of 104.0 ft (ok)

CLIENT NWSE - EARLE	JOB NUMBER
SUBJECT SEDIMENT / DETENTION BASIN # 3 - SITE 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/2/98		12/31/97

(4) AS STATED IN THE PRELIMINARY CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF SEDIMENT / DETENTION BASINS, SECTION D.2, THE REQUIRED STORAGE = 0.21 AC-FT

FROM THE ELEVATION - STORAGE MATRIX, SECTION D.4, THE TOTAL STORAGE OF THE PROPOSED SEDIMENT / DETENTION BASIN #3 = 0.84 AC-FT.

THEREFORE, THE MINIMUM STORAGE REQUIREMENT WAS MET.

CLIENT	JOB NUMBER
NWSE - EARLE	7602

SUBJECT: SEDIMENT / DETENTION BASIN #1 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/29/97

OBJECTIVE : VERIFY THE FOLLOWING CONDITIONS FOR SEDIMENT/ DETENTION BASIN #1.

(1) THE COMBINATION OF ACCUMULATED SEDIMENT AND THE 2-YR, 24-HR STORM, PEAK DISCHARGE UNDER CONSTRUCTION CONDITIONS DOES NOT OVERTOP THE BASIN.

(2) THE EMERGENCY SPILLWAY IS ADEQUATELY SIZED TO CONVEY THE 25-YEAR DURING CONSTRUCTION PEAK DISCHARGE WITHOUT OVERTOPPING THE BASIN SINCE THE TOTAL DRAINAGE AREA EXCEEDS 20 ACRES IN ACCORDANCE WITH THE NEW JERSEY EPS REGULATIONS.

(3) THE POST-DEVELOPMENT 2, 10, AND 25-YEAR BASIN OUTFLOWS DO NOT EXCEED THE PRE-DEVELOPMENT 2, 10, AND 25-YEAR BASIN OUTFLOWS

(4) THAT THE MINIMUM STORAGE REQUIREMENT WAS MET

APPROACH :

(1) FROM SECTION D.2, THE VOLUME OF TRAPPED SEDIMENT = 0.02 AC-FT.

THE ELEVATION OF THE TRAPPED SEDIMENT SHALL BE DETERMINED BY INTERPOLATION. REFER TO SECTION D.4 FOR THE FOLLOWING ELEVATION AND STORAGE NUMBERS :

$$\frac{\text{ELEV A} - \text{ELEV B}}{\text{STORAGE A} - \text{STORAGE B}} = \frac{\text{ELEV Y} - \text{ELEV B}}{\text{STORAGE Y} - \text{STORAGE B}}$$

$$\frac{95-94}{0.20-0.0} = \frac{y-94}{0.02-0.0} \rightarrow \underline{y = 94.1 \text{ FT}}$$

THEREFORE, THE ELEVATION - STORAGE MATRIX SHALL BE REVISED TO BEGIN AT AN ELEVATION = 94.1 FT TO ACCOUNT FOR THE TRAPPED SEDIMENT. THE 2-YEAR DURING CONSTRUCTION PEAK DISCHARGE SHALL THEN BE ROUTED THROUGH THE REVISED ELEVATION - STORAGE MATRIX.

CLIENT	JOB NUMBER
NWSE - EARLE	7602

SUBJECT: SEDIMENT / DETENTION BASIN #1 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/29/97

FROM SECTION D.6, HYDROGRAPH ROUTINGS, FOR SEDIMENT BASIN #1, THE PEAK ELEVATION FOR THE 2-YEAR DURING CONSTRUCTION PEAK DISCHARGE ROUTED THROUGH THE REVISED ELEVATION-STORAGE MATRIX = 97.61 FT. THE TOP OF THE BASIN = 101.0 FT. THEREFORE, THE COMBINATION OF ACCUMULATED SEDIMENT AND THE 2-YR, 24-HR STORM, PEAK DISCHARGE DURING CONSTRUCTION CONDITIONS DOES NOT OVERTOP THE BASIN.

(2) USE THE REVISED ELEVATION-STORAGE MATRIX AND ROUTE THE 25-YEAR DURING CONSTRUCTION ON-SITE AND OFF-SITE PEAK DISCHARGE THROUGH EMERGENCY SPILLWAY. IN THE CASE OF SEDIMENT BASIN #1, THERE IS NO PRINCIPAL SPILLWAY. THE ONLY COMPONENT OF THE OUTLET STRUCTURE IS THE EXISTING SPILLWAY THAT WILL NOT BE CHANGED.

FROM SECTION D.6, HYDROGRAPH ROUTINGS, FOR SEDIMENT BASIN #1, THE PEAK ELEVATION = 100.09 FT. THE TOP OF THE BASIN = 101.0 FT. THEREFORE, THE SPILLWAY IS ADEQUATELY SIZED TO CONVEY THE 25-YEAR DURING CONSTRUCTION PEAK DISCHARGE WITHOUT OVERTOPPING THE BASIN. EVEN THOUGH THE 25-YEAR DURING CONSTRUCTION BASIN OUTFLOW (5.6 CFS) EXCEEDS THE 25-YEAR PRE-DEVELOPMENT BASIN OUTFLOW, DOWNSTREAM IMACTS ARE NOT A CONCERN. EROSION IS ALSO NOT A PROBLEM SINCE THE INCREASED 1.4 CFS WILL BE SPREAD ALONG THE 58-FOOT SPILLWAY.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT SEDIMENT / DETENTION BASIN #1 - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/1/98	APPROVED BY / DATE 12/29/97

(3) IN THE AREA OF THE PROPOSED SEDIMENT/DETENTION BASIN #1, AN EXISTING DRAINAGE BASIN WITH AN OVERFLOW SPILLWAY CONTROLS THE PRE-DEVELOPMENT RUNOFF. THEREFORE, THE EXISTING BASIN WAS MODELED AND ROUTED TO CALCULATE THE PRE-DEVELOPMENT BASIN OUTFLOW. REFER TO THE APPROPRIATE SECTION FOR THE ELEVATION-STORAGE MATRIX, THE OUTLET STRUCTURE, THE BASIN INFLOW HYDROGRAPHS, AND THE ROUTINGS OF THE EXISTING BASIN. THE OBJECTIVE OF THE PROPOSED DETENTION BASIN IS TO RELEASE THE 2, 10, AND 25-YEAR POST-DEVELOPMENT PEAK DISCHARGES AT A LOWER RATE THAN THE PRE-DEVELOPMENT BASIN OUTFLOWS.

FROM SECTION D.6, HYDROGRAPH ROUTINGS, THE PRE-DEVELOPMENT AND POST-DEVELOPMENT BASIN OUTFLOWS ARE SUMMARIZED BELOW.

STORM (YR)	PRE-DEVELOPMENT BASIN OUTFLOW (CFS)	POST-DEVELOPMENT BASIN OUTFLOW (CFS)
2	0.0	0.0
10	2.90	0.0
25	4.20	3.0

ALL POST-DEVELOPMENT BASIN OUTFLOWS ARE LESS THAN THE PRE-DEVELOPMENT BASIN OUTFLOWS.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT SEDIMENT / DETENTION BASIN #1 · SITE 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/31/97

(4) AS STATED IN THE PRELIMINARY CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF SEDIMENT / DETENTION BASINS, SECTION D.2, THE REQUIRED STORAGE = 2.41 AC-FT.

FROM THE ELEVATION-STORAGE MATRIX, SECTION D.4, THE TOTAL STORAGE OF THE PROPOSED SEDIMENT / DETENTION BASIN # 1 = 3.58 AC-FT.

THEREFORE, THE MINIMUM STORAGE REQUIREMENT WAS MET.

CLIENT	JOB NUMBER
NWSE - EARLE	7602

SUBJECT: SEDIMENT / DETENTION BASIN #2 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/29/97

OBJECTIVE : VERIFY THE FOLLOWING CONDITIONS FOR SEDIMENT / DETENTION BASIN #2.

(1) THE COMBINATION OF ACCUMULATED SEDIMENT AND THE 2-YR, 24-HR STORM, PEAK DISCHARGE UNDER CONSTRUCTION CONDITIONS DOES NOT OVERTOP THE BASIN.

(2) THE EMERGENCY SPILLWAY IS ADEQUATELY SIZED TO CONVEY THE 10-YEAR DURING CONSTRUCTION PEAK DISCHARGE WITHOUT OVERTOPPING THE BASIN.

(3) THE BASIN OUTFLOWS FOR THE 2, 10, AND 25-YEAR POST-DEVELOPMENT STORM EVENTS DO NOT ADVERSELY IMPACT THE DOWNSTREAM DRAINAGE CHANNEL.

(4) THAT THE MINIMUM STORAGE REQUIREMENT WAS MET.

APPROACH :

(1) FROM SECTION D.2, THE VOLUME OF TRAPPED SEDIMENT = 0.005 AC-FT.

THE ELEVATION OF THE TRAPPED SEDIMENT SHALL BE DETERMINED BY INTERPOLATION. REFER TO SECTION D.4 FOR THE FOLLOWING ELEVATION AND STORAGE NUMBERS:

$$\frac{\text{ELEV A} - \text{ELEV B}}{\text{STORAGE A} - \text{STORAGE B}} = \frac{\text{ELEV Y} - \text{ELEV B}}{\text{STORAGE Y} - \text{STORAGE B}}$$

$$\frac{105 - 104}{0.06 - 0} = \frac{y - 104}{0.005 - 0} \longrightarrow y = 104.10 \text{ FT}$$

THEREFORE, THE ELEVATION - STORAGE MATRIX SHALL BE REVISED TO BEGIN AT ELEVATION 104.10 FEET.

CLIENT	JOB NUMBER
NWSE - EARLE	7602

SUBJECT: SEDIMENT / DETENTION BASIN #2 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/29/97

FROM SECTION D.6, HYDROGRAPH ROUTINGS, FOR SEDIMENT BASIN #2, THE PEAK ELEVATION FOR THE 2-YEAR DURING CONSTRUCTION PEAK DISCHARGE ROUTED THROUGH THE REVISED ELEVATION-STORAGE MATRIX = 105.78 FT. THE TOP OF THE BASIN = 110.0 FEET. THEREFORE, THE COMBINATION OF ACCUMULATED SEDIMENT AND THE 2-YR, 24-HR STORM, PEAK DISCHARGE DURING CONSTRUCTION CONDITIONS DOES NOT OVERTOP THE BASIN.

(2) IN ORDER TO CHECK THE CAPACITY OF THE EMERGENCY SPILLWAY, THE REVISED ELEVATION-STORAGE MATRIX (TO ACCOUNT FOR TRAPPED SEDIMENT) SHALL BE USED. THE OUTLET STRUCTURE SHALL BE REVISED TO HAVE THE EMERGENCY SPILLWAY AS THE ONLY STAGE. THE 10-YEAR DURING CONSTRUCTION AND OFF-SITE PEAK DISCHARGE SHALL THEN BE ROUTED THROUGH THE REVISED BASIN AND OUTLET STRUCTURE. FROM THE RESULTS IN SECTION D.7, THE PEAK ELEVATION = 108.0 FT. THE TOP OF THE BASIN = 110.0 FT. THEREFORE, THE BASIN AND THE EMERGENCY SPILLWAY ARE ADEQUATELY SIZED TO CONVEY THE 10-YEAR DURING CONSTRUCTION PEAK DISCHARGE.

A SECOND CHECK FOR THE EMERGENCY SPILLWAY IS TO DETERMINE IF THERE IS ADEQUATE STORAGE BETWEEN THE TOP OF THE PRINCIPAL SPILLWAY AND THE CREST OF THE EMERGENCY SPILLWAY. THEREFORE, THE ELEVATION-STORAGE MATRIX SHALL BE REVISED TO START AT TOP OF THE PRINCIPAL SPILLWAY = 108.0 FT. THE OUTLET STRUCTURE SHALL BE REVISED TO INCLUDE THE EMERGENCY SPILLWAY ONLY. THE 2-YR DURING CONSTRUCTION FLOW WILL THEN BE ROUTED THROUGH THE REVISED ELEVATION-STORAGE MATRIX AND OUTLET STRUCTURE. THE RESULTS CAN BE FOUND IN SECTION D.7, EMERGENCY SPILLWAY

CLIENT	JOB NUMBER
NUSE - EARLE	7602

SUBJECT: SEDIMENT/DETENTION BASIN #2 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/29/97

CALCULATIONS. AS A RESULT OF THE ROUTING, THE PEAK ELEVATION = 108.87 FT. THEREFORE, SINCE THE CREST OF THE EMERGENCY SPILLWAY = 109.00 FT, THERE IS ADEQUATE STORAGE BETWEEN THE TOP OF THE PRINCIPAL SPILLWAY AND THE CREST OF THE EMERGENCY SPILLWAY.

(3) IDEALLY, THE POST-DEVELOPMENT PEAK DISCHARGES SHOULD ALWAYS BE LESS THAN THE PRE-DEVELOPMENT PEAK DISCHARGES. HOWEVER, IN THE CASE OF PROPOSED SEDIMENT/DETENTION BASIN #2, THE PRE-DEVELOPMENT RUNOFF TO THE POST-DEVELOPMENT POINT-OF-INTEREST IS NEGLIGIBLE.

THE POST-DEVELOPMENT BASIN OUTFLOWS FROM DETENTION BASIN #2 ARE SUMMARIZED BELOW:

STORM (YR)	POST-DEVELOPMENT BASIN OUTFLOWS (CFS)
2	0.41
10	1.28
25	1.68

EVEN THOUGH THE POST-DEVELOPMENT BASIN OUTFLOWS EXCEED THE PRE-DEVELOPMENT PEAK DISCHARGES, THE BASIN OUTFLOWS ARE NOT VERY HIGH AND ARE DISCHARGED TO AN EXISTING SWALE THAT CAN CONVEY THE OUTFLOWS. ALSO, THERE ARE NO DOWNSTREAM IMPACTS BELOW DETENTION BASIN #2.

CLIENT	JOB NUMBER
NWSE - EARLE	7602

SUBJECT: SEDIMENT / DETENTION BASIN # 2 - SITE 5

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/1/98		12/31/97

(4) AS STATED IN THE PRELIMINARY CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF THE SEDIMENT / DETENTION BASINS, SECTION D.2, THE REQUIRED STORAGE = 0.25 AC-FT

FROM THE ELEVATION - STORAGE MATRIX, SECTION D.4, THE TOTAL STORAGE OF THE PROPOSED SEDIMENT / DETENTION BASIN # 2 = 0.59 AC-FT.

THEREFORE, THE MINIMUM STORAGE REQUIREMENT WAS MET.

D.2 PRELIMINARY CALCULATIONS FOR DETERMINING CAPACITY AND SIZE OF SEDIMENT/DETENTION BASINS

CALCULATION WORKSHEET Order No. 19116 (01-91)

PAGE ____ OF ____

CLIENT		JOB NUMBER	
SUBJECT			
BASED ON		DRAWING NUMBER	
BY	CHECKED BY	APPROVED BY	DATE

SITE 5

CALCULATIONS FOR

CAPACITY AND SIZE

OF SEDIMENT BASINS

BASED ON NJ REGS.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT: CAPACITY OF SEDIMENT BASINS

BASED ON	DRAWING NUMBER
SEDIMENT BASIN STANDARDS	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97 BER 12/31/97	JJB 8/27/97 REV. CHK'D [illegible] 12/31/96		

BASED ON THE STANDARD FOR SEDIMENT BASIN DESIGN, THE VOLUME IN THE SEDIMENT BASIN BELOW THE CREST ELEVATION OF THE EMERGENCY SPILLWAY SHALL BE THE LARGER OF:

1. VOLUME NECESSARY TO OBTAIN 70% TRAP EFFICIENCY AT THE START OF ITS USEFUL LIFE OR
2. THE VOLUME NECESSARY TO PROVIDE FOR SEDIMENT STORAGE CAPACITY AND FOR TEMPORARY STORM-WATER RUNOFF STORAGE FOR A 2-YR, 24-HOUR TYPE III STORM.

CALCULATIONS WERE COMPLETED FOR 1 AND 2 AND THEY FOLLOW THIS SUMMARY PAGE. THE CAPACITIES ESTIMATED BY 1 AND 2 ARE SUMMARIZED BELOW

DRAINAGE AREA	1 TRAP EFFICIENCY	2 SEDIMENT + RUNOFF STORAGE	REQUIRED STORAGE (MAX OF 1 & 2)
1	2.41 ac-ft	1.38 ac-ft	2.41 ac-ft
2	0.09 ac-ft	0.25 ac-ft	0.25 ac-ft
3	0.21 ac-ft	0.14 ac-ft	0.21 ac-ft

∴ USE THE REQUIRED STORAGE CAPACITIES TO COMPLETE THE DESIGN CALCULATIONS FOR THE SITE 5 SEDIMENT BASINS.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NWSE - SITE 5	JOB NUMBER: 7602/0106
SUBJECT: CAPACITY OF SEDIMENT BASINS	
BASED ON: TRAP EFFICIENCY	DRAWING NUMBER:
BY: CAR 8/22/97 — CHECKED BY: JJB 8/27/97	APPROVED BY: — DATE:

BER 12/31/97 REV. CHK'D DCW 12/31/97

ESTIMATE THE SIZES OF SEDIMENT BASINS THAT HAVE ADEQUATE VOLUME BELOW THE CREST OF THE EMERGENCY SPILLWAY TO HAVE ANY ACTUAL TRAP EFFICIENCY OF AT LEAST 70% AT THE START OF ITS USEFUL LIFE. USE CURVE 4.4-1.

WHERE: C = TOTAL CAPACITY OF THE SEDIMENT BASIN UP TO THE CREST ELEVATION OF THE EMERGENCY SPILLWAY (ac-ft)

I = AVG. ANNUAL SURFACE RUNOFF FROM FIGURE 4.4-1 CONVERTED TO (ac-ft).

- ASSUME THE INCOMING SEDIMENT IS SAND; THEREFORE USE A TRAP EFFICIENCY OF 75% FOR CURVE 4.4-1

FROM CURVE 4.4-1: $\frac{C}{I} = 0.025$
(SEE p 2-4)

FROM FIGURE 4.4-1: R = 22.1 IN
(SEE p 3-4)

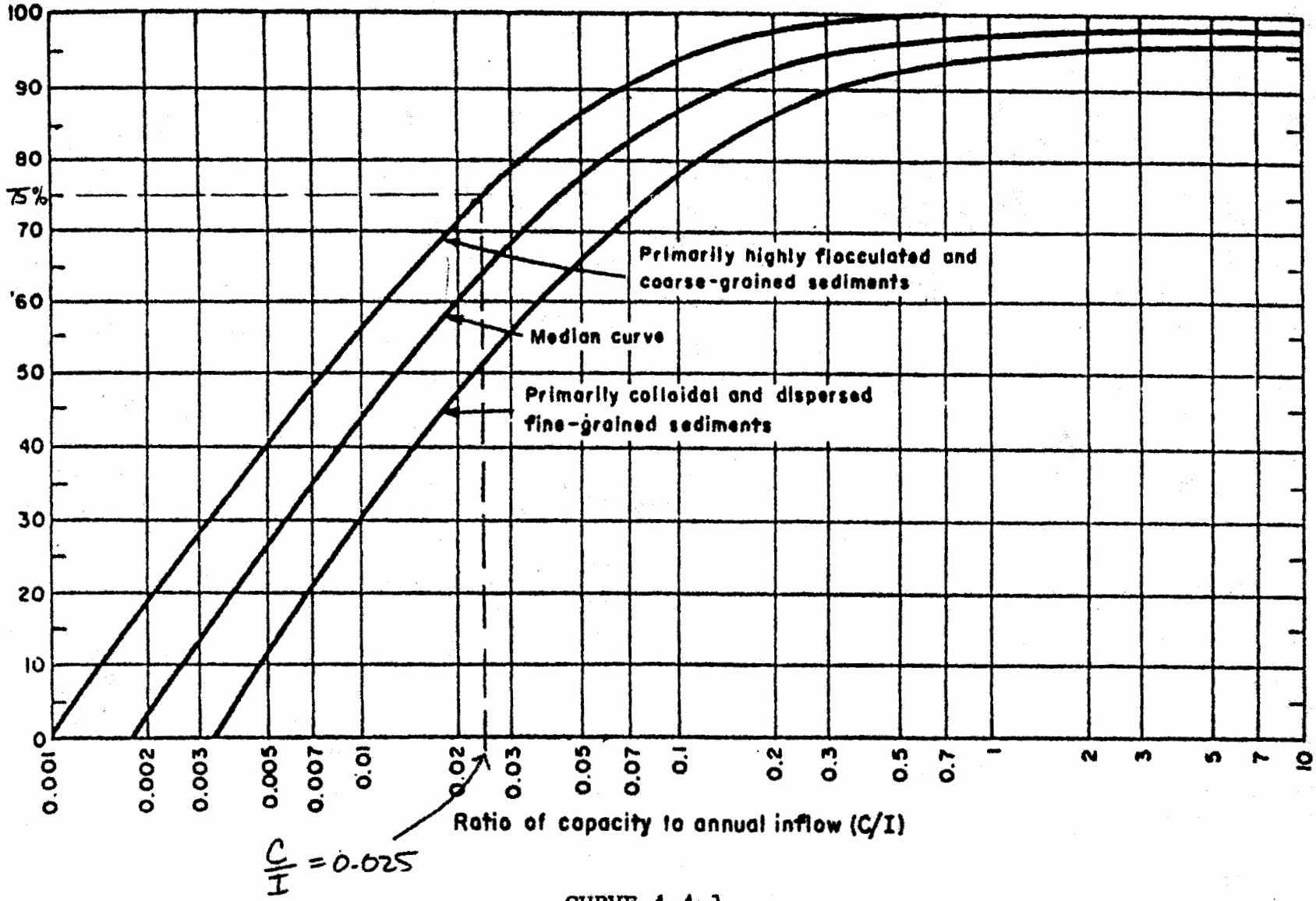
$I = (R)(\text{DRAINAGE AREA})$

$I_{DA\#1} = \frac{(22.1\ IN)(52.26^{*}\ ac)}{(12\ IN/FT)} = 96.25\ ac\text{-}ft$

$I_{DA\#2} = \frac{(22.1\ IN)(1.92\ ac)}{(12\ IN/FT)} = 3.5\ ac\text{-}ft$

$I_{DA\#3} = \frac{(22.1\ IN)(4.63\ ac)}{(12\ IN/FT)} = 8.5\ ac\text{-}ft$

* Based on on-site DA1 and off-site runoff from the 24" RCP culvert



BY: CAC DATE: 8/22/97

CHKD: JJB DATE: 8/27/97

CURVE 4.4-1

TRAP EFFICIENCY OF RESERVOIRS

Reference: Brune, Gunnar M., "Trap Efficiency of Reservoirs", Trans. AGU, Vol. 34, No.3, pp 407-418, June 1953.

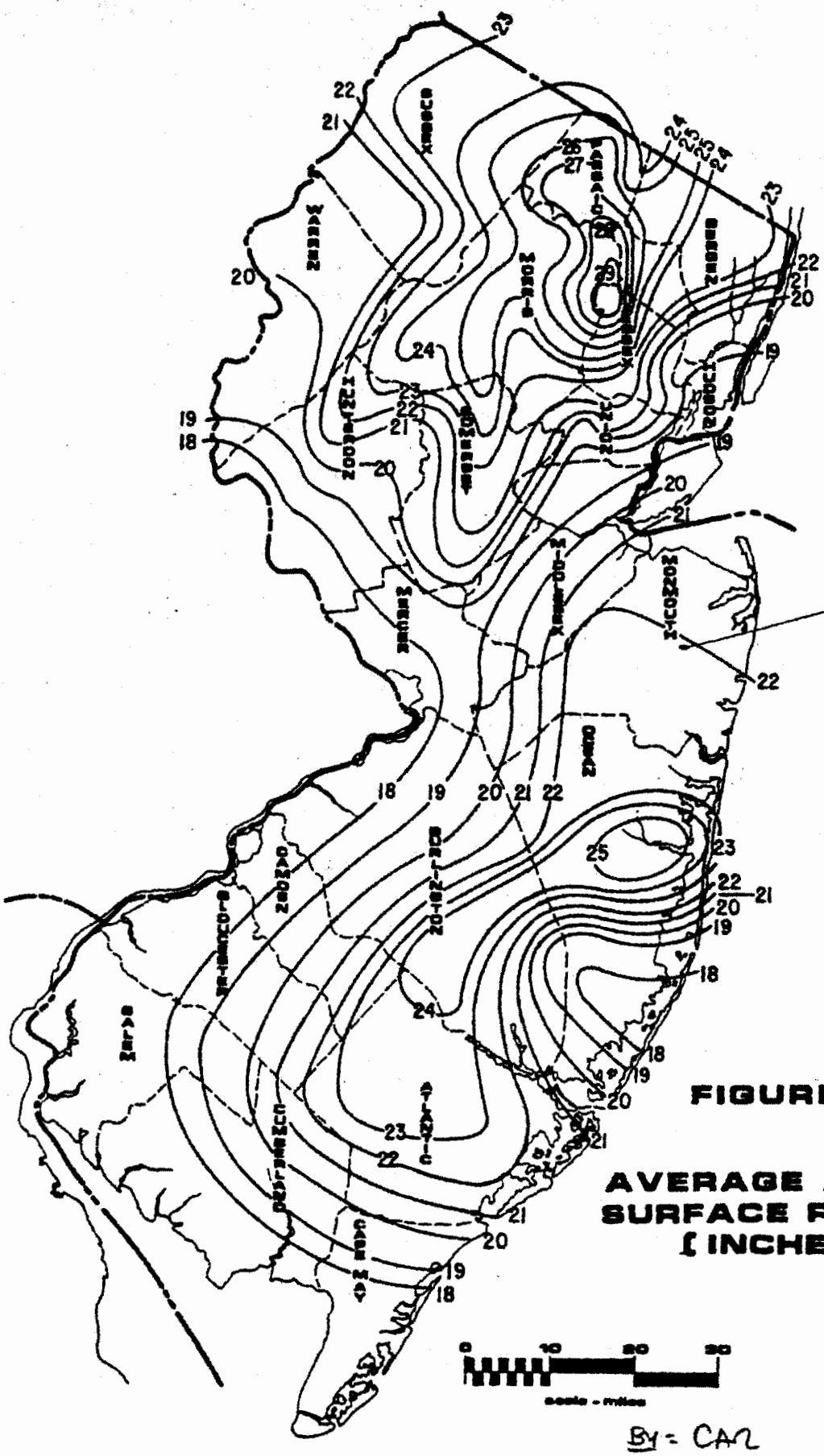


FIGURE 4.4-1

AVERAGE ANNUAL SURFACE RUNOFF (INCHES)

BY = CAR CHKD: JJB
DATE = 8/22/97 DATE: 8/27/97

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0104

SUBJECT: CAPACITY OF SEDIMENT BASINS

BASED ON	DRAWING NUMBER
TRAP EFFICIENCY	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/22/97	JOB 8/27/97		

REV. CHK'D DCW 12/31/97

CALCULATE C:

$C_{DA\#1} = (0.025)(96.25 \text{ ac-ft}) = 2.41 \text{ ac-ft}$

$C_{DA\#2} = (0.025)(3.5 \text{ ac-ft}) = 0.09 \text{ ac-ft}$

$C_{DA\#3} = (0.025)(8.5 \text{ ac-ft}) = 0.21 \text{ ac-ft}$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT: NWSE - SITE 5	JOB NUMBER: 7602/0106
SUBJECT: ESTIMATION OF SEDIMENT BASIN STORAGE CAPACITY	
BASED ON: "DURING-CONSTRUCTION" SCENARIO	DRAWING NUMBER:
BY: CAR 8/24/97 — CHECKED BY: JJB 8/27/97	APPROVED BY: — DATE:

BER 12/31/97 REVIEWED 12/31/97

- SEDIMENT STORAGE CAPACITY:

USE APPROACH AND EQUATIONS SPECIFIED IN "STANDARD FOR SEDIMENT BASIN," SECTION 4.4, REVISED, APRIL 1987 TO DETERMINE THE CAPACITY AND SIZE OF THE 3 SITE 5 SEDIMENT BASINS.

(1) ESTIMATE SEDIMENT CAPACITY STORAGE BY METHOD #1

- PROVIDE 0.07 ac·ft OF SEDIMENT STORAGE VOLUME PER ACRE OF TOTAL DRAINAGE AREA PER YEAR OF PLANNED LIFE.

[NOTE: THIS IS A VERY CONSERVATIVE APPROACH AND THE RESULTS WILL BE COMPARED TO METHOD #2]

DA #1: $V_{S_1} = \left(0.07 \frac{ac \cdot ft}{ac \cdot yr}\right)(52.26\ ac)\left(\frac{6\ months}{1}\right)\left(\frac{1\ yr}{12\ months}\right)$

$= \underline{1.83\ ac \cdot ft}$

DA #2: $V_{S_2} = (0.07)(1.92)(6/12) = \underline{0.07\ ac\text{-}ft}$

DA #3: $V_{S_3} = (0.07)(4.63)(6/12) = \underline{0.16\ ac\text{-}ft}$

ASSUMATION: LANDFILL AREA WILL BE CLEARED AND GRUBBED AND UNCOVERED FOR 4 MONTHS. AFTER THAT TIME, CAP CONSTRUCTION WILL BEGIN. ENTIRE AREA WILL BE COVERED IN 2 MONTHS. TOTAL TIME WHEN EROSION POSSIBLE = 6 MONTHS.

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT: ESTIMATION OF SEDIMENT BASIN STORAGE CAPACI

BASED ON	DRAWING NUMBER
"DURING CONSTRUCTION" SCENARIO	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JJB 8/27/97		

BER 12/31/97 REV. CHKD 12/31/97

(2) ESTIMATE SEDIMENT CAPACITY STORAGE BY METHOD #2

$$V = (DA)(A)(DR)(TE)(1/\gamma_s)(2000)(1/43560)$$

V = Vol. OF SEDIMENT
DA = TOTAL DRAINAGE AREA
A = AVG. ANNUAL EROSION
DR = DELIVERY RATIO
TE = TRAP EFFICIENCY
γ_s = SUBMERGED SEDIMENT DENSITY
γ_a = AERATED DENSITY

(NOTE: THIS IS A MORE REALISTIC, LESS CONSERVATIVE APPROACH.)

(I) DETERMINE DA AND A. ASSUME 2 COVER TYPES (A) WOODED AREAS AND (B) CONSTRUCTION AREAS. FROM TABLE ON p. 4.4.3

A_{WOOD} = 0.2 TON/AC/YR
$A_{CONST.}$ = 50 TON/AC/YR

(II) FROM PREVIOUS MEASUREMENTS:

DA_1 = 52.26 ac = 0.082 sq mi
$DA_{1\,WOOD}$ = 44.85 ac
$DA_{1\,CONST.}$ = 7.41 ac

[SEE CALCULATIONS LABELED - "DETERMINATION OF SITE 5 DRAINAGE AREA AND WEIGHTED CURVE NUMBERS - DURING CONSTRUCTION CONDITIONS (REGRADED WASTE)."]

DA_2 = 1.92 ac = 0.003 sq mi
$DA_{2\,WOOD}$ = 0.45 ac
$DA_{2\,CONST.}$ = 1.47 ac

DA_3 = 4.63 ac = 0.007 sq mi
$DA_{3\,WOOD}$ = 1.61 ac
$DA_{3\,CONST.}$ = 3.02 ac

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT: ESTIMATION OF SEDIMENT BASIN STORAGE CAPACITY

BASED ON	DRAWING NUMBER
"DURING CONSTRUCTION" SCENARIO	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JSB 8/27/97		

BER 12/31/97 REV. CHK'D 12/31/97

(III) DETERMINE THE TOTAL SEDIMENT LOAD FOR EACH DRAINAGE AREA.

DA #1: $DA_1 \cdot A_{WOOD} = 44.85\ ac \times 0.2\ TON/AC/YR = 8.97\ TON/YR$
$DA_1 \cdot A_{CONST} = 7.41\ ac \times 50\ TON/AC/YR = 371\ TON/YR$

DA #2: $DA_2 \cdot A_{WOOD} = 0.45\ ac \times 0.2\ TON/AC/YR = 0.09\ TON/YR$
$DA_2 \cdot A_{CONST} = 1.47\ ac \times 50\ TON/AC/YR = 73.5\ TON/YR$

DA #3: $DA_3 \cdot A_{WOOD} = 1.61\ ac \times 0.2\ TON/AC/YR = 0.32\ TON/YR$
$DA_3 \cdot A_{CONST} = 3.02\ ac \times 50\ TON/AC/YR = 151\ TON/YR$

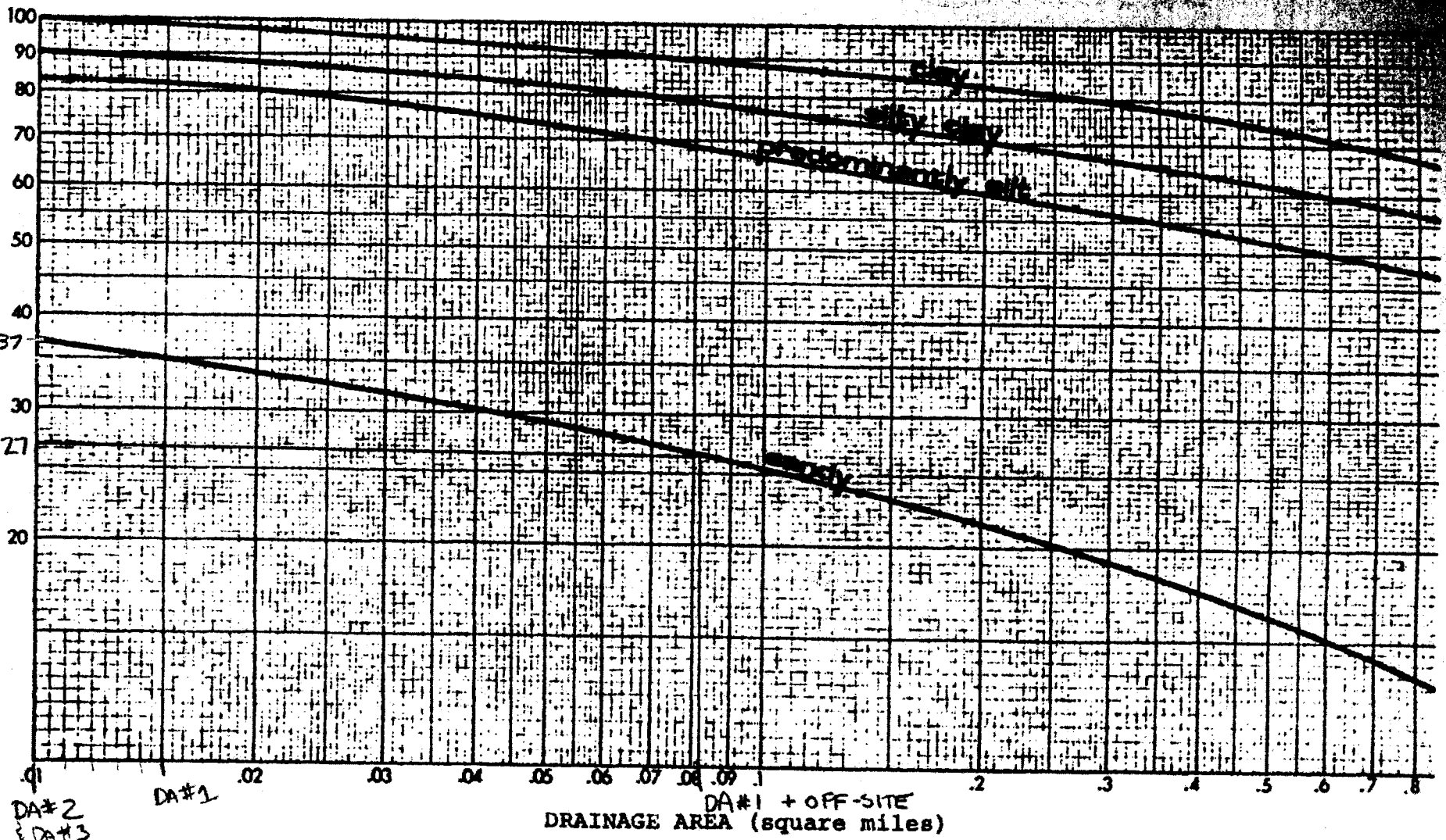
TOTAL 1 = 379.97 TON/YR
TOTAL 2 = 73.59 TON/YR
TOTAL 3 = 151.32 TON/YR

(IV) DETERMINE THE DELIVERY RATIO USING FIGURE 4.4-2, p. 4.4-10. (SEE p. 4 OF 11)

DA #1 = 27
DA #2 = 37
DA #3 = 37

ASSUME: - THE TRAP EFFICIENCY FOR BOTH AREAS IS 70%

- THE SEDIMENTS WILL BE MAINLY SAND AND WILL BE TYPICALLY DRY. USE AN AERATED DENSITY OF 90 lbs/ft^3.



BY: CAC
DATE 8/24/97
CHKD: JJB
DATE: 8/27/97
REV. CHK'D 12/31/97

Revised April 1987
REVISED: RKP 12/31/97

4.4.10

DA#1 ; DELIVERY RATIO = 27 %

DA#2 & #3 ; DELIVERY RATIO = 37 %

FIGURE 4.4-2

SEDIMENT DELIVERY RATIO VS. DRAINAGE AREA

CLIENT NWSE - SITE 5	JOB NUMBER 7602 / 0106
SUBJECT ESTIMATION OF SEDIMENT BASIN STORAGE CAPACITY	
BASED ON "DURING CONSTRUCTION" SCENARIO	DRAWING NUMBER
BY CAR 8/24/97 / CHECKED BY DJB 8/27/97	APPROVED BY / DATE

BER 12/31/97 REV. CHK'D 12/31/97

(V) CALCULATE VOLUME OF TRAPPED SEDIMENT

$$V_1 = \left(379.97 \frac{TON}{YR}\right)(0.27)(0.70)\left(\frac{1}{90 \frac{lb}{ft^3}}\right)(2000)\left(\frac{1}{43560}\right)$$

$$= \left(0.0366 \frac{ac\text{-}ft}{YR}\right)\left(\frac{6 \text{ MONTHS}}{12 \text{ MONTHS/YR}}\right) = \underline{\underline{0.018 \text{ ac-ft}}}$$

$$V_2 = \left(73.59 \frac{TON}{YR}\right)(0.37)(0.70)\left(\frac{1}{90 \frac{lb}{ft^3}}\right)(2000)\left(\frac{1}{43560}\right)$$

$$= \left(0.010 \frac{ac\text{-}ft}{YR}\right)\left(\frac{6 \text{ MONTHS}}{12 \text{ MONTHS/YR}}\right) = \underline{\underline{0.005 \text{ ac-ft}}}$$

$$V_3 = \left(151.32 \frac{TON}{YR}\right)(0.37)(0.70)\left(\frac{1}{90 \frac{lb}{ft^3}}\right)(2000)\left(\frac{1}{43560}\right)$$

$$= \left(0.020 \frac{ac\text{-}ft}{YR}\right)\left(\frac{6 \text{ MONTHS}}{12 \text{ MONTHS/YR}}\right) = \underline{\underline{0.010 \text{ ac-ft}}}$$

NOTE: USE THE SEDIMENT CAPACITY ESTIMATED BY METHOD #2 FOR THE REMAINDER OF THE CALCULATIONS.

(3) DETERMINE THE REQUIRED VOLUME OF STORAGE FOR THE RUNOFF FROM A 2-YR STORM FOR EACH DRAINAGE BASIN. USE THE GRAPHICAL PEAK DISCHARGE ESTIMATES CALCULATED FOR PRE-CONSTRUCTION AND DURING CONSTRUCTION CONDITIONS ALONG WITH THE EQUATIONS OF CHAPTER 6.0 OF THE TR-55 MANUAL TO COMPLETE THE CALCULATIONS.

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT: VOLUME OF STORAGE FOR 2-YR STORM

BASED ON	DRAWING NUMBER
PRE- AND DURING CONSTRUCTION.	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JJD 8/27/97 CHK'D DKW	12/31/97	

~~REVISED BER 12/31/97~~ REV.

(4) FOR THE "DURING CONSTRUCTION" SCENARIO DETERMINE TOTAL RUNOFF VOLUME FROM EACH DRAINAGE BASIN FOR A 2-YR STORM. USE RESULTS FROM TR-55:

DRAINAGE AREA #1:

ON-SITE
$R_{2\text{-}YR} = 1.49$ IN
AREA = 9.56 AC

OFF-SITE (South of RR Tracks)
$R_{2\text{-}YR} = 0.03$ IN
AREA = 42.7 AC

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad S = \frac{1000}{CN} - 10 \qquad P = 3.4$$

$$S = \frac{1000}{42} - 10$$

$$Q = \frac{(3.4 - (0.2)(13.8))^2}{(3.4 + (0.8)(13.8))} \qquad S = 13.8$$

$Q = 0.03$ IN

$$V_{R'2\text{-}YR} = \left(9.56\text{ AC} \times 1.49\text{ IN} \times \frac{\text{FT}}{12\text{IN}}\right) + \left(42.7\text{AC} \times 0.03\text{IN} \times \text{FT}/12\text{IN}\right)$$

$V_{R'2\text{-}YR} = 1.30$ AC-FT

DRAINAGE AREA #2:

$R_{2\text{-}YR} = 1.49$ IN
AREA = 1.92 AC
$V_{R^2 2\text{-}YR} = 1.92\text{ AC} \times 1.49\text{ IN} \times \text{FT}/12\text{IN}$
$V_{R^2 2\text{-}YR} = 0.24$ AC-FT

DRAINAGE AREA #3:

$R_{2\text{-}YR} = 1.23$ IN
AREA = 4.63 AC
$V_{R^3 2\text{-}YR} = 4.63\text{AC} \times 1.23\text{IN} \times \text{FT}/12\text{IN}$
$V_{R^3 2\text{-}YR} = 0.47$ AC-FT

(5) PEAK DISCHARGE RATES FOR THESE SAME AREAS AND STORMS ARE:

STORM	DA	qi (CFS)
2-YR	1	14
2-YR	2	3
2-YR	3	6

CLIENT NWSE - SITE 5	JOB NUMBER 7602/0106
SUBJECT VOLUME OF STORAGE FOR 2-YR STORM	
BASED ON PRE- AND DURING CONSTRUCTION	DRAWING NUMBER
BY CAR 8/28/97 / CHECKED BY JJD 8/27/97	APPROVED BY / DATE

REVISED BER 12/31/97 REV CHKD 12/31/97

(6) FROM PRE-CONSTRUCTION CONDITIONS, THE ESTIMATED PEAK DISCHARGE RATES WERE:

DRAINAGE AREA (PRE-CONSTRUCTION)	Q(2-YR) (CFS)
1A	1
1B	2
3	3

(7) BECAUSE OF REGRADING OF THE WASTE, DRAINAGE AREAS FROM "PRE-CONSTRUCTION" TO "DURING CONSTRUCTION" HAVE CHANGED AND WERE LABELED DIFFERENTLY. THE FOLLOWING TABLE PROVIDES A CROSS-REFERENCE:

DRAINAGE AREA "DURING CONSTRUCTION"		DRAINAGE AREA "PRE-CONSTRUCTION"
1	→	1A, 1B
2	→	PREVIOUSLY, ONLY A NEGLIGIBLE AMOUNT OF FLOW WENT TO THIS POINT OF INTE
3	→	3

(8) ASSUME:

(I) - RUNOFF FROM "D-C" DA # 1 = RUNOFF FROM "P-C" DA # 1B

(II) - ASSUME ENTIRE 2-YEAR "D-C" RUNOFF MUST BE CONTAINED IN THE BASIN

(III) - RUNOFF FROM "D-C" DA # 3 = RUNOFF FROM "P-C" DA # 3

CLIENT	JOB NUMBER
NWSE - SITE 5	7602/0106

SUBJECT: VOLUME OF STORAGE FOR 2-YR STORM

BASED ON	DRAWING NUMBER
PRE- AND DURING CONSTRUCTION	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97 ~~REVISED BCR 12/31/97~~	JAB 8/27/97	REV. CHK'D DKW 12/31/97	

(2) WITH THESE ASSUMPTIONS AND NOTATIONS OF CHAPTER 6.0 TR-55:

$q_{o_{DA\#1}} = 1$ CFS (PRE-CONSTRUCTION ZONE 1B)

$q_{o_{DA\#3}} = 3$ CFS (PRE-CONSTRUCTION ZONE 3)

$q_{i_{DA\#1}} = 14$ CFS (POST-CONST., ZONE 1)

$q_{i_{DA\#3}} = 6$ CFS (POST-CONST., ZONE 3)

(10) CALCULATE THE RATIO OF q_o/q_i

$$\frac{q_o}{q_{i_1}} = \frac{1}{14} = \underline{\underline{0.07}}$$

$$\frac{q_o}{q_{i_3}} = \frac{3}{6} = \underline{\underline{0.50}}$$

CLIENT	JOB NUMBER
NWSE - SITE 5	7602 / 0106

SUBJECT: VOLUME OF STORAGE FOR 2-YR STORM

BASED ON	DRAWING NUMBER
PRE- AND DURING CONSTRUCTION	

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JJD 8/27/97		

REVISED BER 12/31/97 REV. CHK'D PGW 12/31/97

(11) USING FIGURE 6-1 (SEE p. 10 OF 11) AND THE CALCULATED q_o/q_i VALUES, DETERMINE THE RATIO OF VOLUME OF STORAGE TO VOLUME OF RUNOFF. THEN CALCULATE THE VOLUME OF STORAGE (V_S) USING V_R FROM p. 6 OF 11.

(I) DRAINAGE AREA #1

$$\frac{q_o}{q_i} = 0.07 \Rightarrow \text{USE } 0.1 \Rightarrow \frac{V_S}{V_R} = 0.55$$

(TYPE III CURVE)

$$V_{S_{2YR}} = (0.55)(1.30 \text{ ac-ft})$$

$$= \underline{0.72 \text{ ac-ft}}$$

(II) DRAINAGE AREA #2

ASSUME ENTIRE 2-YR DURING CONSTRUCTION FLOW MUST BE CONTAINED IN THE BASIN

$$V_{S\ 2YR} = 0.24 \text{ AC-FT}$$

(III) DRAINAGE AREA #3

$$\frac{q_o}{q_i} = 0.50 \Rightarrow \frac{V_S}{V_R} = 0.275$$

$$V_{S_{2YR}} = (0.275)(0.47 \text{ ac-ft}) = \underline{0.13 \text{ ac-ft}}$$

REVISED BER 12/31/97 10 OF 11

BY: CAL CHKD: JJB

DATE: 8/24/97 DATE: 8/27/97

REV. CHK'D 12/31/97 DCW

Input requirements and procedures

Use figure 6-1 to estimate storage volume (V_s) required or peak outflow discharge (q_o). The most frequent application is to estimate V_s, for which the required inputs are runoff volume (V_r), q_o, and peak inflow discharge (q_i). To estimate q_o, the required inputs are V_r, V_s, and q_i.

Estimating V_s

Use worksheet 6a to estimate V_s, storage volume required, by the following procedure.

1. Determine q_o. Many factors may dictate the selection of peak outflow discharge. The most common is to limit downstream discharges to a desired level, such as predevelopment discharge. Another factor may be that the outflow device has already been selected.
2. Estimate q_i by procedures in chapters 4 or 5. Do not use peak discharges developed by any other procedure. When using the Tabular Hydrograph method to estimate q_i for a subarea, only use

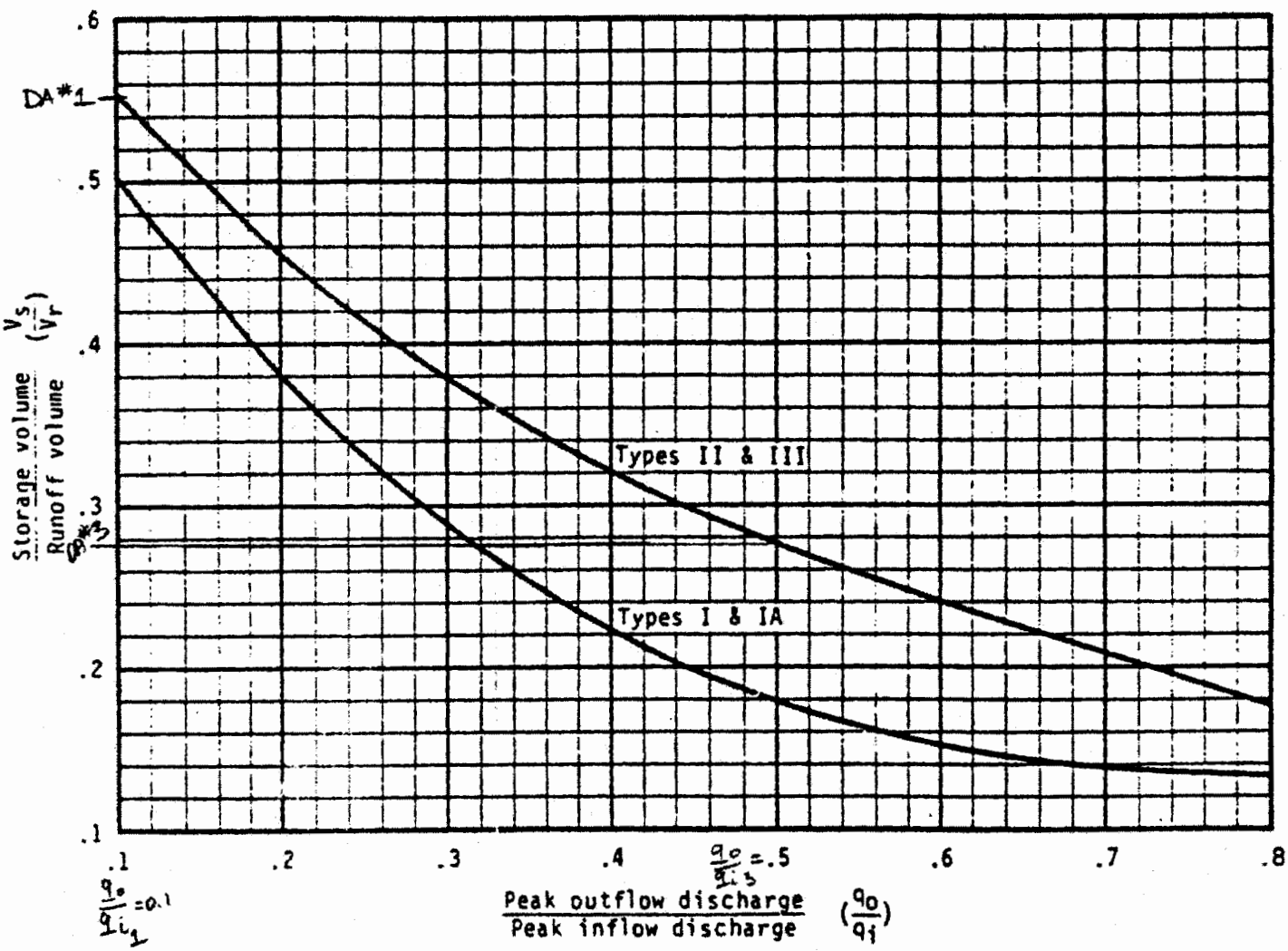


Figure 6-1.—Approximate detention basin routing for rainfall types I, IA, II, and III.

CLIENT	JOB NUMBER
NWSE - SITE 5	7602 / 0106

SUBJECT: CAPACITY OF SEDIMENT BASIN → SEDIMENT + 2 YR STORM

BASED ON: CHP #6 — TR-55

DRAWING NUMBER:

BY	CHECKED BY	APPROVED BY	DATE
CAR 8/24/97	JJB 8/27/97		

REVISED BER 12/31/97 12/31/97 DCW

(12) DETERMINE TOTAL, REQUIRED CAPACITY OF SEDIMENT BASINS.

DRAINAGE AREA #1

$$\text{TOTAL VOLUME}_1 = V^1_{SED} + V^1_{2\text{-}YR}$$

$$= 0.018 \text{ AC-FT} + 0.72 \text{ AC-FT}$$

$$V_{T_1} = \underline{\underline{0.74 \text{ AC-FT}}}$$

DRAINAGE AREA #2

$$\text{TOTAL VOLUME}_2 = V^2_{SED} + V^2_{2\text{-}YR}$$

$$= 0.005 \text{ ac-ft} + 0.24 \text{ ac-ft}$$

$$= \underline{\underline{0.295 \text{ AC-FT}}}$$

DRAINAGE AREA #3

$$\text{TOTAL VOLUME}_3 = V^3_{SED} + V^3_{2\text{-}YR}$$

$$= 0.01 \text{ ac-ft} + 0.13 \text{ ac-ft}$$

$$= \underline{\underline{0.14 \text{ ac-ft}}}$$

D.3 BASIN INFLOW HYDROGRAPHS

CALCULATION WORKSHEET Order No. 19118 (01-91) PAGE ____ OF ____

CLIENT NWSE - SITE 5		JOB NUMBER 7602	
SUBJECT BASIN INFLOW HYDROGRAPHS			
BASED ON		DRAWING NUMBER	
BY BER	CHECKED BY	APPROVED BY	DATE 12/19/97

(1) THE BASIN INFLOW HYDROGRAPHS FOR THE SEDIMENT BASIN DESIGN WERE BASED ON THE TC, AREA AND WEIGHTED CURVE NUMBER FOR EACH "DURING CONSTRUCTION" DRAINAGE AREA.

(2) THE BASIN INFLOW HYDROGRAPHS FOR THE DETENTION BASIN DESIGN WERE BASED ON THE TC, AREA, AND WEIGHTED CURVE NUMBER FOR EACH POST-DEVELOPMENT DRAINAGE AREA.

(3) SEDIMENT / DETENTION BASIN #1 :

- THE ON-SITE HYDROGRAPH WAS ADDED TO THE OFF-SITE HYDROGRAPH FOR BOTH THE SEDIMENT AND DETENTION BASIN DESIGN. THE RESULTING HYDROGRAPH IS FOLLOWED BY THE ORIGINAL ON-SITE AND OFF-SITE HYDROGRAPHS. THE RESULTANT HYDROGRAPHS WERE GENERATED BY PONDPACK THROUGH THE ADDITION OF THE ON-SITE HYDROGRAPH AND THE OFF-SITE HYDROGRAPH.

D.3.1 Sediment / Detention Basin #1

CSF 12/31/97

Executed 12-30-1997 19:36:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-2 (cfs)	OFF-2 (cfs)	EX-SUM2 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	0.0	0.0	0.0
12.30	0.0	0.0	0.0
12.40	0.0	0.0	0.0
12.50	0.0	0.0	0.0
12.60	1.0	0.0	1.0
12.70	1.0	0.0	1.0
12.80	1.0	0.0	1.0
12.90	1.0	0.0	1.0
13.00	1.0	0.0	1.0
13.10	1.0	0.0	1.0
13.20	1.0	0.0	1.0
13.30	1.0	0.0	1.0
13.40	1.0	0.0	1.0
13.50	1.0	0.0	1.0
13.60	0.0	0.0	0.0
13.70	0.0	0.0	0.0
13.80	0.0	0.0	0.0
13.90	0.0	0.0	0.0
14.00	0.0	0.0	0.0
14.10	0.0	0.0	0.0
14.20	0.0	0.0	0.0
14.30	0.0	0.0	0.0
14.40	0.0	0.0	0.0
14.50	0.0	0.0	0.0
14.60	0.0	0.0	0.0
14.70	0.0	0.0	0.0
14.80	0.0	0.0	0.0
14.90	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 12-30-1997 19:36:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-2 (cfs)	OFF-2 (cfs)	EX-SUM2 (Total)
15.00	0.0	0.0	0.0
15.10	0.0	0.0	0.0
15.20	0.0	0.0	0.0
15.30	0.0	0.0	0.0
15.40	0.0	0.0	0.0
15.50	0.0	0.0	0.0
15.60	0.0	0.0	0.0
15.70	0.0	0.0	0.0
15.80	0.0	0.0	0.0
15.90	0.0	0.0	0.0
16.00	0.0	0.0	0.0
16.10	0.0	0.0	0.0
16.20	0.0	0.0	0.0
16.30	0.0	0.0	0.0
16.40	0.0	0.0	0.0
16.50	0.0	0.0	0.0
16.60	0.0	0.0	0.0
16.70	0.0	0.0	0.0
16.80	0.0	0.0	0.0
16.90	0.0	0.0	0.0
17.00	0.0	0.0	0.0
17.10	0.0	0.0	0.0
17.20	0.0	0.0	0.0
17.30	0.0	0.0	0.0
17.40	0.0	0.0	0.0
17.50	0.0	0.0	0.0
17.60	0.0	0.0	0.0
17.70	0.0	0.0	0.0
17.80	0.0	0.0	0.0
17.90	0.0	0.0	0.0
18.00	0.0	0.0	0.0
18.10	0.0	0.0	0.0
18.20	0.0	0.0	0.0
18.30	0.0	0.0	0.0
18.40	0.0	0.0	0.0
18.50	0.0	0.0	0.0
18.60	0.0	0.0	0.0
18.70	0.0	0.0	0.0
18.80	0.0	0.0	0.0
18.90	0.0	0.0	0.0
19.00	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 12-30-1997 19:36:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-2 (cfs)	OFF-2 (cfs)	EX-SUM2 (Total)
19.10	0.0	0.0	0.0
19.20	0.0	0.0	0.0
19.30	0.0	0.0	0.0
19.40	0.0	0.0	0.0
19.50	0.0	0.0	0.0
19.60	0.0	0.0	0.0
19.70	0.0	0.0	0.0
19.80	0.0	0.0	0.0
19.90	0.0	0.0	0.0
20.00	0.0	0.0	0.0
20.10	0.0	0.0	0.0
20.20	0.0	0.0	0.0
20.30	0.0	0.0	0.0
20.40	0.0	0.0	0.0
20.50	0.0	0.0	0.0
20.60	0.0	0.0	0.0
20.70	0.0	0.0	0.0
20.80	0.0	0.0	0.0
20.90	0.0	0.0	0.0
21.00	0.0	0.0	0.0
21.10	0.0	0.0	0.0
21.20	0.0	0.0	0.0
21.30	0.0	0.0	0.0
21.40	0.0	0.0	0.0
21.50	0.0	0.0	0.0
21.60	0.0	0.0	0.0
21.70	0.0	0.0	0.0
21.80	0.0	0.0	0.0
21.90	0.0	0.0	0.0
22.00	0.0	0.0	0.0
22.10	0.0	0.0	0.0
22.20	0.0	0.0	0.0
22.30	0.0	0.0	0.0
22.40	0.0	0.0	0.0
22.50	0.0	0.0	0.0
22.60	0.0	0.0	0.0
22.70	0.0	0.0	0.0
22.80	0.0	0.0	0.0
22.90	0.0	0.0	0.0
23.00	0.0	0.0	0.0
23.10	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 12-30-1997 19:36:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-2 (cfs)	OFF-2 (cfs)	EX-SUM2 (Total)
23.20	0.0	0.0	0.0
23.30	0.0	0.0	0.0
23.40	0.0	0.0	0.0
23.50	0.0	0.0	0.0
23.60	0.0	0.0	0.0
23.70	0.0	0.0	0.0
23.80	0.0	0.0	0.0
23.90	0.0	0.0	0.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CRF 12/31/97

Executed: 12-30-1997 19:33:33
Watershed file: --> EX-1A-2 .WSD
Hydrograph file: --> EX-1A-2 .HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
2 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA 1A	4.88	60.0	0.40	0.40	3.40	0.49	.39	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 4.88 acres or 0.00763 sq.mi
Peak discharge = 1 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1A	0.39	0.39	0.40	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:33:33
Watershed file: --> EX-1A-2 .WSD
Hydrograph file: --> EX-1A-2 .HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
2 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1A	1	12.6
Composite Watershed	1	12.6

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:33:33
Watershed file: --> EX-1A-2 .WSD
Hydrograph file: --> EX-1A-2 .HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
2 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1A	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1A	0	1	1	1	1	1	1	0	0
Total (cfs)	0	1	1	1	1	1	1	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1A	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1A	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:33:33
Watershed file: --> EX-1A-2 .WSD
Hydrograph file: --> EX-1A-2 .HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
2 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	0	16.1	0
12.4	0	16.2	0
12.5	0	16.3	0
12.6	1	16.4	0
12.7	1	16.5	0
12.8	1	16.6	0
12.9	1	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:33:33
Watershed file: --> EX-1A-2 .WSD
Hydrograph file: --> EX-1A-2 .HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
2 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CJF 12/31/97
Against 10/31/97 calcs

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
OFF-SITE	42.70	42.0	0.30	0.40	3.40	0.03	.81	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	0	0.0
Composite Watershed	0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	0	16.1	0
12.4	0	16.2	0
12.5	0	16.3	0
12.6	0	16.4	0
12.7	0	16.5	0
12.8	0	16.6	0
12.9	0	16.7	0
13.0	0	16.8	0
13.1	0	16.9	0
13.2	0	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

Executed 12-30-1997 19:38:35

Data directory: *.HYD

File Summary for Composite Hydrograph

OIF 12/31/97

Time (hrs)	EX-1A-10 (cfs)	OFF-10 (cfs)	EX-SUM10 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	0.0	0.0	0.0
12.30	0.0	0.0	0.0
12.40	1.0	1.0	2.0
12.50	1.0	2.0	3.0
12.60	2.0	3.0	5.0
12.70	3.0	4.0	7.0
12.80	4.0	5.0	9.0
12.90	4.0	4.0	8.0
13.00	3.0	4.0	7.0
13.10	3.0	4.0	7.0
13.20	3.0	4.0	7.0
13.30	2.0	4.0	6.0
13.40	2.0	3.0	5.0
13.50	2.0	3.0	5.0
13.60	1.0	3.0	4.0
13.70	1.0	2.0	3.0
13.80	1.0	2.0	3.0
13.90	1.0	2.0	3.0
14.00	1.0	2.0	3.0
14.10	1.0	2.0	3.0
14.20	1.0	2.0	3.0
14.30	1.0	2.0	3.0
14.40	1.0	2.0	3.0
14.50	1.0	2.0	3.0
14.60	1.0	2.0	3.0
14.70	1.0	2.0	3.0
14.80	1.0	2.0	3.0
14.90	1.0	2.0	3.0

Executed 12-30-1997 19:38:35

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-10 (cfs)	OFF-10 (cfs)	EX-SUM10 (Total)
15.00	1.0	2.0	3.0
15.10	1.0	2.0	3.0
15.20	1.0	2.0	3.0
15.30	1.0	2.0	3.0
15.40	1.0	2.0	3.0
15.50	1.0	2.0	3.0
15.60	1.0	2.0	3.0
15.70	1.0	2.0	3.0
15.80	1.0	2.0	3.0
15.90	1.0	2.0	3.0
16.00	1.0	2.0	3.0
16.10	1.0	2.0	3.0
16.20	1.0	2.0	3.0
16.30	0.0	1.0	1.0
16.40	0.0	1.0	1.0
16.50	0.0	1.0	1.0
16.60	0.0	1.0	1.0
16.70	0.0	1.0	1.0
16.80	0.0	1.0	1.0
16.90	0.0	1.0	1.0
17.00	0.0	1.0	1.0
17.10	0.0	1.0	1.0
17.20	0.0	1.0	1.0
17.30	0.0	1.0	1.0
17.40	0.0	1.0	1.0
17.50	0.0	1.0	1.0
17.60	0.0	1.0	1.0
17.70	0.0	1.0	1.0
17.80	0.0	1.0	1.0
17.90	0.0	1.0	1.0
18.00	0.0	1.0	1.0
18.10	0.0	1.0	1.0
18.20	0.0	1.0	1.0
18.30	0.0	1.0	1.0
18.40	0.0	1.0	1.0
18.50	0.0	1.0	1.0
18.60	0.0	1.0	1.0
18.70	0.0	1.0	1.0
18.80	0.0	1.0	1.0
18.90	0.0	1.0	1.0
19.00	0.0	1.0	1.0

Executed 12-30-1997 19:38:35

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-10 (cfs)	OFF-10 (cfs)	EX-SUM10 (Total)
19.10	0.0	1.0	1.0
19.20	0.0	1.0	1.0
19.30	0.0	1.0	1.0
19.40	0.0	1.0	1.0
19.50	0.0	1.0	1.0
19.60	0.0	1.0	1.0
19.70	0.0	1.0	1.0
19.80	0.0	1.0	1.0
19.90	0.0	1.0	1.0
20.00	0.0	1.0	1.0
20.10	0.0	1.0	1.0
20.20	0.0	1.0	1.0
20.30	0.0	1.0	1.0
20.40	0.0	1.0	1.0
20.50	0.0	1.0	1.0
20.60	0.0	1.0	1.0
20.70	0.0	1.0	1.0
20.80	0.0	1.0	1.0
20.90	0.0	1.0	1.0
21.00	0.0	1.0	1.0
21.10	0.0	1.0	1.0
21.20	0.0	1.0	1.0
21.30	0.0	1.0	1.0
21.40	0.0	1.0	1.0
21.50	0.0	1.0	1.0
21.60	0.0	1.0	1.0
21.70	0.0	1.0	1.0
21.80	0.0	1.0	1.0
21.90	0.0	1.0	1.0
22.00	0.0	1.0	1.0
22.10	0.0	1.0	1.0
22.20	0.0	1.0	1.0
22.30	0.0	1.0	1.0
22.40	0.0	1.0	1.0
22.50	0.0	1.0	1.0
22.60	0.0	1.0	1.0
22.70	0.0	1.0	1.0
22.80	0.0	1.0	1.0
22.90	0.0	1.0	1.0
23.00	0.0	1.0	1.0
23.10	0.0	1.0	1.0

Executed 12-30-1997 19:38:35

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-10 (cfs)	OFF-10 (cfs)	EX-SUM10 (Total)
23.20	0.0	1.0	1.0
23.30	0.0	1.0	1.0
23.40	0.0	1.0	1.0
23.50	0.0	1.0	1.0
23.60	0.0	1.0	1.0
23.70	0.0	1.0	1.0
23.80	0.0	1.0	1.0
23.90	0.0	1.0	1.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CSF 12/31/97

Executed: 12-30-1997 19:34:47
Watershed file: --> EX-1A-10.WSD
Hydrograph file: --> EX-1A-10.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
10 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1A	4.88	60.0	0.40	0.40	5.20	1.42	.26	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 4.88 acres or 0.00763 sq.mi
Peak discharge = 4 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1A	0.39	0.39	0.40	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:34:47
Watershed file: --> EX-1A-10.WSD
Hydrograph file: --> EX-1A-10.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
10 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1A	4	12.8
Composite Watershed	4	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:34:47
Watershed file: --> EX-1A-10.WSD
Hydrograph file: --> EX-1A-10.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
10 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1A	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1A	1	2	3	4	3	3	2	1	1
Total (cfs)	1	2	3	4	3	3	2	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1A	1	1	1	1	1	1	0	0	0
Total (cfs)	1	1	1	1	1	1	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1A	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:34:47
Watershed file: --> EX-1A-10.WSD
Hydrograph file: --> EX-1A-10.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
10 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	0	15.3	1
11.6	0	15.4	1
11.7	0	15.5	1
11.8	0	15.6	1
11.9	0	15.7	1
12.0	0	15.8	1
12.1	0	15.9	1
12.2	0	16.0	1
12.3	0	16.1	1
12.4	1	16.2	1
12.5	1	16.3	0
12.6	2	16.4	0
12.7	3	16.5	0
12.8	4	16.6	0
12.9	4	16.7	0
13.0	3	16.8	0
13.1	3	16.9	0
13.2	3	17.0	0
13.3	2	17.1	0
13.4	2	17.2	0
13.5	2	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:34:47
Watershed file: --> EX-1A-10.WSD
Hydrograph file: --> EX-1A-10.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
10 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

Executed 12-30-1997 19:39:28

Data directory: *.HYD

File Summary for Composite Hydrograph

CJF 12/31/97

Time (hrs)	EX-1A-25 (cfs)	OFF-25 (cfs)	EX-SUM25 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	0.0	0.0	0.0
12.30	0.0	0.0	0.0
12.40	1.0	1.0	2.0
12.50	2.0	3.0	5.0
12.60	3.0	5.0	8.0
12.70	4.0	7.0	11.0
12.80	5.0	8.0	13.0
12.90	4.0	8.0	12.0
13.00	4.0	7.0	11.0
13.10	4.0	6.0	10.0
13.20	3.0	6.0	9.0
13.30	2.0	6.0	8.0
13.40	2.0	5.0	7.0
13.50	2.0	5.0	7.0
13.60	2.0	4.0	6.0
13.70	2.0	4.0	6.0
13.80	1.0	4.0	5.0
13.90	1.0	4.0	5.0
14.00	1.0	4.0	5.0
14.10	1.0	4.0	5.0
14.20	1.0	4.0	5.0
14.30	1.0	4.0	5.0
14.40	1.0	4.0	5.0
14.50	1.0	3.0	4.0
14.60	1.0	3.0	4.0
14.70	1.0	3.0	4.0
14.80	1.0	3.0	4.0
14.90	1.0	3.0	4.0

Executed 12-30-1997 19:39:28

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-25 (cfs)	OFF-25 (cfs)	EX-SUM25 (Total)
15.00	1.0	3.0	4.0
15.10	1.0	3.0	4.0
15.20	1.0	3.0	4.0
15.30	1.0	3.0	4.0
15.40	1.0	3.0	4.0
15.50	1.0	3.0	4.0
15.60	1.0	3.0	4.0
15.70	1.0	3.0	4.0
15.80	1.0	3.0	4.0
15.90	1.0	3.0	4.0
16.00	1.0	3.0	4.0
16.10	1.0	3.0	4.0
16.20	1.0	3.0	4.0
16.30	1.0	2.0	3.0
16.40	1.0	2.0	3.0
16.50	1.0	2.0	3.0
16.60	1.0	2.0	3.0
16.70	1.0	2.0	3.0
16.80	1.0	2.0	3.0
16.90	1.0	2.0	3.0
17.00	1.0	2.0	3.0
17.10	1.0	2.0	3.0
17.20	1.0	2.0	3.0
17.30	0.0	2.0	2.0
17.40	0.0	2.0	2.0
17.50	0.0	2.0	2.0
17.60	0.0	2.0	2.0
17.70	0.0	2.0	2.0
17.80	0.0	2.0	2.0
17.90	0.0	2.0	2.0
18.00	0.0	2.0	2.0
18.10	0.0	2.0	2.0
18.20	0.0	2.0	2.0
18.30	0.0	2.0	2.0
18.40	0.0	2.0	2.0
18.50	0.0	2.0	2.0
18.60	0.0	1.0	1.0
18.70	0.0	1.0	1.0
18.80	0.0	1.0	1.0
18.90	0.0	1.0	1.0
19.00	0.0	1.0	1.0

Executed 12-30-1997 19:39:28

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-25 (cfs)	OFF-25 (cfs)	EX-SUM25 (Total)
19.10	0.0	1.0	1.0
19.20	0.0	1.0	1.0
19.30	0.0	1.0	1.0
19.40	0.0	1.0	1.0
19.50	0.0	1.0	1.0
19.60	0.0	1.0	1.0
19.70	0.0	1.0	1.0
19.80	0.0	1.0	1.0
19.90	0.0	1.0	1.0
20.00	0.0	1.0	1.0
20.10	0.0	1.0	1.0
20.20	0.0	1.0	1.0
20.30	0.0	1.0	1.0
20.40	0.0	1.0	1.0
20.50	0.0	1.0	1.0
20.60	0.0	1.0	1.0
20.70	0.0	1.0	1.0
20.80	0.0	1.0	1.0
20.90	0.0	1.0	1.0
21.00	0.0	1.0	1.0
21.10	0.0	1.0	1.0
21.20	0.0	1.0	1.0
21.30	0.0	1.0	1.0
21.40	0.0	1.0	1.0
21.50	0.0	1.0	1.0
21.60	0.0	1.0	1.0
21.70	0.0	1.0	1.0
21.80	0.0	1.0	1.0
21.90	0.0	1.0	1.0
22.00	0.0	1.0	1.0
22.10	0.0	1.0	1.0
22.20	0.0	1.0	1.0
22.30	0.0	1.0	1.0
22.40	0.0	1.0	1.0
22.50	0.0	1.0	1.0
22.60	0.0	1.0	1.0
22.70	0.0	1.0	1.0
22.80	0.0	1.0	1.0
22.90	0.0	1.0	1.0
23.00	0.0	1.0	1.0
23.10	0.0	1.0	1.0

Executed 12-30-1997 19:39:28

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	EX-1A-25 (cfs)	OFF-25 (cfs)	EX-SUM25 (Total)
23.20	0.0	1.0	1.0
23.30	0.0	1.0	1.0
23.40	0.0	1.0	1.0
23.50	0.0	1.0	1.0
23.60	0.0	1.0	1.0
23.70	0.0	1.0	1.0
23.80	0.0	1.0	1.0
23.90	0.0	1.0	1.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

CSF 12/31/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:35:12
Watershed file: --> EX-1A-25.WSD
Hydrograph file: --> EX-1A-25.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
25 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1A	4.88	60.0	0.40	0.40	6.00	1.92	.22	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 4.88 acres or 0.00763 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1A	0.39	0.39	0.40	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:35:12
Watershed file: --> EX-1A-25.WSD
Hydrograph file: --> EX-1A-25.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
25 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1A	5	12.8
Composite Watershed	5	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:35:12
Watershed file: --> EX-1A-25.WSD
Hydrograph file: --> EX-1A-25.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
25 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1A	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1A	2	3	4	5	4	3	2	2	1
Total (cfs)	2	3	4	5	4	3	2	2	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1A	1	1	1	1	1	1	1	1	0
Total (cfs)	1	1	1	1	1	1	1	1	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1A	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:35:12
Watershed file: --> EX-1A-25.WSD
Hydrograph file: --> EX-1A-25.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
25 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	0	15.3	1
11.6	0	15.4	1
11.7	0	15.5	1
11.8	0	15.6	1
11.9	0	15.7	1
12.0	0	15.8	1
12.1	0	15.9	1
12.2	0	16.0	1
12.3	0	16.1	1
12.4	1	16.2	1
12.5	2	16.3	1
12.6	3	16.4	1
12.7	4	16.5	1
12.8	5	16.6	1
12.9	4	16.7	1
13.0	4	16.8	1
13.1	4	16.9	1
13.2	3	17.0	1
13.3	2	17.1	1
13.4	2	17.2	1
13.5	2	17.3	0
13.6	2	17.4	0
13.7	2	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-30-1997 19:35:12
Watershed file: --> EX-1A-25.WSD
Hydrograph file: --> EX-1A-25.HYD

EARLE - SITE 5
PRE-DEVELOPMENT CONDITIONS
25 YEAR STORM
ON-SITE RUNOFF FROM DA 1A

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

Executed 01-02-1998 11:03:21

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-2 (cfs)	OFF-2 (cfs)	DC1-SUM2 (Total)
11.00	1.0	0.0	1.0
11.10	1.0	0.0	1.0
11.20	1.0	0.0	1.0
11.30	1.0	0.0	1.0
11.40	1.0	0.0	1.0
11.50	1.0	0.0	1.0
11.60	1.0	0.0	1.0
11.70	1.0	0.0	1.0
11.80	2.0	0.0	2.0
11.90	2.0	0.0	2.0
12.00	3.0	0.0	3.0
12.10	5.0	0.0	5.0
12.20	8.0	0.0	8.0
12.30	12.0	0.0	12.0
12.40	12.0	0.0	12.0
12.50	9.0	0.0	9.0
12.60	7.0	0.0	7.0
12.70	5.0	0.0	5.0
12.80	4.0	0.0	4.0
12.90	3.0	0.0	3.0
13.00	2.0	0.0	2.0
13.10	2.0	0.0	2.0
13.20	2.0	0.0	2.0
13.30	2.0	0.0	2.0
13.40	1.0	0.0	1.0
13.50	1.0	0.0	1.0
13.60	1.0	0.0	1.0
13.70	1.0	0.0	1.0
13.80	1.0	0.0	1.0
13.90	1.0	0.0	1.0
14.00	1.0	0.0	1.0
14.10	1.0	0.0	1.0
14.20	1.0	0.0	1.0
14.30	1.0	0.0	1.0
14.40	1.0	0.0	1.0
14.50	1.0	0.0	1.0
14.60	1.0	0.0	1.0
14.70	1.0	0.0	1.0
14.80	1.0	0.0	1.0
14.90	1.0	0.0	1.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:03:21

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-2 (cfs)	OFF-2 (cfs)	DC1-SUM2 (Total)
15.00	1.0	0.0	1.0
15.10	1.0	0.0	1.0
15.20	1.0	0.0	1.0
15.30	1.0	0.0	1.0
15.40	1.0	0.0	1.0
15.50	1.0	0.0	1.0
15.60	1.0	0.0	1.0
15.70	1.0	0.0	1.0
15.80	1.0	0.0	1.0
15.90	1.0	0.0	1.0
16.00	1.0	0.0	1.0
16.10	1.0	0.0	1.0
16.20	1.0	0.0	1.0
16.30	1.0	0.0	1.0
16.40	1.0	0.0	1.0
16.50	1.0	0.0	1.0
16.60	1.0	0.0	1.0
16.70	1.0	0.0	1.0
16.80	0.0	0.0	0.0
16.90	0.0	0.0	0.0
17.00	0.0	0.0	0.0
17.10	0.0	0.0	0.0
17.20	0.0	0.0	0.0
17.30	0.0	0.0	0.0
17.40	0.0	0.0	0.0
17.50	0.0	0.0	0.0
17.60	0.0	0.0	0.0
17.70	0.0	0.0	0.0
17.80	0.0	0.0	0.0
17.90	0.0	0.0	0.0
18.00	0.0	0.0	0.0
18.10	0.0	0.0	0.0
18.20	0.0	0.0	0.0
18.30	0.0	0.0	0.0
18.40	0.0	0.0	0.0
18.50	0.0	0.0	0.0
18.60	0.0	0.0	0.0
18.70	0.0	0.0	0.0
18.80	0.0	0.0	0.0
18.90	0.0	0.0	0.0
19.00	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:03:21

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-2 (cfs)	OFF-2 (cfs)	DC1-SUM2 (Total)
19.10	0.0	0.0	0.0
19.20	0.0	0.0	0.0
19.30	0.0	0.0	0.0
19.40	0.0	0.0	0.0
19.50	0.0	0.0	0.0
19.60	0.0	0.0	0.0
19.70	0.0	0.0	0.0
19.80	0.0	0.0	0.0
19.90	0.0	0.0	0.0
20.00	0.0	0.0	0.0
20.10	0.0	0.0	0.0
20.20	0.0	0.0	0.0
20.30	0.0	0.0	0.0
20.40	0.0	0.0	0.0
20.50	0.0	0.0	0.0
20.60	0.0	0.0	0.0
20.70	0.0	0.0	0.0
20.80	0.0	0.0	0.0
20.90	0.0	0.0	0.0
21.00	0.0	0.0	0.0
21.10	0.0	0.0	0.0
21.20	0.0	0.0	0.0
21.30	0.0	0.0	0.0
21.40	0.0	0.0	0.0
21.50	0.0	0.0	0.0
21.60	0.0	0.0	0.0
21.70	0.0	0.0	0.0
21.80	0.0	0.0	0.0
21.90	0.0	0.0	0.0
22.00	0.0	0.0	0.0
22.10	0.0	0.0	0.0
22.20	0.0	0.0	0.0
22.30	0.0	0.0	0.0
22.40	0.0	0.0	0.0
22.50	0.0	0.0	0.0
22.60	0.0	0.0	0.0
22.70	0.0	0.0	0.0
22.80	0.0	0.0	0.0
22.90	0.0	0.0	0.0
23.00	0.0	0.0	0.0
23.10	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:03:21

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-2 (cfs)	OFF-2 (cfs)	DC1-SUM2 (Total)
23.20	0.0	0.0	0.0
23.30	0.0	0.0	0.0
23.40	0.0	0.0	0.0
23.50	0.0	0.0	0.0
23.60	0.0	0.0	0.0
23.70	0.0	0.0	0.0
23.80	0.0	0.0	0.0
23.90	0.0	0.0	0.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:07:25
Watershed file: --> DC1-2 .WSD
Hydrograph file: --> DC1-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.56	79.0	0.10	0.10	3.40	1.49	.16	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.56 acres or 0.01494 sq.mi
Peak discharge = 12 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.10	0.10	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:07:25
Watershed file: --> DC1-2 .WSD
Hydrograph file: --> DC1-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1	12	12.3
Composite Watershed	12	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:07:25
Watershed file: --> DC1-2 .WSD
Hydrograph file: --> DC1-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1	1	1	1	2	3	5	8	12	12
Total (cfs)	1	1	1	2	3	5	8	12	12

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1	9	7	5	4	2	2	1	1	1
Total (cfs)	9	7	5	4	2	2	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1	1	1	1	1	1	1	1	0	0
Total (cfs)	1	1	1	1	1	1	1	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:07:25
Watershed file: --> DC1-2 .WSD
Hydrograph file: --> DC1-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	1	14.8	1
11.1	1	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	1	15.5	1
11.8	2	15.6	1
11.9	2	15.7	1
12.0	3	15.8	1
12.1	5	15.9	1
12.2	8	16.0	1
12.3	12	16.1	1
12.4	12	16.2	1
12.5	9	16.3	1
12.6	7	16.4	1
12.7	5	16.5	1
12.8	4	16.6	1
12.9	3	16.7	1
13.0	2	16.8	0
13.1	2	16.9	0
13.2	2	17.0	0
13.3	2	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:07:25
Watershed file: --> DC1-2 .WSD
Hydrograph file: --> DC1-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

Executed 01-02-1998 11:11:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-2 (cfs)	OFF-2 (cfs)	PD-2 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	1.0	0.0	1.0
12.30	1.0	0.0	1.0
12.40	3.0	0.0	3.0
12.50	3.0	0.0	3.0
12.60	3.0	0.0	3.0
12.70	3.0	0.0	3.0
12.80	2.0	0.0	2.0
12.90	2.0	0.0	2.0
13.00	2.0	0.0	2.0
13.10	2.0	0.0	2.0
13.20	1.0	0.0	1.0
13.30	1.0	0.0	1.0
13.40	1.0	0.0	1.0
13.50	1.0	0.0	1.0
13.60	1.0	0.0	1.0
13.70	1.0	0.0	1.0
13.80	1.0	0.0	1.0
13.90	1.0	0.0	1.0
14.00	1.0	0.0	1.0
14.10	1.0	0.0	1.0
14.20	1.0	0.0	1.0
14.30	1.0	0.0	1.0
14.40	1.0	0.0	1.0
14.50	1.0	0.0	1.0
14.60	1.0	0.0	1.0
14.70	1.0	0.0	1.0
14.80	0.0	0.0	0.0
14.90	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:11:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-2 (cfs)	OFF-2 (cfs)	PD-2 (Total)
15.00	0.0	0.0	0.0
15.10	0.0	0.0	0.0
15.20	0.0	0.0	0.0
15.30	0.0	0.0	0.0
15.40	0.0	0.0	0.0
15.50	0.0	0.0	0.0
15.60	0.0	0.0	0.0
15.70	0.0	0.0	0.0
15.80	0.0	0.0	0.0
15.90	0.0	0.0	0.0
16.00	0.0	0.0	0.0
16.10	0.0	0.0	0.0
16.20	0.0	0.0	0.0
16.30	0.0	0.0	0.0
16.40	0.0	0.0	0.0
16.50	0.0	0.0	0.0
16.60	0.0	0.0	0.0
16.70	0.0	0.0	0.0
16.80	0.0	0.0	0.0
16.90	0.0	0.0	0.0
17.00	0.0	0.0	0.0
17.10	0.0	0.0	0.0
17.20	0.0	0.0	0.0
17.30	0.0	0.0	0.0
17.40	0.0	0.0	0.0
17.50	0.0	0.0	0.0
17.60	0.0	0.0	0.0
17.70	0.0	0.0	0.0
17.80	0.0	0.0	0.0
17.90	0.0	0.0	0.0
18.00	0.0	0.0	0.0
18.10	0.0	0.0	0.0
18.20	0.0	0.0	0.0
18.30	0.0	0.0	0.0
18.40	0.0	0.0	0.0
18.50	0.0	0.0	0.0
18.60	0.0	0.0	0.0
18.70	0.0	0.0	0.0
18.80	0.0	0.0	0.0
18.90	0.0	0.0	0.0
19.00	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:11:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-2 (cfs)	OFF-2 (cfs)	PD-2 (Total)
19.10	0.0	0.0	0.0
19.20	0.0	0.0	0.0
19.30	0.0	0.0	0.0
19.40	0.0	0.0	0.0
19.50	0.0	0.0	0.0
19.60	0.0	0.0	0.0
19.70	0.0	0.0	0.0
19.80	0.0	0.0	0.0
19.90	0.0	0.0	0.0
20.00	0.0	0.0	0.0
20.10	0.0	0.0	0.0
20.20	0.0	0.0	0.0
20.30	0.0	0.0	0.0
20.40	0.0	0.0	0.0
20.50	0.0	0.0	0.0
20.60	0.0	0.0	0.0
20.70	0.0	0.0	0.0
20.80	0.0	0.0	0.0
20.90	0.0	0.0	0.0
21.00	0.0	0.0	0.0
21.10	0.0	0.0	0.0
21.20	0.0	0.0	0.0
21.30	0.0	0.0	0.0
21.40	0.0	0.0	0.0
21.50	0.0	0.0	0.0
21.60	0.0	0.0	0.0
21.70	0.0	0.0	0.0
21.80	0.0	0.0	0.0
21.90	0.0	0.0	0.0
22.00	0.0	0.0	0.0
22.10	0.0	0.0	0.0
22.20	0.0	0.0	0.0
22.30	0.0	0.0	0.0
22.40	0.0	0.0	0.0
22.50	0.0	0.0	0.0
22.60	0.0	0.0	0.0
22.70	0.0	0.0	0.0
22.80	0.0	0.0	0.0
22.90	0.0	0.0	0.0
23.00	0.0	0.0	0.0
23.10	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

Executed 01-02-1998 11:11:31

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-2 (cfs)	OFF-2 (cfs)	PD-2 (Total)
23.20	0.0	0.0	0.0
23.30	0.0	0.0	0.0
23.40	0.0	0.0	0.0
23.50	0.0	0.0	0.0
23.60	0.0	0.0	0.0
23.70	0.0	0.0	0.0
23.80	0.0	0.0	0.0
23.90	0.0	0.0	0.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

>>>>>>>>>>>>>>>>> SUMMATION WARNING <<<<<<<<<<<<<<<<<
Peaks were missed during interpolation for the following files:
OFF-2 .HYD

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-31-1997 13:17:18
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
DA 1	9.90	61.0	0.40	0.00	3.40	0.53	.38 .30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.00	0.40	0.00	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-31-1997 13:17:18
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1	3	12.4
Composite Watershed	3	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-31-1997 13:17:18
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1	0	0	0	0	0	0	1	1	3
Total (cfs)	0	0	0	0	0	0	1	1	3

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1	3	3	3	2	2	1	1	1	1
Total (cfs)	3	3	3	2	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1	1	1	1	0	0	0	0	0	0
Total (cfs)	1	1	1	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-31-1997 13:17:18
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	1	16.0	0
12.3	1	16.1	0
12.4	3	16.2	0
12.5	3	16.3	0
12.6	3	16.4	0
12.7	3	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-31-1997 13:17:18
Watershed file: --> DA1-2 .WSD
Hydrograph file: --> DA1-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CSF 12/31/97
Agnuit 10/31/97 cahs

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	3.40	0.03	.81	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 0 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	0	0.0
Composite Watershed	0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	0	16.0	0
12.3	0	16.1	0
12.4	0	16.2	0
12.5	0	16.3	0
12.6	0	16.4	0
12.7	0	16.5	0
12.8	0	16.6	0
12.9	0	16.7	0
13.0	0	16.8	0
13.1	0	16.9	0
13.2	0	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:35:17
Watershed file: --> OFF-2 .WSD
Hydrograph file: --> OFF-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM THE RAILROAD EMBANKMENT CULVERT
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

Executed 12-30-1997 17:59:18

Data directory: *.HYD

File Summary for Composite Hydrograph

CJF 12/31/97

Time (hrs)	DA1-10 (cfs)	OFF-10 (cfs)	PD-10 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	0.0	0.0	0.0
12.30	1.0	0.0	1.0
12.40	2.0	1.0	3.0
12.50	4.0	2.0	6.0
12.60	6.0	3.0	9.0
12.70	7.0	4.0	11.0
12.80	8.0	5.0	13.0
12.90	8.0	4.0	12.0
13.00	7.0	4.0	11.0
13.10	6.0	4.0	10.0
13.20	5.0	4.0	9.0
13.30	4.0	4.0	8.0
13.40	4.0	3.0	7.0
13.50	4.0	3.0	7.0
13.60	3.0	3.0	6.0
13.70	2.0	2.0	4.0
13.80	2.0	2.0	4.0
13.90	2.0	2.0	4.0
14.00	2.0	2.0	4.0
14.10	2.0	2.0	4.0
14.20	2.0	2.0	4.0
14.30	2.0	2.0	4.0
14.40	2.0	2.0	4.0
14.50	2.0	2.0	4.0
14.60	2.0	2.0	4.0
14.70	2.0	2.0	4.0
14.80	2.0	2.0	4.0
14.90	1.0	2.0	3.0

Executed 12-30-1997 17:59:18

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-10 (cfs)	OFF-10 (cfs)	PD-10 (Total)
15.00	1.0	2.0	3.0
15.10	1.0	2.0	3.0
15.20	1.0	2.0	3.0
15.30	1.0	2.0	3.0
15.40	1.0	2.0	3.0
15.50	1.0	2.0	3.0
15.60	1.0	2.0	3.0
15.70	1.0	2.0	3.0
15.80	1.0	2.0	3.0
15.90	1.0	2.0	3.0
16.00	1.0	2.0	3.0
16.10	1.0	2.0	3.0
16.20	1.0	2.0	3.0
16.30	1.0	1.0	2.0
16.40	1.0	1.0	2.0
16.50	1.0	1.0	2.0
16.60	1.0	1.0	2.0
16.70	1.0	1.0	2.0
16.80	1.0	1.0	2.0
16.90	1.0	1.0	2.0
17.00	1.0	1.0	2.0
17.10	1.0	1.0	2.0
17.20	1.0	1.0	2.0
17.30	1.0	1.0	2.0
17.40	1.0	1.0	2.0
17.50	1.0	1.0	2.0
17.60	1.0	1.0	2.0
17.70	1.0	1.0	2.0
17.80	1.0	1.0	2.0
17.90	1.0	1.0	2.0
18.00	1.0	1.0	2.0
18.10	1.0	1.0	2.0
18.20	1.0	1.0	2.0
18.30	1.0	1.0	2.0
18.40	1.0	1.0	2.0
18.50	1.0	1.0	2.0
18.60	1.0	1.0	2.0
18.70	1.0	1.0	2.0
18.80	1.0	1.0	2.0
18.90	1.0	1.0	2.0
19.00	1.0	1.0	2.0

Executed 12-30-1997 17:59:18

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-10 (cfs)	OFF-10 (cfs)	PD-10 (Total)
19.10	1.0	1.0	2.0
19.20	1.0	1.0	2.0
19.30	1.0	1.0	2.0
19.40	1.0	1.0	2.0
19.50	0.0	1.0	1.0
19.60	0.0	1.0	1.0
19.70	0.0	1.0	1.0
19.80	0.0	1.0	1.0
19.90	0.0	1.0	1.0
20.00	0.0	1.0	1.0
20.10	0.0	1.0	1.0
20.20	0.0	1.0	1.0
20.30	0.0	1.0	1.0
20.40	0.0	1.0	1.0
20.50	0.0	1.0	1.0
20.60	0.0	1.0	1.0
20.70	0.0	1.0	1.0
20.80	0.0	1.0	1.0
20.90	0.0	1.0	1.0
21.00	0.0	1.0	1.0
21.10	0.0	1.0	1.0
21.20	0.0	1.0	1.0
21.30	0.0	1.0	1.0
21.40	0.0	1.0	1.0
21.50	0.0	1.0	1.0
21.60	0.0	1.0	1.0
21.70	0.0	1.0	1.0
21.80	0.0	1.0	1.0
21.90	0.0	1.0	1.0
22.00	0.0	1.0	1.0
22.10	0.0	1.0	1.0
22.20	0.0	1.0	1.0
22.30	0.0	1.0	1.0
22.40	0.0	1.0	1.0
22.50	0.0	1.0	1.0
22.60	0.0	1.0	1.0
22.70	0.0	1.0	1.0
22.80	0.0	1.0	1.0
22.90	0.0	1.0	1.0
23.00	0.0	1.0	1.0
23.10	0.0	1.0	1.0

Executed 12-30-1997 17:59:18

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-10 (cfs)	OFF-10 (cfs)	PD-10 (Total)
23.20	0.0	1.0	1.0
23.30	0.0	1.0	1.0
23.40	0.0	1.0	1.0
23.50	0.0	1.0	1.0
23.60	0.0	1.0	1.0
23.70	0.0	1.0	1.0
23.80	0.0	1.0	1.0
23.90	0.0	1.0	1.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CIF 12/31/97
ASamit 12/24/97
calcs
checked 12/29/97

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.90	61.0	0.40	0.30	5.20	1.49	.25	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.36	0.40	0.30	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1	8	12.8
Composite Watershed	8	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1	0	0	0	0	0	0	0	1	2
Total (cfs)	0	0	0	0	0	0	0	1	2

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1	4	6	7	8	7	5	4	3	2
Total (cfs)	4	6	7	8	7	5	4	3	2

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1	2	2	2	1	1	1	1	1	1
Total (cfs)	2	2	2	1	1	1	1	1	1

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1	1	1	0	0	0
Total (cfs)	1	1	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	2
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	0	15.3	1
11.6	0	15.4	1
11.7	0	15.5	1
11.8	0	15.6	1
11.9	0	15.7	1
12.0	0	15.8	1
12.1	0	15.9	1
12.2	0	16.0	1
12.3	1	16.1	1
12.4	2	16.2	1
12.5	4	16.3	1
12.6	6	16.4	1
12.7	7	16.5	1
12.8	8	16.6	1
12.9	8	16.7	1
13.0	7	16.8	1
13.1	6	16.9	1
13.2	5	17.0	1
13.3	4	17.1	1
13.4	4	17.2	1
13.5	4	17.3	1
13.6	3	17.4	1
13.7	2	17.5	1
13.8	2	17.6	1
13.9	2	17.7	1
14.0	2	17.8	1
14.1	2	17.9	1
14.2	2	18.0	1
14.3	2	18.1	1
14.4	2	18.2	1
14.5	2	18.3	1
14.6	2	18.4	1
14.7	2	18.5	1

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:14
Watershed file: --> DA1-10 .WSD
Hydrograph file: --> DA1-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	0
18.7	1	22.5	0
18.8	1	22.6	0
18.9	1	22.7	0
19.0	1	22.8	0
19.1	1	22.9	0
19.2	1	23.0	0
19.3	1	23.1	0
19.4	1	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:36:29
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

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AGAINST 10/31/97
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EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	5.20	0.37	.53	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	Computed Ia/p > .5

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:36:29
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	5	12.8
Composite Watershed	5	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:36:29
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	2	3	4	5	4	4	3	3	2
Total (cfs)	2	3	4	5	4	4	3	3	2

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	2	2	2	2	2	2	1	1	1
Total (cfs)	2	2	2	2	2	2	1	1	1

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	1	1	1	1	0
Total (cfs)	1	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:36:29
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	2
11.1	0	14.9	2
11.2	0	15.0	2
11.3	0	15.1	2
11.4	0	15.2	2
11.5	0	15.3	2
11.6	0	15.4	2
11.7	0	15.5	2
11.8	0	15.6	2
11.9	0	15.7	2
12.0	0	15.8	2
12.1	0	15.9	2
12.2	0	16.0	2
12.3	0	16.1	2
12.4	1	16.2	2
12.5	2	16.3	1
12.6	3	16.4	1
12.7	4	16.5	1
12.8	5	16.6	1
12.9	4	16.7	1
13.0	4	16.8	1
13.1	4	16.9	1
13.2	4	17.0	1
13.3	4	17.1	1
13.4	3	17.2	1
13.5	3	17.3	1
13.6	3	17.4	1
13.7	2	17.5	1
13.8	2	17.6	1
13.9	2	17.7	1
14.0	2	17.8	1
14.1	2	17.9	1
14.2	2	18.0	1
14.3	2	18.1	1
14.4	2	18.2	1
14.5	2	18.3	1
14.6	2	18.4	1
14.7	2	18.5	1

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:36:29
Watershed file: --> OFF-10 .WSD
Hydrograph file: --> OFF-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFF-SITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

Executed 12-30-1997 18:02:03

Data directory: *.HYD

File Summary for Composite Hydrograph

CJF 12/30/97

Time (hrs)	DA1-25 (cfs)	OFF-25 (cfs)	PD-25 (Total)
11.00	0.0	0.0	0.0
11.10	0.0	0.0	0.0
11.20	0.0	0.0	0.0
11.30	0.0	0.0	0.0
11.40	0.0	0.0	0.0
11.50	0.0	0.0	0.0
11.60	0.0	0.0	0.0
11.70	0.0	0.0	0.0
11.80	0.0	0.0	0.0
11.90	0.0	0.0	0.0
12.00	0.0	0.0	0.0
12.10	0.0	0.0	0.0
12.20	0.0	0.0	0.0
12.30	1.0	0.0	1.0
12.40	3.0	1.0	4.0
12.50	5.0	3.0	8.0
12.60	8.0	5.0	13.0
12.70	10.0	7.0	17.0
12.80	10.0	8.0	18.0
12.90	9.0	8.0	17.0
13.00	9.0	7.0	16.0
13.10	8.0	6.0	14.0
13.20	7.0	6.0	13.0
13.30	6.0	6.0	12.0
13.40	5.0	5.0	10.0
13.50	5.0	5.0	10.0
13.60	4.0	4.0	8.0
13.70	4.0	4.0	8.0
13.80	3.0	4.0	7.0
13.90	3.0	4.0	7.0
14.00	3.0	4.0	7.0
14.10	3.0	4.0	7.0
14.20	2.0	4.0	6.0
14.30	2.0	4.0	6.0
14.40	2.0	4.0	6.0
14.50	2.0	3.0	5.0
14.60	2.0	3.0	5.0
14.70	2.0	3.0	5.0
14.80	2.0	3.0	5.0
14.90	2.0	3.0	5.0

Executed 12-30-1997 18:02:03

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-25 (cfs)	OFF-25 (cfs)	PD-25 (Total)
15.00	2.0	3.0	5.0
15.10	2.0	3.0	5.0
15.20	2.0	3.0	5.0
15.30	2.0	3.0	5.0
15.40	2.0	3.0	5.0
15.50	2.0	3.0	5.0
15.60	2.0	3.0	5.0
15.70	2.0	3.0	5.0
15.80	1.0	3.0	4.0
15.90	1.0	3.0	4.0
16.00	1.0	3.0	4.0
16.10	1.0	3.0	4.0
16.20	1.0	3.0	4.0
16.30	1.0	2.0	3.0
16.40	1.0	2.0	3.0
16.50	1.0	2.0	3.0
16.60	1.0	2.0	3.0
16.70	1.0	2.0	3.0
16.80	1.0	2.0	3.0
16.90	1.0	2.0	3.0
17.00	1.0	2.0	3.0
17.10	1.0	2.0	3.0
17.20	1.0	2.0	3.0
17.30	1.0	2.0	3.0
17.40	1.0	2.0	3.0
17.50	1.0	2.0	3.0
17.60	1.0	2.0	3.0
17.70	1.0	2.0	3.0
17.80	1.0	2.0	3.0
17.90	1.0	2.0	3.0
18.00	1.0	2.0	3.0
18.10	1.0	2.0	3.0
18.20	1.0	2.0	3.0
18.30	1.0	2.0	3.0
18.40	1.0	2.0	3.0
18.50	1.0	2.0	3.0
18.60	1.0	1.0	2.0
18.70	1.0	1.0	2.0
18.80	1.0	1.0	2.0
18.90	1.0	1.0	2.0
19.00	1.0	1.0	2.0

Executed 12-30-1997 18:02:03

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-25 (cfs)	OFF-25 (cfs)	PD-25 (Total)
19.10	1.0	1.0	2.0
19.20	1.0	1.0	2.0
19.30	1.0	1.0	2.0
19.40	1.0	1.0	2.0
19.50	1.0	1.0	2.0
19.60	1.0	1.0	2.0
19.70	1.0	1.0	2.0
19.80	1.0	1.0	2.0
19.90	1.0	1.0	2.0
20.00	1.0	1.0	2.0
20.10	1.0	1.0	2.0
20.20	1.0	1.0	2.0
20.30	1.0	1.0	2.0
20.40	1.0	1.0	2.0
20.50	1.0	1.0	2.0
20.60	1.0	1.0	2.0
20.70	1.0	1.0	2.0
20.80	1.0	1.0	2.0
20.90	1.0	1.0	2.0
21.00	1.0	1.0	2.0
21.10	1.0	1.0	2.0
21.20	1.0	1.0	2.0
21.30	1.0	1.0	2.0
21.40	1.0	1.0	2.0
21.50	1.0	1.0	2.0
21.60	1.0	1.0	2.0
21.70	1.0	1.0	2.0
21.80	1.0	1.0	2.0
21.90	1.0	1.0	2.0
22.00	1.0	1.0	2.0
22.10	1.0	1.0	2.0
22.20	1.0	1.0	2.0
22.30	1.0	1.0	2.0
22.40	1.0	1.0	2.0
22.50	1.0	1.0	2.0
22.60	1.0	1.0	2.0
22.70	1.0	1.0	2.0
22.80	1.0	1.0	2.0
22.90	1.0	1.0	2.0
23.00	1.0	1.0	2.0
23.10	1.0	1.0	2.0

Executed 12-30-1997 18:02:03

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DA1-25 (cfs)	OFF-25 (cfs)	PD-25 (Total)
23.20	1.0	1.0	2.0
23.30	1.0	1.0	2.0
23.40	1.0	1.0	2.0
23.50	1.0	1.0	2.0
23.60	1.0	1.0	2.0
23.70	1.0	1.0	2.0
23.80	1.0	1.0	2.0
23.90	1.0	1.0	2.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

CJF 12/21/97
Agent 12/24/97 calcs
checked 12/29/97

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
DA 1	9.90	61.0	0.40	0.30	6.00	2.01	.21 .30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.90 acres or 0.01547 sq.mi
Peak discharge = 10 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.36	0.36	0.40	0.30	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1	10	12.7
Composite Watershed	10	12.7

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1	0	0	0	0	0	0	0	1	3
Total (cfs)	0	0	0	0	0	0	0	1	3

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1	5	8	10	10	9	7	5	4	3
Total (cfs)	5	8	10	10	9	7	5	4	3

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1	3	2	2	2	2	1	1	1	1
Total (cfs)	3	2	2	2	2	1	1	1	1

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1	1	1	1	1	0
Total (cfs)	1	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	2
11.1	0	14.9	2
11.2	0	15.0	2
11.3	0	15.1	2
11.4	0	15.2	2
11.5	0	15.3	2
11.6	0	15.4	2
11.7	0	15.5	2
11.8	0	15.6	2
11.9	0	15.7	2
12.0	0	15.8	1
12.1	0	15.9	1
12.2	0	16.0	1
12.3	1	16.1	1
12.4	3	16.2	1
12.5	5	16.3	1
12.6	8	16.4	1
12.7	10	16.5	1
12.8	10	16.6	1
12.9	9	16.7	1
13.0	9	16.8	1
13.1	8	16.9	1
13.2	7	17.0	1
13.3	6	17.1	1
13.4	5	17.2	1
13.5	5	17.3	1
13.6	4	17.4	1
13.7	4	17.5	1
13.8	3	17.6	1
13.9	3	17.7	1
14.0	3	17.8	1
14.1	3	17.9	1
14.2	2	18.0	1
14.3	2	18.1	1
14.4	2	18.2	1
14.5	2	18.3	1
14.6	2	18.4	1
14.7	2	18.5	1

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:23:54
Watershed file: --> DA1-25 .WSD
Hydrograph file: --> DA1-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #1
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:37:16
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

CJF 12/31/97
Against 12/29/97 Calcs

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
OFF-SITE	42.70	42.0	0.30	0.40	6.00	0.62	.46	.50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:37:16
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	8	12.8
Composite Watershed	8	12.8

```
*********************************
*                               *
*        EARLE - SITE 5         *
*      DETENTION BASIN #2       *
* POST-DEVELOPMENT CONDITIONS   *
*       2 YEAR STORM            *
*                               *
*********************************
```

Inflow Hydrograph: DA2-2 .HYD
Rating Table file: SB2 .PND

----INITIAL CONDITIONS----
Elevation = 104.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
104.00	0.0	0.000
105.00	0.0	0.055
105.50	0.0	0.087
106.00	0.3	0.125
107.00	0.5	0.214
108.00	0.7	0.319
109.00	2.7	0.444

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
13.3	13.3
21.2	21.2
30.2	30.5
51.9	52.4
77.3	78.0
107.5	110.2

Time increment (t) = 0.100 hrs.

Pond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-23-1997
17:05:49

Peak Inflow = 2.00 cfs
Peak Outflow = 0.24 cfs
Peak Elevation = 105.78 ft

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 104.10 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 2.00 cfs
Peak Outflow = 0.24 cfs
Peak Elevation = 105.78 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.10 ac-ft

Total Storage in Pond = 0.10 ac-ft

'ond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	20.0	20.0	0.00	105.50
24.800	0.00	0.0	20.0	20.0	0.00	105.50
24.900	0.00	0.0	20.0	20.0	0.00	105.50
25.000	0.00	0.0	20.0	20.0	0.00	105.50
25.100	0.00	0.0	20.0	20.0	0.00	105.50
25.200	0.00	0.0	20.0	20.0	0.00	105.50
25.300	0.00	0.0	20.0	20.0	0.00	105.50
25.400	0.00	0.0	20.0	20.0	0.00	105.50
25.500	0.00	0.0	20.0	20.0	0.00	105.50
25.600	0.00	0.0	20.0	20.0	0.00	105.50
25.700	0.00	0.0	20.0	20.0	0.00	105.50
25.800	0.00	0.0	20.0	20.0	0.00	105.50
25.900	0.00	0.0	20.0	20.0	0.00	105.50

Pond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	20.0	20.0	0.00	105.50
20.200	0.00	0.0	20.0	20.0	0.00	105.50
20.300	0.00	0.0	20.0	20.0	0.00	105.50
20.400	0.00	0.0	20.0	20.0	0.00	105.50
20.500	0.00	0.0	20.0	20.0	0.00	105.50
20.600	0.00	0.0	20.0	20.0	0.00	105.50
20.700	0.00	0.0	20.0	20.0	0.00	105.50
20.800	0.00	0.0	20.0	20.0	0.00	105.50
20.900	0.00	0.0	20.0	20.0	0.00	105.50
21.000	0.00	0.0	20.0	20.0	0.00	105.50
21.100	0.00	0.0	20.0	20.0	0.00	105.50
21.200	0.00	0.0	20.0	20.0	0.00	105.50
21.300	0.00	0.0	20.0	20.0	0.00	105.50
21.400	0.00	0.0	20.0	20.0	0.00	105.50
21.500	0.00	0.0	20.0	20.0	0.00	105.50
21.600	0.00	0.0	20.0	20.0	0.00	105.50
21.700	0.00	0.0	20.0	20.0	0.00	105.50
21.800	0.00	0.0	20.0	20.0	0.00	105.50
21.900	0.00	0.0	20.0	20.0	0.00	105.50
22.000	0.00	0.0	20.0	20.0	0.00	105.50
22.100	0.00	0.0	20.0	20.0	0.00	105.50
22.200	0.00	0.0	20.0	20.0	0.00	105.50
22.300	0.00	0.0	20.0	20.0	0.00	105.50
22.400	0.00	0.0	20.0	20.0	0.00	105.50
22.500	0.00	0.0	20.0	20.0	0.00	105.50
22.600	0.00	0.0	20.0	20.0	0.00	105.50
22.700	0.00	0.0	20.0	20.0	0.00	105.50
22.800	0.00	0.0	20.0	20.0	0.00	105.50
22.900	0.00	0.0	20.0	20.0	0.00	105.50
23.000	0.00	0.0	20.0	20.0	0.00	105.50
23.100	0.00	0.0	20.0	20.0	0.00	105.50
23.200	0.00	0.0	20.0	20.0	0.00	105.50
23.300	0.00	0.0	20.0	20.0	0.00	105.50
23.400	0.00	0.0	20.0	20.0	0.00	105.50
23.500	0.00	0.0	20.0	20.0	0.00	105.50
23.600	0.00	0.0	20.0	20.0	0.00	105.50
23.700	0.00	0.0	20.0	20.0	0.00	105.50
23.800	0.00	0.0	20.0	20.0	0.00	105.50
23.900	0.00	0.0	20.0	20.0	0.00	105.50
24.000	0.00	0.0	20.0	20.0	0.00	105.50
24.100	0.00	0.0	20.0	20.0	0.00	105.50
24.200	0.00	0.0	20.0	20.0	0.00	105.50
24.300	0.00	0.0	20.0	20.0	0.00	105.50
24.400	0.00	0.0	20.0	20.0	0.00	105.50
24.500	0.00	0.0	20.0	20.0	0.00	105.50
24.600	0.00	0.0	20.0	20.0	0.00	105.50

ond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	20.2	20.2	0.01	105.51
15.600	0.00	0.0	20.2	20.2	0.01	105.51
15.700	0.00	0.0	20.2	20.2	0.01	105.51
15.800	0.00	0.0	20.1	20.2	0.01	105.51
15.900	0.00	0.0	20.1	20.1	0.01	105.51
16.000	0.00	0.0	20.1	20.1	0.01	105.51
16.100	0.00	0.0	20.1	20.1	0.01	105.51
16.200	0.00	0.0	20.1	20.1	0.01	105.51
16.300	0.00	0.0	20.1	20.1	0.01	105.51
16.400	0.00	0.0	20.0	20.1	0.01	105.51
16.500	0.00	0.0	20.0	20.0	0.00	105.50
16.600	0.00	0.0	20.0	20.0	0.00	105.50
16.700	0.00	0.0	20.0	20.0	0.00	105.50
16.800	0.00	0.0	20.0	20.0	0.00	105.50
16.900	0.00	0.0	20.0	20.0	0.00	105.50
17.000	0.00	0.0	20.0	20.0	0.00	105.50
17.100	0.00	0.0	20.0	20.0	0.00	105.50
17.200	0.00	0.0	20.0	20.0	0.00	105.50
17.300	0.00	0.0	20.0	20.0	0.00	105.50
17.400	0.00	0.0	20.0	20.0	0.00	105.50
17.500	0.00	0.0	20.0	20.0	0.00	105.50
17.600	0.00	0.0	20.0	20.0	0.00	105.50
17.700	0.00	0.0	20.0	20.0	0.00	105.50
17.800	0.00	0.0	20.0	20.0	0.00	105.50
17.900	0.00	0.0	20.0	20.0	0.00	105.50
18.000	0.00	0.0	20.0	20.0	0.00	105.50
18.100	0.00	0.0	20.0	20.0	0.00	105.50
18.200	0.00	0.0	20.0	20.0	0.00	105.50
18.300	0.00	0.0	20.0	20.0	0.00	105.50
18.400	0.00	0.0	20.0	20.0	0.00	105.50
18.500	0.00	0.0	20.0	20.0	0.00	105.50
18.600	0.00	0.0	20.0	20.0	0.00	105.50
18.700	0.00	0.0	20.0	20.0	0.00	105.50
18.800	0.00	0.0	20.0	20.0	0.00	105.50
18.900	0.00	0.0	20.0	20.0	0.00	105.50
19.000	0.00	0.0	20.0	20.0	0.00	105.50
19.100	0.00	0.0	20.0	20.0	0.00	105.50
19.200	0.00	0.0	20.0	20.0	0.00	105.50
19.300	0.00	0.0	20.0	20.0	0.00	105.50
19.400	0.00	0.0	20.0	20.0	0.00	105.50
19.500	0.00	0.0	20.0	20.0	0.00	105.50
19.600	0.00	0.0	20.0	20.0	0.00	105.50
19.700	0.00	0.0	20.0	20.0	0.00	105.50
19.800	0.00	0.0	20.0	20.0	0.00	105.50
19.900	0.00	0.0	20.0	20.0	0.00	105.50
20.000	0.00	0.0	20.0	20.0	0.00	105.50

POND-2 Version: 5.17 S/N:
EXECUTED: 12-23-1997 17:05:49

SB2.PND is provided up front in earlier calc

CSF 12/31/97

Pond File: SB2-TEST.PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	104.10
11.100	0.00	0.0	0.0	0.0	0.00	104.10
11.200	0.00	0.0	0.0	0.0	0.00	104.10
11.300	0.00	0.0	0.0	0.0	0.00	104.10
11.400	0.00	0.0	0.0	0.0	0.00	104.10
11.500	0.00	0.0	0.0	0.0	0.00	104.10
11.600	0.00	0.0	0.0	0.0	0.00	104.10
11.700	0.00	0.0	0.0	0.0	0.00	104.10
11.800	0.00	0.0	0.0	0.0	0.00	104.10
11.900	0.00	0.0	0.0	0.0	0.00	104.10
12.000	1.00	1.0	1.0	1.0	0.00	104.18
12.100	1.00	2.0	3.0	3.0	0.00	104.34
12.200	2.00	3.0	6.0	6.0	0.00	104.56
12.300	2.00	4.0	10.0	10.0	0.00	104.85
12.400	2.00	4.0	14.0	14.0	0.00	105.13
12.500	2.00	4.0	18.0	18.0	0.00	105.38
12.600	1.00	3.0	20.9	21.0	0.06	105.56
12.700	1.00	2.0	22.6	22.9	0.16	105.66
12.800	1.00	2.0	24.1	24.6	0.22	105.75
12.900	0.00	1.0	24.6	25.1	0.24	105.78
13.000	0.00	0.0	24.2	24.6	0.23	105.75
13.100	0.00	0.0	23.8	24.2	0.21	105.73
13.200	0.00	0.0	23.4	23.8	0.20	105.71
13.300	0.00	0.0	23.0	23.4	0.18	105.68
13.400	0.00	0.0	22.7	23.0	0.16	105.66
13.500	0.00	0.0	22.4	22.7	0.15	105.65
13.600	0.00	0.0	22.1	22.4	0.13	105.63
13.700	0.00	0.0	21.9	22.1	0.12	105.62
13.800	0.00	0.0	21.7	21.9	0.10	105.60
13.900	0.00	0.0	21.5	21.7	0.09	105.59
14.000	0.00	0.0	21.3	21.5	0.08	105.58
14.100	0.00	0.0	21.2	21.3	0.07	105.57
14.200	0.00	0.0	21.0	21.2	0.07	105.57
14.300	0.00	0.0	20.9	21.0	0.06	105.56
14.400	0.00	0.0	20.8	20.9	0.05	105.55
14.500	0.00	0.0	20.7	20.8	0.05	105.55
14.600	0.00	0.0	20.6	20.7	0.04	105.54
14.700	0.00	0.0	20.6	20.6	0.04	105.54
14.800	0.00	0.0	20.5	20.6	0.03	105.53
14.900	0.00	0.0	20.4	20.5	0.03	105.53
15.000	0.00	0.0	20.4	20.4	0.03	105.53
15.100	0.00	0.0	20.3	20.4	0.02	105.52
15.200	0.00	0.0	20.3	20.3	0.02	105.52
15.300	0.00	0.0	20.3	20.3	0.02	105.52
15.400	0.00	0.0	20.2	20.3	0.02	105.52

```
*********************************************************************
*                                                                   *
*                          EARLE - SITE 5                           *
*                    DURING CONSTRUCTION CONDITIONS                 *
* SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR   *
*                        THE TRAPPED SEDIMENT                       *
*                                                                   *
*********************************************************************
```

Inflow Hydrograph: SB2-2 .HYD
Rating Table file: SB2-TEST.PND

----INITIAL CONDITIONS----
Elevation = 104.10 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
104.10	0.0	0.000	0.0	0.0
104.30	0.0	0.010	2.5	2.5
104.50	0.0	0.021	5.1	5.1
104.70	0.0	0.032	7.9	7.9
104.90	0.0	0.044	10.7	10.7
105.10	0.0	0.056	13.6	13.6
105.30	0.0	0.069	16.7	16.7
105.50	0.0	0.083	20.0	20.0
105.70	0.2	0.097	23.4	23.6
105.90	0.3	0.112	27.1	27.4
106.10	0.3	0.128	31.0	31.3
106.30	0.4	0.145	35.0	35.4
106.50	0.4	0.162	39.2	39.6
106.70	0.5	0.180	43.7	44.2
106.90	0.5	0.200	48.3	48.8
107.10	0.5	0.220	53.1	53.6
107.30	0.6	0.240	58.1	58.7
107.50	0.6	0.261	63.1	63.7
107.70	0.6	0.282	68.2	68.8
107.90	0.7	0.303	73.4	74.1
108.10	0.7	0.326	78.8	79.5
108.30	1.0	0.349	84.4	85.4
108.50	1.4	0.373	90.3	91.7
108.70	1.9	0.399	96.5	98.4
108.90	2.4	0.425	103.0	105.4
109.10	3.2	0.453	109.7	112.9
109.30	4.6	0.482	116.7	121.3
109.50	6.4	0.512	123.8	130.2
109.70	8.5	0.542	131.2	139.7
109.90	10.9	0.573	138.7	149.6

Time increment (t) = 0.100 hrs.

D.6.2 Sediment / Detention Basin #2

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-30-1997
18:46:25

Peak Inflow = 18.00 cfs
Peak Outflow = 3.00 cfs
Peak Elevation = 100.04 ft

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 94.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 18.00 cfs
Peak Outflow = 3.00 cfs
Peak Elevation = 100.04 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 2.71 ac-ft

Total Storage in Pond = 2.71 ac-ft

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	647.9	647.9	0.00	100.00
24.800	0.00	0.0	647.9	647.9	0.00	100.00
24.900	0.00	0.0	647.9	647.9	0.00	100.00
25.000	0.00	0.0	647.9	647.9	0.00	100.00
25.100	0.00	0.0	647.9	647.9	0.00	100.00
25.200	0.00	0.0	647.9	647.9	0.00	100.00
25.300	0.00	0.0	647.9	647.9	0.00	100.00
25.400	0.00	0.0	647.9	647.9	0.00	100.00
25.500	0.00	0.0	647.9	647.9	0.00	100.00
25.600	0.00	0.0	647.9	647.9	0.00	100.00
25.700	0.00	0.0	647.9	647.9	0.00	100.00
25.800	0.00	0.0	647.9	647.9	0.00	100.00
25.900	0.00	0.0	647.9	647.9	0.00	100.00

:ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	2.00	4.0	651.0	655.0	2.00	100.02
20.200	2.00	4.0	651.0	655.0	2.00	100.02
20.300	2.00	4.0	651.0	655.0	2.00	100.02
20.400	2.00	4.0	651.0	655.0	2.00	100.02
20.500	2.00	4.0	651.0	655.0	2.00	100.02
20.600	2.00	4.0	651.0	655.0	2.00	100.02
20.700	2.00	4.0	651.0	655.0	2.00	100.02
20.800	2.00	4.0	651.0	655.0	2.00	100.02
20.900	2.00	4.0	651.0	655.0	2.00	100.02
21.000	2.00	4.0	651.0	655.0	2.00	100.02
21.100	2.00	4.0	651.0	655.0	2.00	100.02
21.200	2.00	4.0	651.0	655.0	2.00	100.02
21.300	2.00	4.0	651.0	655.0	2.00	100.02
21.400	2.00	4.0	651.0	655.0	2.00	100.02
21.500	2.00	4.0	651.0	655.0	2.00	100.02
21.600	2.00	4.0	651.0	655.0	2.00	100.02
21.700	2.00	4.0	651.0	655.0	2.00	100.02
21.800	2.00	4.0	651.0	655.0	2.00	100.02
21.900	2.00	4.0	651.0	655.0	2.00	100.02
22.000	2.00	4.0	651.0	655.0	2.00	100.02
22.100	2.00	4.0	651.0	655.0	2.00	100.02
22.200	2.00	4.0	651.0	655.0	2.00	100.02
22.300	2.00	4.0	651.0	655.0	2.00	100.02
22.400	2.00	4.0	651.0	655.0	2.00	100.02
22.500	2.00	4.0	651.0	655.0	2.00	100.02
22.600	2.00	4.0	651.0	655.0	2.00	100.02
22.700	2.00	4.0	651.0	655.0	2.00	100.02
22.800	2.00	4.0	651.0	655.0	2.00	100.02
22.900	2.00	4.0	651.0	655.0	2.00	100.02
23.000	2.00	4.0	651.0	655.0	2.00	100.02
23.100	2.00	4.0	651.0	655.0	2.00	100.02
23.200	2.00	4.0	651.0	655.0	2.00	100.02
23.300	2.00	4.0	651.0	655.0	2.00	100.02
23.400	2.00	4.0	651.0	655.0	2.00	100.02
23.500	2.00	4.0	651.0	655.0	2.00	100.02
23.600	2.00	4.0	651.0	655.0	2.00	100.02
23.700	2.00	4.0	651.0	655.0	2.00	100.02
23.800	2.00	4.0	651.0	655.0	2.00	100.02
23.900	2.00	4.0	651.0	655.0	2.00	100.02
24.000	0.00	2.0	650.1	653.0	1.44	100.02
24.100	0.00	0.0	648.9	650.1	0.62	100.01
24.200	0.00	0.0	648.3	648.9	0.27	100.00
24.300	0.00	0.0	648.1	648.3	0.12	100.00
24.400	0.00	0.0	648.0	648.1	0.05	100.00
24.500	0.00	0.0	647.9	648.0	0.02	100.00
24.600	0.00	0.0	647.9	647.9	0.01	100.00

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
15.500	5.00
15.600	5.00
15.700	5.00
15.800	4.00
15.900	4.00
16.000	4.00
16.100	4.00
16.200	4.00
16.300	3.00
16.400	3.00
16.500	3.00
16.600	3.00
16.700	3.00
16.800	3.00
16.900	3.00
17.000	3.00
17.100	3.00
17.200	3.00
17.300	3.00
17.400	3.00
17.500	3.00
17.600	3.00
17.700	3.00
17.800	3.00
17.900	3.00
18.000	3.00
18.100	3.00
18.200	3.00
18.300	3.00
18.400	3.00
18.500	3.00
18.600	2.00
18.700	2.00
18.800	2.00
18.900	2.00
19.000	2.00
19.100	2.00
19.200	2.00
19.300	2.00
19.400	2.00
19.500	2.00
19.600	2.00
19.700	2.00
19.800	2.00
19.900	2.00
20.000	2.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
10.0	535.0	535.0	0.00	99.43
10.0	545.0	545.0	0.00	99.48
10.0	555.0	555.0	0.00	99.53
9.0	564.0	564.0	0.00	99.58
8.0	572.0	572.0	0.00	99.62
8.0	580.0	580.0	0.00	99.66
8.0	588.0	588.0	0.00	99.70
8.0	596.0	596.0	0.00	99.74
7.0	603.0	603.0	0.00	99.78
6.0	609.0	609.0	0.00	99.81
6.0	615.0	615.0	0.00	99.84
6.0	621.0	621.0	0.00	99.87
6.0	627.0	627.0	0.00	99.90
6.0	633.0	633.0	0.00	99.93
6.0	639.0	639.0	0.00	99.96
6.0	645.0	645.0	0.00	99.99
6.0	649.3	651.0	0.87	100.01
6.0	651.1	655.3	2.07	100.02
6.0	651.9	657.1	2.60	100.03
6.0	652.3	657.9	2.82	100.03
6.0	652.4	658.3	2.92	100.04
6.0	652.5	658.4	2.97	100.04
6.0	652.5	658.5	2.99	100.04
6.0	652.5	658.5	2.99	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
6.0	652.5	658.5	3.00	100.04
5.0	652.1	657.5	2.72	100.03
4.0	651.5	656.1	2.31	100.03
4.0	651.2	655.5	2.14	100.03
4.0	651.1	655.2	2.06	100.02
4.0	651.0	655.1	2.03	100.02
4.0	651.0	655.0	2.01	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02
4.0	651.0	655.0	2.00	100.02

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 18:46:25

CJF 12/30/97

ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	94.00
11.100	0.00	0.0	0.0	0.0	0.00	94.00
11.200	0.00	0.0	0.0	0.0	0.00	94.00
11.300	0.00	0.0	0.0	0.0	0.00	94.00
11.400	0.00	0.0	0.0	0.0	0.00	94.00
11.500	0.00	0.0	0.0	0.0	0.00	94.00
11.600	0.00	0.0	0.0	0.0	0.00	94.00
11.700	0.00	0.0	0.0	0.0	0.00	94.00
11.800	0.00	0.0	0.0	0.0	0.00	94.00
11.900	0.00	0.0	0.0	0.0	0.00	94.00
12.000	0.00	0.0	0.0	0.0	0.00	94.00
12.100	0.00	0.0	0.0	0.0	0.00	94.00
12.200	0.00	0.0	0.0	0.0	0.00	94.00
12.300	1.00	1.0	1.0	1.0	0.00	94.02
12.400	4.00	5.0	6.0	6.0	0.00	94.13
12.500	8.00	12.0	18.0	18.0	0.00	94.38
12.600	13.00	21.0	39.0	39.0	0.00	94.80
12.700	17.00	30.0	69.0	69.0	0.00	95.36
12.800	18.00	35.0	104.0	104.0	0.00	95.96
12.900	17.00	35.0	139.0	139.0	0.00	96.48
13.000	16.00	33.0	172.0	172.0	0.00	96.88
13.100	14.00	30.0	202.0	202.0	0.00	97.19
13.200	13.00	27.0	229.0	229.0	0.00	97.44
13.300	12.00	25.0	254.0	254.0	0.00	97.65
13.400	10.00	22.0	276.0	276.0	0.00	97.82
13.500	10.00	20.0	296.0	296.0	0.00	97.97
13.600	8.00	18.0	314.0	314.0	0.00	98.10
13.700	8.00	16.0	330.0	330.0	0.00	98.21
13.800	7.00	15.0	345.0	345.0	0.00	98.31
13.900	7.00	14.0	359.0	359.0	0.00	98.40
14.000	7.00	14.0	373.0	373.0	0.00	98.49
14.100	7.00	14.0	387.0	387.0	0.00	98.58
14.200	6.00	13.0	400.0	400.0	0.00	98.66
14.300	6.00	12.0	412.0	412.0	0.00	98.73
14.400	6.00	12.0	424.0	424.0	0.00	98.81
14.500	5.00	11.0	435.0	435.0	0.00	98.87
14.600	5.00	10.0	445.0	445.0	0.00	98.93
14.700	5.00	10.0	455.0	455.0	0.00	98.99
14.800	5.00	10.0	465.0	465.0	0.00	99.05
14.900	5.00	10.0	475.0	475.0	0.00	99.10
15.000	5.00	10.0	485.0	485.0	0.00	99.16
15.100	5.00	10.0	495.0	495.0	0.00	99.21
15.200	5.00	10.0	505.0	505.0	0.00	99.27
15.300	5.00	10.0	515.0	515.0	0.00	99.32
15.400	5.00	10.0	525.0	525.0	0.00	99.38

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
100.20	16.6	2.852
100.40	48.3	3.031
100.60	91.2	3.214
100.80	144.3	3.403

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
690.1	706.7
733.4	781.7
777.9	869.1
823.5	967.8

Time increment (t) = 0.100 hrs.

```
*****************************************************************
*                                                               *
*                        EARLE - SITE 5                         *
*                      DETENTION BASIN #1                       *
*          POST-DEVELOPMENT CONDITIONS : 25 YEAR STORM          *
*  ON-SITE RUNOFF FROM DA 1 PLUS OFF-SITE RUNOFF FROM CULVERT   *
*                                                               *
*****************************************************************
```

Inflow Hydrograph: PD-25 .HYD
Rating Table file: SB1-SUM2.PND

----INITIAL CONDITIONS----
Elevation = 94.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
94.00	0.0	0.000
94.20	0.0	0.039
94.40	0.0	0.078
94.60	0.0	0.119
94.80	0.0	0.161
95.00	0.0	0.205
95.20	0.0	0.249
95.40	0.0	0.295
95.60	0.0	0.342
95.80	0.0	0.390
96.00	0.0	0.440
96.20	0.0	0.492
96.40	0.0	0.550
96.60	0.0	0.613
96.80	0.0	0.682
97.00	0.0	0.757
97.20	0.0	0.839
97.40	0.0	0.927
97.60	0.0	1.024
97.80	0.0	1.127
98.00	0.0	1.239
98.20	0.0	1.358
98.40	0.0	1.482
98.60	0.0	1.612
98.80	0.0	1.747
99.00	0.0	1.888
99.20	0.0	2.035
99.40	0.0	2.187
99.60	0.0	2.345
99.80	0.0	2.508
100.00	0.0	2.677

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
9.3	9.3
19.0	19.0
28.9	28.9
39.0	39.0
49.5	49.5
60.3	60.3
71.4	71.4
82.8	82.8
94.4	94.4
106.4	106.4
119.1	119.1
133.1	133.1
148.4	148.4
165.1	165.1
183.2	183.2
203.0	203.0
224.4	224.4
247.7	247.7
272.8	272.8
299.9	299.9
328.7	328.7
358.7	358.7
390.1	390.1
422.8	422.8
457.0	457.0
492.5	492.5
529.3	529.3
567.5	567.5
607.0	607.0
647.9	647.9

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-30-1997
18:44:31

Peak Inflow = 13.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 99.88 ft

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 94.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 13.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 99.88 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 2.58 ac-ft

Total Storage in Pond = 2.58 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	624.0	624.0	0.00	99.88
24.800	0.00	0.0	624.0	624.0	0.00	99.88
24.900	0.00	0.0	624.0	624.0	0.00	99.88
25.000	0.00	0.0	624.0	624.0	0.00	99.88
25.100	0.00	0.0	624.0	624.0	0.00	99.88
25.200	0.00	0.0	624.0	624.0	0.00	99.88
25.300	0.00	0.0	624.0	624.0	0.00	99.88
25.400	0.00	0.0	624.0	624.0	0.00	99.88
25.500	0.00	0.0	624.0	624.0	0.00	99.88
25.600	0.00	0.0	624.0	624.0	0.00	99.88
25.700	0.00	0.0	624.0	624.0	0.00	99.88
25.800	0.00	0.0	624.0	624.0	0.00	99.88
25.900	0.00	0.0	624.0	624.0	0.00	99.88

ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	1.00	2.0	547.0	547.0	0.00	99.49
20.200	1.00	2.0	549.0	549.0	0.00	99.50
20.300	1.00	2.0	551.0	551.0	0.00	99.51
20.400	1.00	2.0	553.0	553.0	0.00	99.52
20.500	1.00	2.0	555.0	555.0	0.00	99.53
20.600	1.00	2.0	557.0	557.0	0.00	99.55
20.700	1.00	2.0	559.0	559.0	0.00	99.56
20.800	1.00	2.0	561.0	561.0	0.00	99.57
20.900	1.00	2.0	563.0	563.0	0.00	99.58
21.000	1.00	2.0	565.0	565.0	0.00	99.59
21.100	1.00	2.0	567.0	567.0	0.00	99.60
21.200	1.00	2.0	569.0	569.0	0.00	99.61
21.300	1.00	2.0	571.0	571.0	0.00	99.62
21.400	1.00	2.0	573.0	573.0	0.00	99.63
21.500	1.00	2.0	575.0	575.0	0.00	99.64
21.600	1.00	2.0	577.0	577.0	0.00	99.65
21.700	1.00	2.0	579.0	579.0	0.00	99.66
21.800	1.00	2.0	581.0	581.0	0.00	99.67
21.900	1.00	2.0	583.0	583.0	0.00	99.68
22.000	1.00	2.0	585.0	585.0	0.00	99.69
22.100	1.00	2.0	587.0	587.0	0.00	99.70
22.200	1.00	2.0	589.0	589.0	0.00	99.71
22.300	1.00	2.0	591.0	591.0	0.00	99.72
22.400	1.00	2.0	593.0	593.0	0.00	99.73
22.500	1.00	2.0	595.0	595.0	0.00	99.74
22.600	1.00	2.0	597.0	597.0	0.00	99.75
22.700	1.00	2.0	599.0	599.0	0.00	99.76
22.800	1.00	2.0	601.0	601.0	0.00	99.77
22.900	1.00	2.0	603.0	603.0	0.00	99.78
23.000	1.00	2.0	605.0	605.0	0.00	99.79
23.100	1.00	2.0	607.0	607.0	0.00	99.80
23.200	1.00	2.0	609.0	609.0	0.00	99.81
23.300	1.00	2.0	611.0	611.0	0.00	99.82
23.400	1.00	2.0	613.0	613.0	0.00	99.83
23.500	1.00	2.0	615.0	615.0	0.00	99.84
23.600	1.00	2.0	617.0	617.0	0.00	99.85
23.700	1.00	2.0	619.0	619.0	0.00	99.86
23.800	1.00	2.0	621.0	621.0	0.00	99.87
23.900	1.00	2.0	623.0	623.0	0.00	99.88
24.000	0.00	1.0	624.0	624.0	0.00	99.88
24.100	0.00	0.0	624.0	624.0	0.00	99.88
24.200	0.00	0.0	624.0	624.0	0.00	99.88
24.300	0.00	0.0	624.0	624.0	0.00	99.88
24.400	0.00	0.0	624.0	624.0	0.00	99.88
24.500	0.00	0.0	624.0	624.0	0.00	99.88
24.600	0.00	0.0	624.0	624.0	0.00	99.88

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 18:44:31

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	3.00	6.0	361.0	361.0	0.00	98.41
15.600	3.00	6.0	367.0	367.0	0.00	98.45
15.700	3.00	6.0	373.0	373.0	0.00	98.49
15.800	3.00	6.0	379.0	379.0	0.00	98.53
15.900	3.00	6.0	385.0	385.0	0.00	98.57
16.000	3.00	6.0	391.0	391.0	0.00	98.61
16.100	3.00	6.0	397.0	397.0	0.00	98.64
16.200	3.00	6.0	403.0	403.0	0.00	98.68
16.300	2.00	5.0	408.0	408.0	0.00	98.71
16.400	2.00	4.0	412.0	412.0	0.00	98.73
16.500	2.00	4.0	416.0	416.0	0.00	98.76
16.600	2.00	4.0	420.0	420.0	0.00	98.78
16.700	2.00	4.0	424.0	424.0	0.00	98.81
16.800	2.00	4.0	428.0	428.0	0.00	98.83
16.900	2.00	4.0	432.0	432.0	0.00	98.85
17.000	2.00	4.0	436.0	436.0	0.00	98.88
17.100	2.00	4.0	440.0	440.0	0.00	98.90
17.200	2.00	4.0	444.0	444.0	0.00	98.92
17.300	2.00	4.0	448.0	448.0	0.00	98.95
17.400	2.00	4.0	452.0	452.0	0.00	98.97
17.500	2.00	4.0	456.0	456.0	0.00	98.99
17.600	2.00	4.0	460.0	460.0	0.00	99.02
17.700	2.00	4.0	464.0	464.0	0.00	99.04
17.800	2.00	4.0	468.0	468.0	0.00	99.06
17.900	2.00	4.0	472.0	472.0	0.00	99.08
18.000	2.00	4.0	476.0	476.0	0.00	99.11
18.100	2.00	4.0	480.0	480.0	0.00	99.13
18.200	2.00	4.0	484.0	484.0	0.00	99.15
18.300	2.00	4.0	488.0	488.0	0.00	99.17
18.400	2.00	4.0	492.0	492.0	0.00	99.20
18.500	2.00	4.0	496.0	496.0	0.00	99.22
18.600	2.00	4.0	500.0	500.0	0.00	99.24
18.700	2.00	4.0	504.0	504.0	0.00	99.26
18.800	2.00	4.0	508.0	508.0	0.00	99.28
18.900	2.00	4.0	512.0	512.0	0.00	99.31
19.000	2.00	4.0	516.0	516.0	0.00	99.33
19.100	2.00	4.0	520.0	520.0	0.00	99.35
19.200	2.00	4.0	524.0	524.0	0.00	99.37
19.300	2.00	4.0	528.0	528.0	0.00	99.39
19.400	2.00	4.0	532.0	532.0	0.00	99.41
19.500	1.00	3.0	535.0	535.0	0.00	99.43
19.600	1.00	2.0	537.0	537.0	0.00	99.44
19.700	1.00	2.0	539.0	539.0	0.00	99.45
19.800	1.00	2.0	541.0	541.0	0.00	99.46
19.900	1.00	2.0	543.0	543.0	0.00	99.47
20.000	1.00	2.0	545.0	545.0	0.00	99.48

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 18:44:31

CJF 12/31/97

ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	94.00
11.100	0.00	0.0	0.0	0.0	0.00	94.00
11.200	0.00	0.0	0.0	0.0	0.00	94.00
11.300	0.00	0.0	0.0	0.0	0.00	94.00
11.400	0.00	0.0	0.0	0.0	0.00	94.00
11.500	0.00	0.0	0.0	0.0	0.00	94.00
11.600	0.00	0.0	0.0	0.0	0.00	94.00
11.700	0.00	0.0	0.0	0.0	0.00	94.00
11.800	0.00	0.0	0.0	0.0	0.00	94.00
11.900	0.00	0.0	0.0	0.0	0.00	94.00
12.000	0.00	0.0	0.0	0.0	0.00	94.00
12.100	0.00	0.0	0.0	0.0	0.00	94.00
12.200	0.00	0.0	0.0	0.0	0.00	94.00
12.300	1.00	1.0	1.0	1.0	0.00	94.02
12.400	3.00	4.0	5.0	5.0	0.00	94.11
12.500	6.00	9.0	14.0	14.0	0.00	94.30
12.600	9.00	15.0	29.0	29.0	0.00	94.60
12.700	11.00	20.0	49.0	49.0	0.00	94.99
12.800	13.00	24.0	73.0	73.0	0.00	95.43
12.900	12.00	25.0	98.0	98.0	0.00	95.86
13.000	11.00	23.0	121.0	121.0	0.00	96.23
13.100	10.00	21.0	142.0	142.0	0.00	96.52
13.200	9.00	19.0	161.0	161.0	0.00	96.75
13.300	8.00	17.0	178.0	178.0	0.00	96.94
13.400	7.00	15.0	193.0	193.0	0.00	97.10
13.500	7.00	14.0	207.0	207.0	0.00	97.24
13.600	6.00	13.0	220.0	220.0	0.00	97.36
13.700	4.00	10.0	230.0	230.0	0.00	97.45
13.800	4.00	8.0	238.0	238.0	0.00	97.52
13.900	4.00	8.0	246.0	246.0	0.00	97.59
14.000	4.00	8.0	254.0	254.0	0.00	97.65
14.100	4.00	8.0	262.0	262.0	0.00	97.71
14.200	4.00	8.0	270.0	270.0	0.00	97.78
14.300	4.00	8.0	278.0	278.0	0.00	97.84
14.400	4.00	8.0	286.0	286.0	0.00	97.90
14.500	4.00	8.0	294.0	294.0	0.00	97.96
14.600	4.00	8.0	302.0	302.0	0.00	98.01
14.700	4.00	8.0	310.0	310.0	0.00	98.07
14.800	4.00	8.0	318.0	318.0	0.00	98.13
14.900	3.00	7.0	325.0	325.0	0.00	98.17
15.000	3.00	6.0	331.0	331.0	0.00	98.22
15.100	3.00	6.0	337.0	337.0	0.00	98.26
15.200	3.00	6.0	343.0	343.0	0.00	98.30
15.300	3.00	6.0	349.0	349.0	0.00	98.34
15.400	3.00	6.0	355.0	355.0	0.00	98.38

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
100.20	16.6	2.852	690.1	706.7
100.40	48.3	3.031	733.4	781.7
100.60	91.2	3.214	777.9	869.1
100.80	144.3	3.403	823.5	967.8

Time increment (t) = 0.100 hrs.

```
*****************************************************************
*                                                               *
*                        EARLE - SITE 5                         *
*                      DETENTION BASIN #1                       *
*          POST-DEVELOPMENT CONDITIONS : 10 YEAR STORM          *
*  ON-SITE RUNOFF FROM DA 1 PLUS OFF-SITE RUNOFF FROM CULVERT   *
*                                                               *
*****************************************************************
```

Inflow Hydrograph: PD-10 .HYD
Rating Table file: SB1-SUM2.PND

----INITIAL CONDITIONS----
Elevation = 94.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
94.00	0.0	0.000
94.20	0.0	0.039
94.40	0.0	0.078
94.60	0.0	0.119
94.80	0.0	0.161
95.00	0.0	0.205
95.20	0.0	0.249
95.40	0.0	0.295
95.60	0.0	0.342
95.80	0.0	0.390
96.00	0.0	0.440
96.20	0.0	0.492
96.40	0.0	0.550
96.60	0.0	0.613
96.80	0.0	0.682
97.00	0.0	0.757
97.20	0.0	0.839
97.40	0.0	0.927
97.60	0.0	1.024
97.80	0.0	1.127
98.00	0.0	1.239
98.20	0.0	1.358
98.40	0.0	1.482
98.60	0.0	1.612
98.80	0.0	1.747
99.00	0.0	1.888
99.20	0.0	2.035
99.40	0.0	2.187
99.60	0.0	2.345
99.80	0.0	2.508
100.00	0.0	2.677

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
9.3	9.3
19.0	19.0
28.9	28.9
39.0	39.0
49.5	49.5
60.3	60.3
71.4	71.4
82.8	82.8
94.4	94.4
106.4	106.4
119.1	119.1
133.1	133.1
148.4	148.4
165.1	165.1
183.2	183.2
203.0	203.0
224.4	224.4
247.7	247.7
272.8	272.8
299.9	299.9
328.7	328.7
358.7	358.7
390.1	390.1
422.8	422.8
457.0	457.0
492.5	492.5
529.3	529.3
567.5	567.5
607.0	607.0
647.9	647.9

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.17 S/N:                                    Page 8

Pond File:            SB1-SUM2.PND
Inflow Hydrograph:    PD-2     .HYD
Outflow Hydrograph:   OUT      .HYD
                                                   EXECUTED: 01-02-1998
Peak Inflow     =      3.00 cfs                          12:05:55
Peak Outflow    =      0.00 cfs
Peak Elevation  =     95.48 ft
```

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 94.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 3.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 95.48 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.31 ac-ft

Total Storage in Pond = 0.31 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.00
24.800	0.00
24.900	0.00
25.000	0.00
25.100	0.00
25.200	0.00
25.300	0.00
25.400	0.00
25.500	0.00
25.600	0.00
25.700	0.00
25.800	0.00
25.900	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48
0.0	76.0	76.0	0.00	95.48

ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	76.0	76.0	0.00	95.48
20.200	0.00	0.0	76.0	76.0	0.00	95.48
20.300	0.00	0.0	76.0	76.0	0.00	95.48
20.400	0.00	0.0	76.0	76.0	0.00	95.48
20.500	0.00	0.0	76.0	76.0	0.00	95.48
20.600	0.00	0.0	76.0	76.0	0.00	95.48
20.700	0.00	0.0	76.0	76.0	0.00	95.48
20.800	0.00	0.0	76.0	76.0	0.00	95.48
20.900	0.00	0.0	76.0	76.0	0.00	95.48
21.000	0.00	0.0	76.0	76.0	0.00	95.48
21.100	0.00	0.0	76.0	76.0	0.00	95.48
21.200	0.00	0.0	76.0	76.0	0.00	95.48
21.300	0.00	0.0	76.0	76.0	0.00	95.48
21.400	0.00	0.0	76.0	76.0	0.00	95.48
21.500	0.00	0.0	76.0	76.0	0.00	95.48
21.600	0.00	0.0	76.0	76.0	0.00	95.48
21.700	0.00	0.0	76.0	76.0	0.00	95.48
21.800	0.00	0.0	76.0	76.0	0.00	95.48
21.900	0.00	0.0	76.0	76.0	0.00	95.48
22.000	0.00	0.0	76.0	76.0	0.00	95.48
22.100	0.00	0.0	76.0	76.0	0.00	95.48
22.200	0.00	0.0	76.0	76.0	0.00	95.48
22.300	0.00	0.0	76.0	76.0	0.00	95.48
22.400	0.00	0.0	76.0	76.0	0.00	95.48
22.500	0.00	0.0	76.0	76.0	0.00	95.48
22.600	0.00	0.0	76.0	76.0	0.00	95.48
22.700	0.00	0.0	76.0	76.0	0.00	95.48
22.800	0.00	0.0	76.0	76.0	0.00	95.48
22.900	0.00	0.0	76.0	76.0	0.00	95.48
23.000	0.00	0.0	76.0	76.0	0.00	95.48
23.100	0.00	0.0	76.0	76.0	0.00	95.48
23.200	0.00	0.0	76.0	76.0	0.00	95.48
23.300	0.00	0.0	76.0	76.0	0.00	95.48
23.400	0.00	0.0	76.0	76.0	0.00	95.48
23.500	0.00	0.0	76.0	76.0	0.00	95.48
23.600	0.00	0.0	76.0	76.0	0.00	95.48
23.700	0.00	0.0	76.0	76.0	0.00	95.48
23.800	0.00	0.0	76.0	76.0	0.00	95.48
23.900	0.00	0.0	76.0	76.0	0.00	95.48
24.000	0.00	0.0	76.0	76.0	0.00	95.48
24.100	0.00	0.0	76.0	76.0	0.00	95.48
24.200	0.00	0.0	76.0	76.0	0.00	95.48
24.300	0.00	0.0	76.0	76.0	0.00	95.48
24.400	0.00	0.0	76.0	76.0	0.00	95.48
24.500	0.00	0.0	76.0	76.0	0.00	95.48
24.600	0.00	0.0	76.0	76.0	0.00	95.48

Pond File: SB1-SUM2.PND
Inflow Hydrograph: PD-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	76.0	76.0	0.00	95.48
15.600	0.00	0.0	76.0	76.0	0.00	95.48
15.700	0.00	0.0	76.0	76.0	0.00	95.48
15.800	0.00	0.0	76.0	76.0	0.00	95.48
15.900	0.00	0.0	76.0	76.0	0.00	95.48
16.000	0.00	0.0	76.0	76.0	0.00	95.48
16.100	0.00	0.0	76.0	76.0	0.00	95.48
16.200	0.00	0.0	76.0	76.0	0.00	95.48
16.300	0.00	0.0	76.0	76.0	0.00	95.48
16.400	0.00	0.0	76.0	76.0	0.00	95.48
16.500	0.00	0.0	76.0	76.0	0.00	95.48
16.600	0.00	0.0	76.0	76.0	0.00	95.48
16.700	0.00	0.0	76.0	76.0	0.00	95.48
16.800	0.00	0.0	76.0	76.0	0.00	95.48
16.900	0.00	0.0	76.0	76.0	0.00	95.48
17.000	0.00	0.0	76.0	76.0	0.00	95.48
17.100	0.00	0.0	76.0	76.0	0.00	95.48
17.200	0.00	0.0	76.0	76.0	0.00	95.48
17.300	0.00	0.0	76.0	76.0	0.00	95.48
17.400	0.00	0.0	76.0	76.0	0.00	95.48
17.500	0.00	0.0	76.0	76.0	0.00	95.48
17.600	0.00	0.0	76.0	76.0	0.00	95.48
17.700	0.00	0.0	76.0	76.0	0.00	95.48
17.800	0.00	0.0	76.0	76.0	0.00	95.48
17.900	0.00	0.0	76.0	76.0	0.00	95.48
18.000	0.00	0.0	76.0	76.0	0.00	95.48
18.100	0.00	0.0	76.0	76.0	0.00	95.48
18.200	0.00	0.0	76.0	76.0	0.00	95.48
18.300	0.00	0.0	76.0	76.0	0.00	95.48
18.400	0.00	0.0	76.0	76.0	0.00	95.48
18.500	0.00	0.0	76.0	76.0	0.00	95.48
18.600	0.00	0.0	76.0	76.0	0.00	95.48
18.700	0.00	0.0	76.0	76.0	0.00	95.48
18.800	0.00	0.0	76.0	76.0	0.00	95.48
18.900	0.00	0.0	76.0	76.0	0.00	95.48
19.000	0.00	0.0	76.0	76.0	0.00	95.48
19.100	0.00	0.0	76.0	76.0	0.00	95.48
19.200	0.00	0.0	76.0	76.0	0.00	95.48
19.300	0.00	0.0	76.0	76.0	0.00	95.48
19.400	0.00	0.0	76.0	76.0	0.00	95.48
19.500	0.00	0.0	76.0	76.0	0.00	95.48
19.600	0.00	0.0	76.0	76.0	0.00	95.48
19.700	0.00	0.0	76.0	76.0	0.00	95.48
19.800	0.00	0.0	76.0	76.0	0.00	95.48
19.900	0.00	0.0	76.0	76.0	0.00	95.48
20.000	0.00	0.0	76.0	76.0	0.00	95.48

ond File: SB1-SUM2.PND
Inflow Hydrograph: PD-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	94.00
11.100	0.00	0.0	0.0	0.0	0.00	94.00
11.200	0.00	0.0	0.0	0.0	0.00	94.00
11.300	0.00	0.0	0.0	0.0	0.00	94.00
11.400	0.00	0.0	0.0	0.0	0.00	94.00
11.500	0.00	0.0	0.0	0.0	0.00	94.00
11.600	0.00	0.0	0.0	0.0	0.00	94.00
11.700	0.00	0.0	0.0	0.0	0.00	94.00
11.800	0.00	0.0	0.0	0.0	0.00	94.00
11.900	0.00	0.0	0.0	0.0	0.00	94.00
12.000	0.00	0.0	0.0	0.0	0.00	94.00
12.100	0.00	0.0	0.0	0.0	0.00	94.00
12.200	1.00	1.0	1.0	1.0	0.00	94.02
12.300	1.00	2.0	3.0	3.0	0.00	94.06
12.400	3.00	4.0	7.0	7.0	0.00	94.15
12.500	3.00	6.0	13.0	13.0	0.00	94.28
12.600	3.00	6.0	19.0	19.0	0.00	94.40
12.700	3.00	6.0	25.0	25.0	0.00	94.52
12.800	2.00	5.0	30.0	30.0	0.00	94.62
12.900	2.00	4.0	34.0	34.0	0.00	94.70
13.000	2.00	4.0	38.0	38.0	0.00	94.78
13.100	2.00	4.0	42.0	42.0	0.00	94.86
13.200	1.00	3.0	45.0	45.0	0.00	94.91
13.300	1.00	2.0	47.0	47.0	0.00	94.95
13.400	1.00	2.0	49.0	49.0	0.00	94.99
13.500	1.00	2.0	51.0	51.0	0.00	95.03
13.600	1.00	2.0	53.0	53.0	0.00	95.06
13.700	1.00	2.0	55.0	55.0	0.00	95.10
13.800	1.00	2.0	57.0	57.0	0.00	95.14
13.900	1.00	2.0	59.0	59.0	0.00	95.18
14.000	1.00	2.0	61.0	61.0	0.00	95.21
14.100	1.00	2.0	63.0	63.0	0.00	95.25
14.200	1.00	2.0	65.0	65.0	0.00	95.28
14.300	1.00	2.0	67.0	67.0	0.00	95.32
14.400	1.00	2.0	69.0	69.0	0.00	95.36
14.500	1.00	2.0	71.0	71.0	0.00	95.39
14.600	1.00	2.0	73.0	73.0	0.00	95.43
14.700	1.00	2.0	75.0	75.0	0.00	95.46
14.800	0.00	1.0	76.0	76.0	0.00	95.48
14.900	0.00	0.0	76.0	76.0	0.00	95.48
15.000	0.00	0.0	76.0	76.0	0.00	95.48
15.100	0.00	0.0	76.0	76.0	0.00	95.48
15.200	0.00	0.0	76.0	76.0	0.00	95.48
15.300	0.00	0.0	76.0	76.0	0.00	95.48
15.400	0.00	0.0	76.0	76.0	0.00	95.48

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
100.20	16.6	2.852	690.1	706.7
100.40	48.3	3.031	733.4	781.7
100.60	91.2	3.214	777.9	869.1
100.80	144.3	3.403	823.5	967.8

Time increment (t) = 0.100 hrs.

```
*************************************************************
*                                                           *
*                      EARLE - SITE 5                       *
*                    DETENTION BASIN #1                     *
*        POST-DEVELOPMENT CONDITIONS : 2 YEAR STORM         *
*  ON-SITE DA1 RUNOFF PLUS OFF-SITE RUNOFF FROM CULVERT     *
*                                                           *
*************************************************************
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Inflow Hydrograph: PD-2 .HYD
Rating Table file: SB1-SUM2.PND

----INITIAL CONDITIONS----
Elevation = 94.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
94.00	0.0	0.000	0.0	0.0
94.20	0.0	0.039	9.3	9.3
94.40	0.0	0.078	19.0	19.0
94.60	0.0	0.119	28.9	28.9
94.80	0.0	0.161	39.0	39.0
95.00	0.0	0.205	49.5	49.5
95.20	0.0	0.249	60.3	60.3
95.40	0.0	0.295	71.4	71.4
95.60	0.0	0.342	82.8	82.8
95.80	0.0	0.390	94.4	94.4
96.00	0.0	0.440	106.4	106.4
96.20	0.0	0.492	119.1	119.1
96.40	0.0	0.550	133.1	133.1
96.60	0.0	0.613	148.4	148.4
96.80	0.0	0.682	165.1	165.1
97.00	0.0	0.757	183.2	183.2
97.20	0.0	0.839	203.0	203.0
97.40	0.0	0.927	224.4	224.4
97.60	0.0	1.024	247.7	247.7
97.80	0.0	1.127	272.8	272.8
98.00	0.0	1.239	299.9	299.9
98.20	0.0	1.358	328.7	328.7
98.40	0.0	1.482	358.7	358.7
98.60	0.0	1.612	390.1	390.1
98.80	0.0	1.747	422.8	422.8
99.00	0.0	1.888	457.0	457.0
99.20	0.0	2.035	492.5	492.5
99.40	0.0	2.187	529.3	529.3
99.60	0.0	2.345	567.5	567.5
99.80	0.0	2.508	607.0	607.0
100.00	0.0	2.677	647.9	647.9

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 01-02-1998
12:01:24

Peak Inflow = 12.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 97.60 ft

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 94.10 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 12.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 97.60 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 1.00 ac-ft

Total Storage in Pond = 1.00 ac-ft

Warning: Inflow hydrograph truncated on left side.

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	243.0	243.0	0.00	97.60
24.800	0.00	0.0	243.0	243.0	0.00	97.60
24.900	0.00	0.0	243.0	243.0	0.00	97.60
25.000	0.00	0.0	243.0	243.0	0.00	97.60
25.100	0.00	0.0	243.0	243.0	0.00	97.60
25.200	0.00	0.0	243.0	243.0	0.00	97.60
25.300	0.00	0.0	243.0	243.0	0.00	97.60
25.400	0.00	0.0	243.0	243.0	0.00	97.60
25.500	0.00	0.0	243.0	243.0	0.00	97.60
25.600	0.00	0.0	243.0	243.0	0.00	97.60
25.700	0.00	0.0	243.0	243.0	0.00	97.60
25.800	0.00	0.0	243.0	243.0	0.00	97.60
25.900	0.00	0.0	243.0	243.0	0.00	97.60

ond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	243.0	243.0	0.00	97.60
20.200	0.00	0.0	243.0	243.0	0.00	97.60
20.300	0.00	0.0	243.0	243.0	0.00	97.60
20.400	0.00	0.0	243.0	243.0	0.00	97.60
20.500	0.00	0.0	243.0	243.0	0.00	97.60
20.600	0.00	0.0	243.0	243.0	0.00	97.60
20.700	0.00	0.0	243.0	243.0	0.00	97.60
20.800	0.00	0.0	243.0	243.0	0.00	97.60
20.900	0.00	0.0	243.0	243.0	0.00	97.60
21.000	0.00	0.0	243.0	243.0	0.00	97.60
21.100	0.00	0.0	243.0	243.0	0.00	97.60
21.200	0.00	0.0	243.0	243.0	0.00	97.60
21.300	0.00	0.0	243.0	243.0	0.00	97.60
21.400	0.00	0.0	243.0	243.0	0.00	97.60
21.500	0.00	0.0	243.0	243.0	0.00	97.60
21.600	0.00	0.0	243.0	243.0	0.00	97.60
21.700	0.00	0.0	243.0	243.0	0.00	97.60
21.800	0.00	0.0	243.0	243.0	0.00	97.60
21.900	0.00	0.0	243.0	243.0	0.00	97.60
22.000	0.00	0.0	243.0	243.0	0.00	97.60
22.100	0.00	0.0	243.0	243.0	0.00	97.60
22.200	0.00	0.0	243.0	243.0	0.00	97.60
22.300	0.00	0.0	243.0	243.0	0.00	97.60
22.400	0.00	0.0	243.0	243.0	0.00	97.60
22.500	0.00	0.0	243.0	243.0	0.00	97.60
22.600	0.00	0.0	243.0	243.0	0.00	97.60
22.700	0.00	0.0	243.0	243.0	0.00	97.60
22.800	0.00	0.0	243.0	243.0	0.00	97.60
22.900	0.00	0.0	243.0	243.0	0.00	97.60
23.000	0.00	0.0	243.0	243.0	0.00	97.60
23.100	0.00	0.0	243.0	243.0	0.00	97.60
23.200	0.00	0.0	243.0	243.0	0.00	97.60
23.300	0.00	0.0	243.0	243.0	0.00	97.60
23.400	0.00	0.0	243.0	243.0	0.00	97.60
23.500	0.00	0.0	243.0	243.0	0.00	97.60
23.600	0.00	0.0	243.0	243.0	0.00	97.60
23.700	0.00	0.0	243.0	243.0	0.00	97.60
23.800	0.00	0.0	243.0	243.0	0.00	97.60
23.900	0.00	0.0	243.0	243.0	0.00	97.60
24.000	0.00	0.0	243.0	243.0	0.00	97.60
24.100	0.00	0.0	243.0	243.0	0.00	97.60
24.200	0.00	0.0	243.0	243.0	0.00	97.60
24.300	0.00	0.0	243.0	243.0	0.00	97.60
24.400	0.00	0.0	243.0	243.0	0.00	97.60
24.500	0.00	0.0	243.0	243.0	0.00	97.60
24.600	0.00	0.0	243.0	243.0	0.00	97.60

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	1.00	2.0	218.0	218.0	0.00	97.38
15.600	1.00	2.0	220.0	220.0	0.00	97.40
15.700	1.00	2.0	222.0	222.0	0.00	97.42
15.800	1.00	2.0	224.0	224.0	0.00	97.44
15.900	1.00	2.0	226.0	226.0	0.00	97.45
16.000	1.00	2.0	228.0	228.0	0.00	97.47
16.100	1.00	2.0	230.0	230.0	0.00	97.49
16.200	1.00	2.0	232.0	232.0	0.00	97.51
16.300	1.00	2.0	234.0	234.0	0.00	97.52
16.400	1.00	2.0	236.0	236.0	0.00	97.54
16.500	1.00	2.0	238.0	238.0	0.00	97.56
16.600	1.00	2.0	240.0	240.0	0.00	97.57
16.700	1.00	2.0	242.0	242.0	0.00	97.59
16.800	0.00	1.0	243.0	243.0	0.00	97.60
16.900	0.00	0.0	243.0	243.0	0.00	97.60
17.000	0.00	0.0	243.0	243.0	0.00	97.60
17.100	0.00	0.0	243.0	243.0	0.00	97.60
17.200	0.00	0.0	243.0	243.0	0.00	97.60
17.300	0.00	0.0	243.0	243.0	0.00	97.60
17.400	0.00	0.0	243.0	243.0	0.00	97.60
17.500	0.00	0.0	243.0	243.0	0.00	97.60
17.600	0.00	0.0	243.0	243.0	0.00	97.60
17.700	0.00	0.0	243.0	243.0	0.00	97.60
17.800	0.00	0.0	243.0	243.0	0.00	97.60
17.900	0.00	0.0	243.0	243.0	0.00	97.60
18.000	0.00	0.0	243.0	243.0	0.00	97.60
18.100	0.00	0.0	243.0	243.0	0.00	97.60
18.200	0.00	0.0	243.0	243.0	0.00	97.60
18.300	0.00	0.0	243.0	243.0	0.00	97.60
18.400	0.00	0.0	243.0	243.0	0.00	97.60
18.500	0.00	0.0	243.0	243.0	0.00	97.60
18.600	0.00	0.0	243.0	243.0	0.00	97.60
18.700	0.00	0.0	243.0	243.0	0.00	97.60
18.800	0.00	0.0	243.0	243.0	0.00	97.60
18.900	0.00	0.0	243.0	243.0	0.00	97.60
19.000	0.00	0.0	243.0	243.0	0.00	97.60
19.100	0.00	0.0	243.0	243.0	0.00	97.60
19.200	0.00	0.0	243.0	243.0	0.00	97.60
19.300	0.00	0.0	243.0	243.0	0.00	97.60
19.400	0.00	0.0	243.0	243.0	0.00	97.60
19.500	0.00	0.0	243.0	243.0	0.00	97.60
19.600	0.00	0.0	243.0	243.0	0.00	97.60
19.700	0.00	0.0	243.0	243.0	0.00	97.60
19.800	0.00	0.0	243.0	243.0	0.00	97.60
19.900	0.00	0.0	243.0	243.0	0.00	97.60
20.000	0.00	0.0	243.0	243.0	0.00	97.60

ond File: SB1-TEST.PND
Inflow Hydrograph: DC1-SUM2.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	1.00	-----	0.0	0.0	0.00	94.10
11.100	1.00	2.0	2.0	2.0	0.00	94.14
11.200	1.00	2.0	4.0	4.0	0.00	94.18
11.300	1.00	2.0	6.0	6.0	0.00	94.23
11.400	1.00	2.0	8.0	8.0	0.00	94.27
11.500	1.00	2.0	10.0	10.0	0.00	94.31
11.600	1.00	2.0	12.0	12.0	0.00	94.35
11.700	1.00	2.0	14.0	14.0	0.00	94.39
11.800	2.00	3.0	17.0	17.0	0.00	94.45
11.900	2.00	4.0	21.0	21.0	0.00	94.54
12.000	3.00	5.0	26.0	26.0	0.00	94.63
12.100	5.00	8.0	34.0	34.0	0.00	94.79
12.200	8.00	13.0	47.0	47.0	0.00	95.04
12.300	12.00	20.0	67.0	67.0	0.00	95.40
12.400	12.00	24.0	91.0	91.0	0.00	95.82
12.500	9.00	21.0	112.0	112.0	0.00	96.16
12.600	7.00	16.0	128.0	128.0	0.00	96.39
12.700	5.00	12.0	140.0	140.0	0.00	96.55
12.800	4.00	9.0	149.0	149.0	0.00	96.66
12.900	3.00	7.0	156.0	156.0	0.00	96.75
13.000	2.00	5.0	161.0	161.0	0.00	96.80
13.100	2.00	4.0	165.0	165.0	0.00	96.85
13.200	2.00	4.0	169.0	169.0	0.00	96.90
13.300	2.00	4.0	173.0	173.0	0.00	96.94
13.400	1.00	3.0	176.0	176.0	0.00	96.97
13.500	1.00	2.0	178.0	178.0	0.00	96.99
13.600	1.00	2.0	180.0	180.0	0.00	97.01
13.700	1.00	2.0	182.0	182.0	0.00	97.03
13.800	1.00	2.0	184.0	184.0	0.00	97.05
13.900	1.00	2.0	186.0	186.0	0.00	97.08
14.000	1.00	2.0	188.0	188.0	0.00	97.10
14.100	1.00	2.0	190.0	190.0	0.00	97.12
14.200	1.00	2.0	192.0	192.0	0.00	97.14
14.300	1.00	2.0	194.0	194.0	0.00	97.16
14.400	1.00	2.0	196.0	196.0	0.00	97.18
14.500	1.00	2.0	198.0	198.0	0.00	97.19
14.600	1.00	2.0	200.0	200.0	0.00	97.21
14.700	1.00	2.0	202.0	202.0	0.00	97.23
14.800	1.00	2.0	204.0	204.0	0.00	97.25
14.900	1.00	2.0	206.0	206.0	0.00	97.27
15.000	1.00	2.0	208.0	208.0	0.00	97.29
15.100	1.00	2.0	210.0	210.0	0.00	97.31
15.200	1.00	2.0	212.0	212.0	0.00	97.33
15.300	1.00	2.0	214.0	214.0	0.00	97.35
15.400	1.00	2.0	216.0	216.0	0.00	97.36

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
100.30	30.9	2.921
100.50	68.4	3.103
100.70	116.5	3.289
100.90	174.6	3.480

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
707.0	737.9
750.9	819.3
795.9	912.4
842.2	1016.8

Time increment (t) = 0.100 hrs.

```
*************************************************************
*                                                           *
*                      EARLE - SITE 5                       *
*                     SEDIMENT BASIN #1                     *
*      DURING CONSTRUCTION CONDITIONS : 2 YEAR STORM        *
*  ON-SITE DA1 RUNOFF PLUS OFF-SITE RUNOFF FROM CULVERT     *
*                                                           *
*************************************************************
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Inflow Hydrograph: DC1-SUM2.HYD
Rating Table file: SB1-TEST.PND

----INITIAL CONDITIONS----
Elevation = 94.10 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
94.10	0.0	0.000
94.30	0.0	0.039
94.50	0.0	0.079
94.70	0.0	0.121
94.90	0.0	0.164
95.10	0.0	0.208
95.30	0.0	0.253
95.50	0.0	0.299
95.70	0.0	0.347
95.90	0.0	0.396
96.10	0.0	0.446
96.30	0.0	0.501
96.50	0.0	0.562
96.70	0.0	0.628
96.90	0.0	0.700
97.10	0.0	0.778
97.30	0.0	0.863
97.50	0.0	0.955
97.70	0.0	1.055
97.90	0.0	1.163
98.10	0.0	1.279
98.30	0.0	1.400
98.50	0.0	1.527
98.70	0.0	1.660
98.90	0.0	1.798
99.10	0.0	1.942
99.30	0.0	2.091
99.50	0.0	2.246
99.70	0.0	2.407
99.90	0.0	2.573
100.10	5.8	2.745

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
9.5	9.5
19.2	19.2
29.3	29.3
39.6	39.6
50.3	50.3
61.2	61.2
72.4	72.4
83.9	83.9
95.7	95.7
107.9	107.9
121.3	121.3
135.9	135.9
151.9	151.9
169.4	169.4
188.3	188.3
208.9	208.9
231.2	231.2
255.4	255.4
281.5	281.5
309.5	309.5
338.9	338.9
369.6	369.6
401.6	401.6
435.1	435.1
469.9	469.9
506.1	506.1
543.6	543.6
582.4	582.4
622.6	622.6
664.2	670.0

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-30-1997
19:48:50

Peak Inflow = 13.00 cfs
Peak Outflow = 4.20 cfs
Peak Elevation = 100.07 ft

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 97.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 13.00 cfs
Peak Outflow = 4.20 cfs
Peak Elevation = 100.07 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 1.19 ac-ft

Total Storage in Pond = 1.19 ac-ft

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.00
24.800	0.00
24.900	0.00
25.000	0.00
25.100	0.00
25.200	0.00
25.300	0.00
25.400	0.00
25.500	0.00
25.600	0.00
25.700	0.00
25.800	0.00
25.900	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00
0.0	275.2	275.2	0.00	100.00

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	1.00	2.0	277.0	279.0	1.00	100.02
20.200	1.00	2.0	277.0	279.0	1.00	100.02
20.300	1.00	2.0	277.0	279.0	1.00	100.02
20.400	1.00	2.0	277.0	279.0	1.00	100.02
20.500	1.00	2.0	277.0	279.0	1.00	100.02
20.600	1.00	2.0	277.0	279.0	1.00	100.02
20.700	1.00	2.0	277.0	279.0	1.00	100.02
20.800	1.00	2.0	277.0	279.0	1.00	100.02
20.900	1.00	2.0	277.0	279.0	1.00	100.02
21.000	1.00	2.0	277.0	279.0	1.00	100.02
21.100	1.00	2.0	277.0	279.0	1.00	100.02
21.200	1.00	2.0	277.0	279.0	1.00	100.02
21.300	1.00	2.0	277.0	279.0	1.00	100.02
21.400	1.00	2.0	277.0	279.0	1.00	100.02
21.500	1.00	2.0	277.0	279.0	1.00	100.02
21.600	1.00	2.0	277.0	279.0	1.00	100.02
21.700	1.00	2.0	277.0	279.0	1.00	100.02
21.800	1.00	2.0	277.0	279.0	1.00	100.02
21.900	1.00	2.0	277.0	279.0	1.00	100.02
22.000	1.00	2.0	277.0	279.0	1.00	100.02
22.100	1.00	2.0	277.0	279.0	1.00	100.02
22.200	1.00	2.0	277.0	279.0	1.00	100.02
22.300	1.00	2.0	277.0	279.0	1.00	100.02
22.400	1.00	2.0	277.0	279.0	1.00	100.02
22.500	1.00	2.0	277.0	279.0	1.00	100.02
22.600	1.00	2.0	277.0	279.0	1.00	100.02
22.700	1.00	2.0	277.0	279.0	1.00	100.02
22.800	1.00	2.0	277.0	279.0	1.00	100.02
22.900	1.00	2.0	277.0	279.0	1.00	100.02
23.000	1.00	2.0	277.0	279.0	1.00	100.02
23.100	1.00	2.0	277.0	279.0	1.00	100.02
23.200	1.00	2.0	277.0	279.0	1.00	100.02
23.300	1.00	2.0	277.0	279.0	1.00	100.02
23.400	1.00	2.0	277.0	279.0	1.00	100.02
23.500	1.00	2.0	277.0	279.0	1.00	100.02
23.600	1.00	2.0	277.0	279.0	1.00	100.02
23.700	1.00	2.0	277.0	279.0	1.00	100.02
23.800	1.00	2.0	277.0	279.0	1.00	100.02
23.900	1.00	2.0	277.0	279.0	1.00	100.02
24.000	0.00	1.0	276.5	278.0	0.74	100.01
24.100	0.00	0.0	275.8	276.5	0.35	100.01
24.200	0.00	0.0	275.5	275.8	0.16	100.00
24.300	0.00	0.0	275.3	275.5	0.08	100.00
24.400	0.00	0.0	275.3	275.3	0.04	100.00
24.500	0.00	0.0	275.2	275.3	0.02	100.00
24.600	0.00	0.0	275.2	275.2	0.01	100.00

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	4.00	8.0	282.4	290.4	4.00	100.07
15.600	4.00	8.0	282.4	290.4	4.00	100.07
15.700	4.00	8.0	282.4	290.4	4.00	100.07
15.800	4.00	8.0	282.4	290.4	4.00	100.07
15.900	4.00	8.0	282.4	290.4	4.00	100.07
16.000	4.00	8.0	282.4	290.4	4.00	100.07
16.100	4.00	8.0	282.4	290.4	4.00	100.07
16.200	4.00	8.0	282.4	290.4	4.00	100.07
16.300	3.00	7.0	281.9	289.4	3.74	100.06
16.400	3.00	6.0	281.2	287.9	3.35	100.06
16.500	3.00	6.0	280.9	287.2	3.16	100.05
16.600	3.00	6.0	280.7	286.9	3.08	100.05
16.700	3.00	6.0	280.6	286.7	3.04	100.05
16.800	3.00	6.0	280.6	286.6	3.02	100.05
16.900	3.00	6.0	280.6	286.6	3.01	100.05
17.000	3.00	6.0	280.6	286.6	3.00	100.05
17.100	3.00	6.0	280.6	286.6	3.00	100.05
17.200	3.00	6.0	280.6	286.6	3.00	100.05
17.300	2.00	5.0	280.1	285.6	2.74	100.05
17.400	2.00	4.0	279.4	284.1	2.35	100.04
17.500	2.00	4.0	279.1	283.4	2.16	100.04
17.600	2.00	4.0	278.9	283.1	2.08	100.04
17.700	2.00	4.0	278.8	282.9	2.04	100.04
17.800	2.00	4.0	278.8	282.8	2.02	100.03
17.900	2.00	4.0	278.8	282.8	2.01	100.03
18.000	2.00	4.0	278.8	282.8	2.00	100.03
18.100	2.00	4.0	278.8	282.8	2.00	100.03
18.200	2.00	4.0	278.8	282.8	2.00	100.03
18.300	2.00	4.0	278.8	282.8	2.00	100.03
18.400	2.00	4.0	278.8	282.8	2.00	100.03
18.500	2.00	4.0	278.8	282.8	2.00	100.03
18.600	1.00	3.0	278.3	281.8	1.74	100.03
18.700	1.00	2.0	277.6	280.3	1.35	100.02
18.800	1.00	2.0	277.3	279.6	1.16	100.02
18.900	1.00	2.0	277.1	279.3	1.08	100.02
19.000	1.00	2.0	277.0	279.1	1.04	100.02
19.100	1.00	2.0	277.0	279.0	1.02	100.02
19.200	1.00	2.0	277.0	279.0	1.01	100.02
19.300	1.00	2.0	277.0	279.0	1.00	100.02
19.400	1.00	2.0	277.0	279.0	1.00	100.02
19.500	1.00	2.0	277.0	279.0	1.00	100.02
19.600	1.00	2.0	277.0	279.0	1.00	100.02
19.700	1.00	2.0	277.0	279.0	1.00	100.02
19.800	1.00	2.0	277.0	279.0	1.00	100.02
19.900	1.00	2.0	277.0	279.0	1.00	100.02
20.000	1.00	2.0	277.0	279.0	1.00	100.02

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 19:48:50

CJF 12/31/97

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	97.00
11.100	0.00	0.0	0.0	0.0	0.00	97.00
11.200	0.00	0.0	0.0	0.0	0.00	97.00
11.300	0.00	0.0	0.0	0.0	0.00	97.00
11.400	0.00	0.0	0.0	0.0	0.00	97.00
11.500	0.00	0.0	0.0	0.0	0.00	97.00
11.600	0.00	0.0	0.0	0.0	0.00	97.00
11.700	0.00	0.0	0.0	0.0	0.00	97.00
11.800	0.00	0.0	0.0	0.0	0.00	97.00
11.900	0.00	0.0	0.0	0.0	0.00	97.00
12.000	0.00	0.0	0.0	0.0	0.00	97.00
12.100	0.00	0.0	0.0	0.0	0.00	97.00
12.200	0.00	0.0	0.0	0.0	0.00	97.00
12.300	0.00	0.0	0.0	0.0	0.00	97.00
12.400	2.00	2.0	2.0	2.0	0.00	97.08
12.500	5.00	7.0	9.0	9.0	0.00	97.32
12.600	8.00	13.0	22.0	22.0	0.00	97.63
12.700	11.00	19.0	41.0	41.0	0.00	97.95
12.800	13.00	24.0	65.0	65.0	0.00	98.27
12.900	12.00	25.0	90.0	90.0	0.00	98.56
13.000	11.00	23.0	113.0	113.0	0.00	98.79
13.100	10.00	21.0	134.0	134.0	0.00	98.98
13.200	9.00	19.0	153.0	153.0	0.00	99.13
13.300	8.00	17.0	170.0	170.0	0.00	99.27
13.400	7.00	15.0	185.0	185.0	0.00	99.38
13.500	7.00	14.0	199.0	199.0	0.00	99.49
13.600	6.00	13.0	212.0	212.0	0.00	99.58
13.700	6.00	12.0	224.0	224.0	0.00	99.66
13.800	5.00	11.0	235.0	235.0	0.00	99.74
13.900	5.00	10.0	245.0	245.0	0.00	99.81
14.000	5.00	10.0	255.0	255.0	0.00	99.87
14.100	5.00	10.0	265.0	265.0	0.00	99.94
14.200	5.00	10.0	275.0	275.0	0.00	100.00
14.300	5.00	10.0	279.8	285.0	2.59	100.04
14.400	5.00	10.0	282.1	289.8	3.86	100.07
14.500	4.00	9.0	282.7	291.1	4.20	100.07
14.600	4.00	8.0	282.5	290.7	4.09	100.07
14.700	4.00	8.0	282.4	290.5	4.04	100.07
14.800	4.00	8.0	282.4	290.4	4.02	100.07
14.900	4.00	8.0	282.4	290.4	4.01	100.07
15.000	4.00	8.0	282.4	290.4	4.00	100.07
15.100	4.00	8.0	282.4	290.4	4.00	100.07
15.200	4.00	8.0	282.4	290.4	4.00	100.07
15.300	4.00	8.0	282.4	290.4	4.00	100.07
15.400	4.00	8.0	282.4	290.4	4.00	100.07

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
100.10	5.8	1.204
100.20	16.6	1.272
100.30	30.9	1.342
100.40	48.3	1.412
100.50	68.4	1.484
100.60	91.2	1.557
100.70	116.5	1.631
100.80	144.3	1.707
100.90	174.6	1.784

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
291.4	297.2
307.9	324.5
324.6	355.5
341.7	390.0
359.1	427.5
376.8	468.0
394.8	511.3
413.1	557.4
431.7	606.3

Time increment (t) = 0.100 hrs.

```
*************************************************
*                                               *
*                EARLE - SITE 5                 *
*  PRE-DEVELOPMENT CONDITIONS : 25 YEAR STORM   *
*   EXISTING DETENTION BASIN IN THE PROPOSED    *
*     AREA FOR SEDIMENT/DETENTION BASIN #1      *
*                                               *
*************************************************
```

Inflow Hydrograph: EX-SUM25.HYD
Rating Table file: EX-SB1 .PND

----INITIAL CONDITIONS----
Elevation = 97.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
97.00	0.0	0.000
97.10	0.0	0.010
97.20	0.0	0.022
97.30	0.0	0.035
97.40	0.0	0.050
97.50	0.0	0.067
97.60	0.0	0.085
97.70	0.0	0.106
97.80	0.0	0.129
97.90	0.0	0.155
98.00	0.0	0.182
98.10	0.0	0.212
98.20	0.0	0.244
98.30	0.0	0.277
98.40	0.0	0.312
98.50	0.0	0.350
98.60	0.0	0.389
98.70	0.0	0.430
98.80	0.0	0.473
98.90	0.0	0.518
99.00	0.0	0.566
99.10	0.0	0.615
99.20	0.0	0.666
99.30	0.0	0.719
99.40	0.0	0.773
99.50	0.0	0.829
99.60	0.0	0.887
99.70	0.0	0.947
99.80	0.0	1.008
99.90	0.0	1.072
100.00	0.0	1.137

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.4	2.4
5.2	5.2
8.4	8.4
12.0	12.0
16.1	16.1
20.6	20.6
25.7	25.7
31.3	31.3
37.4	37.4
44.1	44.1
51.3	51.3
59.0	59.0
67.1	67.1
75.6	75.6
84.6	84.6
94.1	94.1
104.0	104.0
114.4	114.4
125.4	125.4
136.9	136.9
148.8	148.8
161.1	161.1
173.9	173.9
187.1	187.1
200.6	200.6
214.7	214.7
229.1	229.1
244.0	244.0
259.4	259.4
275.2	275.2

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-30-1997
19:41:55

Peak Inflow = 9.00 cfs
Peak Outflow = 2.90 cfs
Peak Elevation = 100.05 ft

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:37:16
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	3	5	7	8	7	6	5	4	4
Total (cfs)	3	5	7	8	7	6	5	4	4

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	4	4	3	3	3	3	2	2	2
Total (cfs)	4	4	3	3	3	3	2	2	2

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	2	1	1	1	0
Total (cfs)	2	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:37:16
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	3
11.1	0	14.9	3
11.2	0	15.0	3
11.3	0	15.1	3
11.4	0	15.2	3
11.5	0	15.3	3
11.6	0	15.4	3
11.7	0	15.5	3
11.8	0	15.6	3
11.9	0	15.7	3
12.0	0	15.8	3
12.1	0	15.9	3
12.2	0	16.0	3
12.3	0	16.1	3
12.4	1	16.2	3
12.5	3	16.3	2
12.6	5	16.4	2
12.7	7	16.5	2
12.8	8	16.6	2
12.9	8	16.7	2
13.0	7	16.8	2
13.1	6	16.9	2
13.2	6	17.0	2
13.3	6	17.1	2
13.4	5	17.2	2
13.5	5	17.3	2
13.6	4	17.4	2
13.7	4	17.5	2
13.8	4	17.6	2
13.9	4	17.7	2
14.0	4	17.8	2
14.1	4	17.9	2
14.2	4	18.0	2
14.3	4	18.1	2
14.4	4	18.2	2
14.5	3	18.3	2
14.6	3	18.4	2
14.7	3	18.5	2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-24-1997 09:37:16
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

D.3.2 Sediment / Detention Basin #2

CSF 12/31/97
Against 8/28/97 calcs

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-23-1997 15:15:35
Watershed file: --> SB2-2 .WSD
Hydrograph file: --> SB2-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
SEDIMENT BASIN # 2
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
DA 2	1.92	79.0	0.10	0.10	3.40	1.49	.16 .10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.92 acres or 0.00300 sq.mi
Peak discharge = 2 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.10	0.10	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-23-1997 15:15:35
Watershed file: --> SB2-2 .WSD
Hydrograph file: --> SB2-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
SEDIMENT BASIN # 2
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 2	2	12.2
Composite Watershed	2	12.2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-23-1997 15:15:35
Watershed file: --> SB2-2 .WSD
Hydrograph file: --> SB2-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
SEDIMENT BASIN # 2
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 2	0	0	0	0	1	1	2	2	2
Total (cfs)	0	0	0	0	1	1	2	2	2

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 2	2	1	1	1	0	0	0	0	0
Total (cfs)	2	1	1	1	0	0	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 2	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-23-1997 15:15:35
Watershed file: --> SB2-2 .WSD
Hydrograph file: --> SB2-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
SEDIMENT BASIN # 2
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	1	15.8	0
12.1	1	15.9	0
12.2	2	16.0	0
12.3	2	16.1	0
12.4	2	16.2	0
12.5	2	16.3	0
12.6	1	16.4	0
12.7	1	16.5	0
12.8	1	16.6	0
12.9	0	16.7	0
13.0	0	16.8	0
13.1	0	16.9	0
13.2	0	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-23-1997 15:15:35
Watershed file: --> SB2-2 .WSD
Hydrograph file: --> SB2-2 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
SEDIMENT BASIN # 2
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CSF 12/30/97
RSmit 12/19/97 checked 12/28/97

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 2	2.60	81.0	0.10	0.20	3.40	1.63	.14	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.13	0.13	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 2	3	12.3
Composite Watershed	3	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 2	0	0	0	1	1	1	2	3	3
Total (cfs)	0	0	0	1	1	1	2	3	3

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 2	3	2	2	1	1	1	0	0	0
Total (cfs)	3	2	2	1	1	1	0	0	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 2	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	1	15.6	0
11.9	1	15.7	0
12.0	1	15.8	0
12.1	1	15.9	0
12.2	2	16.0	0
12.3	3	16.1	0
12.4	3	16.2	0
12.5	3	16.3	0
12.6	2	16.4	0
12.7	2	16.5	0
12.8	1	16.6	0
12.9	1	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	0	17.1	0
13.4	0	17.2	0
13.5	0	17.3	0
13.6	0	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:53:42
Watershed file: --> DA2-2 .WSD
Hydrograph file: --> DA2-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:27:57
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 2	2.60	81.0	0.10	0.10	5.20	3.16	.09	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 7 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.10	0.10	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:27:57
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 2	7	12.3
Composite Watershed	7	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:27:57
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 2	0	0	1	1	2	3	5	7	7
Total (cfs)	0	0	1	1	2	3	5	7	7

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 2	5	4	3	2	1	1	1	1	1
Total (cfs)	5	4	3	2	1	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 2	1	1	1	1	0	0	0	0	0
Total (cfs)	1	1	1	1	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:27:57
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	1	15.3	0
11.6	1	15.4	0
11.7	1	15.5	0
11.8	1	15.6	0
11.9	1	15.7	0
12.0	2	15.8	0
12.1	3	15.9	0
12.2	5	16.0	0
12.3	7	16.1	0
12.4	7	16.2	0
12.5	5	16.3	0
12.6	4	16.4	0
12.7	3	16.5	0
12.8	2	16.6	0
12.9	2	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 11:27:57
Watershed file: --> DA2-10 .WSD
Hydrograph file: --> DA2-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

CJF 12/31/97
Ajust 12/19/97
checked 12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
DA 2	2.60	81.0	0.10	0.20	6.00	3.88	.08 .10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 2.60 acres or 0.00406 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.13	0.13	0.10	0.20	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 2	8	12.4
Composite Watershed	8	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 2	0	0	1	1	2	3	5	7	8
Total (cfs)	0	0	1	1	2	3	5	7	8

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 2	7	6	4	3	2	1	1	1	1
Total (cfs)	7	6	4	3	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 2	1	1	1	1	1	0	0	0	0
Total (cfs)	1	1	1	1	1	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	1	15.5	1
11.8	1	15.6	1
11.9	1	15.7	1
12.0	2	15.8	0
12.1	3	15.9	0
12.2	5	16.0	0
12.3	7	16.1	0
12.4	8	16.2	0
12.5	7	16.3	0
12.6	6	16.4	0
12.7	4	16.5	0
12.8	3	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:56:42
Watershed file: --> DA2-25 .WSD
Hydrograph file: --> DA2-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 2
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

D.3.3 Sediment / Detention Basin #3

CSF 12/30/97
Against
12/19/97 calcs
checked 12/29/97

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	3.61	72.0	0.10	0.20	3.40	1.06	.23	.30

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 3 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 3	3	12.4
Composite Watershed	3	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 3	0	0	0	0	0	0	1	2	3
Total (cfs)	0	0	0	0	0	0	1	2	3

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 3	3	2	2	1	1	1	1	1	0
Total (cfs)	3	2	2	1	1	1	1	1	0

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 3	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 3	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	0	15.6	0
11.9	0	15.7	0
12.0	0	15.8	0
12.1	0	15.9	0
12.2	1	16.0	0
12.3	2	16.1	0
12.4	3	16.2	0
12.5	3	16.3	0
12.6	2	16.4	0
12.7	2	16.5	0
12.8	1	16.6	0
12.9	1	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	0	17.5	0
13.8	0	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:23
Watershed file: --> DA3-2 .WSD
Hydrograph file: --> DA3-2 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA #3
2 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CSF 12/31/97
Against
12/19/97 calcs
checked
12/29/97

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 3	3.61	72.0	0.10	0.20	5.20	2.35	.15	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 7 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 3	7	12.4
Composite Watershed	7	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 3	0	0	1	1	2	2	4	6	7
Total (cfs)	0	0	1	1	2	2	4	6	7

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 3	6	5	4	3	2	1	1	1	1
Total (cfs)	6	5	4	3	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 3	1	1	1	1	0	0	0	0	0
Total (cfs)	1	1	1	1	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 3	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	0	15.0	1
11.3	0	15.1	1
11.4	0	15.2	1
11.5	1	15.3	0
11.6	1	15.4	0
11.7	1	15.5	0
11.8	1	15.6	0
11.9	1	15.7	0
12.0	2	15.8	0
12.1	2	15.9	0
12.2	4	16.0	0
12.3	6	16.1	0
12.4	7	16.2	0
12.5	6	16.3	0
12.6	5	16.4	0
12.7	4	16.5	0
12.8	3	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:48:57
Watershed file: --> DA3-10 .WSD
Hydrograph file: --> DA3-10 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

CJF 12/31/97
Assist 12/18/97 calcs
checked 12/28/97

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input	Ia/p used
DA 3	3.61	72.0	0.10	0.20	6.00	2.99	.13	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 3.61 acres or 0.00564 sq.mi
Peak discharge = 9 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 3	0.15	0.15	0.10	0.20	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 3	9	12.4
Composite Watershed	9	12.4

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 3	0	1	1	1	2	3	5	8	9
Total (cfs)	0	1	1	1	2	3	5	8	9

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 3	8	6	5	3	2	1	1	1	1
Total (cfs)	8	6	5	3	2	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 3	1	1	1	1	1	0	0	0	0
Total (cfs)	1	1	1	1	1	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 3	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	1
11.1	0	14.9	1
11.2	1	15.0	1
11.3	1	15.1	1
11.4	1	15.2	1
11.5	1	15.3	1
11.6	1	15.4	1
11.7	1	15.5	1
11.8	1	15.6	1
11.9	1	15.7	1
12.0	2	15.8	0
12.1	3	15.9	0
12.2	5	16.0	0
12.3	8	16.1	0
12.4	9	16.2	0
12.5	8	16.3	0
12.6	6	16.4	0
12.7	5	16.5	0
12.8	3	16.6	0
12.9	2	16.7	0
13.0	2	16.8	0
13.1	2	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	1	17.7	0
14.0	1	17.8	0
14.1	1	17.9	0
14.2	1	18.0	0
14.3	1	18.1	0
14.4	1	18.2	0
14.5	1	18.3	0
14.6	1	18.4	0
14.7	1	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-19-1997 14:49:55
Watershed file: --> DA3-25 .WSD
Hydrograph file: --> DA3-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
DRAINAGE AREA 3
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

D.4 ELEVATION-STORAGE MATRIX

D.4.1 Sediment / Detention Basin #1

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
EXISTING DETENTION BASIN IN AREA OF PROPOSED SEDIMENT/DETENTION
BASIN # 1

CALCULATED 12-29-1997 15:56:39
DISK FILE: EX-SB1 .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
97.00	1.62	0.09	0.00	0.00	0.00
98.00	5.05	0.29	0.55	0.18	0.18
99.00	8.45	0.48	1.15	0.38	0.57
100.00	11.55	0.66	1.71	0.57	1.14
101.00	13.75	0.79	2.18	0.73	1.86

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

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT BASIN #1
REVISED ELEVATION STORAGE : SUBTRACT VOLUME OF TRAPPED SEDIMENT
AND ROUTE 2-YEAR "DURING CONSTRUCTION" STORM

CALCULATED 12-22-1997 11:34:44
DISK FILE: SB1-TEST.VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
94.10	3.36	0.19	0.00	0.00	0.00
95.00	3.83	0.22	0.62	0.19	0.19
96.00	4.36	0.25	0.70	0.23	0.42
97.00	6.80	0.39	0.95	0.32	0.74
98.00	10.11	0.58	1.45	0.48	1.22
99.00	12.55	0.72	1.95	0.65	1.87
100.00	14.98	0.86	2.37	0.79	2.66
101.00	17.08	0.98	2.76	0.92	3.58

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

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT/DETENTION BASIN #1
ON-SITE DA 1/OFF-SITE FLOW FROM RR CULVERT

CALCULATED 12-21-1997 17:23:00
DISK FILE: SB1-SUM2.VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
94.00	3.31	0.19	0.00	0.00	0.00
95.00	3.83	0.22	0.61	0.20	0.20
96.00	4.36	0.25	0.70	0.23	0.44
97.00	6.80	0.39	0.95	0.32	0.76
98.00	10.11	0.58	1.45	0.48	1.24
99.00	12.55	0.72	1.95	0.65	1.89
100.00	14.98	0.86	2.37	0.79	2.68
101.00	17.08	0.98	2.76	0.92	3.60

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

D.4.2 Sediment / Detention Basin #2

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT BASIN #2
REVISED ELEVATION STORAGE : SUBTRACT THE VOLUME OF TRAPPED SEDIMENT FROM THE ORIGINAL BASIN AND ROUTE THE 2-YEAR STORM

CALCULATED 12-23-1997 17:00:46
DISK FILE: SB2-TEST.VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
104.10	0.89	0.05	0.00	0.00	0.00
105.00	1.05	0.06	0.17	0.05	0.05
106.00	1.39	0.08	0.21	0.07	0.12
107.00	1.74	0.10	0.27	0.09	0.21
108.00	1.92	0.11	0.31	0.10	0.31
109.00	2.44	0.14	0.37	0.12	0.44
110.00	2.79	0.16	0.45	0.15	0.59

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

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT BASIN #2

CALCULATED 12-27-1997 17:41:21
DISK FILE: SB2 .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
104.00	0.87	0.05	0.00	0.00	0.00
105.00	1.05	0.06	0.17	0.06	0.06
106.00	1.39	0.08	0.21	0.07	0.12
107.00	1.74	0.10	0.27	0.09	0.21
108.00	1.92	0.11	0.31	0.10	0.32
109.00	2.44	0.14	0.37	0.12	0.44
110.00	2.79	0.16	0.45	0.15	0.59

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

D.4.3 Sediment / Detention Basin #3

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT BASIN # 3

CALCULATED 11-01-1997 16:29:46
DISK FILE: E-S5-SB3.VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
98.00	1.10	0.06	0.00	0.00	0.00
99.00	1.53	0.09	0.23	0.08	0.08
100.00	1.92	0.11	0.30	0.10	0.17
101.00	2.39	0.14	0.37	0.12	0.30
102.00	2.85	0.16	0.45	0.15	0.45
103.00	3.39	0.19	0.54	0.18	0.63
104.00	3.98	0.23	0.63	0.21	0.84

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

D.5 OUTLET STRUCTURE DESIGN

D.5.1 Sediment / Detention Basin #1

Outlet Structure File: EX-SB1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
EXISTING DETENTION BASIN IN PROPOSED AREA FOR SEDIMENT/DETENTION BASIN #1

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
97.00	0.0	
97.10	0.0	
97.20	0.0	
97.30	0.0	
97.40	0.0	
97.50	0.0	
97.60	0.0	
97.70	0.0	
97.80	0.0	
97.90	0.0	
98.00	0.0	
98.10	0.0	
98.20	0.0	
98.30	0.0	
98.40	0.0	
98.50	0.0	
98.60	0.0	
98.70	0.0	
98.80	0.0	
98.90	0.0	
99.00	0.0	
99.10	0.0	
99.20	0.0	
99.30	0.0	
99.40	0.0	
99.50	0.0	
99.60	0.0	
99.70	0.0	
99.80	0.0	
99.90	0.0	
100.00	0.0	1
100.10	5.8	1
100.20	16.6	1
100.30	30.9	1
100.40	48.3	1
100.50	68.4	1
100.60	91.2	1
100.70	116.5	1
100.80	144.3	1
100.90	174.6	1
101.00	0.0	

Outlet Structure File: EX-SB1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
EXISTING DETENTION BASIN IN PROPOSED AREA FOR SEDIMENT/DETENTION BASIN #1

****

Outlet Structure File: EX-SB1 .STR
Planimeter Input File: EX-SB1 .VOL
Rating Table Output File: EX-SB1 .PND

Min. Elev.(ft) = 97 Max. Elev.(ft) = 101 Incr.(ft) = .1

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-XY	1		->	1

Outflow rating table summary was stored in file:
EX-SB1 .PND

Outlet Structure File: EX-SB1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
EXISTING DETENTION BASIN IN PROPOSED AREA FOR SEDIMENT/DETENTION BASIN #1

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-XY
Weir - Defined by X, Y Coordinates
E1 (ft) =100 E2 (ft) =101

X dist.(ft)	Y elev.(ft)
0	101
4	100
62	100
83	101

Outlet Structure File: EX-SB1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
EXISTING DETENTION BASIN IN PROPOSED AREA FOR SEDIMENT/DETENTION BASIN #1

****

Outflow Rating Table for Structure #1
WEIR-XY Weir - Defined by X, Y Coordinates

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages	
97.00	0.0	E < Y min= 100	
97.10	0.0	E < E1=100	
97.20	0.0	E < E1=100	
97.30	0.0	E < E1=100	
97.40	0.0	E < E1=100	
97.50	0.0	E < E1=100	
97.60	0.0	E < E1=100	
97.70	0.0	E < E1=100	
97.80	0.0	E < E1=100	
97.90	0.0	E < E1=100	
98.00	0.0	E < E1=100	
98.10	0.0	E < E1=100	
98.20	0.0	E < E1=100	
98.30	0.0	E < E1=100	
98.40	0.0	E < E1=100	
98.50	0.0	E < E1=100	
98.60	0.0	E < E1=100	
98.70	0.0	E < E1=100	
98.80	0.0	E < E1=100	
98.90	0.0	E < E1=100	
99.00	0.0	E < E1=100	
99.10	0.0	E < E1=100	
99.20	0.0	E < E1=100	
99.30	0.0	E < E1=100	
99.40	0.0	E < E1=100	
99.50	0.0	E < E1=100	
99.60	0.0	E < E1=100	
99.70	0.0	E < E1=100	
99.80	0.0	E < E1=100	
99.90	0.0	E < E1=100	
100.00	0.0	W(ft)=58.0	Max. D(ft)=0.0
100.10	5.8	W(ft)=60.5	Max. D(ft)=.1
100.20	16.6	W(ft)=63.0	Max. D(ft)=.2
100.30	30.9	W(ft)=65.5	Max. D(ft)=.3
100.40	48.3	W(ft)=68.0	Max. D(ft)=.4
100.50	68.4	W(ft)=70.5	Max. D(ft)=.5
100.60	91.2	W(ft)=73.0	Max. D(ft)=.6

Outlet Structure File: EX-SB1 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

>>>>> CONTINUED from previous page <<<<<

Outflow Rating Table for Structure #1
WEIR-XY Weir - Defined by X, Y Coordinates

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages	
100.70	116.5	W(ft)=75.5	Max. D(ft)=.7
100.80	144.3	W(ft)=78.0	Max. D(ft)=.8
100.90	174.6	W(ft)=80.500	Max. D(ft)=.9
101.00	0.0	E = or > E2=101	

Outlet Structure File: SB1-TEST.STR ✓

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
REVISED ELEVATION-STORAGE : SUBTRACT VOLUME OF TRAPPED SEDIMENT
AND ROUTE 2-YEAR "DURING CONSTRUCTION" STORM
****

CSF 12/30/97

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

Elevation (ft)	Q (cfs)	Contributing Structures
94.10	0.0	
94.30	0.0	
94.50	0.0	
94.70	0.0	
94.90	0.0	
95.10	0.0	
95.30	0.0	
95.50	0.0	
95.70	0.0	
95.90	0.0	
96.10	0.0	
96.30	0.0	
96.50	0.0	
96.70	0.0	
96.90	0.0	
97.10	0.0	
97.30	0.0	
97.50	0.0	
97.70	0.0	
97.90	0.0	
98.10	0.0	
98.30	0.0	
98.50	0.0	
98.70	0.0	
98.90	0.0	
99.10	0.0	
99.30	0.0	
99.50	0.0	
99.70	0.0	
99.90	0.0	
100.10	5.8	1 ✓ start point
100.30	30.9	1
100.50	68.4	1
100.70	116.5	1
100.90	174.6	1
101.00	0.0	

Outlet Structure File: SB1-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
REVISED ELEVATION-STORAGE : SUBTRACT VOLUME OF TRAPPED SEDIMENT
AND ROUTE 2-YEAR "DURING CONSTRUCTION" STORM
****

Outlet Structure File: SB1-TEST.STR
Planimeter Input File: SB1-TEST.VOL
Rating Table Output File: SB1-TEST.PND

Min. Elev.(ft) = 94.1 Max. Elev.(ft) = 101 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-XY	1		->	1

Outflow rating table summary was stored in file:
SB1-TEST.PND

Outlet Structure File: SB1-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
REVISED ELEVATION-STORAGE : SUBTRACT VOLUME OF TRAPPED SEDIMENT
AND ROUTE 2-YEAR "DURING CONSTRUCTION" STORM
****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-XY
Weir - Defined by X, Y Coordinates
E1 (ft) =100 E2 (ft) =101

X dist.(ft)	Y elev.(ft)
0	101
4	100
62	100
83	101

Outlet Structure File: SB1-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
REVISED ELEVATION-STORAGE : SUBTRACT VOLUME OF TRAPPED SEDIMENT
AND ROUTE 2-YEAR "DURING CONSTRUCTION" STORM
****

Outflow Rating Table for Structure #1
WEIR-XY Weir - Defined by X, Y Coordinates

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages	
94.10	0.0	E < Y min= 100	
94.30	0.0	E < E1=100	
94.50	0.0	E < E1=100	
94.70	0.0	E < E1=100	
94.90	0.0	E < E1=100	
95.10	0.0	E < E1=100	
95.30	0.0	E < E1=100	
95.50	0.0	E < E1=100	
95.70	0.0	E < E1=100	
95.90	0.0	E < E1=100	
96.10	0.0	E < E1=100	
96.30	0.0	E < E1=100	
96.50	0.0	E < E1=100	
96.70	0.0	E < E1=100	
96.90	0.0	E < E1=100	
97.10	0.0	E < E1=100	
97.30	0.0	E < E1=100	
97.50	0.0	E < E1=100	
97.70	0.0	E < E1=100	
97.90	0.0	E < E1=100	
98.10	0.0	E < E1=100	
98.30	0.0	E < E1=100	
98.50	0.0	E < E1=100	
98.70	0.0	E < E1=100	
98.90	0.0	E < E1=100	
99.10	0.0	E < E1=100	
99.30	0.0	E < E1=100	
99.50	0.0	E < E1=100	
99.70	0.0	E < E1=100	
99.90	0.0	E < E1=100	
100.10	5.8	W(ft)=60.5	Max. D(ft)=.1
100.30	30.9	W(ft)=65.5	Max. D(ft)=.3
100.50	68.4	W(ft)=70.5	Max. D(ft)=.5
100.70	116.5	W(ft)=75.5	Max. D(ft)=.7
100.90	174.6	W(ft)=80.500	Max. D(ft)=.9
101.00	0.0	E = or > E2=101	

Outlet Structure File: SB1-SUM2.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE -SITE 5
SEDIMENT/DETENTION BASIN 1

****

CSF 12/30/97

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

Elevation (ft)	Q (cfs)	Contributing Structures
94.00	0.0	
94.20	0.0	
94.40	0.0	
94.60	0.0	
94.80	0.0	
95.00	0.0	
95.20	0.0	
95.40	0.0	
95.60	0.0	
95.80	0.0	
96.00	0.0	
96.20	0.0	
96.40	0.0	
96.60	0.0	
96.80	0.0	
97.00	0.0	
97.20	0.0	
97.40	0.0	
97.60	0.0	
97.80	0.0	
98.00	0.0	
98.20	0.0	
98.40	0.0	
98.60	0.0	
98.80	0.0	
99.00	0.0	
99.20	0.0	
99.40	0.0	
99.60	0.0	
99.80	0.0	
100.00	0.0	1
100.20	16.6	1
100.40	48.3	1
100.60	91.2	1
100.80	144.3	1
101.00	0.0	

start point

Outlet Structure File: SB1-SUM2.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE -SITE 5
SEDIMENT/DETENTION BASIN 1

****

Outlet Structure File: SB1-SUM2.STR
Planimeter Input File: SB1-SUM2.VOL
Rating Table Output File: SB1-SUM2.PND

Min. Elev.(ft) = 94 Max. Elev.(ft) = 101 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-XY	1		->	1

Outflow rating table summary was stored in file:
SB1-SUM2.PND

Outlet Structure File: SB1-SUM2.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE -SITE 5
SEDIMENT/DETENTION BASIN 1

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-XY
Weir - Defined by X, Y Coordinates
E1 (ft) =100 E2 (ft) =101

X dist.(ft)	Y elev.(ft)
0	101
4	100
62	100
83	101

Outlet Structure File: SB1-SUM2.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE -SITE 5
SEDIMENT/DETENTION BASIN 1

****

Outflow Rating Table for Structure #1
WEIR-XY Weir - Defined by X, Y Coordinates

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages	
94.00	0.0	E < Y min= 100	
94.20	0.0	E < E1=100	
94.40	0.0	E < E1=100	
94.60	0.0	E < E1=100	
94.80	0.0	E < E1=100	
95.00	0.0	E < E1=100	
95.20	0.0	E < E1=100	
95.40	0.0	E < E1=100	
95.60	0.0	E < E1=100	
95.80	0.0	E < E1=100	
96.00	0.0	E < E1=100	
96.20	0.0	E < E1=100	
96.40	0.0	E < E1=100	
96.60	0.0	E < E1=100	
96.80	0.0	E < E1=100	
97.00	0.0	E < E1=100	
97.20	0.0	E < E1=100	
97.40	0.0	E < E1=100	
97.60	0.0	E < E1=100	
97.80	0.0	E < E1=100	
98.00	0.0	E < E1=100	
98.20	0.0	E < E1=100	
98.40	0.0	E < E1=100	
98.60	0.0	E < E1=100	
98.80	0.0	E < E1=100	
99.00	0.0	E < E1=100	
99.20	0.0	E < E1=100	
99.40	0.0	E < E1=100	
99.60	0.0	E < E1=100	
99.80	0.0	E < E1=100	
100.00	0.0	W(ft)=58.0	Max. D(ft)=0.0
100.20	16.6	W(ft)=63.0	Max. D(ft)=.2
100.40	48.3	W(ft)=68.0	Max. D(ft)=.4
100.60	91.2	W(ft)=73.0	Max. D(ft)=.6
100.80	144.3	W(ft)=78.0	Max. D(ft)=.8
101.00	0.0	E = or > E2=101	

D.5.2 Sediment / Detention Basin #2

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NWSE - EARLE	JOB NUMBER
SUBJECT SEDIMENT / DETENTION BASIN #2 OUTFALL CULVERT - SITE 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/2/98		12/29/97

OBJECTIVE : TO PROVE THAT THE OUTFALL CULVERT FOR SEDIMENT/DETENTION BASIN #2 CAN CONVEY THE BASIN OUTFLOW.

APPROACH : USE THE FLOWMASTER PROGRAM BY HAESTAD'S METHODS TO SOLVE FOR THE DEPTH OF FLOW IN THE CULVERT.

THE INPUT QUANTITIES ARE SUMMARIZED BELOW:

Manning's n = 0.012
Culvert Slope = 0.0125 FT/FT
Culvert Diameter = 12"
Q OUTFLOW = 1.68 CFS (Q PEAK 25-YR)

CONCLUSIONS : BASED ON THE OUTPUT (PAGE 2 OF 2), THE CALCULATED DEPTH = 0.43 FT WHICH IS LESS THAN THE DIAMETER OF THE OUTFALL CULVERT FOR SEDIMENT/DETENTION BASIN #2. THEREFORE, THE OUTFALL CULVERT CAN CONVEY THE BASIN OUTFLOW.

CHK'D DIW
1/2/98

EARLE - SITE 5: DB #2 OUTFALL CULVERT
Worksheet for Circular Channel

Project Description	
Project File	untitled
Worksheet	5-db2
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.012	
Channel Slope	0.012500	ft/ft
Diameter	1.00	ft
Discharge	1.68	ft^3/s

Results		
Depth	0.43	ft
Flow Area	0.33	ft^2
Wetted Perimeter	1.44	ft
Top Width	0.99	ft
Critical Depth	0.55	ft
Percent Full	43.32	%
Critical Slope	0.005493	ft/ft
Velocity	5.15	ft/s
Velocity Head	0.41	ft
Specific Energy	0.85	ft
Froude Number	1.58	
Maximum Discharge	4.64	ft^3/s
Full Flow Capacity	4.32	ft^3/s
Full Flow Slope	0.001895	ft/ft
Flow is supercritical.		

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

CJF 12/3/87

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

Elevation (ft)	Q (cfs)	Contributing Structures
104.10	0.0	
104.30	0.0	
104.50	0.0	
104.70	0.0	
104.90	0.0	
105.10	0.0	
105.30	0.0	
105.50	0.0	1
105.70	0.2	1
105.90	0.3	1
106.10	0.3	1
106.30	0.4	1
106.50	0.4	1
106.70	0.5	1
106.90	0.5	1
107.10	0.5	1
107.30	0.6	1
107.50	0.6	1
107.70	0.6	1
107.90	0.7	1
108.10	0.7	2 +1
108.30	1.0	2 +1
108.50	1.4	2 +1
108.70	1.9	2 +1
108.90	2.4	2 +1
109.10	3.2	3 +2 +1
109.30	4.6	3 +2 +1
109.50	6.4	3 +2 +1
109.70	8.5	3 +2 +1
109.90	10.9	3 +2 +1
110.00	0.0	

start

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

Outlet Structure File: SB2-TEST.STR
Planimeter Input File: SB2-TEST.VOL
Rating Table Output File: SB2-TEST.PND

Min. Elev.(ft) = 104.1 Max. Elev.(ft) = 110 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	3		->	3
STAND PIPE	2		->	2
ORIFICE	1		->	1

Outflow rating table summary was stored in file:
SB2-TEST.PND

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

CDF
12/1/97

>>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	109
E2 elev.(ft)?	110
Weir coefficient?	0.6
Weir elev.(ft)?	109
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE
Stand Pipe with weir or orifice flow

CLF 12/31/97

E1 elev.(ft)?	108
E2 elev.(ft)?	110
Crest elev.(ft)?	108
Diameter (ft)?	1
Weir coefficient?	0.6
Orifice coefficient?	0.73
Start transition elev.(ft) @ ?	
Transition height (ft)?	

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	105.5
E2 elev.(ft)?	110
Orifice coeff.?	0.61
Invert elev.(ft)?	105.5
Datum elev.(ft) ?	105.5
Orifice area (sq ft)?	0.0873

CBF 12/22/97

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
104.10	0.0	E < Inv.El.= 109
104.30	0.0	E < Inv.El.= 109
104.50	0.0	E < Inv.El.= 109
104.70	0.0	E < Inv.El.= 109
104.90	0.0	E < Inv.El.= 109
105.10	0.0	E < Inv.El.= 109
105.30	0.0	E < Inv.El.= 109
105.50	0.0	E < Inv.El.= 109
105.70	0.0	E < Inv.El.= 109
105.90	0.0	E < Inv.El.= 109
106.10	0.0	E < Inv.El.= 109
106.30	0.0	E < Inv.El.= 109
106.50	0.0	E < Inv.El.= 109
106.70	0.0	E < Inv.El.= 109
106.90	0.0	E < Inv.El.= 109
107.10	0.0	E < Inv.El.= 109
107.30	0.0	E < Inv.El.= 109
107.50	0.0	E < Inv.El.= 109
107.70	0.0	E < Inv.El.= 109
107.90	0.0	E < Inv.El.= 109
108.10	0.0	E < Inv.El.= 109
108.30	0.0	E < Inv.El.= 109
108.50	0.0	E < Inv.El.= 109
108.70	0.0	E < Inv.El.= 109
108.90	0.0	E < Inv.El.= 109
109.10	0.2	H =.1
109.30	1.0	H =.3
109.50	2.1	H =.5
109.70	3.5	H =.7
109.90	5.0	H =.9
110.00	0.0	E = or > E2=110

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (109 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
104.10	0.0	E < Inv.El.= 108
104.30	0.0	E < El=108
104.50	0.0	E < El=108
104.70	0.0	E < El=108
104.90	0.0	E < El=108
105.10	0.0	E < El=108
105.30	0.0	E < El=108
105.50	0.0	E < El=108
105.70	0.0	E < El=108
105.90	0.0	E < El=108
106.10	0.0	E < El=108
106.30	0.0	E < El=108
106.50	0.0	E < El=108
106.70	0.0	E < El=108
106.90	0.0	E < El=108
107.10	0.0	E < El=108
107.30	0.0	E < El=108
107.50	0.0	E < El=108
107.70	0.0	E < El=108
107.90	0.0	E < El=108
108.10	0.1	Weir: H =.1
108.30	0.3	Weir: H =.3
108.50	0.7	Weir: H =.5
108.70	1.1	Weir: H =.7
108.90	1.6	Weir: H =.9
109.10	2.2	Weir: H =1.1
109.30	2.8	Weir: H =1.3
109.50	3.5	Weir: H =1.5
109.70	4.2	Weir: H =1.7
109.90	4.9	Weir: H =1.9
110.00	0.0	E = or > E2=110

Weir Cw = .6 Weir length = 3.141593 ft
Orifice Co = .73 Orifice area = .7853982 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
No transition used, transition height = 0.0
Weir equation = Orifice equation @ elev.= 110.4409 ft

Outlet Structure File: SB2-TEST.STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 WITH REVISED ELEVATION-STORAGE TO ACCOUNT FOR THE TRAPPED SEDIMENT

****

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
104.10	0.0	E < E1=105.5
104.30	0.0	E < E1=105.5
104.50	0.0	E < E1=105.5
104.70	0.0	E < E1=105.5
104.90	0.0	E < E1=105.5
105.10	0.0	E < E1=105.5
105.30	0.0	E < E1=105.5
105.50	0.0	H =0.0
105.70	0.2	H =.2
105.90	0.3	H =.4
106.10	0.3	H =.6
106.30	0.4	H =.8
106.50	0.4	H =1.0
106.70	0.5	H =1.2
106.90	0.5	H =1.4
107.10	0.5	H =1.6
107.30	0.6	H =1.8
107.50	0.6	H =2.0
107.70	0.6	H =2.2
107.90	0.7	H =2.4
108.10	0.7	H =2.6
108.30	0.7	H =2.8
108.50	0.7	H =3.0
108.70	0.8	H =3.2
108.90	0.8	H =3.4
109.10	0.8	H =3.6
109.30	0.8	H =3.8
109.50	0.9	H =4.0
109.70	0.9	H =4.2
109.90	0.9	H =4.4
110.00	0.0	E = or > E2=110

C = .61 A = .0873 sq.ft.
H (ft) = Table elev. - Datum elev. (105.5 ft)
Q (cfs) = C * A * sqr(2g * H)

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

COF
12/3/97

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

Elevation (ft)	Q (cfs)	Contributing Structures
104.00	0.0	
105.00	0.0	
105.50	0.0	1 ✓
106.00	0.3	1
107.00	0.5	1
108.00	0.7	2 +1 ✓
109.00	2.7	3 +2 +1 ✓
110.00	0.0	

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

Outlet Structure File: SB2 .STR
Planimeter Input File: SB2 .VOL
Rating Table Output File: SB2 .PND

Min. Elev.(ft) = 104 Max. Elev.(ft) = 110 Incr.(ft) = 1

Additional elevations (ft) to be included in table:
* *
105.5

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	3		->	3
STAND PIPE	2		->	2
ORIFICE	1		->	1

Outflow rating table summary was stored in file:
SB2 .PND

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

>>>>>> Structure No. 3 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	109.0
E2 elev.(ft)?	110.0
Weir coefficient?	0.6
Weir elev.(ft)?	109.0
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

>>>>>> Structure No. 2 <<<<<<
(Input Data)

STAND PIPE
Stand Pipe with weir or orifice flow

E1 elev.(ft)?	108.0
E2 elev.(ft)?	110.0
Crest elev.(ft)?	108.0
Diameter (ft)?	1
Weir coefficient?	0.6
Orifice coefficient?	0.73
Start transition elev.(ft) @ ?	
Transition height (ft)?	1.0

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

ORIFICE
Orifice - Based on Area and Datum Elevation

E1 elev.(ft)?	105.5
E2 elev.(ft)?	110.0
Orifice coeff.?	0.61
Invert elev.(ft)?	105.5
Datum elev.(ft) ?	105.5
Orifice area (sq ft)?	.0873

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

Outflow Rating Table for Structure #3
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
104.00	0.0	E < Inv.El.= 109
105.00	0.0	E < Inv.El.= 109
105.50	0.0	E < Inv.El.= 109
106.00	0.0	E < Inv.El.= 109
107.00	0.0	E < Inv.El.= 109
108.00	0.0	E < Inv.El.= 109
109.00	0.0	H =0.0
110.00	0.0	E = or > E2=110.0

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (109 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

Outflow Rating Table for Structure #2
STAND PIPE Stand Pipe with weir or orifice flow

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
104.00	0.0	E < Inv.El.= 108
105.00	0.0	E < El=108.0
105.50	0.0	E < El=108.0
106.00	0.0	E < El=108.0
107.00	0.0	E < El=108.0
108.00	0.0	Weir: H =0.0
109.00	1.9	Weir: H =1.0
110.00	0.0	E = or > E2=110.0

Weir Cw = .6 Weir length = 3.141593 ft
Orifice Co = .73 Orifice area = .7853982 sq.ft.
Q (cfs) = (Cw * L * H**1.5) or (Co * A * sqr(2*g*H))
Transition interpolated between elev. 109.9409 and 110.9409 ft
Weir equation = Orifice equation @ elev.= 110.4409 ft

Outlet Structure File: SB2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 2

****

Outflow Rating Table for Structure #1
ORIFICE Orifice - Based on Area and Datum Elevation

Elevation (ft)	Q (cfs)	Computation Messages
104.00	0.0	E < E1=105.5
105.00	0.0	E < E1=105.5
105.50	0.0	H =0.0
106.00	0.3	H =.5
107.00	0.5	H =1.5
108.00	0.7	H =2.5
109.00	0.8	H =3.5
110.00	0.0	E = or > E2=110.0

C = .61 A = .0873 sq.ft.
H (ft) = Table elev. - Datum elev. (105.5 ft)
Q (cfs) = C * A * sqr(2g * H)

D.5.3 Sediment / Detention Basin #3

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
ADJUSTED SEDIMENT BASIN # 3

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
98.00	0.0	
98.25	0.0	
98.50	0.0	
98.75	0.0	
99.00	0.0	
99.25	0.0	
99.50	0.0	
99.75	0.0	
100.00	0.0	
100.25	0.0	
100.50	0.0	
100.75	0.0	
101.00	0.0	
101.25	0.0	
101.50	0.0	
101.75	0.0	
102.00	0.0	
102.25	0.0	
102.50	0.0	
102.75	0.0	
103.00	0.0	1
103.25	0.7	1
103.50	2.1	1
103.75	3.8	1
104.00	0.0	

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
ADJUSTED SEDIMENT BASIN # 3

****

Outlet Structure File: SB3 .STR
Planimeter Input File: E-S5-SB3.VOL
Rating Table Output File: SB3 .PND

Min. Elev.(ft) = 98 Max. Elev.(ft) = 104 Incr.(ft) = .25

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	1		->	1

Outflow rating table summary was stored in file:
SB3 .PND

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 3

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	103.0
E2 elev.(ft)?	104.0
Weir coefficient?	0.6
Weir elev.(ft)?	103.0
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
ADJUSTED SEDIMENT BASIN # 3

****

Outflow Rating Table for Structure #1
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
98.00	0.0	E < Inv.El.= 103
98.25	0.0	E < Inv.El.= 103
98.50	0.0	E < Inv.El.= 103
98.75	0.0	E < Inv.El.= 103
99.00	0.0	E < Inv.El.= 103
99.25	0.0	E < Inv.El.= 103
99.50	0.0	E < Inv.El.= 103
99.75	0.0	E < Inv.El.= 103
100.00	0.0	E < Inv.El.= 103
100.25	0.0	E < Inv.El.= 103
100.50	0.0	E < Inv.El.= 103
100.75	0.0	E < Inv.El.= 103
101.00	0.0	E < Inv.El.= 103
101.25	0.0	E < Inv.El.= 103
101.50	0.0	E < Inv.El.= 103
101.75	0.0	E < Inv.El.= 103
102.00	0.0	E < Inv.El.= 103
102.25	0.0	E < Inv.El.= 103
102.50	0.0	E < Inv.El.= 103
102.75	0.0	E < Inv.El.= 103
103.00	0.0	H =0.0
103.25	0.7	H =.25
103.50	2.1	H =.5
103.75	3.8	H =.750
104.00	0.0	E = or > E2=104.0

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (103 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 3

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
98.00	0.0	
98.25	0.0	
98.50	0.0	
98.75	0.0	
99.00	0.0	
99.25	0.0	
99.50	0.0	
99.75	0.0	
100.00	0.0	
100.25	0.0	
100.50	0.0	
100.75	0.0	
101.00	0.0	
101.25	0.0	
101.50	0.0	
101.75	0.0	
102.00	0.0	
102.25	0.0	
102.50	0.0	
102.75	0.0	
103.00	0.0	1
103.25	0.7	1
103.50	2.1	1
103.75	3.8	1
104.00	0.0	

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 3

****

Outlet Structure File: SB3 .STR
Planimeter Input File: E-S5-SB3.VOL
Rating Table Output File: SB3 .PND

Min. Elev.(ft) = 98 Max. Elev.(ft) = 104 Incr.(ft) = .25

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	1		->	1

Outflow rating table summary was stored in file:
SB3 .PND

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 3

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	103.0
E2 elev.(ft)?	104.0
Weir coefficient?	0.6
Weir elev.(ft)?	103.0
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB3 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN # 3

****

Outflow Rating Table for Structure #1
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
98.00	0.0	E < Inv.El.= 103
98.25	0.0	E < Inv.El.= 103
98.50	0.0	E < Inv.El.= 103
98.75	0.0	E < Inv.El.= 103
99.00	0.0	E < Inv.El.= 103
99.25	0.0	E < Inv.El.= 103
99.50	0.0	E < Inv.El.= 103
99.75	0.0	E < Inv.El.= 103
100.00	0.0	E < Inv.El.= 103
100.25	0.0	E < Inv.El.= 103
100.50	0.0	E < Inv.El.= 103
100.75	0.0	E < Inv.El.= 103
101.00	0.0	E < Inv.El.= 103
101.25	0.0	E < Inv.El.= 103
101.50	0.0	E < Inv.El.= 103
101.75	0.0	E < Inv.El.= 103
102.00	0.0	E < Inv.El.= 103
102.25	0.0	E < Inv.El.= 103
102.50	0.0	E < Inv.El.= 103
102.75	0.0	E < Inv.El.= 103
103.00	0.0	H =0.0
103.25	0.7	H =.25
103.50	2.1	H =.5
103.75	3.8	H =.750
104.00	0.0	E = or > E2=104.0

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (103 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

D.6 HYDROGRAPH ROUTINGS

D.6.1 Sediment / Detention Basin #1

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*********************************************
*                                           *
*                EARLE - SITE 5             *
*   PRE-DEVELOPMENT CONDITIONS : 2 YEAR STORM *
*   EXISTING DETENTION BASIN IN THE PROPOSED  *
*     AREA FOR SEDIMENT/DETENTION BASIN #1    *
*                                           *
*********************************************
```

Inflow Hydrograph: EX-SUM2 .HYD
Rating Table file: EX-SB1 .PND

----INITIAL CONDITIONS----
Elevation = 97.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
97.00	0.0	0.000
97.10	0.0	0.010
97.20	0.0	0.022
97.30	0.0	0.035
97.40	0.0	0.050
97.50	0.0	0.067
97.60	0.0	0.085
97.70	0.0	0.106
97.80	0.0	0.129
97.90	0.0	0.155
98.00	0.0	0.182
98.10	0.0	0.212
98.20	0.0	0.244
98.30	0.0	0.277
98.40	0.0	0.312
98.50	0.0	0.350
98.60	0.0	0.389
98.70	0.0	0.430
98.80	0.0	0.473
98.90	0.0	0.518
99.00	0.0	0.566
99.10	0.0	0.615
99.20	0.0	0.666
99.30	0.0	0.719
99.40	0.0	0.773
99.50	0.0	0.829
99.60	0.0	0.887
99.70	0.0	0.947
99.80	0.0	1.008
99.90	0.0	1.072
100.00	0.0	1.137

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.4	2.4
5.2	5.2
8.4	8.4
12.0	12.0
16.1	16.1
20.6	20.6
25.7	25.7
31.3	31.3
37.4	37.4
44.1	44.1
51.3	51.3
59.0	59.0
67.1	67.1
75.6	75.6
84.6	84.6
94.1	94.1
104.0	104.0
114.4	114.4
125.4	125.4
136.9	136.9
148.8	148.8
161.1	161.1
173.9	173.9
187.1	187.1
200.6	200.6
214.7	214.7
229.1	229.1
244.0	244.0
259.4	259.4
275.2	275.2

DISK FILES: EX-SUM2 .HYD ; EX-SB1 .PND

CJF 12/31/97

GIVEN POND DATA			INTERMEDIATE ROUTING COMPUTATIONS	
ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)	2S/t (cfs)	2S/t + O (cfs)
100.10	5.8	1.204	291.4	297.2
100.20	16.6	1.272	307.9	324.5
100.30	30.9	1.342	324.6	355.5
100.40	48.3	1.412	341.7	390.0
100.50	68.4	1.484	359.1	427.5
100.60	91.2	1.557	376.8	468.0
100.70	116.5	1.631	394.8	511.3
100.80	144.3	1.707	413.1	557.4
100.90	174.6	1.784	431.7	606.3

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 19:46:37

CSF 12/31/97

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	97.00
11.100	0.00	0.0	0.0	0.0	0.00	97.00
11.200	0.00	0.0	0.0	0.0	0.00	97.00
11.300	0.00	0.0	0.0	0.0	0.00	97.00
11.400	0.00	0.0	0.0	0.0	0.00	97.00
11.500	0.00	0.0	0.0	0.0	0.00	97.00
11.600	0.00	0.0	0.0	0.0	0.00	97.00
11.700	0.00	0.0	0.0	0.0	0.00	97.00
11.800	0.00	0.0	0.0	0.0	0.00	97.00
11.900	0.00	0.0	0.0	0.0	0.00	97.00
12.000	0.00	0.0	0.0	0.0	0.00	97.00
12.100	0.00	0.0	0.0	0.0	0.00	97.00
12.200	0.00	0.0	0.0	0.0	0.00	97.00
12.300	0.00	0.0	0.0	0.0	0.00	97.00
12.400	0.00	0.0	0.0	0.0	0.00	97.00
12.500	0.00	0.0	0.0	0.0	0.00	97.00
12.600	1.00	1.0	1.0	1.0	0.00	97.04
12.700	1.00	2.0	3.0	3.0	0.00	97.12
12.800	1.00	2.0	5.0	5.0	0.00	97.19
12.900	1.00	2.0	7.0	7.0	0.00	97.26
13.000	1.00	2.0	9.0	9.0	0.00	97.32
13.100	1.00	2.0	11.0	11.0	0.00	97.37
13.200	1.00	2.0	13.0	13.0	0.00	97.42
13.300	1.00	2.0	15.0	15.0	0.00	97.47
13.400	1.00	2.0	17.0	17.0	0.00	97.52
13.500	1.00	2.0	19.0	19.0	0.00	97.56
13.600	0.00	1.0	20.0	20.0	0.00	97.59
13.700	0.00	0.0	20.0	20.0	0.00	97.59
13.800	0.00	0.0	20.0	20.0	0.00	97.59
13.900	0.00	0.0	20.0	20.0	0.00	97.59
14.000	0.00	0.0	20.0	20.0	0.00	97.59
14.100	0.00	0.0	20.0	20.0	0.00	97.59
14.200	0.00	0.0	20.0	20.0	0.00	97.59
14.300	0.00	0.0	20.0	20.0	0.00	97.59
14.400	0.00	0.0	20.0	20.0	0.00	97.59
14.500	0.00	0.0	20.0	20.0	0.00	97.59
14.600	0.00	0.0	20.0	20.0	0.00	97.59
14.700	0.00	0.0	20.0	20.0	0.00	97.59
14.800	0.00	0.0	20.0	20.0	0.00	97.59
14.900	0.00	0.0	20.0	20.0	0.00	97.59
15.000	0.00	0.0	20.0	20.0	0.00	97.59
15.100	0.00	0.0	20.0	20.0	0.00	97.59
15.200	0.00	0.0	20.0	20.0	0.00	97.59
15.300	0.00	0.0	20.0	20.0	0.00	97.59
15.400	0.00	0.0	20.0	20.0	0.00	97.59

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	20.0	20.0	0.00	97.59
15.600	0.00	0.0	20.0	20.0	0.00	97.59
15.700	0.00	0.0	20.0	20.0	0.00	97.59
15.800	0.00	0.0	20.0	20.0	0.00	97.59
15.900	0.00	0.0	20.0	20.0	0.00	97.59
16.000	0.00	0.0	20.0	20.0	0.00	97.59
16.100	0.00	0.0	20.0	20.0	0.00	97.59
16.200	0.00	0.0	20.0	20.0	0.00	97.59
16.300	0.00	0.0	20.0	20.0	0.00	97.59
16.400	0.00	0.0	20.0	20.0	0.00	97.59
16.500	0.00	0.0	20.0	20.0	0.00	97.59
16.600	0.00	0.0	20.0	20.0	0.00	97.59
16.700	0.00	0.0	20.0	20.0	0.00	97.59
16.800	0.00	0.0	20.0	20.0	0.00	97.59
16.900	0.00	0.0	20.0	20.0	0.00	97.59
17.000	0.00	0.0	20.0	20.0	0.00	97.59
17.100	0.00	0.0	20.0	20.0	0.00	97.59
17.200	0.00	0.0	20.0	20.0	0.00	97.59
17.300	0.00	0.0	20.0	20.0	0.00	97.59
17.400	0.00	0.0	20.0	20.0	0.00	97.59
17.500	0.00	0.0	20.0	20.0	0.00	97.59
17.600	0.00	0.0	20.0	20.0	0.00	97.59
17.700	0.00	0.0	20.0	20.0	0.00	97.59
17.800	0.00	0.0	20.0	20.0	0.00	97.59
17.900	0.00	0.0	20.0	20.0	0.00	97.59
18.000	0.00	0.0	20.0	20.0	0.00	97.59
18.100	0.00	0.0	20.0	20.0	0.00	97.59
18.200	0.00	0.0	20.0	20.0	0.00	97.59
18.300	0.00	0.0	20.0	20.0	0.00	97.59
18.400	0.00	0.0	20.0	20.0	0.00	97.59
18.500	0.00	0.0	20.0	20.0	0.00	97.59
18.600	0.00	0.0	20.0	20.0	0.00	97.59
18.700	0.00	0.0	20.0	20.0	0.00	97.59
18.800	0.00	0.0	20.0	20.0	0.00	97.59
18.900	0.00	0.0	20.0	20.0	0.00	97.59
19.000	0.00	0.0	20.0	20.0	0.00	97.59
19.100	0.00	0.0	20.0	20.0	0.00	97.59
19.200	0.00	0.0	20.0	20.0	0.00	97.59
19.300	0.00	0.0	20.0	20.0	0.00	97.59
19.400	0.00	0.0	20.0	20.0	0.00	97.59
19.500	0.00	0.0	20.0	20.0	0.00	97.59
19.600	0.00	0.0	20.0	20.0	0.00	97.59
19.700	0.00	0.0	20.0	20.0	0.00	97.59
19.800	0.00	0.0	20.0	20.0	0.00	97.59
19.900	0.00	0.0	20.0	20.0	0.00	97.59
20.000	0.00	0.0	20.0	20.0	0.00	97.59

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	20.0	20.0	0.00	97.59
20.200	0.00	0.0	20.0	20.0	0.00	97.59
20.300	0.00	0.0	20.0	20.0	0.00	97.59
20.400	0.00	0.0	20.0	20.0	0.00	97.59
20.500	0.00	0.0	20.0	20.0	0.00	97.59
20.600	0.00	0.0	20.0	20.0	0.00	97.59
20.700	0.00	0.0	20.0	20.0	0.00	97.59
20.800	0.00	0.0	20.0	20.0	0.00	97.59
20.900	0.00	0.0	20.0	20.0	0.00	97.59
21.000	0.00	0.0	20.0	20.0	0.00	97.59
21.100	0.00	0.0	20.0	20.0	0.00	97.59
21.200	0.00	0.0	20.0	20.0	0.00	97.59
21.300	0.00	0.0	20.0	20.0	0.00	97.59
21.400	0.00	0.0	20.0	20.0	0.00	97.59
21.500	0.00	0.0	20.0	20.0	0.00	97.59
21.600	0.00	0.0	20.0	20.0	0.00	97.59
21.700	0.00	0.0	20.0	20.0	0.00	97.59
21.800	0.00	0.0	20.0	20.0	0.00	97.59
21.900	0.00	0.0	20.0	20.0	0.00	97.59
22.000	0.00	0.0	20.0	20.0	0.00	97.59
22.100	0.00	0.0	20.0	20.0	0.00	97.59
22.200	0.00	0.0	20.0	20.0	0.00	97.59
22.300	0.00	0.0	20.0	20.0	0.00	97.59
22.400	0.00	0.0	20.0	20.0	0.00	97.59
22.500	0.00	0.0	20.0	20.0	0.00	97.59
22.600	0.00	0.0	20.0	20.0	0.00	97.59
22.700	0.00	0.0	20.0	20.0	0.00	97.59
22.800	0.00	0.0	20.0	20.0	0.00	97.59
22.900	0.00	0.0	20.0	20.0	0.00	97.59
23.000	0.00	0.0	20.0	20.0	0.00	97.59
23.100	0.00	0.0	20.0	20.0	0.00	97.59
23.200	0.00	0.0	20.0	20.0	0.00	97.59
23.300	0.00	0.0	20.0	20.0	0.00	97.59
23.400	0.00	0.0	20.0	20.0	0.00	97.59
23.500	0.00	0.0	20.0	20.0	0.00	97.59
23.600	0.00	0.0	20.0	20.0	0.00	97.59
23.700	0.00	0.0	20.0	20.0	0.00	97.59
23.800	0.00	0.0	20.0	20.0	0.00	97.59
23.900	0.00	0.0	20.0	20.0	0.00	97.59
24.000	0.00	0.0	20.0	20.0	0.00	97.59
24.100	0.00	0.0	20.0	20.0	0.00	97.59
24.200	0.00	0.0	20.0	20.0	0.00	97.59
24.300	0.00	0.0	20.0	20.0	0.00	97.59
24.400	0.00	0.0	20.0	20.0	0.00	97.59
24.500	0.00	0.0	20.0	20.0	0.00	97.59
24.600	0.00	0.0	20.0	20.0	0.00	97.59

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	20.0	20.0	0.00	97.59
24.800	0.00	0.0	20.0	20.0	0.00	97.59
24.900	0.00	0.0	20.0	20.0	0.00	97.59
25.000	0.00	0.0	20.0	20.0	0.00	97.59
25.100	0.00	0.0	20.0	20.0	0.00	97.59
25.200	0.00	0.0	20.0	20.0	0.00	97.59
25.300	0.00	0.0	20.0	20.0	0.00	97.59
25.400	0.00	0.0	20.0	20.0	0.00	97.59
25.500	0.00	0.0	20.0	20.0	0.00	97.59
25.600	0.00	0.0	20.0	20.0	0.00	97.59
25.700	0.00	0.0	20.0	20.0	0.00	97.59
25.800	0.00	0.0	20.0	20.0	0.00	97.59
25.900	0.00	0.0	20.0	20.0	0.00	97.59

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 97.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow	=	1.00 cfs
Peak Outflow	=	0.00 cfs
Peak Elevation	=	97.59 ft

***** Summary of Approximate Peak Storage *****

Initial Storage	=	0.00 ac-ft
Peak Storage From Storm	=	0.08 ac-ft
Total Storage in Pond	=	0.08 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.17 S/N:                                    Page 8

Pond File:           EX-SB1  .PND
Inflow Hydrograph:   EX-SUM2 .HYD
Outflow Hydrograph:  OUT     .HYD
                                                  EXECUTED: 12-30-1997
Peak Inflow    =      1.00 cfs                                19:46:37
Peak Outflow   =      0.00 cfs
Peak Elevation =     97.59 ft
```

```
*************************************************
*                                               *
*                EARLE - SITE 5                 *
*  PRE-DEVELOPMENT CONDITIONS : 10 YEAR STORM   *
*   EXISTING DETENTION BASIN IN THE PROPOSED    *
*     AREA FOR SEDIMENT/DETENTION BASIN #1      *
*                                               *
*************************************************
```

Inflow Hydrograph: EX-SUM10.HYD
Rating Table file: EX-SB1 .PND

----INITIAL CONDITIONS----
Elevation = 97.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
97.00	0.0	0.000
97.10	0.0	0.010
97.20	0.0	0.022
97.30	0.0	0.035
97.40	0.0	0.050
97.50	0.0	0.067
97.60	0.0	0.085
97.70	0.0	0.106
97.80	0.0	0.129
97.90	0.0	0.155
98.00	0.0	0.182
98.10	0.0	0.212
98.20	0.0	0.244
98.30	0.0	0.277
98.40	0.0	0.312
98.50	0.0	0.350
98.60	0.0	0.389
98.70	0.0	0.430
98.80	0.0	0.473
98.90	0.0	0.518
99.00	0.0	0.566
99.10	0.0	0.615
99.20	0.0	0.666
99.30	0.0	0.719
99.40	0.0	0.773
99.50	0.0	0.829
99.60	0.0	0.887
99.70	0.0	0.947
99.80	0.0	1.008
99.90	0.0	1.072
100.00	0.0	1.137

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.4	2.4
5.2	5.2
8.4	8.4
12.0	12.0
16.1	16.1
20.6	20.6
25.7	25.7
31.3	31.3
37.4	37.4
44.1	44.1
51.3	51.3
59.0	59.0
67.1	67.1
75.6	75.6
84.6	84.6
94.1	94.1
104.0	104.0
114.4	114.4
125.4	125.4
136.9	136.9
148.8	148.8
161.1	161.1
173.9	173.9
187.1	187.1
200.6	200.6
214.7	214.7
229.1	229.1
244.0	244.0
259.4	259.4
275.2	275.2

EXECUTED 12-30-1997 19:41:55
DISK FILES: EX-SUM10.HYD ; EX-SB1 .PND

CJF 12/31/97

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
100.10	5.8	1.204
100.20	16.6	1.272
100.30	30.9	1.342
100.40	48.3	1.412
100.50	68.4	1.484
100.60	91.2	1.557
100.70	116.5	1.631
100.80	144.3	1.707
100.90	174.6	1.784

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
291.4	297.2
307.9	324.5
324.6	355.5
341.7	390.0
359.1	427.5
376.8	468.0
394.8	511.3
413.1	557.4
431.7	606.3

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 19:41:55

CIF 12/31/97

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	97.00
11.100	0.00	0.0	0.0	0.0	0.00	97.00
11.200	0.00	0.0	0.0	0.0	0.00	97.00
11.300	0.00	0.0	0.0	0.0	0.00	97.00
11.400	0.00	0.0	0.0	0.0	0.00	97.00
11.500	0.00	0.0	0.0	0.0	0.00	97.00
11.600	0.00	0.0	0.0	0.0	0.00	97.00
11.700	0.00	0.0	0.0	0.0	0.00	97.00
11.800	0.00	0.0	0.0	0.0	0.00	97.00
11.900	0.00	0.0	0.0	0.0	0.00	97.00
12.000	0.00	0.0	0.0	0.0	0.00	97.00
12.100	0.00	0.0	0.0	0.0	0.00	97.00
12.200	0.00	0.0	0.0	0.0	0.00	97.00
12.300	0.00	0.0	0.0	0.0	0.00	97.00
12.400	2.00	2.0	2.0	2.0	0.00	97.08
12.500	3.00	5.0	7.0	7.0	0.00	97.26
12.600	5.00	8.0	15.0	15.0	0.00	97.47
12.700	7.00	12.0	27.0	27.0	0.00	97.72
12.800	9.00	16.0	43.0	43.0	0.00	97.98
12.900	8.00	17.0	60.0	60.0	0.00	98.21
13.000	7.00	15.0	75.0	75.0	0.00	98.39
13.100	7.00	14.0	89.0	89.0	0.00	98.55
13.200	7.00	14.0	103.0	103.0	0.00	98.69
13.300	6.00	13.0	116.0	116.0	0.00	98.81
13.400	5.00	11.0	127.0	127.0	0.00	98.91
13.500	5.00	10.0	137.0	137.0	0.00	99.00
13.600	4.00	9.0	146.0	146.0	0.00	99.08
13.700	3.00	7.0	153.0	153.0	0.00	99.13
13.800	3.00	6.0	159.0	159.0	0.00	99.18
13.900	3.00	6.0	165.0	165.0	0.00	99.23
14.000	3.00	6.0	171.0	171.0	0.00	99.28
14.100	3.00	6.0	177.0	177.0	0.00	99.32
14.200	3.00	6.0	183.0	183.0	0.00	99.37
14.300	3.00	6.0	189.0	189.0	0.00	99.41
14.400	3.00	6.0	195.0	195.0	0.00	99.46
14.500	3.00	6.0	201.0	201.0	0.00	99.50
14.600	3.00	6.0	207.0	207.0	0.00	99.55
14.700	3.00	6.0	213.0	213.0	0.00	99.59
14.800	3.00	6.0	219.0	219.0	0.00	99.63
14.900	3.00	6.0	225.0	225.0	0.00	99.67
15.000	3.00	6.0	231.0	231.0	0.00	99.71
15.100	3.00	6.0	237.0	237.0	0.00	99.75
15.200	3.00	6.0	243.0	243.0	0.00	99.79
15.300	3.00	6.0	249.0	249.0	0.00	99.83
15.400	3.00	6.0	255.0	255.0	0.00	99.87

POND-2 Version: 5.17 S/N:
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Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	3.00	6.0	261.0	261.0	0.00	99.91
15.600	3.00	6.0	267.0	267.0	0.00	99.95
15.700	3.00	6.0	273.0	273.0	0.00	99.99
15.800	3.00	6.0	277.0	279.0	1.00	100.02
15.900	3.00	6.0	278.9	283.0	2.06	100.04
16.000	3.00	6.0	279.8	284.9	2.55	100.04
16.100	3.00	6.0	280.2	285.8	2.79	100.05
16.200	3.00	6.0	280.4	286.2	2.90	100.05
16.300	1.00	4.0	279.5	284.4	2.43	100.04
16.400	1.00	2.0	278.2	281.5	1.67	100.03
16.500	1.00	2.0	277.6	280.2	1.32	100.02
16.600	1.00	2.0	277.3	279.6	1.15	100.02
16.700	1.00	2.0	277.1	279.3	1.07	100.02
16.800	1.00	2.0	277.0	279.1	1.03	100.02
16.900	1.00	2.0	277.0	279.0	1.02	100.02
17.000	1.00	2.0	277.0	279.0	1.01	100.02
17.100	1.00	2.0	277.0	279.0	1.00	100.02
17.200	1.00	2.0	277.0	279.0	1.00	100.02
17.300	1.00	2.0	277.0	279.0	1.00	100.02
17.400	1.00	2.0	277.0	279.0	1.00	100.02
17.500	1.00	2.0	277.0	279.0	1.00	100.02
17.600	1.00	2.0	277.0	279.0	1.00	100.02
17.700	1.00	2.0	277.0	279.0	1.00	100.02
17.800	1.00	2.0	277.0	279.0	1.00	100.02
17.900	1.00	2.0	277.0	279.0	1.00	100.02
18.000	1.00	2.0	277.0	279.0	1.00	100.02
18.100	1.00	2.0	277.0	279.0	1.00	100.02
18.200	1.00	2.0	277.0	279.0	1.00	100.02
18.300	1.00	2.0	277.0	279.0	1.00	100.02
18.400	1.00	2.0	277.0	279.0	1.00	100.02
18.500	1.00	2.0	277.0	279.0	1.00	100.02
18.600	1.00	2.0	277.0	279.0	1.00	100.02
18.700	1.00	2.0	277.0	279.0	1.00	100.02
18.800	1.00	2.0	277.0	279.0	1.00	100.02
18.900	1.00	2.0	277.0	279.0	1.00	100.02
19.000	1.00	2.0	277.0	279.0	1.00	100.02
19.100	1.00	2.0	277.0	279.0	1.00	100.02
19.200	1.00	2.0	277.0	279.0	1.00	100.02
19.300	1.00	2.0	277.0	279.0	1.00	100.02
19.400	1.00	2.0	277.0	279.0	1.00	100.02
19.500	1.00	2.0	277.0	279.0	1.00	100.02
19.600	1.00	2.0	277.0	279.0	1.00	100.02
19.700	1.00	2.0	277.0	279.0	1.00	100.02
19.800	1.00	2.0	277.0	279.0	1.00	100.02
19.900	1.00	2.0	277.0	279.0	1.00	100.02
20.000	1.00	2.0	277.0	279.0	1.00	100.02

ond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	1.00	2.0	277.0	279.0	1.00	100.02
20.200	1.00	2.0	277.0	279.0	1.00	100.02
20.300	1.00	2.0	277.0	279.0	1.00	100.02
20.400	1.00	2.0	277.0	279.0	1.00	100.02
20.500	1.00	2.0	277.0	279.0	1.00	100.02
20.600	1.00	2.0	277.0	279.0	1.00	100.02
20.700	1.00	2.0	277.0	279.0	1.00	100.02
20.800	1.00	2.0	277.0	279.0	1.00	100.02
20.900	1.00	2.0	277.0	279.0	1.00	100.02
21.000	1.00	2.0	277.0	279.0	1.00	100.02
21.100	1.00	2.0	277.0	279.0	1.00	100.02
21.200	1.00	2.0	277.0	279.0	1.00	100.02
21.300	1.00	2.0	277.0	279.0	1.00	100.02
21.400	1.00	2.0	277.0	279.0	1.00	100.02
21.500	1.00	2.0	277.0	279.0	1.00	100.02
21.600	1.00	2.0	277.0	279.0	1.00	100.02
21.700	1.00	2.0	277.0	279.0	1.00	100.02
21.800	1.00	2.0	277.0	279.0	1.00	100.02
21.900	1.00	2.0	277.0	279.0	1.00	100.02
22.000	1.00	2.0	277.0	279.0	1.00	100.02
22.100	1.00	2.0	277.0	279.0	1.00	100.02
22.200	1.00	2.0	277.0	279.0	1.00	100.02
22.300	1.00	2.0	277.0	279.0	1.00	100.02
22.400	1.00	2.0	277.0	279.0	1.00	100.02
22.500	1.00	2.0	277.0	279.0	1.00	100.02
22.600	1.00	2.0	277.0	279.0	1.00	100.02
22.700	1.00	2.0	277.0	279.0	1.00	100.02
22.800	1.00	2.0	277.0	279.0	1.00	100.02
22.900	1.00	2.0	277.0	279.0	1.00	100.02
23.000	1.00	2.0	277.0	279.0	1.00	100.02
23.100	1.00	2.0	277.0	279.0	1.00	100.02
23.200	1.00	2.0	277.0	279.0	1.00	100.02
23.300	1.00	2.0	277.0	279.0	1.00	100.02
23.400	1.00	2.0	277.0	279.0	1.00	100.02
23.500	1.00	2.0	277.0	279.0	1.00	100.02
23.600	1.00	2.0	277.0	279.0	1.00	100.02
23.700	1.00	2.0	277.0	279.0	1.00	100.02
23.800	1.00	2.0	277.0	279.0	1.00	100.02
23.900	1.00	2.0	277.0	279.0	1.00	100.02
24.000	0.00	1.0	276.5	278.0	0.74	100.01
24.100	0.00	0.0	275.8	276.5	0.35	100.01
24.200	0.00	0.0	275.5	275.8	0.16	100.00
24.300	0.00	0.0	275.3	275.5	0.08	100.00
24.400	0.00	0.0	275.3	275.3	0.04	100.00
24.500	0.00	0.0	275.2	275.3	0.02	100.00
24.600	0.00	0.0	275.2	275.2	0.01	100.00

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	275.2	275.2	0.00	100.00
24.800	0.00	0.0	275.2	275.2	0.00	100.00
24.900	0.00	0.0	275.2	275.2	0.00	100.00
25.000	0.00	0.0	275.2	275.2	0.00	100.00
25.100	0.00	0.0	275.2	275.2	0.00	100.00
25.200	0.00	0.0	275.2	275.2	0.00	100.00
25.300	0.00	0.0	275.2	275.2	0.00	100.00
25.400	0.00	0.0	275.2	275.2	0.00	100.00
25.500	0.00	0.0	275.2	275.2	0.00	100.00
25.600	0.00	0.0	275.2	275.2	0.00	100.00
25.700	0.00	0.0	275.2	275.2	0.00	100.00
25.800	0.00	0.0	275.2	275.2	0.00	100.00
25.900	0.00	0.0	275.2	275.2	0.00	100.00

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: EX-SB1 .PND
Inflow Hydrograph: EX-SUM10.HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 97.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 9.00 cfs
Peak Outflow = 2.90 cfs
Peak Elevation = 100.05 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 1.17 ac-ft

Total Storage in Pond = 1.17 ac-ft

POND-2 Version: 5.17 S/N:
EXECUTED: 12-23-1997 17:12:57

CJF 12/31/97

ond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	104.00
11.100	0.00	0.0	0.0	0.0	0.00	104.00
11.200	0.00	0.0	0.0	0.0	0.00	104.00
11.300	0.00	0.0	0.0	0.0	0.00	104.00
11.400	0.00	0.0	0.0	0.0	0.00	104.00
11.500	0.00	0.0	0.0	0.0	0.00	104.00
11.600	0.00	0.0	0.0	0.0	0.00	104.00
11.700	0.00	0.0	0.0	0.0	0.00	104.00
11.800	1.00	1.0	1.0	1.0	0.00	104.08
11.900	1.00	2.0	3.0	3.0	0.00	104.23
12.000	1.00	2.0	5.0	5.0	0.00	104.38
12.100	1.00	2.0	7.0	7.0	0.00	104.53
12.200	2.00	3.0	10.0	10.0	0.00	104.75
12.300	3.00	5.0	15.0	15.0	0.00	105.11
12.400	3.00	6.0	21.0	21.0	0.00	105.49
12.500	3.00	6.0	26.6	27.0	0.19	105.81
12.600	2.00	5.0	31.0	31.6	0.31	106.05
12.700	2.00	4.0	34.3	35.0	0.34	106.21
12.800	1.00	3.0	36.6	37.3	0.36	106.31
12.900	1.00	2.0	37.8	38.6	0.37	106.37
13.000	1.00	2.0	39.1	39.8	0.39	106.43
13.100	1.00	2.0	40.3	41.1	0.40	106.48
13.200	1.00	2.0	41.5	42.3	0.41	106.54
13.300	0.00	1.0	41.7	42.5	0.41	106.55
13.400	0.00	0.0	40.8	41.7	0.40	106.51
13.500	0.00	0.0	40.1	40.8	0.39	106.47
13.600	0.00	0.0	39.3	40.1	0.39	106.44
13.700	0.00	0.0	38.5	39.3	0.38	106.40
13.800	0.00	0.0	37.8	38.5	0.37	106.37
13.900	0.00	0.0	37.0	37.8	0.37	106.33
14.000	0.00	0.0	36.3	37.0	0.36	106.30
14.100	0.00	0.0	35.6	36.3	0.35	106.27
14.200	0.00	0.0	34.9	35.6	0.35	106.23
14.300	0.00	0.0	34.2	34.9	0.34	106.20
14.400	0.00	0.0	33.6	34.2	0.33	106.17
14.500	0.00	0.0	32.9	33.6	0.33	106.14
14.600	0.00	0.0	32.3	32.9	0.32	106.11
14.700	0.00	0.0	31.6	32.3	0.32	106.08
14.800	0.00	0.0	31.0	31.6	0.31	106.05
14.900	0.00	0.0	30.4	31.0	0.30	106.02
15.000	0.00	0.0	29.8	30.4	0.30	106.00
15.100	0.00	0.0	29.3	29.8	0.28	105.96
15.200	0.00	0.0	28.7	29.3	0.26	105.93
15.300	0.00	0.0	28.3	28.7	0.24	105.91
15.400	0.00	0.0	27.8	28.3	0.23	105.88

Pond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	27.4	27.8	0.21	105.86
15.600	0.00	0.0	27.0	27.4	0.20	105.83
15.700	0.00	0.0	26.6	27.0	0.19	105.81
15.800	0.00	0.0	26.3	26.6	0.17	105.79
15.900	0.00	0.0	25.9	26.3	0.16	105.77
16.000	0.00	0.0	25.6	25.9	0.15	105.75
16.100	0.00	0.0	25.3	25.6	0.14	105.74
16.200	0.00	0.0	25.1	25.3	0.13	105.72
16.300	0.00	0.0	24.8	25.1	0.13	105.71
16.400	0.00	0.0	24.6	24.8	0.12	105.70
16.500	0.00	0.0	24.4	24.6	0.11	105.68
16.600	0.00	0.0	24.2	24.4	0.10	105.67
16.700	0.00	0.0	24.0	24.2	0.10	105.66
16.800	0.00	0.0	23.8	24.0	0.09	105.65
16.900	0.00	0.0	23.6	23.8	0.08	105.64
17.000	0.00	0.0	23.5	23.6	0.08	105.63
17.100	0.00	0.0	23.3	23.5	0.07	105.62
17.200	0.00	0.0	23.2	23.3	0.07	105.61
17.300	0.00	0.0	23.0	23.2	0.06	105.61
17.400	0.00	0.0	22.9	23.0	0.06	105.60
17.500	0.00	0.0	22.8	22.9	0.06	105.59
17.600	0.00	0.0	22.7	22.8	0.05	105.59
17.700	0.00	0.0	22.6	22.7	0.05	105.58
17.800	0.00	0.0	22.5	22.6	0.05	105.58
17.900	0.00	0.0	22.4	22.5	0.04	105.57
18.000	0.00	0.0	22.3	22.4	0.04	105.57
18.100	0.00	0.0	22.3	22.3	0.04	105.56
18.200	0.00	0.0	22.2	22.3	0.04	105.56
18.300	0.00	0.0	22.1	22.2	0.03	105.56
18.400	0.00	0.0	22.1	22.1	0.03	105.55
18.500	0.00	0.0	22.0	22.1	0.03	105.55
18.600	0.00	0.0	22.0	22.0	0.03	105.55
18.700	0.00	0.0	21.9	22.0	0.03	105.54
18.800	0.00	0.0	21.9	21.9	0.02	105.54
18.900	0.00	0.0	21.8	21.9	0.02	105.54
19.000	0.00	0.0	21.8	21.8	0.02	105.53
19.100	0.00	0.0	21.7	21.8	0.02	105.53
19.200	0.00	0.0	21.7	21.7	0.02	105.53
19.300	0.00	0.0	21.7	21.7	0.02	105.53
19.400	0.00	0.0	21.6	21.7	0.02	105.53
19.500	0.00	0.0	21.6	21.6	0.01	105.52
19.600	0.00	0.0	21.6	21.6	0.01	105.52
19.700	0.00	0.0	21.5	21.6	0.01	105.52
19.800	0.00	0.0	21.5	21.5	0.01	105.52
19.900	0.00	0.0	21.5	21.5	0.01	105.52
20.000	0.00	0.0	21.5	21.5	0.01	105.52

ond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	21.5	21.5	0.01	105.52
20.200	0.00	0.0	21.4	21.5	0.01	105.52
20.300	0.00	0.0	21.4	21.4	0.01	105.51
20.400	0.00	0.0	21.4	21.4	0.01	105.51
20.500	0.00	0.0	21.4	21.4	0.01	105.51
20.600	0.00	0.0	21.4	21.4	0.01	105.51
20.700	0.00	0.0	21.4	21.4	0.01	105.51
20.800	0.00	0.0	21.4	21.4	0.01	105.51
20.900	0.00	0.0	21.3	21.4	0.01	105.51
21.000	0.00	0.0	21.3	21.3	0.01	105.51
21.100	0.00	0.0	21.3	21.3	0.01	105.51
21.200	0.00	0.0	21.3	21.3	0.00	105.51
21.300	0.00	0.0	21.3	21.3	0.00	105.51
21.400	0.00	0.0	21.3	21.3	0.00	105.51
21.500	0.00	0.0	21.3	21.3	0.00	105.51
21.600	0.00	0.0	21.3	21.3	0.00	105.51
21.700	0.00	0.0	21.3	21.3	0.00	105.51
21.800	0.00	0.0	21.3	21.3	0.00	105.51
21.900	0.00	0.0	21.3	21.3	0.00	105.51
22.000	0.00	0.0	21.3	21.3	0.00	105.50
22.100	0.00	0.0	21.2	21.3	0.00	105.50
22.200	0.00	0.0	21.2	21.2	0.00	105.50
22.300	0.00	0.0	21.2	21.2	0.00	105.50
22.400	0.00	0.0	21.2	21.2	0.00	105.50
22.500	0.00	0.0	21.2	21.2	0.00	105.50
22.600	0.00	0.0	21.2	21.2	0.00	105.50
22.700	0.00	0.0	21.2	21.2	0.00	105.50
22.800	0.00	0.0	21.2	21.2	0.00	105.50
22.900	0.00	0.0	21.2	21.2	0.00	105.50
23.000	0.00	0.0	21.2	21.2	0.00	105.50
23.100	0.00	0.0	21.2	21.2	0.00	105.50
23.200	0.00	0.0	21.2	21.2	0.00	105.50
23.300	0.00	0.0	21.2	21.2	0.00	105.50
23.400	0.00	0.0	21.2	21.2	0.00	105.50
23.500	0.00	0.0	21.2	21.2	0.00	105.50
23.600	0.00	0.0	21.2	21.2	0.00	105.50
23.700	0.00	0.0	21.2	21.2	0.00	105.50
23.800	0.00	0.0	21.2	21.2	0.00	105.50
23.900	0.00	0.0	21.2	21.2	0.00	105.50
24.000	0.00	0.0	21.2	21.2	0.00	105.50
24.100	0.00	0.0	21.2	21.2	0.00	105.50
24.200	0.00	0.0	21.2	21.2	0.00	105.50
24.300	0.00	0.0	21.2	21.2	0.00	105.50
24.400	0.00	0.0	21.2	21.2	0.00	105.50
24.500	0.00	0.0	21.2	21.2	0.00	105.50
24.600	0.00	0.0	21.2	21.2	0.00	105.50

Pond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	21.2	21.2	0.00	105.50
24.800	0.00	0.0	21.2	21.2	0.00	105.50
24.900	0.00	0.0	21.2	21.2	0.00	105.50
25.000	0.00	0.0	21.2	21.2	0.00	105.50
25.100	0.00	0.0	21.2	21.2	0.00	105.50
25.200	0.00	0.0	21.2	21.2	0.00	105.50
25.300	0.00	0.0	21.2	21.2	0.00	105.50
25.400	0.00	0.0	21.2	21.2	0.00	105.50
25.500	0.00	0.0	21.2	21.2	0.00	105.50
25.600	0.00	0.0	21.2	21.2	0.00	105.50
25.700	0.00	0.0	21.2	21.2	0.00	105.50
25.800	0.00	0.0	21.2	21.2	0.00	105.50
25.900	0.00	0.0	21.2	21.2	0.00	105.50

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 104.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 3.00 cfs
Peak Outflow = 0.41 cfs
Peak Elevation = 106.55 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.17 ac-ft

Total Storage in Pond = 0.17 ac-ft

Pond File: SB2 .PND
Inflow Hydrograph: DA2-2 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-23-1997
17:12:57

Peak Inflow = 3.00 cfs
Peak Outflow = 0.41 cfs
Peak Elevation = 106.55 ft

```
*********************************
*                               *
*        EARLE - SITE 5         *
*      DETENTION BASIN #2       *
* POST-DEVELOPMENT CONDITIONS   *
*      10 YEAR STORM            *
*                               *
*********************************
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Inflow Hydrograph: DA2-10 .HYD
Rating Table file: SB2 .PND

----INITIAL CONDITIONS----
Elevation = 104.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
104.00	0.0	0.000
105.00	0.0	0.055
105.50	0.0	0.087
106.00	0.3	0.125
107.00	0.5	0.214
108.00	0.7	0.319
109.00	2.7	0.444

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
13.3	13.3
21.2	21.2
30.2	30.5
51.9	52.4
77.3	78.0
107.5	110.2

Time increment (t) = 0.100 hrs.

Pond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	104.00
11.100	0.00	0.0	0.0	0.0	0.00	104.00
11.200	0.00	0.0	0.0	0.0	0.00	104.00
11.300	0.00	0.0	0.0	0.0	0.00	104.00
11.400	0.00	0.0	0.0	0.0	0.00	104.00
11.500	1.00	1.0	1.0	1.0	0.00	104.08
11.600	1.00	2.0	3.0	3.0	0.00	104.23
11.700	1.00	2.0	5.0	5.0	0.00	104.38
11.800	1.00	2.0	7.0	7.0	0.00	104.53
11.900	1.00	2.0	9.0	9.0	0.00	104.68
12.000	2.00	3.0	12.0	12.0	0.00	104.90
12.100	3.00	5.0	17.0	17.0	0.00	105.23
12.200	5.00	8.0	24.8	25.0	0.12	105.71
12.300	7.00	12.0	36.0	36.8	0.36	106.29
12.400	7.00	14.0	49.1	50.0	0.48	106.89
12.500	5.00	12.0	59.9	61.1	0.57	107.34
12.600	4.00	9.0	67.7	68.9	0.63	107.65
12.700	3.00	7.0	73.3	74.7	0.67	107.87
12.800	2.00	5.0	76.9	78.3	0.72	108.01
12.900	2.00	4.0	79.1	80.9	0.88	108.09
13.000	1.00	3.0	80.2	82.1	0.96	108.13
13.100	1.00	2.0	80.3	82.2	0.96	108.13
13.200	1.00	2.0	80.4	82.3	0.97	108.13
13.300	1.00	2.0	80.4	82.4	0.97	108.14
13.400	1.00	2.0	80.5	82.4	0.97	108.14
13.500	1.00	2.0	80.5	82.5	0.98	108.14
13.600	1.00	2.0	80.6	82.5	0.98	108.14
13.700	1.00	2.0	80.6	82.6	0.98	108.14
13.800	1.00	2.0	80.6	82.6	0.99	108.14
13.900	1.00	2.0	80.6	82.6	0.99	108.14
14.000	1.00	2.0	80.7	82.6	0.99	108.14
14.100	1.00	2.0	80.7	82.7	0.99	108.14
14.200	1.00	2.0	80.7	82.7	0.99	108.15
14.300	1.00	2.0	80.7	82.7	0.99	108.15
14.400	1.00	2.0	80.7	82.7	0.99	108.15
14.500	1.00	2.0	80.7	82.7	0.99	108.15
14.600	1.00	2.0	80.8	82.7	0.99	108.15
14.700	1.00	2.0	80.8	82.8	1.00	108.15
14.800	1.00	2.0	80.8	82.8	1.00	108.15
14.900	1.00	2.0	80.8	82.8	1.00	108.15
15.000	1.00	2.0	80.8	82.8	1.00	108.15
15.100	1.00	2.0	80.8	82.8	1.00	108.15
15.200	1.00	2.0	80.8	82.8	1.00	108.15
15.300	0.00	1.0	79.9	81.8	0.94	108.12
15.400	0.00	0.0	78.3	79.9	0.82	108.06

ond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	76.9	78.3	0.72	108.01
15.600	0.00	0.0	75.5	76.9	0.69	107.96
15.700	0.00	0.0	74.1	75.5	0.68	107.90
15.800	0.00	0.0	72.8	74.1	0.67	107.85
15.900	0.00	0.0	71.5	72.8	0.66	107.80
16.000	0.00	0.0	70.2	71.5	0.65	107.74
16.100	0.00	0.0	68.9	70.2	0.64	107.69
16.200	0.00	0.0	67.6	68.9	0.63	107.64
16.300	0.00	0.0	66.4	67.6	0.62	107.59
16.400	0.00	0.0	65.2	66.4	0.61	107.55
16.500	0.00	0.0	64.0	65.2	0.60	107.50
16.600	0.00	0.0	62.8	64.0	0.59	107.45
16.700	0.00	0.0	61.6	62.8	0.58	107.41
16.800	0.00	0.0	60.5	61.6	0.57	107.36
16.900	0.00	0.0	59.3	60.5	0.56	107.32
17.000	0.00	0.0	58.2	59.3	0.55	107.27
17.100	0.00	0.0	57.1	58.2	0.55	107.23
17.200	0.00	0.0	56.1	57.1	0.54	107.19
17.300	0.00	0.0	55.0	56.1	0.53	107.14
17.400	0.00	0.0	54.0	55.0	0.52	107.10
17.500	0.00	0.0	53.0	54.0	0.51	107.06
17.600	0.00	0.0	51.9	53.0	0.50	107.02
17.700	0.00	0.0	51.0	51.9	0.50	106.98
17.800	0.00	0.0	50.0	51.0	0.49	106.93
17.900	0.00	0.0	49.0	50.0	0.48	106.89
18.000	0.00	0.0	48.1	49.0	0.47	106.85
18.100	0.00	0.0	47.2	48.1	0.46	106.80
18.200	0.00	0.0	46.3	47.2	0.45	106.76
18.300	0.00	0.0	45.4	46.3	0.44	106.72
18.400	0.00	0.0	44.5	45.4	0.44	106.68
18.500	0.00	0.0	43.6	44.5	0.43	106.64
18.600	0.00	0.0	42.8	43.6	0.42	106.60
18.700	0.00	0.0	42.0	42.8	0.41	106.56
18.800	0.00	0.0	41.2	42.0	0.40	106.52
18.900	0.00	0.0	40.4	41.2	0.40	106.49
19.000	0.00	0.0	39.6	40.4	0.39	106.45
19.100	0.00	0.0	38.8	39.6	0.38	106.42
19.200	0.00	0.0	38.1	38.8	0.38	106.38
19.300	0.00	0.0	37.3	38.1	0.37	106.35
19.400	0.00	0.0	36.6	37.3	0.36	106.31
19.500	0.00	0.0	35.9	36.6	0.36	106.28
19.600	0.00	0.0	35.2	35.9	0.35	106.25
19.700	0.00	0.0	34.5	35.2	0.34	106.21
19.800	0.00	0.0	33.8	34.5	0.34	106.18
19.900	0.00	0.0	33.2	33.8	0.33	106.15
20.000	0.00	0.0	32.5	33.2	0.32	106.12

Pond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	31.9	32.5	0.32	106.09
20.200	0.00	0.0	31.3	31.9	0.31	106.06
20.300	0.00	0.0	30.7	31.3	0.31	106.03
20.400	0.00	0.0	30.1	30.7	0.30	106.01
20.500	0.00	0.0	29.5	30.1	0.29	105.98
20.600	0.00	0.0	28.9	29.5	0.27	105.95
20.700	0.00	0.0	28.4	28.9	0.25	105.92
20.800	0.00	0.0	28.0	28.4	0.23	105.89
20.900	0.00	0.0	27.5	28.0	0.22	105.86
21.000	0.00	0.0	27.1	27.5	0.20	105.84
21.100	0.00	0.0	26.7	27.1	0.19	105.82
21.200	0.00	0.0	26.4	26.7	0.18	105.80
21.300	0.00	0.0	26.1	26.4	0.17	105.78
21.400	0.00	0.0	25.7	26.1	0.16	105.76
21.500	0.00	0.0	25.4	25.7	0.15	105.74
21.600	0.00	0.0	25.2	25.4	0.14	105.73
21.700	0.00	0.0	24.9	25.2	0.13	105.71
21.800	0.00	0.0	24.7	24.9	0.12	105.70
21.900	0.00	0.0	24.4	24.7	0.11	105.69
22.000	0.00	0.0	24.2	24.4	0.11	105.68
22.100	0.00	0.0	24.0	24.2	0.10	105.66
22.200	0.00	0.0	23.9	24.0	0.09	105.65
22.300	0.00	0.0	23.7	23.9	0.09	105.64
22.400	0.00	0.0	23.5	23.7	0.08	105.63
22.500	0.00	0.0	23.4	23.5	0.08	105.63
22.600	0.00	0.0	23.2	23.4	0.07	105.62
22.700	0.00	0.0	23.1	23.2	0.07	105.61
22.800	0.00	0.0	23.0	23.1	0.06	105.60
22.900	0.00	0.0	22.9	23.0	0.06	105.60
23.000	0.00	0.0	22.7	22.9	0.05	105.59
23.100	0.00	0.0	22.6	22.7	0.05	105.58
23.200	0.00	0.0	22.6	22.6	0.05	105.58
23.300	0.00	0.0	22.5	22.6	0.04	105.57
23.400	0.00	0.0	22.4	22.5	0.04	105.57
23.500	0.00	0.0	22.3	22.4	0.04	105.56
23.600	0.00	0.0	22.2	22.3	0.04	105.56
23.700	0.00	0.0	22.2	22.2	0.03	105.56
23.800	0.00	0.0	22.1	22.2	0.03	105.55
23.900	0.00	0.0	22.0	22.1	0.03	105.55
24.000	0.00	0.0	22.0	22.0	0.03	105.55
24.100	0.00	0.0	21.9	22.0	0.03	105.54
24.200	0.00	0.0	21.9	21.9	0.02	105.54
24.300	0.00	0.0	21.8	21.9	0.02	105.54
24.400	0.00	0.0	21.8	21.8	0.02	105.54
24.500	0.00	0.0	21.8	21.8	0.02	105.53
24.600	0.00	0.0	21.7	21.8	0.02	105.53

ond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	21.7	21.7	0.02	105.53
24.800	0.00	0.0	21.6	21.7	0.02	105.53
24.900	0.00	0.0	21.6	21.6	0.02	105.53
25.000	0.00	0.0	21.6	21.6	0.01	105.52
25.100	0.00	0.0	21.6	21.6	0.01	105.52
25.200	0.00	0.0	21.5	21.6	0.01	105.52
25.300	0.00	0.0	21.5	21.5	0.01	105.52
25.400	0.00	0.0	21.5	21.5	0.01	105.52
25.500	0.00	0.0	21.5	21.5	0.01	105.52
25.600	0.00	0.0	21.4	21.5	0.01	105.52
25.700	0.00	0.0	21.4	21.4	0.01	105.52
25.800	0.00	0.0	21.4	21.4	0.01	105.51
25.900	0.00	0.0	21.4	21.4	0.01	105.51

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 104.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 7.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 108.15 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.34 ac-ft

Total Storage in Pond = 0.34 ac-ft

Pond File: SB2 .PND
Inflow Hydrograph: DA2-10 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 01-02-1998
12:13:33

Peak Inflow = 7.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 108.15 ft

```
*********************************
*                               *
*        EARLE - SITE 5         *
*      DETENTION BASIN #2       *
* POST-DEVELOPMENT CONDITIONS   *
*      25 YEAR STORM            *
*                               *
*********************************
```

Inflow Hydrograph: DA2-25 .HYD
Rating Table file: SB2 .PND

----INITIAL CONDITIONS----
Elevation = 104.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
104.00	0.0	0.000
105.00	0.0	0.055
105.50	0.0	0.087
106.00	0.3	0.125
107.00	0.5	0.214
108.00	0.7	0.319
109.00	2.7	0.444

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
13.3	13.3
21.2	21.2
30.2	30.5
51.9	52.4
77.3	78.0
107.5	110.2

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-23-1997 16:46:05

CDF 12/31/97

ɔnd File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH — ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	104.00
11.100	0.00	0.0	0.0	0.0	0.00	104.00
11.200	0.00	0.0	0.0	0.0	0.00	104.00
11.300	0.00	0.0	0.0	0.0	0.00	104.00
11.400	0.00	0.0	0.0	0.0	0.00	104.00
11.500	1.00	1.0	1.0	1.0	0.00	104.08
11.600	1.00	2.0	3.0	3.0	0.00	104.23
11.700	1.00	2.0	5.0	5.0	0.00	104.38
11.800	1.00	2.0	7.0	7.0	0.00	104.53
11.900	1.00	2.0	9.0	9.0	0.00	104.68
12.000	2.00	3.0	12.0	12.0	0.00	104.90
12.100	3.00	5.0	17.0	17.0	0.00	105.23
12.200	5.00	8.0	24.8	25.0	0.12	105.71
12.300	7.00	12.0	36.0	36.8	0.36	106.29
12.400	8.00	15.0	50.1	51.0	0.49	106.94
12.500	7.00	15.0	63.9	65.1	0.60	107.49
12.600	6.00	13.0	75.5	76.9	0.69	107.96
12.700	4.00	10.0	83.2	85.5	1.16	108.23
12.800	3.00	7.0	87.2	90.2	1.45	108.38
12.900	2.00	5.0	89.1	92.2	1.58	108.44
13.000	2.00	4.0	89.8	93.1	1.64	108.47
13.100	2.00	4.0	90.4	93.8	1.68	108.49
13.200	1.00	3.0	90.1	93.4	1.66	108.48
13.300	1.00	2.0	89.0	92.1	1.58	108.44
13.400	1.00	2.0	88.0	91.0	1.51	108.40
13.500	1.00	2.0	87.1	90.0	1.44	108.37
13.600	1.00	2.0	86.3	89.1	1.39	108.34
13.700	1.00	2.0	85.6	88.3	1.34	108.32
13.800	1.00	2.0	85.0	87.6	1.30	108.30
13.900	1.00	2.0	84.5	87.0	1.26	108.28
14.000	1.00	2.0	84.0	86.5	1.23	108.26
14.100	1.00	2.0	83.6	86.0	1.20	108.25
14.200	1.00	2.0	83.3	85.6	1.17	108.24
14.300	1.00	2.0	83.0	85.3	1.15	108.23
14.400	1.00	2.0	82.7	85.0	1.13	108.22
14.500	1.00	2.0	82.5	84.7	1.12	108.21
14.600	1.00	2.0	82.3	84.5	1.10	108.20
14.700	1.00	2.0	82.1	84.3	1.09	108.20
14.800	1.00	2.0	81.9	84.1	1.08	108.19
14.900	1.00	2.0	81.8	83.9	1.07	108.18
15.000	1.00	2.0	81.7	83.8	1.06	108.18
15.100	1.00	2.0	81.6	83.7	1.05	108.18
15.200	1.00	2.0	81.5	83.6	1.05	108.17
15.300	1.00	2.0	81.4	83.5	1.04	108.17
15.400	1.00	2.0	81.3	83.4	1.04	108.17

Pond File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	1.00	2.0	81.3	83.3	1.03	108.17
15.600	1.00	2.0	81.2	83.3	1.03	108.16
15.700	1.00	2.0	81.2	83.2	1.02	108.16
15.800	0.00	1.0	80.3	82.2	0.96	108.13
15.900	0.00	0.0	78.6	80.3	0.84	108.07
16.000	0.00	0.0	77.1	78.6	0.74	108.02
16.100	0.00	0.0	75.7	77.1	0.69	107.96
16.200	0.00	0.0	74.3	75.7	0.68	107.91
16.300	0.00	0.0	73.0	74.3	0.67	107.86
16.400	0.00	0.0	71.7	73.0	0.66	107.81
16.500	0.00	0.0	70.4	71.7	0.65	107.75
16.600	0.00	0.0	69.1	70.4	0.64	107.70
16.700	0.00	0.0	67.8	69.1	0.63	107.65
16.800	0.00	0.0	66.6	67.8	0.62	107.60
16.900	0.00	0.0	65.4	66.6	0.61	107.55
17.000	0.00	0.0	64.2	65.4	0.60	107.51
17.100	0.00	0.0	63.0	64.2	0.59	107.46
17.200	0.00	0.0	61.8	63.0	0.58	107.41
17.300	0.00	0.0	60.7	61.8	0.57	107.37
17.400	0.00	0.0	59.5	60.7	0.56	107.32
17.500	0.00	0.0	58.4	59.5	0.56	107.28
17.600	0.00	0.0	57.3	58.4	0.55	107.24
17.700	0.00	0.0	56.3	57.3	0.54	107.19
17.800	0.00	0.0	55.2	56.3	0.53	107.15
17.900	0.00	0.0	54.2	55.2	0.52	107.11
18.000	0.00	0.0	53.1	54.2	0.51	107.07
18.100	0.00	0.0	52.1	53.1	0.51	107.03
18.200	0.00	0.0	51.1	52.1	0.50	106.99
18.300	0.00	0.0	50.2	51.1	0.49	106.94
18.400	0.00	0.0	49.2	50.2	0.48	106.90
18.500	0.00	0.0	48.2	49.2	0.47	106.85
18.600	0.00	0.0	47.3	48.2	0.46	106.81
18.700	0.00	0.0	46.4	47.3	0.45	106.77
18.800	0.00	0.0	45.5	46.4	0.45	106.73
18.900	0.00	0.0	44.7	45.5	0.44	106.69
19.000	0.00	0.0	43.8	44.7	0.43	106.65
19.100	0.00	0.0	43.0	43.8	0.42	106.61
19.200	0.00	0.0	42.1	43.0	0.41	106.57
19.300	0.00	0.0	41.3	42.1	0.41	106.53
19.400	0.00	0.0	40.5	41.3	0.40	106.49
19.500	0.00	0.0	39.7	40.5	0.39	106.46
19.600	0.00	0.0	39.0	39.7	0.38	106.42
19.700	0.00	0.0	38.2	39.0	0.38	106.39
19.800	0.00	0.0	37.5	38.2	0.37	106.35
19.900	0.00	0.0	36.7	37.5	0.36	106.32
20.000	0.00	0.0	36.0	36.7	0.36	106.28

POND-2 Version: 5.17 S/N:
EXECUTED: 12-23-1997 16:46:05

ond File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	35.3	36.0	0.35	106.25
20.200	0.00	0.0	34.6	35.3	0.34	106.22
20.300	0.00	0.0	34.0	34.6	0.34	106.19
20.400	0.00	0.0	33.3	34.0	0.33	106.16
20.500	0.00	0.0	32.6	33.3	0.33	106.13
20.600	0.00	0.0	32.0	32.6	0.32	106.10
20.700	0.00	0.0	31.4	32.0	0.31	106.07
20.800	0.00	0.0	30.8	31.4	0.31	106.04
20.900	0.00	0.0	30.2	30.8	0.30	106.01
21.000	0.00	0.0	29.6	30.2	0.29	105.98
21.100	0.00	0.0	29.0	29.6	0.27	105.95
21.200	0.00	0.0	28.5	29.0	0.25	105.92
21.300	0.00	0.0	28.1	28.5	0.24	105.89
21.400	0.00	0.0	27.6	28.1	0.22	105.87
21.500	0.00	0.0	27.2	27.6	0.21	105.85
21.600	0.00	0.0	26.8	27.2	0.19	105.82
21.700	0.00	0.0	26.5	26.8	0.18	105.80
21.800	0.00	0.0	26.1	26.5	0.17	105.78
21.900	0.00	0.0	25.8	26.1	0.16	105.76
22.000	0.00	0.0	25.5	25.8	0.15	105.75
22.100	0.00	0.0	25.2	25.5	0.14	105.73
22.200	0.00	0.0	25.0	25.2	0.13	105.72
22.300	0.00	0.0	24.7	25.0	0.12	105.70
22.400	0.00	0.0	24.5	24.7	0.11	105.69
22.500	0.00	0.0	24.3	24.5	0.11	105.68
22.600	0.00	0.0	24.1	24.3	0.10	105.67
22.700	0.00	0.0	23.9	24.1	0.09	105.66
22.800	0.00	0.0	23.7	23.9	0.09	105.65
22.900	0.00	0.0	23.5	23.7	0.08	105.64
23.000	0.00	0.0	23.4	23.5	0.08	105.63
23.100	0.00	0.0	23.3	23.4	0.07	105.62
23.200	0.00	0.0	23.1	23.3	0.07	105.61
23.300	0.00	0.0	23.0	23.1	0.06	105.60
23.400	0.00	0.0	22.9	23.0	0.06	105.60
23.500	0.00	0.0	22.8	22.9	0.05	105.59
23.600	0.00	0.0	22.7	22.8	0.05	105.59
23.700	0.00	0.0	22.6	22.7	0.05	105.58
23.800	0.00	0.0	22.5	22.6	0.04	105.57
23.900	0.00	0.0	22.4	22.5	0.04	105.57
24.000	0.00	0.0	22.3	22.4	0.04	105.57
24.100	0.00	0.0	22.2	22.3	0.04	105.56
24.200	0.00	0.0	22.2	22.2	0.03	105.56
24.300	0.00	0.0	22.1	22.2	0.03	105.55
24.400	0.00	0.0	22.0	22.1	0.03	105.55
24.500	0.00	0.0	22.0	22.0	0.03	105.55
24.600	0.00	0.0	21.9	22.0	0.03	105.54

Pond File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	21.9	21.9	0.02	105.54
24.800	0.00	0.0	21.8	21.9	0.02	105.54
24.900	0.00	0.0	21.8	21.8	0.02	105.54
25.000	0.00	0.0	21.8	21.8	0.02	105.53
25.100	0.00	0.0	21.7	21.8	0.02	105.53
25.200	0.00	0.0	21.7	21.7	0.02	105.53
25.300	0.00	0.0	21.7	21.7	0.02	105.53
25.400	0.00	0.0	21.6	21.7	0.02	105.53
25.500	0.00	0.0	21.6	21.6	0.01	105.52
25.600	0.00	0.0	21.6	21.6	0.01	105.52
25.700	0.00	0.0	21.5	21.6	0.01	105.52
25.800	0.00	0.0	21.5	21.5	0.01	105.52
25.900	0.00	0.0	21.5	21.5	0.01	105.52

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 104.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 8.00 cfs
Peak Outflow = 1.68 cfs
Peak Elevation = 108.49 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.38 ac-ft

Total Storage in Pond = 0.38 ac-ft

Pond File: SB2 .PND
Inflow Hydrograph: DA2-25 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-23-1997
16:46:05

Peak Inflow = 8.00 cfs
Peak Outflow = 1.68 cfs
Peak Elevation = 108.49 ft

D.6.3 Sediment / Detention Basin #3

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*************************
*                       *
*     Examining the     *
*    EARLE - SITE 5     *
*  SEDIMENT BASIN # 3   *
*                       *
*                       *
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Inflow Hydrograph: 5-SB3 .HYD
Rating Table file: SB3B .PND

----INITIAL CONDITIONS----
Elevation = 98.25 ft
Outflow = 0.00 cfs
Storage = 0.02 ac-ft

Include sediment volume (0.01 Ac-ft) from routing calc.

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
98.00	0.0	0.000
98.25	0.0	0.017
98.50	0.0	0.034
98.75	0.0	0.054
99.00	0.0	0.075
99.25	0.0	0.098
99.50	0.0	0.122
99.75	0.0	0.147
100.00	0.0	0.174
100.25	0.0	0.202
100.50	0.0	0.232
100.75	0.0	0.264
101.00	0.0	0.297
101.25	0.0	0.332
101.50	0.0	0.369
101.75	0.0	0.407
102.00	0.0	0.448
102.25	0.0	0.489
102.50	0.0	0.533
102.75	0.0	0.579
103.00	0.0	0.626
103.25	0.7	0.676
103.50	2.1	0.728
103.75	3.8	0.782

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
4.0	4.0
8.3	8.3
13.1	13.1
18.2	18.2
23.7	23.7
29.5	29.5
35.6	35.6
42.1	42.1
48.9	48.9
56.2	56.2
63.9	63.9
72.0	72.0
80.5	80.5
89.3	89.3
98.6	98.6
108.3	108.3
118.4	118.4
129.0	129.0
140.1	140.1
151.6	151.6
163.6	164.3
176.1	178.2
189.2	193.0

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-29-1997 15:10:54

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	4.0	4.0	0.00	98.25
11.100	0.00	0.0	4.0	4.0	0.00	98.25
11.200	1.00	1.0	5.0	5.0	0.00	98.31
11.300	1.00	2.0	7.0	7.0	0.00	98.42
11.400	1.00	2.0	9.0	9.0	0.00	98.53
11.500	1.00	2.0	11.0	11.0	0.00	98.64
11.600	1.00	2.0	13.0	13.0	0.00	98.75
11.700	1.00	2.0	15.0	15.0	0.00	98.84
11.800	2.00	3.0	18.0	18.0	0.00	98.99
11.900	2.00	4.0	22.0	22.0	0.00	99.17
12.000	3.00	5.0	27.0	27.0	0.00	99.39
12.100	4.00	7.0	34.0	34.0	0.00	99.68
12.200	7.00	11.0	45.0	45.0	0.00	100.11
12.300	11.00	18.0	63.0	63.0	0.00	100.72
12.400	10.00	21.0	84.0	84.0	0.00	101.35
12.500	8.00	18.0	102.0	102.0	0.00	101.84
12.600	6.00	14.0	116.0	116.0	0.00	102.1
12.700	4.00	10.0	126.0	126.0	0.00	102.4
12.800	3.00	7.0	133.0	133.0	0.00	102.59
12.900	2.00	5.0	138.0	138.0	0.00	102.70
13.000	2.00	4.0	142.0	142.0	0.00	102.79
13.100	2.00	4.0	146.0	146.0	0.00	102.88
13.200	2.00	4.0	150.0	150.0	0.00	102.97
13.300	2.00	4.0	153.7	154.0	0.13	103.05
13.400	1.00	3.0	156.2	156.7	0.28	103.10
13.500	1.00	2.0	157.4	158.2	0.36	103.13
13.600	1.00	2.0	158.6	159.4	0.43	103.15
13.700	1.00	2.0	159.6	160.6	0.49	103.18
13.800	1.00	2.0	160.5	161.6	0.55	103.20
13.900	1.00	2.0	161.3	162.5	0.60	103.21
14.000	1.00	2.0	162.0	163.3	0.64	103.23
14.100	1.00	2.0	162.6	164.0	0.68	103.24
14.200	1.00	2.0	163.2	164.6	0.73	103.26
14.300	1.00	2.0	163.6	165.2	0.79	103.27
14.400	1.00	2.0	163.9	165.6	0.83	103.27
14.500	1.00	2.0	164.2	165.9	0.86	103.28
14.600	1.00	2.0	164.4	166.2	0.89	103.28
14.700	1.00	2.0	164.6	166.4	0.91	103.29
14.800	1.00	2.0	164.7	166.6	0.93	103.29
14.900	1.00	2.0	164.8	166.7	0.94	103.29
15.000	1.00	2.0	164.9	166.8	0.96	103.30
15.100	1.00	2.0	165.0	166.9	0.96	103.3
15.200	1.00	2.0	165.1	167.0	0.97	103.3
15.300	1.00	2.0	165.1	167.1	0.98	103.30
15.400	1.00	2.0	165.1	167.1	0.98	103.30

POND-2 Version: 5.17 S/N:
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'ond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	1.00	2.0	165.2	167.1	0.99	103.30
15.600	1.00	2.0	165.2	167.2	0.99	103.30
15.700	1.00	2.0	165.2	167.2	0.99	103.30
15.800	1.00	2.0	165.2	167.2	0.99	103.30
15.900	1.00	2.0	165.2	167.2	0.99	103.30
16.000	1.00	2.0	165.2	167.2	1.00	103.30
16.100	1.00	2.0	165.3	167.2	1.00	103.30
16.200	1.00	2.0	165.3	167.3	1.00	103.30
16.300	0.00	1.0	164.5	166.3	0.90	103.29
16.400	0.00	0.0	163.0	164.5	0.72	103.25
16.500	0.00	0.0	161.8	163.0	0.63	103.23
16.600	0.00	0.0	160.6	161.8	0.56	103.20
16.700	0.00	0.0	159.7	160.6	0.50	103.18
16.800	0.00	0.0	158.8	159.7	0.44	103.16
16.900	0.00	0.0	158.0	158.8	0.40	103.14
17.000	0.00	0.0	157.3	158.0	0.35	103.13
17.100	0.00	0.0	156.6	157.3	0.31	103.11
17.200	0.00	0.0	156.1	156.6	0.28	103.10
17.300	0.00	0.0	155.6	156.1	0.25	103.09
17.400	0.00	0.0	155.1	155.6	0.22	103.08
17.500	0.00	0.0	154.8	155.1	0.20	103.07
17.600	0.00	0.0	154.4	154.8	0.17	103.06
17.700	0.00	0.0	154.1	154.4	0.16	103.06
17.800	0.00	0.0	153.8	154.1	0.14	103.05
17.900	0.00	0.0	153.6	153.8	0.12	103.04
18.000	0.00	0.0	153.4	153.6	0.11	103.04
18.100	0.00	0.0	153.2	153.4	0.10	103.03
18.200	0.00	0.0	153.0	153.2	0.09	103.03
18.300	0.00	0.0	152.8	153.0	0.08	103.03
18.400	0.00	0.0	152.7	152.8	0.07	103.02
18.500	0.00	0.0	152.6	152.7	0.06	103.02
18.600	0.00	0.0	152.5	152.6	0.05	103.02
18.700	0.00	0.0	152.4	152.5	0.05	103.02
18.800	0.00	0.0	152.3	152.4	0.04	103.02
18.900	0.00	0.0	152.2	152.3	0.04	103.01
19.000	0.00	0.0	152.1	152.2	0.03	103.01
19.100	0.00	0.0	152.1	152.1	0.03	103.01
19.200	0.00	0.0	152.0	152.1	0.03	103.01
19.300	0.00	0.0	152.0	152.0	0.02	103.01
19.400	0.00	0.0	151.9	152.0	0.02	103.01
19.500	0.00	0.0	151.9	151.9	0.02	103.01
19.600	0.00	0.0	151.9	151.9	0.02	103.01
19.700	0.00	0.0	151.8	151.9	0.02	103.01
19.800	0.00	0.0	151.8	151.8	0.01	103.00
19.900	0.00	0.0	151.8	151.8	0.01	103.00
20.000	0.00	0.0	151.8	151.8	0.01	103.00

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	151.7	151.8	0.01	103.00
20.200	0.00	0.0	151.7	151.7	0.01	103.00
20.300	0.00	0.0	151.7	151.7	0.01	103.00
20.400	0.00	0.0	151.7	151.7	0.01	103.00
20.500	0.00	0.0	151.7	151.7	0.01	103.00
20.600	0.00	0.0	151.7	151.7	0.01	103.00
20.700	0.00	0.0	151.7	151.7	0.00	103.00
20.800	0.00	0.0	151.6	151.7	0.00	103.00
20.900	0.00	0.0	151.6	151.6	0.00	103.00
21.000	0.00	0.0	151.6	151.6	0.00	103.00
21.100	0.00	0.0	151.6	151.6	0.00	103.00
21.200	0.00	0.0	151.6	151.6	0.00	103.00
21.300	0.00	0.0	151.6	151.6	0.00	103.00
21.400	0.00	0.0	151.6	151.6	0.00	103.00
21.500	0.00	0.0	151.6	151.6	0.00	103.00
21.600	0.00	0.0	151.6	151.6	0.00	103.00
21.700	0.00	0.0	151.6	151.6	0.00	103.0
21.800	0.00	0.0	151.6	151.6	0.00	103.0
21.900	0.00	0.0	151.6	151.6	0.00	103.00
22.000	0.00	0.0	151.6	151.6	0.00	103.00
22.100	0.00	0.0	151.6	151.6	0.00	103.00
22.200	0.00	0.0	151.6	151.6	0.00	103.00
22.300	0.00	0.0	151.6	151.6	0.00	103.00
22.400	0.00	0.0	151.6	151.6	0.00	103.00
22.500	0.00	0.0	151.6	151.6	0.00	103.00
22.600	0.00	0.0	151.6	151.6	0.00	103.00
22.700	0.00	0.0	151.6	151.6	0.00	103.00
22.800	0.00	0.0	151.6	151.6	0.00	103.00
22.900	0.00	0.0	151.6	151.6	0.00	103.00
23.000	0.00	0.0	151.6	151.6	0.00	103.00
23.100	0.00	0.0	151.6	151.6	0.00	103.00
23.200	0.00	0.0	151.6	151.6	0.00	103.00
23.300	0.00	0.0	151.6	151.6	0.00	103.00
23.400	0.00	0.0	151.6	151.6	0.00	103.00
23.500	0.00	0.0	151.6	151.6	0.00	103.00
23.600	0.00	0.0	151.6	151.6	0.00	103.00
23.700	0.00	0.0	151.6	151.6	0.00	103.00
23.800	0.00	0.0	151.6	151.6	0.00	103.00
23.900	0.00	0.0	151.6	151.6	0.00	103.00
24.000	0.00	0.0	151.6	151.6	0.00	103.00
24.100	0.00	0.0	151.6	151.6	0.00	103.00
24.200	0.00	0.0	151.6	151.6	0.00	103.0
24.300	0.00	0.0	151.6	151.6	0.00	103.0
24.400	0.00	0.0	151.6	151.6	0.00	103.00
24.500	0.00	0.0	151.6	151.6	0.00	103.00
24.600	0.00	0.0	151.6	151.6	0.00	103.00

POND-2 Version: 5.17 S/N:
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Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.00
24.800	0.00
24.900	0.00
25.000	0.00
25.100	0.00
25.200	0.00
25.300	0.00
25.400	0.00
25.500	0.00
25.600	0.00
25.700	0.00
25.800	0.00
25.900	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

Include soil volume in routing calc.

Starting Pond W.S. Elevation = 98.25 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 11.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 103.30 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.02 ac-ft
Peak Storage From Storm = 0.67 ac-ft

Total Storage in Pond = 0.69 ac-ft

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

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Peak Inflow = 11.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 103.30 ft

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*********************************************************************
*                                                                   *
*  Routing of the 2-yr, 24-hr storm under POST-CONSTRUCTION Cond.   *
*     through Sed Basin #3 with the MODIFIED outlet structure.      *
*                                                                   *
*                                                                   *
*                                                                   *
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Inflow Hydrograph: DA3-2 .HYD
Rating Table file: SB3 .PND

----INITIAL CONDITIONS----
Elevation = 98.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
98.00	0.0	0.000
98.25	0.0	0.017
98.50	0.0	0.034
98.75	0.0	0.054
99.00	0.0	0.075
99.25	0.0	0.098
99.50	0.0	0.122
99.75	0.0	0.147
100.00	0.0	0.174
100.25	0.0	0.202
100.50	0.0	0.232
100.75	0.0	0.264
101.00	0.0	0.297
101.25	0.0	0.332
101.50	0.0	0.369
101.75	0.0	0.407
102.00	0.0	0.448
102.25	0.0	0.489
102.50	0.0	0.533
102.75	0.0	0.579
103.00	0.0	0.626
103.25	0.7	0.676
103.50	2.1	0.728
103.75	3.8	0.782

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
4.0	4.0
8.3	8.3
13.1	13.1
18.2	18.2
23.7	23.7
29.5	29.5
35.6	35.6
42.1	42.1
48.9	48.9
56.2	56.2
63.9	63.9
72.0	72.0
80.5	80.5
89.3	89.3
98.6	98.6
108.3	108.3
118.4	118.4
129.0	129.0
140.1	140.1
151.6	151.6
163.6	164.3
176.1	178.2
189.2	193.0

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-22-1997 13:32:12

Pond File: SB3 .PND
Inflow Hydrograph: DA3-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	98.00
11.100	0.00	0.0	0.0	0.0	0.00	98.00
11.200	0.00	0.0	0.0	0.0	0.00	98.00
11.300	0.00	0.0	0.0	0.0	0.00	98.00
11.400	0.00	0.0	0.0	0.0	0.00	98.00
11.500	0.00	0.0	0.0	0.0	0.00	98.00
11.600	0.00	0.0	0.0	0.0	0.00	98.00
11.700	0.00	0.0	0.0	0.0	0.00	98.00
11.800	0.00	0.0	0.0	0.0	0.00	98.00
11.900	0.00	0.0	0.0	0.0	0.00	98.00
12.000	0.00	0.0	0.0	0.0	0.00	98.00
12.100	0.00	0.0	0.0	0.0	0.00	98.00
12.200	1.00	1.0	1.0	1.0	0.00	98.06
12.300	2.00	3.0	4.0	4.0	0.00	98.25
12.400	3.00	5.0	9.0	9.0	0.00	98.53
12.500	3.00	6.0	15.0	15.0	0.00	98.84
12.600	2.00	5.0	20.0	20.0	0.00	99.08
12.700	2.00	4.0	24.0	24.0	0.00	99.26
12.800	1.00	3.0	27.0	27.0	0.00	99.39
12.900	1.00	2.0	29.0	29.0	0.00	99.48
13.000	1.00	2.0	31.0	31.0	0.00	99.56
13.100	1.00	2.0	33.0	33.0	0.00	99.64
13.200	1.00	2.0	35.0	35.0	0.00	99.73
13.300	1.00	2.0	37.0	37.0	0.00	99.80
13.400	1.00	2.0	39.0	39.0	0.00	99.88
13.500	1.00	2.0	41.0	41.0	0.00	99.96
13.600	1.00	2.0	43.0	43.0	0.00	100.03
13.700	0.00	1.0	44.0	44.0	0.00	100.07
13.800	0.00	0.0	44.0	44.0	0.00	100.07
13.900	0.00	0.0	44.0	44.0	0.00	100.07
14.000	0.00	0.0	44.0	44.0	0.00	100.07
14.100	0.00	0.0	44.0	44.0	0.00	100.07
14.200	0.00	0.0	44.0	44.0	0.00	100.07
14.300	0.00	0.0	44.0	44.0	0.00	100.07
14.400	0.00	0.0	44.0	44.0	0.00	100.07
14.500	0.00	0.0	44.0	44.0	0.00	100.07
14.600	0.00	0.0	44.0	44.0	0.00	100.07
14.700	0.00	0.0	44.0	44.0	0.00	100.07
14.800	0.00	0.0	44.0	44.0	0.00	100.07
14.900	0.00	0.0	44.0	44.0	0.00	100.07
15.000	0.00	0.0	44.0	44.0	0.00	100.07
15.100	0.00	0.0	44.0	44.0	0.00	100.07
15.200	0.00	0.0	44.0	44.0	0.00	100.07
15.300	0.00	0.0	44.0	44.0	0.00	100.07
15.400	0.00	0.0	44.0	44.0	0.00	100.07

POND-2 Version: 5.17 S/N:
EXECUTED: 12-22-1997 13:32:12

Pond File: SB3 .PND
Inflow Hydrograph: DA3-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	44.0	44.0	0.00	100.07
15.600	0.00	0.0	44.0	44.0	0.00	100.07
15.700	0.00	0.0	44.0	44.0	0.00	100.07
15.800	0.00	0.0	44.0	44.0	0.00	100.07
15.900	0.00	0.0	44.0	44.0	0.00	100.07
16.000	0.00	0.0	44.0	44.0	0.00	100.07
16.100	0.00	0.0	44.0	44.0	0.00	100.07
16.200	0.00	0.0	44.0	44.0	0.00	100.07
16.300	0.00	0.0	44.0	44.0	0.00	100.07
16.400	0.00	0.0	44.0	44.0	0.00	100.07
16.500	0.00	0.0	44.0	44.0	0.00	100.07
16.600	0.00	0.0	44.0	44.0	0.00	100.07
16.700	0.00	0.0	44.0	44.0	0.00	100.07
16.800	0.00	0.0	44.0	44.0	0.00	100.07
16.900	0.00	0.0	44.0	44.0	0.00	100.07
17.000	0.00	0.0	44.0	44.0	0.00	100.07
17.100	0.00	0.0	44.0	44.0	0.00	100.0
17.200	0.00	0.0	44.0	44.0	0.00	100.0
17.300	0.00	0.0	44.0	44.0	0.00	100.07
17.400	0.00	0.0	44.0	44.0	0.00	100.07
17.500	0.00	0.0	44.0	44.0	0.00	100.07
17.600	0.00	0.0	44.0	44.0	0.00	100.07
17.700	0.00	0.0	44.0	44.0	0.00	100.07
17.800	0.00	0.0	44.0	44.0	0.00	100.07
17.900	0.00	0.0	44.0	44.0	0.00	100.07
18.000	0.00	0.0	44.0	44.0	0.00	100.07
18.100	0.00	0.0	44.0	44.0	0.00	100.07
18.200	0.00	0.0	44.0	44.0	0.00	100.07
18.300	0.00	0.0	44.0	44.0	0.00	100.07
18.400	0.00	0.0	44.0	44.0	0.00	100.07
18.500	0.00	0.0	44.0	44.0	0.00	100.07
18.600	0.00	0.0	44.0	44.0	0.00	100.07
18.700	0.00	0.0	44.0	44.0	0.00	100.07
18.800	0.00	0.0	44.0	44.0	0.00	100.07
18.900	0.00	0.0	44.0	44.0	0.00	100.07
19.000	0.00	0.0	44.0	44.0	0.00	100.07
19.100	0.00	0.0	44.0	44.0	0.00	100.07
19.200	0.00	0.0	44.0	44.0	0.00	100.07
19.300	0.00	0.0	44.0	44.0	0.00	100.07
19.400	0.00	0.0	44.0	44.0	0.00	100.07
19.500	0.00	0.0	44.0	44.0	0.00	100.07
19.600	0.00	0.0	44.0	44.0	0.00	100.0
19.700	0.00	0.0	44.0	44.0	0.00	100.0
19.800	0.00	0.0	44.0	44.0	0.00	100.07
19.900	0.00	0.0	44.0	44.0	0.00	100.07
20.000	0.00	0.0	44.0	44.0	0.00	100.07

Pond File: SB3 .PND
Inflow Hydrograph: DA3-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	44.0	44.0	0.00	100.07
20.200	0.00	0.0	44.0	44.0	0.00	100.07
20.300	0.00	0.0	44.0	44.0	0.00	100.07
20.400	0.00	0.0	44.0	44.0	0.00	100.07
20.500	0.00	0.0	44.0	44.0	0.00	100.07
20.600	0.00	0.0	44.0	44.0	0.00	100.07
20.700	0.00	0.0	44.0	44.0	0.00	100.07
20.800	0.00	0.0	44.0	44.0	0.00	100.07
20.900	0.00	0.0	44.0	44.0	0.00	100.07
21.000	0.00	0.0	44.0	44.0	0.00	100.07
21.100	0.00	0.0	44.0	44.0	0.00	100.07
21.200	0.00	0.0	44.0	44.0	0.00	100.07
21.300	0.00	0.0	44.0	44.0	0.00	100.07
21.400	0.00	0.0	44.0	44.0	0.00	100.07
21.500	0.00	0.0	44.0	44.0	0.00	100.07
21.600	0.00	0.0	44.0	44.0	0.00	100.07
21.700	0.00	0.0	44.0	44.0	0.00	100.07
21.800	0.00	0.0	44.0	44.0	0.00	100.07
21.900	0.00	0.0	44.0	44.0	0.00	100.07
22.000	0.00	0.0	44.0	44.0	0.00	100.07
22.100	0.00	0.0	44.0	44.0	0.00	100.07
22.200	0.00	0.0	44.0	44.0	0.00	100.07
22.300	0.00	0.0	44.0	44.0	0.00	100.07
22.400	0.00	0.0	44.0	44.0	0.00	100.07
22.500	0.00	0.0	44.0	44.0	0.00	100.07
22.600	0.00	0.0	44.0	44.0	0.00	100.07
22.700	0.00	0.0	44.0	44.0	0.00	100.07
22.800	0.00	0.0	44.0	44.0	0.00	100.07
22.900	0.00	0.0	44.0	44.0	0.00	100.07
23.000	0.00	0.0	44.0	44.0	0.00	100.07
23.100	0.00	0.0	44.0	44.0	0.00	100.07
23.200	0.00	0.0	44.0	44.0	0.00	100.07
23.300	0.00	0.0	44.0	44.0	0.00	100.07
23.400	0.00	0.0	44.0	44.0	0.00	100.07
23.500	0.00	0.0	44.0	44.0	0.00	100.07
23.600	0.00	0.0	44.0	44.0	0.00	100.07
23.700	0.00	0.0	44.0	44.0	0.00	100.07
23.800	0.00	0.0	44.0	44.0	0.00	100.07
23.900	0.00	0.0	44.0	44.0	0.00	100.07
24.000	0.00	0.0	44.0	44.0	0.00	100.07
24.100	0.00	0.0	44.0	44.0	0.00	100.07
24.200	0.00	0.0	44.0	44.0	0.00	100.07
24.300	0.00	0.0	44.0	44.0	0.00	100.07
24.400	0.00	0.0	44.0	44.0	0.00	100.07
24.500	0.00	0.0	44.0	44.0	0.00	100.07
24.600	0.00	0.0	44.0	44.0	0.00	100.07

Pond File: SB3 .PND
Inflow Hydrograph: DA3-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	44.0	44.0	0.00	100.07
24.800	0.00	0.0	44.0	44.0	0.00	100.07
24.900	0.00	0.0	44.0	44.0	0.00	100.07
25.000	0.00	0.0	44.0	44.0	0.00	100.07
25.100	0.00	0.0	44.0	44.0	0.00	100.07
25.200	0.00	0.0	44.0	44.0	0.00	100.07
25.300	0.00	0.0	44.0	44.0	0.00	100.07
25.400	0.00	0.0	44.0	44.0	0.00	100.07
25.500	0.00	0.0	44.0	44.0	0.00	100.07
25.600	0.00	0.0	44.0	44.0	0.00	100.07
25.700	0.00	0.0	44.0	44.0	0.00	100.07
25.800	0.00	0.0	44.0	44.0	0.00	100.07
25.900	0.00	0.0	44.0	44.0	0.00	100.07

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB3 .PND
Inflow Hydrograph: DA3-2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 98.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 3.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 100.07 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.18 ac-ft

Total Storage in Pond = 0.18 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.17 S/N:                                    Page 7

Pond File:            SB3      .PND
Inflow Hydrograph:    DA3-2    .HYD
Outflow Hydrograph:   OUT      .HYD
                                                   EXECUTED: 12-22-1997
Peak Inflow     =      3.00 cfs                              13:32:12
Peak Outflow    =      0.00 cfs
Peak Elevation  =    100.07 ft
```

```
*********************************************************************
*                                                                   *
* Routing of the 10-yr, 24-hr storm under POST-CONSTRUCTION Cond.   *
*     through Sed Basin #3 with the MODIFIED outlet structure.      *
*                                                                   *
*                                                                   *
*                                                                   *
*********************************************************************
```

Inflow Hydrograph: DA3-10 .HYD
Rating Table file: SB3 .PND

----INITIAL CONDITIONS----
Elevation = 98.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
98.00	0.0	0.000
98.25	0.0	0.017
98.50	0.0	0.034
98.75	0.0	0.054
99.00	0.0	0.075
99.25	0.0	0.098
99.50	0.0	0.122
99.75	0.0	0.147
100.00	0.0	0.174
100.25	0.0	0.202
100.50	0.0	0.232
100.75	0.0	0.264
101.00	0.0	0.297
101.25	0.0	0.332
101.50	0.0	0.369
101.75	0.0	0.407
102.00	0.0	0.448
102.25	0.0	0.489
102.50	0.0	0.533
102.75	0.0	0.579
103.00	0.0	0.626
103.25	0.7	0.676
103.50	2.1	0.728
103.75	3.8	0.782

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
4.0	4.0
8.3	8.3
13.1	13.1
18.2	18.2
23.7	23.7
29.5	29.5
35.6	35.6
42.1	42.1
48.9	48.9
56.2	56.2
63.9	63.9
72.0	72.0
80.5	80.5
89.3	89.3
98.6	98.6
108.3	108.3
118.4	118.4
129.0	129.0
140.1	140.1
151.6	151.6
163.6	164.3
176.1	178.2
189.2	193.0

Time increment (t) = 0.100 hrs.

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	98.00
11.100	0.00	0.0	0.0	0.0	0.00	98.00
11.200	0.00	0.0	0.0	0.0	0.00	98.00
11.300	0.00	0.0	0.0	0.0	0.00	98.00
11.400	0.00	0.0	0.0	0.0	0.00	98.00
11.500	1.00	1.0	1.0	1.0	0.00	98.06
11.600	1.00	2.0	3.0	3.0	0.00	98.19
11.700	1.00	2.0	5.0	5.0	0.00	98.31
11.800	1.00	2.0	7.0	7.0	0.00	98.42
11.900	1.00	2.0	9.0	9.0	0.00	98.53
12.000	2.00	3.0	12.0	12.0	0.00	98.69
12.100	2.00	4.0	16.0	16.0	0.00	98.89
12.200	4.00	6.0	22.0	22.0	0.00	99.17
12.300	6.00	10.0	32.0	32.0	0.00	99.60
12.400	7.00	13.0	45.0	45.0	0.00	100.11
12.500	6.00	13.0	58.0	58.0	0.00	100.56
12.600	5.00	11.0	69.0	69.0	0.00	100.91
12.700	4.00	9.0	78.0	78.0	0.00	101.18
12.800	3.00	7.0	85.0	85.0	0.00	101.38
12.900	2.00	5.0	90.0	90.0	0.00	101.52
13.000	2.00	4.0	94.0	94.0	0.00	101.63
13.100	2.00	4.0	98.0	98.0	0.00	101.73
13.200	1.00	3.0	101.0	101.0	0.00	101.81
13.300	1.00	2.0	103.0	103.0	0.00	101.86
13.400	1.00	2.0	105.0	105.0	0.00	101.91
13.500	1.00	2.0	107.0	107.0	0.00	101.97
13.600	1.00	2.0	109.0	109.0	0.00	102.02
13.700	1.00	2.0	111.0	111.0	0.00	102.07
13.800	1.00	2.0	113.0	113.0	0.00	102.12
13.900	1.00	2.0	115.0	115.0	0.00	102.17
14.000	1.00	2.0	117.0	117.0	0.00	102.21
14.100	1.00	2.0	119.0	119.0	0.00	102.26
14.200	1.00	2.0	121.0	121.0	0.00	102.31
14.300	1.00	2.0	123.0	123.0	0.00	102.36
14.400	1.00	2.0	125.0	125.0	0.00	102.41
14.500	1.00	2.0	127.0	127.0	0.00	102.45
14.600	1.00	2.0	129.0	129.0	0.00	102.50
14.700	1.00	2.0	131.0	131.0	0.00	102.55
14.800	1.00	2.0	133.0	133.0	0.00	102.59
14.900	1.00	2.0	135.0	135.0	0.00	102.64
15.000	1.00	2.0	137.0	137.0	0.00	102.68
15.100	1.00	2.0	139.0	139.0	0.00	102.73
15.200	1.00	2.0	141.0	141.0	0.00	102.77
15.300	0.00	1.0	142.0	142.0	0.00	102.79
15.400	0.00	0.0	142.0	142.0	0.00	102.79

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	142.0	142.0	0.00	102.79
15.600	0.00	0.0	142.0	142.0	0.00	102.79
15.700	0.00	0.0	142.0	142.0	0.00	102.79
15.800	0.00	0.0	142.0	142.0	0.00	102.79
15.900	0.00	0.0	142.0	142.0	0.00	102.79
16.000	0.00	0.0	142.0	142.0	0.00	102.79
16.100	0.00	0.0	142.0	142.0	0.00	102.79
16.200	0.00	0.0	142.0	142.0	0.00	102.79
16.300	0.00	0.0	142.0	142.0	0.00	102.79
16.400	0.00	0.0	142.0	142.0	0.00	102.79
16.500	0.00	0.0	142.0	142.0	0.00	102.79
16.600	0.00	0.0	142.0	142.0	0.00	102.79
16.700	0.00	0.0	142.0	142.0	0.00	102.79
16.800	0.00	0.0	142.0	142.0	0.00	102.79
16.900	0.00	0.0	142.0	142.0	0.00	102.79
17.000	0.00	0.0	142.0	142.0	0.00	102.79
17.100	0.00	0.0	142.0	142.0	0.00	102.79
17.200	0.00	0.0	142.0	142.0	0.00	102.79
17.300	0.00	0.0	142.0	142.0	0.00	102.79
17.400	0.00	0.0	142.0	142.0	0.00	102.79
17.500	0.00	0.0	142.0	142.0	0.00	102.79
17.600	0.00	0.0	142.0	142.0	0.00	102.79
17.700	0.00	0.0	142.0	142.0	0.00	102.79
17.800	0.00	0.0	142.0	142.0	0.00	102.79
17.900	0.00	0.0	142.0	142.0	0.00	102.79
18.000	0.00	0.0	142.0	142.0	0.00	102.79
18.100	0.00	0.0	142.0	142.0	0.00	102.79
18.200	0.00	0.0	142.0	142.0	0.00	102.79
18.300	0.00	0.0	142.0	142.0	0.00	102.79
18.400	0.00	0.0	142.0	142.0	0.00	102.79
18.500	0.00	0.0	142.0	142.0	0.00	102.79
18.600	0.00	0.0	142.0	142.0	0.00	102.79
18.700	0.00	0.0	142.0	142.0	0.00	102.79
18.800	0.00	0.0	142.0	142.0	0.00	102.79
18.900	0.00	0.0	142.0	142.0	0.00	102.79
19.000	0.00	0.0	142.0	142.0	0.00	102.79
19.100	0.00	0.0	142.0	142.0	0.00	102.79
19.200	0.00	0.0	142.0	142.0	0.00	102.79
19.300	0.00	0.0	142.0	142.0	0.00	102.79
19.400	0.00	0.0	142.0	142.0	0.00	102.79
19.500	0.00	0.0	142.0	142.0	0.00	102.79
19.600	0.00	0.0	142.0	142.0	0.00	102.79
19.700	0.00	0.0	142.0	142.0	0.00	102.79
19.800	0.00	0.0	142.0	142.0	0.00	102.79
19.900	0.00	0.0	142.0	142.0	0.00	102.79
20.000	0.00	0.0	142.0	142.0	0.00	102.79

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	142.0	142.0	0.00	102.79
20.200	0.00	0.0	142.0	142.0	0.00	102.79
20.300	0.00	0.0	142.0	142.0	0.00	102.79
20.400	0.00	0.0	142.0	142.0	0.00	102.79
20.500	0.00	0.0	142.0	142.0	0.00	102.79
20.600	0.00	0.0	142.0	142.0	0.00	102.79
20.700	0.00	0.0	142.0	142.0	0.00	102.79
20.800	0.00	0.0	142.0	142.0	0.00	102.79
20.900	0.00	0.0	142.0	142.0	0.00	102.79
21.000	0.00	0.0	142.0	142.0	0.00	102.79
21.100	0.00	0.0	142.0	142.0	0.00	102.79
21.200	0.00	0.0	142.0	142.0	0.00	102.79
21.300	0.00	0.0	142.0	142.0	0.00	102.79
21.400	0.00	0.0	142.0	142.0	0.00	102.79
21.500	0.00	0.0	142.0	142.0	0.00	102.79
21.600	0.00	0.0	142.0	142.0	0.00	102.79
21.700	0.00	0.0	142.0	142.0	0.00	102.79
21.800	0.00	0.0	142.0	142.0	0.00	102.79
21.900	0.00	0.0	142.0	142.0	0.00	102.79
22.000	0.00	0.0	142.0	142.0	0.00	102.79
22.100	0.00	0.0	142.0	142.0	0.00	102.79
22.200	0.00	0.0	142.0	142.0	0.00	102.79
22.300	0.00	0.0	142.0	142.0	0.00	102.79
22.400	0.00	0.0	142.0	142.0	0.00	102.79
22.500	0.00	0.0	142.0	142.0	0.00	102.79
22.600	0.00	0.0	142.0	142.0	0.00	102.79
22.700	0.00	0.0	142.0	142.0	0.00	102.79
22.800	0.00	0.0	142.0	142.0	0.00	102.79
22.900	0.00	0.0	142.0	142.0	0.00	102.79
23.000	0.00	0.0	142.0	142.0	0.00	102.79
23.100	0.00	0.0	142.0	142.0	0.00	102.79
23.200	0.00	0.0	142.0	142.0	0.00	102.79
23.300	0.00	0.0	142.0	142.0	0.00	102.79
23.400	0.00	0.0	142.0	142.0	0.00	102.79
23.500	0.00	0.0	142.0	142.0	0.00	102.79
23.600	0.00	0.0	142.0	142.0	0.00	102.79
23.700	0.00	0.0	142.0	142.0	0.00	102.79
23.800	0.00	0.0	142.0	142.0	0.00	102.79
23.900	0.00	0.0	142.0	142.0	0.00	102.79
24.000	0.00	0.0	142.0	142.0	0.00	102.79
24.100	0.00	0.0	142.0	142.0	0.00	102.79
24.200	0.00	0.0	142.0	142.0	0.00	102.79
24.300	0.00	0.0	142.0	142.0	0.00	102.79
24.400	0.00	0.0	142.0	142.0	0.00	102.79
24.500	0.00	0.0	142.0	142.0	0.00	102.79
24.600	0.00	0.0	142.0	142.0	0.00	102.79

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.00
24.800	0.00
24.900	0.00
25.000	0.00
25.100	0.00
25.200	0.00
25.300	0.00
25.400	0.00
25.500	0.00
25.600	0.00
25.700	0.00
25.800	0.00
25.900	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79
0.0	142.0	142.0	0.00	102.79

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 98.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 7.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 102.79 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.59 ac-ft

Total Storage in Pond = 0.59 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

Pond File: SB3 .PND
Inflow Hydrograph: DA3-10 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-22-1997
13:37:07

Peak Inflow = 7.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 102.79 ft

```
*********************************************************************
*                                                                   *
* Routing of the 25-yr, 24-hr storm under POST-CONSTRUCTURE Cond.   *
*     through Sed Basin #3 with the MODIFIED outlet structure.      *
*                                                                   *
*                                                                   *
*                                                                   *
*********************************************************************
```

Inflow Hydrograph: DA3-25 .HYD
Rating Table file: SB3 .PND

----INITIAL CONDITIONS----
Elevation = 98.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
98.00	0.0	0.000
98.25	0.0	0.017
98.50	0.0	0.034
98.75	0.0	0.054
99.00	0.0	0.075
99.25	0.0	0.098
99.50	0.0	0.122
99.75	0.0	0.147
100.00	0.0	0.174
100.25	0.0	0.202
100.50	0.0	0.232
100.75	0.0	0.264
101.00	0.0	0.297
101.25	0.0	0.332
101.50	0.0	0.369
101.75	0.0	0.407
102.00	0.0	0.448
102.25	0.0	0.489
102.50	0.0	0.533
102.75	0.0	0.579
103.00	0.0	0.626
103.25	0.7	0.676
103.50	2.1	0.728
103.75	3.8	0.782

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
4.0	4.0
8.3	8.3
13.1	13.1
18.2	18.2
23.7	23.7
29.5	29.5
35.6	35.6
42.1	42.1
48.9	48.9
56.2	56.2
63.9	63.9
72.0	72.0
80.5	80.5
89.3	89.3
98.6	98.6
108.3	108.3
118.4	118.4
129.0	129.0
140.1	140.1
151.6	151.6
163.6	164.3
176.1	178.2
189.2	193.0

Time increment (t) = 0.100 hrs.

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
11.000	0.00
11.100	0.00
11.200	1.00
11.300	1.00
11.400	1.00
11.500	1.00
11.600	1.00
11.700	1.00
11.800	1.00
11.900	1.00
12.000	2.00
12.100	3.00
12.200	5.00
12.300	8.00
12.400	9.00
12.500	8.00
12.600	6.00
12.700	5.00
12.800	3.00
12.900	2.00
13.000	2.00
13.100	2.00
13.200	1.00
13.300	1.00
13.400	1.00
13.500	1.00
13.600	1.00
13.700	1.00
13.800	1.00
13.900	1.00
14.000	1.00
14.100	1.00
14.200	1.00
14.300	1.00
14.400	1.00
14.500	1.00
14.600	1.00
14.700	1.00
14.800	1.00
14.900	1.00
15.000	1.00
15.100	1.00
15.200	1.00
15.300	1.00
15.400	1.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
-----	0.0	0.0	0.00	98.00
0.0	0.0	0.0	0.00	98.00
1.0	1.0	1.0	0.00	98.06
2.0	3.0	3.0	0.00	98.19
2.0	5.0	5.0	0.00	98.31
2.0	7.0	7.0	0.00	98.42
2.0	9.0	9.0	0.00	98.53
2.0	11.0	11.0	0.00	98.64
2.0	13.0	13.0	0.00	98.75
2.0	15.0	15.0	0.00	98.84
3.0	18.0	18.0	0.00	98.99
5.0	23.0	23.0	0.00	99.22
8.0	31.0	31.0	0.00	99.56
13.0	44.0	44.0	0.00	100.07
17.0	61.0	61.0	0.00	100.66
17.0	78.0	78.0	0.00	101.18
14.0	92.0	92.0	0.00	101.57
11.0	103.0	103.0	0.00	101.86
8.0	111.0	111.0	0.00	102.07
5.0	116.0	116.0	0.00	102.19
4.0	120.0	120.0	0.00	102.29
4.0	124.0	124.0	0.00	102.38
3.0	127.0	127.0	0.00	102.45
2.0	129.0	129.0	0.00	102.50
2.0	131.0	131.0	0.00	102.55
2.0	133.0	133.0	0.00	102.59
2.0	135.0	135.0	0.00	102.64
2.0	137.0	137.0	0.00	102.68
2.0	139.0	139.0	0.00	102.73
2.0	141.0	141.0	0.00	102.77
2.0	143.0	143.0	0.00	102.81
2.0	145.0	145.0	0.00	102.86
2.0	147.0	147.0	0.00	102.90
2.0	149.0	149.0	0.00	102.94
2.0	151.0	151.0	0.00	102.99
2.0	152.8	153.0	0.08	103.03
2.0	154.5	154.8	0.18	103.06
2.0	155.9	156.5	0.27	103.10
2.0	157.2	157.9	0.35	103.13
2.0	158.4	159.2	0.42	103.15
2.0	159.4	160.4	0.49	103.17
2.0	160.3	161.4	0.54	103.19
2.0	161.2	162.3	0.59	103.21
2.0	161.9	163.2	0.64	103.23
2.0	162.5	163.9	0.68	103.24

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
15.500	1.00
15.600	1.00
15.700	1.00
15.800	0.00
15.900	0.00
16.000	0.00
16.100	0.00
16.200	0.00
16.300	0.00
16.400	0.00
16.500	0.00
16.600	0.00
16.700	0.00
16.800	0.00
16.900	0.00
17.000	0.00
17.100	0.00
17.200	0.00
17.300	0.00
17.400	0.00
17.500	0.00
17.600	0.00
17.700	0.00
17.800	0.00
17.900	0.00
18.000	0.00
18.100	0.00
18.200	0.00
18.300	0.00
18.400	0.00
18.500	0.00
18.600	0.00
18.700	0.00
18.800	0.00
18.900	0.00
19.000	0.00
19.100	0.00
19.200	0.00
19.300	0.00
19.400	0.00
19.500	0.00
19.600	0.00
19.700	0.00
19.800	0.00
19.900	0.00
20.000	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
2.0	163.1	164.5	0.72	103.25
2.0	163.5	165.1	0.78	103.26
2.0	163.9	165.5	0.82	103.27
1.0	163.4	164.9	0.76	103.26
0.0	162.1	163.4	0.65	103.23
0.0	160.9	162.1	0.58	103.21
0.0	159.9	160.9	0.51	103.18
0.0	159.0	159.9	0.46	103.16
0.0	158.2	159.0	0.41	103.15
0.0	157.4	158.2	0.36	103.13
0.0	156.8	157.4	0.32	103.12
0.0	156.2	156.8	0.29	103.10
0.0	155.7	156.2	0.26	103.09
0.0	155.3	155.7	0.23	103.08
0.0	154.8	155.3	0.20	103.07
0.0	154.5	154.8	0.18	103.06
0.0	154.2	154.5	0.16	103.06
0.0	153.9	154.2	0.14	103.05
0.0	153.6	153.9	0.13	103.05
0.0	153.4	153.6	0.11	103.04
0.0	153.2	153.4	0.10	103.04
0.0	153.0	153.2	0.09	103.03
0.0	152.9	153.0	0.08	103.03
0.0	152.7	152.9	0.07	103.03
0.0	152.6	152.7	0.06	103.02
0.0	152.5	152.6	0.06	103.02
0.0	152.4	152.5	0.05	103.02
0.0	152.3	152.4	0.04	103.02
0.0	152.2	152.3	0.04	103.01
0.0	152.1	152.2	0.04	103.01
0.0	152.1	152.1	0.03	103.01
0.0	152.0	152.1	0.03	103.01
0.0	152.0	152.0	0.02	103.01
0.0	151.9	152.0	0.02	103.01
0.0	151.9	151.9	0.02	103.01
0.0	151.9	151.9	0.02	103.01
0.0	151.8	151.9	0.02	103.01
0.0	151.8	151.8	0.01	103.00
0.0	151.8	151.8	0.01	103.00
0.0	151.8	151.8	0.01	103.00
0.0	151.7	151.8	0.01	103.00
0.0	151.7	151.7	0.01	103.00
0.0	151.7	151.7	0.01	103.00
0.0	151.7	151.7	0.01	103.00
0.0	151.7	151.7	0.01	103.00
0.0	151.7	151.7	0.01	103.00

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	151.7	151.7	0.00	103.00
20.200	0.00	0.0	151.7	151.7	0.00	103.00
20.300	0.00	0.0	151.6	151.7	0.00	103.00
20.400	0.00	0.0	151.6	151.6	0.00	103.00
20.500	0.00	0.0	151.6	151.6	0.00	103.00
20.600	0.00	0.0	151.6	151.6	0.00	103.00
20.700	0.00	0.0	151.6	151.6	0.00	103.00
20.800	0.00	0.0	151.6	151.6	0.00	103.00
20.900	0.00	0.0	151.6	151.6	0.00	103.00
21.000	0.00	0.0	151.6	151.6	0.00	103.00
21.100	0.00	0.0	151.6	151.6	0.00	103.00
21.200	0.00	0.0	151.6	151.6	0.00	103.00
21.300	0.00	0.0	151.6	151.6	0.00	103.00
21.400	0.00	0.0	151.6	151.6	0.00	103.00
21.500	0.00	0.0	151.6	151.6	0.00	103.00
21.600	0.00	0.0	151.6	151.6	0.00	103.00
21.700	0.00	0.0	151.6	151.6	0.00	103.00
21.800	0.00	0.0	151.6	151.6	0.00	103.00
21.900	0.00	0.0	151.6	151.6	0.00	103.00
22.000	0.00	0.0	151.6	151.6	0.00	103.00
22.100	0.00	0.0	151.6	151.6	0.00	103.00
22.200	0.00	0.0	151.6	151.6	0.00	103.00
22.300	0.00	0.0	151.6	151.6	0.00	103.00
22.400	0.00	0.0	151.6	151.6	0.00	103.00
22.500	0.00	0.0	151.6	151.6	0.00	103.00
22.600	0.00	0.0	151.6	151.6	0.00	103.00
22.700	0.00	0.0	151.6	151.6	0.00	103.00
22.800	0.00	0.0	151.6	151.6	0.00	103.00
22.900	0.00	0.0	151.6	151.6	0.00	103.00
23.000	0.00	0.0	151.6	151.6	0.00	103.00
23.100	0.00	0.0	151.6	151.6	0.00	103.00
23.200	0.00	0.0	151.6	151.6	0.00	103.00
23.300	0.00	0.0	151.6	151.6	0.00	103.00
23.400	0.00	0.0	151.6	151.6	0.00	103.00
23.500	0.00	0.0	151.6	151.6	0.00	103.00
23.600	0.00	0.0	151.6	151.6	0.00	103.00
23.700	0.00	0.0	151.6	151.6	0.00	103.00
23.800	0.00	0.0	151.6	151.6	0.00	103.00
23.900	0.00	0.0	151.6	151.6	0.00	103.00
24.000	0.00	0.0	151.6	151.6	0.00	103.00
24.100	0.00	0.0	151.6	151.6	0.00	103.00
24.200	0.00	0.0	151.6	151.6	0.00	103.00
24.300	0.00	0.0	151.6	151.6	0.00	103.00
24.400	0.00	0.0	151.6	151.6	0.00	103.00
24.500	0.00	0.0	151.6	151.6	0.00	103.00
24.600	0.00	0.0	151.6	151.6	0.00	103.00

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	151.6	151.6	0.00	103.00
24.800	0.00	0.0	151.6	151.6	0.00	103.00
24.900	0.00	0.0	151.6	151.6	0.00	103.00
25.000	0.00	0.0	151.6	151.6	0.00	103.00
25.100	0.00	0.0	151.6	151.6	0.00	103.00
25.200	0.00	0.0	151.6	151.6	0.00	103.00
25.300	0.00	0.0	151.6	151.6	0.00	103.00
25.400	0.00	0.0	151.6	151.6	0.00	103.00
25.500	0.00	0.0	151.6	151.6	0.00	103.00
25.600	0.00	0.0	151.6	151.6	0.00	103.00
25.700	0.00	0.0	151.6	151.6	0.00	103.00
25.800	0.00	0.0	151.6	151.6	0.00	103.00
25.900	0.00	0.0	151.6	151.6	0.00	103.00

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 98.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 9.00 cfs
Peak Outflow = 0.82 cfs
Peak Elevation = 103.27 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.68 ac-ft

Total Storage in Pond = 0.68 ac-ft

Pond File: SB3 .PND
Inflow Hydrograph: DA3-25 .HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-22-1997
13:43:24

Peak Inflow = 9.00 cfs
Peak Outflow = 0.82 cfs
Peak Elevation = 103.27 ft

D.7 EMERGENCY SPILLWAY CALCULATIONS

D.7.1 Sediment / Detention Basin #1

```
*********************************************************************
*                                                                   *
*                          EARLE - SITE 5                           *
*                    DURING CONSTRUCTION CONDITIONS                 *
*  EMERGENCY SPILLWAY CHECK : ROUTE THE 25-YR DURING CONSTRUCTION   *
*   ON-SITE AND OFF-SITE PEAK DISCHARGE THROUGH THE REVISED BASIN   *
*                                                                   *
*********************************************************************
```

Inflow Hydrograph: DC1SUM25.HYD
Rating Table file: SB1-TEST.PND

----INITIAL CONDITIONS----
Elevation = 94.10 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
94.10	0.0	0.000
94.30	0.0	0.039
94.50	0.0	0.079
94.70	0.0	0.121
94.90	0.0	0.164
95.10	0.0	0.208
95.30	0.0	0.253
95.50	0.0	0.299
95.70	0.0	0.347
95.90	0.0	0.396
96.10	0.0	0.446
96.30	0.0	0.501
96.50	0.0	0.562
96.70	0.0	0.628
96.90	0.0	0.700
97.10	0.0	0.778
97.30	0.0	0.863
97.50	0.0	0.955
97.70	0.0	1.055
97.90	0.0	1.163
98.10	0.0	1.279
98.30	0.0	1.400
98.50	0.0	1.527
98.70	0.0	1.660
98.90	0.0	1.798
99.10	0.0	1.942
99.30	0.0	2.091
99.50	0.0	2.246
99.70	0.0	2.407
99.90	0.0	2.573
100.10	5.8	2.745

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
9.5	9.5
19.2	19.2
29.3	29.3
39.6	39.6
50.3	50.3
61.2	61.2
72.4	72.4
83.9	83.9
95.7	95.7
107.9	107.9
121.3	121.3
135.9	135.9
151.9	151.9
169.4	169.4
188.3	188.3
208.9	208.9
231.2	231.2
255.4	255.4
281.5	281.5
309.5	309.5
338.9	338.9
369.6	369.6
401.6	401.6
435.1	435.1
469.9	469.9
506.1	506.1
543.6	543.6
582.4	582.4
622.6	622.6
664.2	670.0

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
100.30	30.9	2.921
100.50	68.4	3.103
100.70	116.5	3.289
100.90	174.6	3.480

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
707.0	737.9
750.9	819.3
795.9	912.4
842.2	1016.8

Time increment (t) = 0.100 hrs.

EXECUTED: 12-30-1997 18:54:07

ɔnd File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	1.00	-----	0.0	0.0	0.00	94.10
11.100	1.00	2.0	2.0	2.0	0.00	94.14
11.200	2.00	3.0	5.0	5.0	0.00	94.21
11.300	2.00	4.0	9.0	9.0	0.00	94.29
11.400	2.00	4.0	13.0	13.0	0.00	94.37
11.500	3.00	5.0	18.0	18.0	0.00	94.47
11.600	3.00	6.0	24.0	24.0	0.00	94.59
11.700	4.00	7.0	31.0	31.0	0.00	94.73
11.800	4.00	8.0	39.0	39.0	0.00	94.89
11.900	5.00	9.0	48.0	48.0	0.00	95.06
12.000	8.00	13.0	61.0	61.0	0.00	95.30
12.100	12.00	20.0	81.0	81.0	0.00	95.65
12.200	19.00	31.0	112.0	112.0	0.00	96.16
12.300	31.00	50.0	162.0	162.0	0.00	96.82
12.400	31.00	62.0	224.0	224.0	0.00	97.44
12.500	26.00	57.0	281.0	281.0	0.00	97.90
12.600	22.00	48.0	329.0	329.0	0.00	98.23
12.700	20.00	42.0	371.0	371.0	0.00	98.51
12.800	17.00	37.0	408.0	408.0	0.00	98.74
12.900	15.00	32.0	440.0	440.0	0.00	98.93
13.000	13.00	28.0	468.0	468.0	0.00	99.09
13.100	11.00	24.0	492.0	492.0	0.00	99.22
13.200	10.00	21.0	513.0	513.0	0.00	99.34
13.300	10.00	20.0	533.0	533.0	0.00	99.44
13.400	9.00	19.0	552.0	552.0	0.00	99.54
13.500	9.00	18.0	570.0	570.0	0.00	99.64
13.600	7.00	16.0	586.0	586.0	0.00	99.72
13.700	7.00	14.0	600.0	600.0	0.00	99.79
13.800	7.00	14.0	614.0	614.0	0.00	99.86
13.900	7.00	14.0	626.7	628.0	0.66	99.92
14.000	7.00	14.0	636.3	640.7	2.21	99.98
14.100	7.00	14.0	643.5	650.3	3.38	100.02
14.200	7.00	14.0	649.0	657.5	4.27	100.05
14.300	7.00	14.0	653.1	663.0	4.94	100.07
14.400	7.00	14.0	656.2	667.1	5.44	100.09
14.500	5.00	12.0	657.1	668.2	5.58	100.09
14.600	5.00	10.0	656.2	667.1	5.44	100.09
14.700	5.00	10.0	655.5	666.2	5.33	100.08
14.800	5.00	10.0	655.0	665.5	5.25	100.08
14.900	5.00	10.0	654.7	665.0	5.19	100.08
15.000	5.00	10.0	654.4	664.7	5.14	100.08
15.100	5.00	10.0	654.2	664.4	5.11	100.08
15.200	5.00	10.0	654.0	664.2	5.08	100.08
15.300	5.00	10.0	653.9	664.0	5.06	100.07
15.400	5.00	10.0	653.8	663.9	5.05	100.07

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 18:54:07

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	5.00	10.0	653.7	663.8	5.03	100.07
15.600	5.00	10.0	653.7	663.7	5.03	100.07
15.700	5.00	10.0	653.6	663.7	5.02	100.07
15.800	5.00	10.0	653.6	663.6	5.02	100.07
15.900	5.00	10.0	653.6	663.6	5.01	100.07
16.000	5.00	10.0	653.5	663.6	5.01	100.07
16.100	5.00	10.0	653.5	663.5	5.01	100.07
16.200	5.00	10.0	653.5	663.5	5.00	100.07
16.300	3.00	8.0	652.0	661.5	4.76	100.06
16.400	3.00	6.0	649.3	658.0	4.33	100.05
16.500	3.00	6.0	647.3	655.3	4.00	100.04
16.600	3.00	6.0	645.8	653.3	3.76	100.03
16.700	3.00	6.0	644.7	651.8	3.57	100.02
16.800	3.00	6.0	643.8	650.7	3.43	100.02
16.900	3.00	6.0	643.2	649.8	3.33	100.01
17.000	3.00	6.0	642.7	649.2	3.25	100.01
17.100	3.00	6.0	642.3	648.7	3.19	100.01
17.200	3.00	6.0	642.0	648.3	3.14	100.01
17.300	3.00	6.0	641.8	648.0	3.11	100.01
17.400	3.00	6.0	641.6	647.8	3.08	100.01
17.500	3.00	6.0	641.5	647.6	3.06	100.01
17.600	3.00	6.0	641.4	647.5	3.05	100.01
17.700	3.00	6.0	641.4	647.4	3.03	100.00
17.800	3.00	6.0	641.3	647.4	3.03	100.00
17.900	3.00	6.0	641.3	647.3	3.02	100.00
18.000	3.00	6.0	641.2	647.3	3.01	100.00
18.100	3.00	6.0	641.2	647.2	3.01	100.00
18.200	3.00	6.0	641.2	647.2	3.01	100.00
18.300	3.00	6.0	641.2	647.2	3.01	100.00
18.400	3.00	6.0	641.2	647.2	3.00	100.00
18.500	3.00	6.0	641.2	647.2	3.00	100.00
18.600	2.00	5.0	640.4	646.2	2.88	100.00
18.700	2.00	4.0	639.1	644.4	2.66	99.99
18.800	2.00	4.0	638.1	643.1	2.50	99.99
18.900	2.00	4.0	637.3	642.1	2.38	99.98
19.000	2.00	4.0	636.7	641.3	2.29	99.98
19.100	2.00	4.0	636.3	640.7	2.22	99.98
19.200	2.00	4.0	636.0	640.3	2.16	99.97
19.300	2.00	4.0	635.7	640.0	2.12	99.97
19.400	2.00	4.0	635.6	639.7	2.09	99.97
19.500	2.00	4.0	635.4	639.6	2.07	99.97
19.600	2.00	4.0	635.3	639.4	2.05	99.97
19.700	2.00	4.0	635.2	639.3	2.04	99.97
19.800	2.00	4.0	635.2	639.2	2.03	99.97
19.900	2.00	4.0	635.1	639.2	2.02	99.97
20.000	2.00	4.0	635.1	639.1	2.02	99.97

POND-2 Version: 5.17 S/N:
EXECUTED: 12-30-1997 18:54:07

ond File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	2.00	4.0	635.1	639.1	2.01	99.97
20.200	2.00	4.0	635.0	639.1	2.01	99.97
20.300	2.00	4.0	635.0	639.0	2.01	99.97
20.400	2.00	4.0	635.0	639.0	2.01	99.97
20.500	2.00	4.0	635.0	639.0	2.00	99.97
20.600	2.00	4.0	635.0	639.0	2.00	99.97
20.700	2.00	4.0	635.0	639.0	2.00	99.97
20.800	2.00	4.0	635.0	639.0	2.00	99.97
20.900	2.00	4.0	635.0	639.0	2.00	99.97
21.000	2.00	4.0	635.0	639.0	2.00	99.97
21.100	2.00	4.0	635.0	639.0	2.00	99.97
21.200	2.00	4.0	635.0	639.0	2.00	99.97
21.300	2.00	4.0	635.0	639.0	2.00	99.97
21.400	2.00	4.0	635.0	639.0	2.00	99.97
21.500	2.00	4.0	635.0	639.0	2.00	99.97
21.600	2.00	4.0	635.0	639.0	2.00	99.97
21.700	2.00	4.0	635.0	639.0	2.00	99.97
21.800	2.00	4.0	635.0	639.0	2.00	99.97
21.900	2.00	4.0	635.0	639.0	2.00	99.97
22.000	2.00	4.0	635.0	639.0	2.00	99.97
22.100	2.00	4.0	635.0	639.0	2.00	99.97
22.200	2.00	4.0	635.0	639.0	2.00	99.97
22.300	2.00	4.0	635.0	639.0	2.00	99.97
22.400	2.00	4.0	635.0	639.0	2.00	99.97
22.500	2.00	4.0	635.0	639.0	2.00	99.97
22.600	2.00	4.0	635.0	639.0	2.00	99.97
22.700	2.00	4.0	635.0	639.0	2.00	99.97
22.800	2.00	4.0	635.0	639.0	2.00	99.97
22.900	2.00	4.0	635.0	639.0	2.00	99.97
23.000	2.00	4.0	635.0	639.0	2.00	99.97
23.100	2.00	4.0	635.0	639.0	2.00	99.97
23.200	2.00	4.0	635.0	639.0	2.00	99.97
23.300	2.00	4.0	635.0	639.0	2.00	99.97
23.400	2.00	4.0	635.0	639.0	2.00	99.97
23.500	2.00	4.0	635.0	639.0	2.00	99.97
23.600	2.00	4.0	635.0	639.0	2.00	99.97
23.700	2.00	4.0	635.0	639.0	2.00	99.97
23.800	2.00	4.0	635.0	639.0	2.00	99.97
23.900	2.00	4.0	635.0	639.0	2.00	99.97
24.000	0.00	2.0	633.5	637.0	1.76	99.96
24.100	0.00	0.0	630.8	633.5	1.33	99.95
24.200	0.00	0.0	628.8	630.8	1.00	99.93
24.300	0.00	0.0	627.3	628.8	0.76	99.93
24.400	0.00	0.0	626.2	627.3	0.57	99.92
24.500	0.00	0.0	625.3	626.2	0.43	99.91
24.600	0.00	0.0	624.7	625.3	0.33	99.91

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	624.2	624.7	0.25	99.91
24.800	0.00	0.0	623.8	624.2	0.19	99.91
24.900	0.00	0.0	623.5	623.8	0.14	99.90
25.000	0.00	0.0	623.3	623.5	0.11	99.90
25.100	0.00	0.0	623.1	623.3	0.08	99.90
25.200	0.00	0.0	623.0	623.1	0.06	99.90
25.300	0.00	0.0	622.9	623.0	0.05	99.90
25.400	0.00	0.0	622.9	622.9	0.03	99.90
25.500	0.00	0.0	622.8	622.9	0.03	99.90
25.600	0.00	0.0	622.8	622.8	0.02	99.90
25.700	0.00	0.0	622.7	622.8	0.01	99.90
25.800	0.00	0.0	622.7	622.7	0.01	99.90
25.900	0.00	0.0	622.7	622.7	0.01	99.90

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 94.10 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 31.00 cfs
Peak Outflow = 5.58 cfs
Peak Elevation = 100.09 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 2.74 ac-ft

Total Storage in Pond = 2.74 ac-ft

Warning: Inflow hydrograph truncated on left side.

Pond File: SB1-TEST.PND
Inflow Hydrograph: DC1SUM25.HYD
Outflow Hydrograph: OUT .HYD

EXECUTED: 12-30-1997
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Peak Inflow = 31.00 cfs
Peak Outflow = 5.58 cfs
Peak Elevation = 100.09 ft

Executed 01-02-1998 12:26:23

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-25 (cfs)	OFF-25 (cfs)	DC1SUM25 (Total)
11.00	1.0	0.0	1.0
11.10	1.0	0.0	1.0
11.20	2.0	0.0	2.0
11.30	2.0	0.0	2.0
11.40	2.0	0.0	2.0
11.50	3.0	0.0	3.0
11.60	3.0	0.0	3.0
11.70	4.0	0.0	4.0
11.80	4.0	0.0	4.0
11.90	5.0	0.0	5.0
12.00	8.0	0.0	8.0
12.10	12.0	0.0	12.0
12.20	19.0	0.0	19.0
12.30	31.0	0.0	31.0
12.40	30.0	1.0	31.0
12.50	23.0	3.0	26.0
12.60	17.0	5.0	22.0
12.70	13.0	7.0	20.0
12.80	9.0	8.0	17.0
12.90	7.0	8.0	15.0
13.00	6.0	7.0	13.0
13.10	5.0	6.0	11.0
13.20	4.0	6.0	10.0
13.30	4.0	6.0	10.0
13.40	4.0	5.0	9.0
13.50	4.0	5.0	9.0
13.60	3.0	4.0	7.0
13.70	3.0	4.0	7.0
13.80	3.0	4.0	7.0
13.90	3.0	4.0	7.0
14.00	3.0	4.0	7.0
14.10	3.0	4.0	7.0
14.20	3.0	4.0	7.0
14.30	3.0	4.0	7.0
14.40	3.0	4.0	7.0
14.50	2.0	3.0	5.0
14.60	2.0	3.0	5.0
14.70	2.0	3.0	5.0
14.80	2.0	3.0	5.0
14.90	2.0	3.0	5.0

Executed 01-02-1998 12:26:23

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-25 (cfs)	OFF-25 (cfs)	DC1SUM25 (Total)
15.00	2.0	3.0	5.0
15.10	2.0	3.0	5.0
15.20	2.0	3.0	5.0
15.30	2.0	3.0	5.0
15.40	2.0	3.0	5.0
15.50	2.0	3.0	5.0
15.60	2.0	3.0	5.0
15.70	2.0	3.0	5.0
15.80	2.0	3.0	5.0
15.90	2.0	3.0	5.0
16.00	2.0	3.0	5.0
16.10	2.0	3.0	5.0
16.20	2.0	3.0	5.0
16.30	1.0	2.0	3.0
16.40	1.0	2.0	3.0
16.50	1.0	2.0	3.0
16.60	1.0	2.0	3.0
16.70	1.0	2.0	3.0
16.80	1.0	2.0	3.0
16.90	1.0	2.0	3.0
17.00	1.0	2.0	3.0
17.10	1.0	2.0	3.0
17.20	1.0	2.0	3.0
17.30	1.0	2.0	3.0
17.40	1.0	2.0	3.0
17.50	1.0	2.0	3.0
17.60	1.0	2.0	3.0
17.70	1.0	2.0	3.0
17.80	1.0	2.0	3.0
17.90	1.0	2.0	3.0
18.00	1.0	2.0	3.0
18.10	1.0	2.0	3.0
18.20	1.0	2.0	3.0
18.30	1.0	2.0	3.0
18.40	1.0	2.0	3.0
18.50	1.0	2.0	3.0
18.60	1.0	1.0	2.0
18.70	1.0	1.0	2.0
18.80	1.0	1.0	2.0
18.90	1.0	1.0	2.0
19.00	1.0	1.0	2.0

Executed 01-02-1998 12:26:23

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-25 (cfs)	OFF-25 (cfs)	DC1SUM25 (Total)
19.10	1.0	1.0	2.0
19.20	1.0	1.0	2.0
19.30	1.0	1.0	2.0
19.40	1.0	1.0	2.0
19.50	1.0	1.0	2.0
19.60	1.0	1.0	2.0
19.70	1.0	1.0	2.0
19.80	1.0	1.0	2.0
19.90	1.0	1.0	2.0
20.00	1.0	1.0	2.0
20.10	1.0	1.0	2.0
20.20	1.0	1.0	2.0
20.30	1.0	1.0	2.0
20.40	1.0	1.0	2.0
20.50	1.0	1.0	2.0
20.60	1.0	1.0	2.0
20.70	1.0	1.0	2.0
20.80	1.0	1.0	2.0
20.90	1.0	1.0	2.0
21.00	1.0	1.0	2.0
21.10	1.0	1.0	2.0
21.20	1.0	1.0	2.0
21.30	1.0	1.0	2.0
21.40	1.0	1.0	2.0
21.50	1.0	1.0	2.0
21.60	1.0	1.0	2.0
21.70	1.0	1.0	2.0
21.80	1.0	1.0	2.0
21.90	1.0	1.0	2.0
22.00	1.0	1.0	2.0
22.10	1.0	1.0	2.0
22.20	1.0	1.0	2.0
22.30	1.0	1.0	2.0
22.40	1.0	1.0	2.0
22.50	1.0	1.0	2.0
22.60	1.0	1.0	2.0
22.70	1.0	1.0	2.0
22.80	1.0	1.0	2.0
22.90	1.0	1.0	2.0
23.00	1.0	1.0	2.0
23.10	1.0	1.0	2.0

Executed 01-02-1998 12:26:23

Data directory: *.HYD

File Summary for Composite Hydrograph

Time (hrs)	DC1-25 (cfs)	OFF-25 (cfs)	DC1SUM25 (Total)
23.20	1.0	1.0	2.0
23.30	1.0	1.0	2.0
23.40	1.0	1.0	2.0
23.50	1.0	1.0	2.0
23.60	1.0	1.0	2.0
23.70	1.0	1.0	2.0
23.80	1.0	1.0	2.0
23.90	1.0	1.0	2.0
24.00	0.0	0.0	0.0
24.10	0.0	0.0	0.0
24.20	0.0	0.0	0.0
24.30	0.0	0.0	0.0
24.40	0.0	0.0	0.0
24.50	0.0	0.0	0.0
24.60	0.0	0.0	0.0
24.70	0.0	0.0	0.0
24.80	0.0	0.0	0.0
24.90	0.0	0.0	0.0
25.00	0.0	0.0	0.0
25.10	0.0	0.0	0.0
25.20	0.0	0.0	0.0
25.30	0.0	0.0	0.0
25.40	0.0	0.0	0.0
25.50	0.0	0.0	0.0
25.60	0.0	0.0	0.0
25.70	0.0	0.0	0.0
25.80	0.0	0.0	0.0
25.90	0.0	0.0	0.0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:23:44
Watershed file: --> DC1-25 .WSD
Hydrograph file: --> DC1-25 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 1	9.56	79.0	0.10	0.10	6.00	3.68	.09	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 9.56 acres or 0.01494 sq.mi
Peak discharge = 31 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 1	0.10	0.10	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:23:44
Watershed file: --> DC1-25 .WSD
Hydrograph file: --> DC1-25 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 1	31	12.3
Composite Watershed	31	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:23:44
Watershed file: --> DC1-25 .WSD
Hydrograph file: --> DC1-25 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 1	1	2	3	5	8	12	19	31	30
Total (cfs)	1	2	3	5	8	12	19	31	30

Subarea escription	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 1	23	17	13	9	6	4	4	3	3
Total (cfs)	23	17	13	9	6	4	4	3	3

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 1	3	3	2	2	2	2	1	1	1
Total (cfs)	3	3	2	2	2	2	1	1	1

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 1	1	1	1	1	0
Total (cfs)	1	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:23:44
Watershed file: --> DC1-25 .WSD
Hydrograph file: --> DC1-25 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	1	14.8	2
11.1	1	14.9	2
11.2	2	15.0	2
11.3	2	15.1	2
11.4	2	15.2	2
11.5	3	15.3	2
11.6	3	15.4	2
11.7	4	15.5	2
11.8	4	15.6	2
11.9	5	15.7	2
12.0	8	15.8	2
12.1	12	15.9	2
12.2	19	16.0	2
12.3	31	16.1	2
12.4	30	16.2	2
12.5	23	16.3	1
12.6	17	16.4	1
12.7	13	16.5	1
12.8	9	16.6	1
12.9	7	16.7	1
13.0	6	16.8	1
13.1	5	16.9	1
13.2	4	17.0	1
13.3	4	17.1	1
13.4	4	17.2	1
13.5	4	17.3	1
13.6	3	17.4	1
13.7	3	17.5	1
13.8	3	17.6	1
13.9	3	17.7	1
14.0	3	17.8	1
14.1	3	17.9	1
14.2	3	18.0	1
14.3	3	18.1	1
14.4	3	18.2	1
14.5	2	18.3	1
14.6	2	18.4	1
14.7	2	18.5	1

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:23:44
Watershed file: --> DC1-25 .WSD
Hydrograph file: --> DC1-25 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
DRAINAGE AREA #1 : ON-SITE RUNOFF
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:24:51
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
OFF-SITE	42.70	42.0	0.30	0.40	6.00	0.62	.46 .50

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 42.70 acres or 0.06672 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
OFF-SITE	0.33	0.33	0.30	0.40	No	--

* Travel time from subarea outfall to composite watershed outfall point.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:24:51
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
OFF-SITE	8	12.8
Composite Watershed	8	12.8

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:24:51
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
OFF-SITE	0	0	0	0	0	0	0	0	1
Total (cfs)	0	0	0	0	0	0	0	0	1

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
OFF-SITE	3	5	7	8	7	6	5	4	4
Total (cfs)	3	5	7	8	7	6	5	4	4

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
OFF-SITE	4	4	3	3	3	3	2	2	2
Total (cfs)	4	4	3	3	3	3	2	2	2

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
OFF-SITE	2	1	1	1	0
Total (cfs)	2	1	1	1	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:24:51
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	3
11.1	0	14.9	3
11.2	0	15.0	3
11.3	0	15.1	3
11.4	0	15.2	3
11.5	0	15.3	3
11.6	0	15.4	3
11.7	0	15.5	3
11.8	0	15.6	3
11.9	0	15.7	3
12.0	0	15.8	3
12.1	0	15.9	3
12.2	0	16.0	3
12.3	0	16.1	3
12.4	1	16.2	3
12.5	3	16.3	2
12.6	5	16.4	2
12.7	7	16.5	2
12.8	8	16.6	2
12.9	8	16.7	2
13.0	7	16.8	2
13.1	6	16.9	2
13.2	6	17.0	2
13.3	6	17.1	2
13.4	5	17.2	2
13.5	5	17.3	2
13.6	4	17.4	2
13.7	4	17.5	2
13.8	4	17.6	2
13.9	4	17.7	2
14.0	4	17.8	2
14.1	4	17.9	2
14.2	4	18.0	2
14.3	4	18.1	2
14.4	4	18.2	2
14.5	3	18.3	2
14.6	3	18.4	2
14.7	3	18.5	2

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 01-02-1998 12:24:51
Watershed file: --> OFF-25 .WSD
Hydrograph file: --> OFF-25 .HYD

EARLE - SITE 5
POST-DEVELOPMENT CONDITIONS
OFFSITE RUNOFF FROM RAILROAD EMBANKMENT CULVERT
25 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	1	22.4	1
18.7	1	22.5	1
18.8	1	22.6	1
18.9	1	22.7	1
19.0	1	22.8	1
19.1	1	22.9	1
19.2	1	23.0	1
19.3	1	23.1	1
19.4	1	23.2	1
19.5	1	23.3	1
19.6	1	23.4	1
19.7	1	23.5	1
19.8	1	23.6	1
19.9	1	23.7	1
20.0	1	23.8	1
20.1	1	23.9	1
20.2	1	24.0	0
20.3	1	24.1	0
20.4	1	24.2	0
20.5	1	24.3	0
20.6	1	24.4	0
20.7	1	24.5	0
20.8	1	24.6	0
20.9	1	24.7	0
21.0	1	24.8	0
21.1	1	24.9	0
21.2	1	25.0	0
21.3	1	25.1	0
21.4	1	25.2	0
21.5	1	25.3	0
21.6	1	25.4	0
21.7	1	25.5	0
21.8	1	25.6	0
21.9	1	25.7	0
22.0	1	25.8	0
22.1	1	25.9	0
22.2	1		
22.3	1		

D.7.2 Sediment / Detention Basin #2

```
*****************************************************************
*                                                               *
*                        EARLE - SITE 5                         *
*          SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK         *
*  ONLY STAGE IN THE OUTLET STRUCTURE IS THE EMERGENCY SPILLWAY *
*                                                               *
*                                                               *
*****************************************************************
```

Inflow Hydrograph: DC2-10 .HYD
Rating Table file: SB2-ES .PND

----INITIAL CONDITIONS----
Elevation = 104.10 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
104.10	0.0	0.000
104.30	0.0	0.010
104.50	0.0	0.021
104.70	0.0	0.032
104.90	0.0	0.044
105.10	0.0	0.056
105.30	0.0	0.069
105.50	0.0	0.083
105.70	0.0	0.097
105.90	0.0	0.112
106.10	0.0	0.128
106.30	0.0	0.145
106.50	0.0	0.162
106.70	0.0	0.180
106.90	0.0	0.200
107.10	0.0	0.220
107.30	0.0	0.240
107.50	0.0	0.261
107.70	0.0	0.282
107.90	0.0	0.303
108.10	0.0	0.326
108.30	0.0	0.349
108.50	0.0	0.373
108.70	0.0	0.399
108.90	0.0	0.425
109.10	0.2	0.453
109.30	1.0	0.482
109.50	2.1	0.512
109.70	3.5	0.542
109.90	5.0	0.573

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.5	2.5
5.1	5.1
7.9	7.9
10.7	10.7
13.6	13.6
16.7	16.7
20.0	20.0
23.4	23.4
27.1	27.1
31.0	31.0
35.0	35.0
39.2	39.2
43.7	43.7
48.3	48.3
53.1	53.1
58.1	58.1
63.1	63.1
68.2	68.2
73.4	73.4
78.8	78.8
84.4	84.4
90.3	90.3
96.5	96.5
103.0	103.0
109.7	109.9
116.7	117.7
123.8	125.9
131.2	134.7
138.7	143.7

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 01-02-1998 12:31:25

Pond File: SB2-ES .PND
Inflow Hydrograph: DC2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
11.000	0.00
11.100	0.00
11.200	0.00
11.300	0.00
11.400	0.00
11.500	0.00
11.600	0.00
11.700	0.00
11.800	1.00
11.900	1.00
12.000	1.00
12.100	2.00
12.200	3.00
12.300	5.00
12.400	5.00
12.500	4.00
12.600	3.00
12.700	2.00
12.800	1.00
12.900	1.00
13.000	1.00
13.100	1.00
13.200	1.00
13.300	1.00
13.400	1.00
13.500	1.00
13.600	1.00
13.700	1.00
13.800	1.00
13.900	0.00
14.000	0.00
14.100	0.00
14.200	0.00
14.300	0.00
14.400	0.00
14.500	0.00
14.600	0.00
14.700	0.00
14.800	0.00
14.900	0.00
15.000	0.00
15.100	0.00
15.200	0.00
15.300	0.00
15.400	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
-----	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
0.0	0.0	0.0	0.00	104.10
1.0	1.0	1.0	0.00	104.18
2.0	3.0	3.0	0.00	104.34
2.0	5.0	5.0	0.00	104.49
3.0	8.0	8.0	0.00	104.71
5.0	13.0	13.0	0.00	105.06
8.0	21.0	21.0	0.00	105.56
10.0	31.0	31.0	0.00	106.10
9.0	40.0	40.0	0.00	106.53
7.0	47.0	47.0	0.00	106.84
5.0	52.0	52.0	0.00	107.05
3.0	55.0	55.0	0.00	107.18
2.0	57.0	57.0	0.00	107.26
2.0	59.0	59.0	0.00	107.34
2.0	61.0	61.0	0.00	107.42
2.0	63.0	63.0	0.00	107.50
2.0	65.0	65.0	0.00	107.57
2.0	67.0	67.0	0.00	107.65
2.0	69.0	69.0	0.00	107.73
2.0	71.0	71.0	0.00	107.81
2.0	73.0	73.0	0.00	107.88
2.0	75.0	75.0	0.00	107.96
1.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00
0.0	76.0	76.0	0.00	108.00

ond File: SB2-ES .PND
Inflow Hydrograph: DC2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	76.0	76.0	0.00	108.00
15.600	0.00	0.0	76.0	76.0	0.00	108.00
15.700	0.00	0.0	76.0	76.0	0.00	108.00
15.800	0.00	0.0	76.0	76.0	0.00	108.00
15.900	0.00	0.0	76.0	76.0	0.00	108.00
16.000	0.00	0.0	76.0	76.0	0.00	108.00
16.100	0.00	0.0	76.0	76.0	0.00	108.00
16.200	0.00	0.0	76.0	76.0	0.00	108.00
16.300	0.00	0.0	76.0	76.0	0.00	108.00
16.400	0.00	0.0	76.0	76.0	0.00	108.00
16.500	0.00	0.0	76.0	76.0	0.00	108.00
16.600	0.00	0.0	76.0	76.0	0.00	108.00
16.700	0.00	0.0	76.0	76.0	0.00	108.00
16.800	0.00	0.0	76.0	76.0	0.00	108.00
16.900	0.00	0.0	76.0	76.0	0.00	108.00
17.000	0.00	0.0	76.0	76.0	0.00	108.00
17.100	0.00	0.0	76.0	76.0	0.00	108.00
17.200	0.00	0.0	76.0	76.0	0.00	108.00
17.300	0.00	0.0	76.0	76.0	0.00	108.00
17.400	0.00	0.0	76.0	76.0	0.00	108.00
17.500	0.00	0.0	76.0	76.0	0.00	108.00
17.600	0.00	0.0	76.0	76.0	0.00	108.00
17.700	0.00	0.0	76.0	76.0	0.00	108.00
17.800	0.00	0.0	76.0	76.0	0.00	108.00
17.900	0.00	0.0	76.0	76.0	0.00	108.00
18.000	0.00	0.0	76.0	76.0	0.00	108.00
18.100	0.00	0.0	76.0	76.0	0.00	108.00
18.200	0.00	0.0	76.0	76.0	0.00	108.00
18.300	0.00	0.0	76.0	76.0	0.00	108.00
18.400	0.00	0.0	76.0	76.0	0.00	108.00
18.500	0.00	0.0	76.0	76.0	0.00	108.00
18.600	0.00	0.0	76.0	76.0	0.00	108.00
18.700	0.00	0.0	76.0	76.0	0.00	108.00
18.800	0.00	0.0	76.0	76.0	0.00	108.00
18.900	0.00	0.0	76.0	76.0	0.00	108.00
19.000	0.00	0.0	76.0	76.0	0.00	108.00
19.100	0.00	0.0	76.0	76.0	0.00	108.00
19.200	0.00	0.0	76.0	76.0	0.00	108.00
19.300	0.00	0.0	76.0	76.0	0.00	108.00
19.400	0.00	0.0	76.0	76.0	0.00	108.00
19.500	0.00	0.0	76.0	76.0	0.00	108.00
19.600	0.00	0.0	76.0	76.0	0.00	108.00
19.700	0.00	0.0	76.0	76.0	0.00	108.00
19.800	0.00	0.0	76.0	76.0	0.00	108.00
19.900	0.00	0.0	76.0	76.0	0.00	108.00
20.000	0.00	0.0	76.0	76.0	0.00	108.00

POND-2 Version: 5.17 S/N:
EXECUTED: 01-02-1998 12:31:25

Pond File: SB2-ES .PND
Inflow Hydrograph: DC2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	76.0	76.0	0.00	108.00
20.200	0.00	0.0	76.0	76.0	0.00	108.00
20.300	0.00	0.0	76.0	76.0	0.00	108.00
20.400	0.00	0.0	76.0	76.0	0.00	108.00
20.500	0.00	0.0	76.0	76.0	0.00	108.00
20.600	0.00	0.0	76.0	76.0	0.00	108.00
20.700	0.00	0.0	76.0	76.0	0.00	108.00
20.800	0.00	0.0	76.0	76.0	0.00	108.00
20.900	0.00	0.0	76.0	76.0	0.00	108.00
21.000	0.00	0.0	76.0	76.0	0.00	108.00
21.100	0.00	0.0	76.0	76.0	0.00	108.00
21.200	0.00	0.0	76.0	76.0	0.00	108.00
21.300	0.00	0.0	76.0	76.0	0.00	108.00
21.400	0.00	0.0	76.0	76.0	0.00	108.00
21.500	0.00	0.0	76.0	76.0	0.00	108.00
21.600	0.00	0.0	76.0	76.0	0.00	108.00
21.700	0.00	0.0	76.0	76.0	0.00	108.00
21.800	0.00	0.0	76.0	76.0	0.00	108.00
21.900	0.00	0.0	76.0	76.0	0.00	108.00
22.000	0.00	0.0	76.0	76.0	0.00	108.00
22.100	0.00	0.0	76.0	76.0	0.00	108.00
22.200	0.00	0.0	76.0	76.0	0.00	108.00
22.300	0.00	0.0	76.0	76.0	0.00	108.00
22.400	0.00	0.0	76.0	76.0	0.00	108.00
22.500	0.00	0.0	76.0	76.0	0.00	108.00
22.600	0.00	0.0	76.0	76.0	0.00	108.00
22.700	0.00	0.0	76.0	76.0	0.00	108.00
22.800	0.00	0.0	76.0	76.0	0.00	108.00
22.900	0.00	0.0	76.0	76.0	0.00	108.00
23.000	0.00	0.0	76.0	76.0	0.00	108.00
23.100	0.00	0.0	76.0	76.0	0.00	108.00
23.200	0.00	0.0	76.0	76.0	0.00	108.00
23.300	0.00	0.0	76.0	76.0	0.00	108.00
23.400	0.00	0.0	76.0	76.0	0.00	108.00
23.500	0.00	0.0	76.0	76.0	0.00	108.00
23.600	0.00	0.0	76.0	76.0	0.00	108.00
23.700	0.00	0.0	76.0	76.0	0.00	108.00
23.800	0.00	0.0	76.0	76.0	0.00	108.00
23.900	0.00	0.0	76.0	76.0	0.00	108.00
24.000	0.00	0.0	76.0	76.0	0.00	108.00
24.100	0.00	0.0	76.0	76.0	0.00	108.00
24.200	0.00	0.0	76.0	76.0	0.00	108.00
24.300	0.00	0.0	76.0	76.0	0.00	108.00
24.400	0.00	0.0	76.0	76.0	0.00	108.00
24.500	0.00	0.0	76.0	76.0	0.00	108.00
24.600	0.00	0.0	76.0	76.0	0.00	108.00

ond File: SB2-ES .PND
Inflow Hydrograph: DC2-10 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	76.0	76.0	0.00	108.00
24.800	0.00	0.0	76.0	76.0	0.00	108.00
24.900	0.00	0.0	76.0	76.0	0.00	108.00
25.000	0.00	0.0	76.0	76.0	0.00	108.00
25.100	0.00	0.0	76.0	76.0	0.00	108.00
25.200	0.00	0.0	76.0	76.0	0.00	108.00
25.300	0.00	0.0	76.0	76.0	0.00	108.00
25.400	0.00	0.0	76.0	76.0	0.00	108.00
25.500	0.00	0.0	76.0	76.0	0.00	108.00
25.600	0.00	0.0	76.0	76.0	0.00	108.00
25.700	0.00	0.0	76.0	76.0	0.00	108.00
25.800	0.00	0.0	76.0	76.0	0.00	108.00
25.900	0.00	0.0	76.0	76.0	0.00	108.00

```
****************** SUMMARY OF ROUTING COMPUTATIONS ******************

Pond File:           SB2-ES  .PND
Inflow Hydrograph:   DC2-10  .HYD
Outflow Hydrograph:  OUT     .HYD

Starting Pond W.S. Elevation =   104.10 ft

        ***** Summary of Peak Outflow and Peak Elevation *****

                Peak Inflow    =     5.00 cfs
                Peak Outflow   =     0.00 cfs
                Peak Elevation =   108.00 ft

         ***** Summary of Approximate Peak Storage *****

            Initial Storage          =     0.00 ac-ft
            Peak Storage From Storm  =     0.31 ac-ft
                                     ---------------
            Total Storage in Pond    =     0.31 ac-ft

       >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
```

```
      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.17 S/N:                                    Page 7

Pond File:           SB2-ES  .PND
Inflow Hydrograph:   DC2-10  .HYD
Outflow Hydrograph:  OUT     .HYD
                                                   EXECUTED: 01-02-1998
Peak Inflow    =      5.00 cfs                                 12:31:25
Peak Outflow   =      0.00 cfs
Peak Elevation =    108.00 ft
```

Outlet Structure File: SB2-ES .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK
ONLY STAGE IN THE OUTLET STRUCTURE IS THE EMERGENCY SPILLWAY

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
104.10	0.0	
104.30	0.0	
104.50	0.0	
104.70	0.0	
104.90	0.0	
105.10	0.0	
105.30	0.0	
105.50	0.0	
105.70	0.0	
105.90	0.0	
106.10	0.0	
106.30	0.0	
106.50	0.0	
106.70	0.0	
106.90	0.0	
107.10	0.0	
107.30	0.0	
107.50	0.0	
107.70	0.0	
107.90	0.0	
108.10	0.0	
108.30	0.0	
108.50	0.0	
108.70	0.0	
108.90	0.0	
109.10	0.2	1
109.30	1.0	1
109.50	2.1	1
109.70	3.5	1
109.90	5.0	1
110.00	0.0	

Outlet Structure File: SB2-ES .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK
ONLY STAGE IN THE OUTLET STRUCTURE IS THE EMERGENCY SPILLWAY

****

Outlet Structure File: SB2-ES .STR
Planimeter Input File: SB2-TEST.VOL
Rating Table Output File: SB2-ES .PND

Min. Elev.(ft) = 104.1 Max. Elev.(ft) = 110 Incr.(ft) = .2

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	1		->	1

Outflow rating table summary was stored in file:
SB2-ES .PND

Outlet Structure File: SB2-ES .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK
ONLY STAGE IN THE OUTLET STRUCTURE IS THE EMERGENCY SPILLWAY

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	109
E2 elev.(ft)?	110
Weir coefficient?	0.6
Weir elev.(ft)?	109
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB2-ES .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK
ONLY STAGE IN THE OUTLET STRUCTURE IS THE EMERGENCY SPILLWAY

****

Outflow Rating Table for Structure #1
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
104.10	0.0	E < Inv.El.= 109
104.30	0.0	E < Inv.El.= 109
104.50	0.0	E < Inv.El.= 109
104.70	0.0	E < Inv.El.= 109
104.90	0.0	E < Inv.El.= 109
105.10	0.0	E < Inv.El.= 109
105.30	0.0	E < Inv.El.= 109
105.50	0.0	E < Inv.El.= 109
105.70	0.0	E < Inv.El.= 109
105.90	0.0	E < Inv.El.= 109
106.10	0.0	E < Inv.El.= 109
106.30	0.0	E < Inv.El.= 109
106.50	0.0	E < Inv.El.= 109
106.70	0.0	E < Inv.El.= 109
106.90	0.0	E < Inv.El.= 109
107.10	0.0	E < Inv.El.= 109
107.30	0.0	E < Inv.El.= 109
107.50	0.0	E < Inv.El.= 109
107.70	0.0	E < Inv.El.= 109
107.90	0.0	E < Inv.El.= 109
108.10	0.0	E < Inv.El.= 109
108.30	0.0	E < Inv.El.= 109
108.50	0.0	E < Inv.El.= 109
108.70	0.0	E < Inv.El.= 109
108.90	0.0	E < Inv.El.= 109
109.10	0.2	H =.1
109.30	1.0	H =.3
109.50	2.1	H =.5
109.70	3.5	H =.7
109.90	5.0	H =.9
110.00	0.0	E = or > E2=110

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (109 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 14:27:16
Watershed file: --> DC2-10 .WSD
Hydrograph file: --> DC2-10 .HYD

CSF
12/31/97
Agent
8/23/97
calcs

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
10 YEAR STORM

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
DA 2	1.92	79.0	0.10	0.10	5.20	2.97	.1	.10

* Travel time from subarea outfall to composite watershed outfall point.
Total area = 1.92 acres or 0.00300 sq.mi
Peak discharge = 5 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
DA 2	0.10	0.10	**	**	No	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 14:27:16
Watershed file: --> DC2-10 .WSD
Hydrograph file: --> DC2-10 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
10 YEAR STORM

>>>> Summary of Subarea Times to Peak <<<<

Subarea	Peak Discharge at Composite Outfall (cfs)	Time to Peak at Composite Outfall (hrs)
DA 2	5	12.3
Composite Watershed	5	12.3

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 14:27:16
Watershed file: --> DC2-10 .WSD
Hydrograph file: --> DC2-10 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
10 YEAR STORM

Composite Hydrograph Summary (cfs)

Subarea Description	11.0 hr	11.3 hr	11.6 hr	11.9 hr	12.0 hr	12.1 hr	12.2 hr	12.3 hr	12.4 hr
DA 2	0	0	0	1	1	2	3	5	5
Total (cfs)	0	0	0	1	1	2	3	5	5

Subarea Description	12.5 hr	12.6 hr	12.7 hr	12.8 hr	13.0 hr	13.2 hr	13.4 hr	13.6 hr	13.8 hr
DA 2	4	3	2	1	1	1	1	1	1
Total (cfs)	4	3	2	1	1	1	1	1	1

Subarea Description	14.0 hr	14.3 hr	14.6 hr	15.0 hr	15.5 hr	16.0 hr	16.5 hr	17.0 hr	17.5 hr
DA 2	0	0	0	0	0	0	0	0	0
Total (cfs)	0	0	0	0	0	0	0	0	0

Subarea Description	18.0 hr	19.0 hr	20.0 hr	22.0 hr	26.0 hr
DA 2	0	0	0	0	0
Total (cfs)	0	0	0	0	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 14:27:16
Watershed file: --> DC2-10 .WSD
Hydrograph file: --> DC2-10 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
11.0	0	14.8	0
11.1	0	14.9	0
11.2	0	15.0	0
11.3	0	15.1	0
11.4	0	15.2	0
11.5	0	15.3	0
11.6	0	15.4	0
11.7	0	15.5	0
11.8	1	15.6	0
11.9	1	15.7	0
12.0	1	15.8	0
12.1	2	15.9	0
12.2	3	16.0	0
12.3	5	16.1	0
12.4	5	16.2	0
12.5	4	16.3	0
12.6	3	16.4	0
12.7	2	16.5	0
12.8	1	16.6	0
12.9	1	16.7	0
13.0	1	16.8	0
13.1	1	16.9	0
13.2	1	17.0	0
13.3	1	17.1	0
13.4	1	17.2	0
13.5	1	17.3	0
13.6	1	17.4	0
13.7	1	17.5	0
13.8	1	17.6	0
13.9	0	17.7	0
14.0	0	17.8	0
14.1	0	17.9	0
14.2	0	18.0	0
14.3	0	18.1	0
14.4	0	18.2	0
14.5	0	18.3	0
14.6	0	18.4	0
14.7	0	18.5	0

TR-55 TABULAR HYDROGRAPH METHOD
Type III Distribution
(24 hr. Duration Storm)

Executed: 12-29-1997 14:27:16
Watershed file: --> DC2-10 .WSD
Hydrograph file: --> DC2-10 .HYD

EARLE - SITE 5
DURING CONSTRUCTION CONDITIONS
10 YEAR STORM

Time (hrs)	Flow (cfs)	Time (hrs)	Flow (cfs)
18.6	0	22.4	0
18.7	0	22.5	0
18.8	0	22.6	0
18.9	0	22.7	0
19.0	0	22.8	0
19.1	0	22.9	0
19.2	0	23.0	0
19.3	0	23.1	0
19.4	0	23.2	0
19.5	0	23.3	0
19.6	0	23.4	0
19.7	0	23.5	0
19.8	0	23.6	0
19.9	0	23.7	0
20.0	0	23.8	0
20.1	0	23.9	0
20.2	0	24.0	0
20.3	0	24.1	0
20.4	0	24.2	0
20.5	0	24.3	0
20.6	0	24.4	0
20.7	0	24.5	0
20.8	0	24.6	0
20.9	0	24.7	0
21.0	0	24.8	0
21.1	0	24.9	0
21.2	0	25.0	0
21.3	0	25.1	0
21.4	0	25.2	0
21.5	0	25.3	0
21.6	0	25.4	0
21.7	0	25.5	0
21.8	0	25.6	0
21.9	0	25.7	0
22.0	0	25.8	0
22.1	0	25.9	0
22.2	0		
22.3	0		

POND-2 Version: 5.17
S/N:

EARLE - SITE 5
SEDIMENT/DETENTION BASIN #2
EMERGENCY SPILLWAY CHECK

CALCULATED 12-29-1997 15:16:51
DISK FILE: SB2-ES .VOL

Planimeter scale: 1 inch = 50 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
108.00	1.92	0.11	0.00	0.00	0.00
109.00	2.44	0.14	0.37	0.12	0.12
110.00	2.79	0.16	0.45	0.15	0.27

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

Outlet Structure File: SB2-ES2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK

****

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

Elevation (ft)	Q (cfs)	Contributing Structures
108.00	0.0	
108.10	0.0	
108.20	0.0	
108.30	0.0	
108.40	0.0	
108.50	0.0	
108.60	0.0	
108.70	0.0	
108.80	0.0	
108.90	0.0	
109.00	0.0	1
109.10	0.2	1
109.20	0.5	1
109.30	1.0	1
109.40	1.5	1
109.50	2.1	1
109.60	2.8	1
109.70	3.5	1
109.80	4.2	1
109.90	5.0	1
110.00	0.0	

Outlet Structure File: SB2-ES2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK

****

Outlet Structure File: SB2-ES2 .STR
Planimeter Input File: SB2-ES .VOL
Rating Table Output File: SB2-ES2 .PND

Min. Elev.(ft) = 108 Max. Elev.(ft) = 110 Incr.(ft) = .1

Additional elevations (ft) to be included in table:
* *

****
SYSTEM CONNECTIVITY
****

Structure	No.	Q Table		Q Table
WEIR-VR	1		->	1

Outflow rating table summary was stored in file:
SB2-ES2 .PND

Outlet Structure File: SB2-ES2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK

****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

WEIR-VR
Weir - Vertical Rectangular

E1 elev.(ft)?	109
E2 elev.(ft)?	110
Weir coefficient?	0.6
Weir elev.(ft)?	109
Length (ft)?	10
Contracted/Suppressed (C/S)?	C

Outlet Structure File: SB2-ES2 .STR

POND-2 Version: 5.17 S/N:
Date Executed: Time Executed:

****

EARLE - SITE 5
SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK

****

Outflow Rating Table for Structure #1
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
108.00	0.0	E < Inv.El.= 109
108.10	0.0	E < Inv.El.= 109
108.20	0.0	E < Inv.El.= 109
108.30	0.0	E < Inv.El.= 109
108.40	0.0	E < Inv.El.= 109
108.50	0.0	E < Inv.El.= 109
108.60	0.0	E < Inv.El.= 109
108.70	0.0	E < Inv.El.= 109
108.80	0.0	E < Inv.El.= 109
108.90	0.0	E < Inv.El.= 109
109.00	0.0	H =0.0
109.10	0.2	H =.1
109.20	0.5	H =.2
109.30	1.0	H =.3
109.40	1.5	H =.4
109.50	2.1	H =.5
109.60	2.8	H =.6
109.70	3.5	H =.7
109.80	4.2	H =.8
109.90	5.0	H =.9
110.00	0.0	E = or > E2=110

C = .6 L (ft) = 10
H (ft) = Table elev. - Invert elev. (109 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

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*************************************************
*                                               *
*                                               *
*                 EARLE - SITE 5                *
*  SEDIMENT BASIN #2 : EMERGENCY SPILLWAY CHECK *
*                                               *
*                                               *
*************************************************
```

Inflow Hydrograph: SB2-2 .HYD
Rating Table file: SB2-ES2 .PND

----INITIAL CONDITIONS----
Elevation = 108.00 ft
Outflow = 0.00 cfs
Storage = 0.00 ac-ft

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
108.00	0.0	0.000
108.10	0.0	0.011
108.20	0.0	0.023
108.30	0.0	0.034
108.40	0.0	0.046
108.50	0.0	0.059
108.60	0.0	0.071
108.70	0.0	0.084
108.80	0.0	0.097
108.90	0.0	0.111
109.00	0.0	0.125
109.10	0.2	0.139
109.20	0.5	0.153
109.30	1.0	0.168
109.40	1.5	0.182
109.50	2.1	0.197
109.60	2.8	0.212
109.70	3.5	0.228
109.80	4.2	0.243
109.90	5.0	0.259

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
2.7	2.7
5.5	5.5
8.3	8.3
11.2	11.2
14.2	14.2
17.3	17.3
20.4	20.4
23.6	23.6
26.9	26.9
30.2	30.2
33.6	33.8
37.1	37.6
40.6	41.6
44.1	45.6
47.7	49.8
51.4	54.2
55.1	58.6
58.8	63.0
62.6	67.6

Time increment (t) = 0.100 hrs.

ond File: SB2-ES2 .PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	0.0	0.0	0.00	108.00
11.100	0.00	0.0	0.0	0.0	0.00	108.00
11.200	0.00	0.0	0.0	0.0	0.00	108.00
11.300	0.00	0.0	0.0	0.0	0.00	108.00
11.400	0.00	0.0	0.0	0.0	0.00	108.00
11.500	0.00	0.0	0.0	0.0	0.00	108.00
11.600	0.00	0.0	0.0	0.0	0.00	108.00
11.700	0.00	0.0	0.0	0.0	0.00	108.00
11.800	0.00	0.0	0.0	0.0	0.00	108.00
11.900	0.00	0.0	0.0	0.0	0.00	108.00
12.000	1.00	1.0	1.0	1.0	0.00	108.04
12.100	1.00	2.0	3.0	3.0	0.00	108.11
12.200	2.00	3.0	6.0	6.0	0.00	108.22
12.300	2.00	4.0	10.0	10.0	0.00	108.36
12.400	2.00	4.0	14.0	14.0	0.00	108.49
12.500	2.00	4.0	18.0	18.0	0.00	108.62
12.600	1.00	3.0	21.0	21.0	0.00	108.72
12.700	1.00	2.0	23.0	23.0	0.00	108.78
12.800	1.00	2.0	25.0	25.0	0.00	108.84
12.900	0.00	1.0	26.0	26.0	0.00	108.87
13.000	0.00	0.0	26.0	26.0	0.00	108.87
13.100	0.00	0.0	26.0	26.0	0.00	108.87
13.200	0.00	0.0	26.0	26.0	0.00	108.87
13.300	0.00	0.0	26.0	26.0	0.00	108.87
13.400	0.00	0.0	26.0	26.0	0.00	108.87
13.500	0.00	0.0	26.0	26.0	0.00	108.87
13.600	0.00	0.0	26.0	26.0	0.00	108.87
13.700	0.00	0.0	26.0	26.0	0.00	108.87
13.800	0.00	0.0	26.0	26.0	0.00	108.87
13.900	0.00	0.0	26.0	26.0	0.00	108.87
14.000	0.00	0.0	26.0	26.0	0.00	108.87
14.100	0.00	0.0	26.0	26.0	0.00	108.87
14.200	0.00	0.0	26.0	26.0	0.00	108.87
14.300	0.00	0.0	26.0	26.0	0.00	108.87
14.400	0.00	0.0	26.0	26.0	0.00	108.87
14.500	0.00	0.0	26.0	26.0	0.00	108.87
14.600	0.00	0.0	26.0	26.0	0.00	108.87
14.700	0.00	0.0	26.0	26.0	0.00	108.87
14.800	0.00	0.0	26.0	26.0	0.00	108.87
14.900	0.00	0.0	26.0	26.0	0.00	108.87
15.000	0.00	0.0	26.0	26.0	0.00	108.87
15.100	0.00	0.0	26.0	26.0	0.00	108.87
15.200	0.00	0.0	26.0	26.0	0.00	108.87
15.300	0.00	0.0	26.0	26.0	0.00	108.87
15.400	0.00	0.0	26.0	26.0	0.00	108.87

Pond File: SB2-ES2 .PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	0.00	0.0	26.0	26.0	0.00	108.87
15.600	0.00	0.0	26.0	26.0	0.00	108.87
15.700	0.00	0.0	26.0	26.0	0.00	108.87
15.800	0.00	0.0	26.0	26.0	0.00	108.87
15.900	0.00	0.0	26.0	26.0	0.00	108.87
16.000	0.00	0.0	26.0	26.0	0.00	108.87
16.100	0.00	0.0	26.0	26.0	0.00	108.87
16.200	0.00	0.0	26.0	26.0	0.00	108.87
16.300	0.00	0.0	26.0	26.0	0.00	108.87
16.400	0.00	0.0	26.0	26.0	0.00	108.87
16.500	0.00	0.0	26.0	26.0	0.00	108.87
16.600	0.00	0.0	26.0	26.0	0.00	108.87
16.700	0.00	0.0	26.0	26.0	0.00	108.87
16.800	0.00	0.0	26.0	26.0	0.00	108.87
16.900	0.00	0.0	26.0	26.0	0.00	108.87
17.000	0.00	0.0	26.0	26.0	0.00	108.87
17.100	0.00	0.0	26.0	26.0	0.00	108.87
17.200	0.00	0.0	26.0	26.0	0.00	108.87
17.300	0.00	0.0	26.0	26.0	0.00	108.87
17.400	0.00	0.0	26.0	26.0	0.00	108.87
17.500	0.00	0.0	26.0	26.0	0.00	108.87
17.600	0.00	0.0	26.0	26.0	0.00	108.87
17.700	0.00	0.0	26.0	26.0	0.00	108.87
17.800	0.00	0.0	26.0	26.0	0.00	108.87
17.900	0.00	0.0	26.0	26.0	0.00	108.87
18.000	0.00	0.0	26.0	26.0	0.00	108.87
18.100	0.00	0.0	26.0	26.0	0.00	108.87
18.200	0.00	0.0	26.0	26.0	0.00	108.87
18.300	0.00	0.0	26.0	26.0	0.00	108.87
18.400	0.00	0.0	26.0	26.0	0.00	108.87
18.500	0.00	0.0	26.0	26.0	0.00	108.87
18.600	0.00	0.0	26.0	26.0	0.00	108.87
18.700	0.00	0.0	26.0	26.0	0.00	108.87
18.800	0.00	0.0	26.0	26.0	0.00	108.87
18.900	0.00	0.0	26.0	26.0	0.00	108.87
19.000	0.00	0.0	26.0	26.0	0.00	108.87
19.100	0.00	0.0	26.0	26.0	0.00	108.87
19.200	0.00	0.0	26.0	26.0	0.00	108.87
19.300	0.00	0.0	26.0	26.0	0.00	108.87
19.400	0.00	0.0	26.0	26.0	0.00	108.87
19.500	0.00	0.0	26.0	26.0	0.00	108.87
19.600	0.00	0.0	26.0	26.0	0.00	108.87
19.700	0.00	0.0	26.0	26.0	0.00	108.87
19.800	0.00	0.0	26.0	26.0	0.00	108.87
19.900	0.00	0.0	26.0	26.0	0.00	108.87
20.000	0.00	0.0	26.0	26.0	0.00	108.87

POND-2 Version: 5.17 S/N:
EXECUTED: 12-29-1997 15:21:38

ond File: SB2-ES2 .PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	26.0	26.0	0.00	108.87
20.200	0.00	0.0	26.0	26.0	0.00	108.87
20.300	0.00	0.0	26.0	26.0	0.00	108.87
20.400	0.00	0.0	26.0	26.0	0.00	108.87
20.500	0.00	0.0	26.0	26.0	0.00	108.87
20.600	0.00	0.0	26.0	26.0	0.00	108.87
20.700	0.00	0.0	26.0	26.0	0.00	108.87
20.800	0.00	0.0	26.0	26.0	0.00	108.87
20.900	0.00	0.0	26.0	26.0	0.00	108.87
21.000	0.00	0.0	26.0	26.0	0.00	108.87
21.100	0.00	0.0	26.0	26.0	0.00	108.87
21.200	0.00	0.0	26.0	26.0	0.00	108.87
21.300	0.00	0.0	26.0	26.0	0.00	108.87
21.400	0.00	0.0	26.0	26.0	0.00	108.87
21.500	0.00	0.0	26.0	26.0	0.00	108.87
21.600	0.00	0.0	26.0	26.0	0.00	108.87
21.700	0.00	0.0	26.0	26.0	0.00	108.87
21.800	0.00	0.0	26.0	26.0	0.00	108.87
21.900	0.00	0.0	26.0	26.0	0.00	108.87
22.000	0.00	0.0	26.0	26.0	0.00	108.87
22.100	0.00	0.0	26.0	26.0	0.00	108.87
22.200	0.00	0.0	26.0	26.0	0.00	108.87
22.300	0.00	0.0	26.0	26.0	0.00	108.87
22.400	0.00	0.0	26.0	26.0	0.00	108.87
22.500	0.00	0.0	26.0	26.0	0.00	108.87
22.600	0.00	0.0	26.0	26.0	0.00	108.87
22.700	0.00	0.0	26.0	26.0	0.00	108.87
22.800	0.00	0.0	26.0	26.0	0.00	108.87
22.900	0.00	0.0	26.0	26.0	0.00	108.87
23.000	0.00	0.0	26.0	26.0	0.00	108.87
23.100	0.00	0.0	26.0	26.0	0.00	108.87
23.200	0.00	0.0	26.0	26.0	0.00	108.87
23.300	0.00	0.0	26.0	26.0	0.00	108.87
23.400	0.00	0.0	26.0	26.0	0.00	108.87
23.500	0.00	0.0	26.0	26.0	0.00	108.87
23.600	0.00	0.0	26.0	26.0	0.00	108.87
23.700	0.00	0.0	26.0	26.0	0.00	108.87
23.800	0.00	0.0	26.0	26.0	0.00	108.87
23.900	0.00	0.0	26.0	26.0	0.00	108.87
24.000	0.00	0.0	26.0	26.0	0.00	108.87
24.100	0.00	0.0	26.0	26.0	0.00	108.87
24.200	0.00	0.0	26.0	26.0	0.00	108.87
24.300	0.00	0.0	26.0	26.0	0.00	108.87
24.400	0.00	0.0	26.0	26.0	0.00	108.87
24.500	0.00	0.0	26.0	26.0	0.00	108.87
24.600	0.00	0.0	26.0	26.0	0.00	108.87

Pond File: SB2-ES2 .PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
24.700	0.00	0.0	26.0	26.0	0.00	108.87
24.800	0.00	0.0	26.0	26.0	0.00	108.87
24.900	0.00	0.0	26.0	26.0	0.00	108.87
25.000	0.00	0.0	26.0	26.0	0.00	108.87
25.100	0.00	0.0	26.0	26.0	0.00	108.87
25.200	0.00	0.0	26.0	26.0	0.00	108.87
25.300	0.00	0.0	26.0	26.0	0.00	108.87
25.400	0.00	0.0	26.0	26.0	0.00	108.87
25.500	0.00	0.0	26.0	26.0	0.00	108.87
25.600	0.00	0.0	26.0	26.0	0.00	108.87
25.700	0.00	0.0	26.0	26.0	0.00	108.87
25.800	0.00	0.0	26.0	26.0	0.00	108.87
25.900	0.00	0.0	26.0	26.0	0.00	108.87

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB2-ES2 .PND
Inflow Hydrograph: SB2-2 .HYD
Outflow Hydrograph: OUT .HYD

Starting Pond W.S. Elevation = 108.00 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 2.00 cfs
Peak Outflow = 0.00 cfs
Peak Elevation = 108.87 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.00 ac-ft
Peak Storage From Storm = 0.11 ac-ft

Total Storage in Pond = 0.11 ac-ft

>>>>>> Warning, peak outflow = last ordinate point. <<<<<<

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      >>>>>> Warning, peak outflow = last ordinate point. <<<<<<
POND-2 Version: 5.17 S/N:                                    Page 7

Pond File:           SB2-ES2  .PND
Inflow Hydrograph:   SB2-2    .HYD
Outflow Hydrograph:  OUT      .HYD
                                                   EXECUTED: 12-29-1997
Peak Inflow     =      2.00 cfs                          15:21:38
Peak Outflow    =      0.00 cfs
Peak Elevation  =    108.87 ft
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D.7.3 Sediment / Detention Basin #3

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*************************
*                       *
*     Examining the     *
*    EARLE - SITE 5     *
*  SEDIMENT BASIN # 3   *
*                       *
*                       *
*************************
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Inflow Hydrograph: 5-SB3 .HYD
Rating Table file: SB3B .PND

----INITIAL CONDITIONS----
Elevation = 98.25 ft
Outflow = 0.00 cfs
Storage = 0.02 ac-ft

Include sediment volume (0.01 ac-ft) from routing calc.

GIVEN POND DATA

ELEVATION (ft)	OUTFLOW (cfs)	STORAGE (ac-ft)
98.00	0.0	0.000
98.25	0.0	0.017
98.50	0.0	0.034
98.75	0.0	0.054
99.00	0.0	0.075
99.25	0.0	0.098
99.50	0.0	0.122
99.75	0.0	0.147
100.00	0.0	0.174
100.25	0.0	0.202
100.50	0.0	0.232
100.75	0.0	0.264
101.00	0.0	0.297
101.25	0.0	0.332
101.50	0.0	0.369
101.75	0.0	0.407
102.00	0.0	0.448
102.25	0.0	0.489
102.50	0.0	0.533
102.75	0.0	0.579
103.00	0.0	0.626
103.25	0.7	0.676
103.50	2.1	0.728
103.75	3.8	0.782

INTERMEDIATE ROUTING COMPUTATIONS

2S/t (cfs)	2S/t + O (cfs)
0.0	0.0
4.0	4.0
8.3	8.3
13.1	13.1
18.2	18.2
23.7	23.7
29.5	29.5
35.6	35.6
42.1	42.1
48.9	48.9
56.2	56.2
63.9	63.9
72.0	72.0
80.5	80.5
89.3	89.3
98.6	98.6
108.3	108.3
118.4	118.4
129.0	129.0
140.1	140.1
151.6	151.6
163.6	164.3
176.1	178.2
189.2	193.0

Time increment (t) = 0.100 hrs.

POND-2 Version: 5.17 S/N:
EXECUTED: 12-29-1997 15:10:54

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH / ROUTING COMPUTATIONS

TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
11.000	0.00	-----	4.0	4.0	0.00	98.25
11.100	0.00	0.0	4.0	4.0	0.00	98.25
11.200	1.00	1.0	5.0	5.0	0.00	98.31
11.300	1.00	2.0	7.0	7.0	0.00	98.42
11.400	1.00	2.0	9.0	9.0	0.00	98.53
11.500	1.00	2.0	11.0	11.0	0.00	98.64
11.600	1.00	2.0	13.0	13.0	0.00	98.75
11.700	1.00	2.0	15.0	15.0	0.00	98.84
11.800	2.00	3.0	18.0	18.0	0.00	98.99
11.900	2.00	4.0	22.0	22.0	0.00	99.17
12.000	3.00	5.0	27.0	27.0	0.00	99.39
12.100	4.00	7.0	34.0	34.0	0.00	99.68
12.200	7.00	11.0	45.0	45.0	0.00	100.11
12.300	11.00	18.0	63.0	63.0	0.00	100.72
12.400	10.00	21.0	84.0	84.0	0.00	101.35
12.500	8.00	18.0	102.0	102.0	0.00	101.84
12.600	6.00	14.0	116.0	116.0	0.00	102.[illegible]
12.700	4.00	10.0	126.0	126.0	0.00	102.[illegible]
12.800	3.00	7.0	133.0	133.0	0.00	102.59
12.900	2.00	5.0	138.0	138.0	0.00	102.70
13.000	2.00	4.0	142.0	142.0	0.00	102.79
13.100	2.00	4.0	146.0	146.0	0.00	102.88
13.200	2.00	4.0	150.0	150.0	0.00	102.97
13.300	2.00	4.0	153.7	154.0	0.13	103.05
13.400	1.00	3.0	156.2	156.7	0.28	103.10
13.500	1.00	2.0	157.4	158.2	0.36	103.13
13.600	1.00	2.0	158.6	159.4	0.43	103.15
13.700	1.00	2.0	159.6	160.6	0.49	103.18
13.800	1.00	2.0	160.5	161.6	0.55	103.20
13.900	1.00	2.0	161.3	162.5	0.60	103.21
14.000	1.00	2.0	162.0	163.3	0.64	103.23
14.100	1.00	2.0	162.6	164.0	0.68	103.24
14.200	1.00	2.0	163.2	164.6	0.73	103.26
14.300	1.00	2.0	163.6	165.2	0.79	103.27
14.400	1.00	2.0	163.9	165.6	0.83	103.27
14.500	1.00	2.0	164.2	165.9	0.86	103.28
14.600	1.00	2.0	164.4	166.2	0.89	103.28
14.700	1.00	2.0	164.6	166.4	0.91	103.29
14.800	1.00	2.0	164.7	166.6	0.93	103.29
14.900	1.00	2.0	164.8	166.7	0.94	103.29
15.000	1.00	2.0	164.9	166.8	0.96	103.30
15.100	1.00	2.0	165.0	166.9	0.96	103.[illegible]
15.200	1.00	2.0	165.1	167.0	0.97	103.[illegible]
15.300	1.00	2.0	165.1	167.1	0.98	103.30
15.400	1.00	2.0	165.1	167.1	0.98	103.30

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
15.500	1.00	2.0	165.2	167.1	0.99	103.30
15.600	1.00	2.0	165.2	167.2	0.99	103.30
15.700	1.00	2.0	165.2	167.2	0.99	103.30
15.800	1.00	2.0	165.2	167.2	0.99	103.30
15.900	1.00	2.0	165.2	167.2	0.99	103.30
16.000	1.00	2.0	165.2	167.2	1.00	103.30
16.100	1.00	2.0	165.3	167.2	1.00	103.30
16.200	1.00	2.0	165.3	167.3	1.00	103.30
16.300	0.00	1.0	164.5	166.3	0.90	103.29
16.400	0.00	0.0	163.0	164.5	0.72	103.25
16.500	0.00	0.0	161.8	163.0	0.63	103.23
16.600	0.00	0.0	160.6	161.8	0.56	103.20
16.700	0.00	0.0	159.7	160.6	0.50	103.18
16.800	0.00	0.0	158.8	159.7	0.44	103.16
16.900	0.00	0.0	158.0	158.8	0.40	103.14
17.000	0.00	0.0	157.3	158.0	0.35	103.13
17.100	0.00	0.0	156.6	157.3	0.31	103.11
17.200	0.00	0.0	156.1	156.6	0.28	103.10
17.300	0.00	0.0	155.6	156.1	0.25	103.09
17.400	0.00	0.0	155.1	155.6	0.22	103.08
17.500	0.00	0.0	154.8	155.1	0.20	103.07
17.600	0.00	0.0	154.4	154.8	0.17	103.06
17.700	0.00	0.0	154.1	154.4	0.16	103.06
17.800	0.00	0.0	153.8	154.1	0.14	103.05
17.900	0.00	0.0	153.6	153.8	0.12	103.04
18.000	0.00	0.0	153.4	153.6	0.11	103.04
18.100	0.00	0.0	153.2	153.4	0.10	103.03
18.200	0.00	0.0	153.0	153.2	0.09	103.03
18.300	0.00	0.0	152.8	153.0	0.08	103.03
18.400	0.00	0.0	152.7	152.8	0.07	103.02
18.500	0.00	0.0	152.6	152.7	0.06	103.02
18.600	0.00	0.0	152.5	152.6	0.05	103.02
18.700	0.00	0.0	152.4	152.5	0.05	103.02
18.800	0.00	0.0	152.3	152.4	0.04	103.02
18.900	0.00	0.0	152.2	152.3	0.04	103.01
19.000	0.00	0.0	152.1	152.2	0.03	103.01
19.100	0.00	0.0	152.1	152.1	0.03	103.01
19.200	0.00	0.0	152.0	152.1	0.03	103.01
19.300	0.00	0.0	152.0	152.0	0.02	103.01
19.400	0.00	0.0	151.9	152.0	0.02	103.01
19.500	0.00	0.0	151.9	151.9	0.02	103.01
19.600	0.00	0.0	151.9	151.9	0.02	103.01
19.700	0.00	0.0	151.8	151.9	0.02	103.01
19.800	0.00	0.0	151.8	151.8	0.01	103.00
19.900	0.00	0.0	151.8	151.8	0.01	103.00
20.000	0.00	0.0	151.8	151.8	0.01	103.00

POND-2 Version: 5.17 S/N:
EXECUTED: 12-29-1997 15:10:54

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH		ROUTING COMPUTATIONS				
TIME (hrs)	INFLOW (cfs)	I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
20.100	0.00	0.0	151.7	151.8	0.01	103.00
20.200	0.00	0.0	151.7	151.7	0.01	103.00
20.300	0.00	0.0	151.7	151.7	0.01	103.00
20.400	0.00	0.0	151.7	151.7	0.01	103.00
20.500	0.00	0.0	151.7	151.7	0.01	103.00
20.600	0.00	0.0	151.7	151.7	0.01	103.00
20.700	0.00	0.0	151.7	151.7	0.00	103.00
20.800	0.00	0.0	151.6	151.7	0.00	103.00
20.900	0.00	0.0	151.6	151.6	0.00	103.00
21.000	0.00	0.0	151.6	151.6	0.00	103.00
21.100	0.00	0.0	151.6	151.6	0.00	103.00
21.200	0.00	0.0	151.6	151.6	0.00	103.00
21.300	0.00	0.0	151.6	151.6	0.00	103.00
21.400	0.00	0.0	151.6	151.6	0.00	103.00
21.500	0.00	0.0	151.6	151.6	0.00	103.00
21.600	0.00	0.0	151.6	151.6	0.00	103.00
21.700	0.00	0.0	151.6	151.6	0.00	103.[illegible]
21.800	0.00	0.0	151.6	151.6	0.00	103.[illegible]
21.900	0.00	0.0	151.6	151.6	0.00	103.00
22.000	0.00	0.0	151.6	151.6	0.00	103.00
22.100	0.00	0.0	151.6	151.6	0.00	103.00
22.200	0.00	0.0	151.6	151.6	0.00	103.00
22.300	0.00	0.0	151.6	151.6	0.00	103.00
22.400	0.00	0.0	151.6	151.6	0.00	103.00
22.500	0.00	0.0	151.6	151.6	0.00	103.00
22.600	0.00	0.0	151.6	151.6	0.00	103.00
22.700	0.00	0.0	151.6	151.6	0.00	103.00
22.800	0.00	0.0	151.6	151.6	0.00	103.00
22.900	0.00	0.0	151.6	151.6	0.00	103.00
23.000	0.00	0.0	151.6	151.6	0.00	103.00
23.100	0.00	0.0	151.6	151.6	0.00	103.00
23.200	0.00	0.0	151.6	151.6	0.00	103.00
23.300	0.00	0.0	151.6	151.6	0.00	103.00
23.400	0.00	0.0	151.6	151.6	0.00	103.00
23.500	0.00	0.0	151.6	151.6	0.00	103.00
23.600	0.00	0.0	151.6	151.6	0.00	103.00
23.700	0.00	0.0	151.6	151.6	0.00	103.00
23.800	0.00	0.0	151.6	151.6	0.00	103.00
23.900	0.00	0.0	151.6	151.6	0.00	103.00
24.000	0.00	0.0	151.6	151.6	0.00	103.00
24.100	0.00	0.0	151.6	151.6	0.00	103.00
24.200	0.00	0.0	151.6	151.6	0.00	103.[illegible]
24.300	0.00	0.0	151.6	151.6	0.00	103.[illegible]
24.400	0.00	0.0	151.6	151.6	0.00	103.00
24.500	0.00	0.0	151.6	151.6	0.00	103.00
24.600	0.00	0.0	151.6	151.6	0.00	103.00

ond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

INFLOW HYDROGRAPH

TIME (hrs)	INFLOW (cfs)
24.700	0.00
24.800	0.00
24.900	0.00
25.000	0.00
25.100	0.00
25.200	0.00
25.300	0.00
25.400	0.00
25.500	0.00
25.600	0.00
25.700	0.00
25.800	0.00
25.900	0.00

ROUTING COMPUTATIONS

I1+I2 (cfs)	2S/t - O (cfs)	2S/t + O (cfs)	OUTFLOW (cfs)	ELEVATION (ft)
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00
0.0	151.6	151.6	0.00	103.00

********** SUMMARY OF ROUTING COMPUTATIONS **********

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

Include sed volume in routing calc.

Starting Pond W.S. Elevation = 98.25 ft

***** Summary of Peak Outflow and Peak Elevation *****

Peak Inflow = 11.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 103.30 ft

***** Summary of Approximate Peak Storage *****

Initial Storage = 0.02 ac-ft
Peak Storage From Storm = 0.67 ac-ft

Total Storage in Pond = 0.69 ac-ft

Pond File: SB3B .PND
Inflow Hydrograph: 5-SB3 .HYD
Outflow Hydrograph: OUTB .HYD

EXECUTED: 12-29-1997
15:10:54

Peak Inflow = 11.00 cfs
Peak Outflow = 1.00 cfs
Peak Elevation = 103.30 ft

D.8 ANTI-SEEP COLLAR DESIGN

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ANTI-SEEP COLLAR CALCULATIONS - SITE 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/2/98		12/28/97

$$L_s = y(z+4)\left[1 + \frac{\text{pipe slope}}{0.25 - \text{pipe slope}}\right]$$

where, L_s = length of pipe in the saturated zone (ft.)
y = distance in feet from the upstream invert of the highest normal water level expected to occur during the life of the structure.
z = slope of upstream embankment as a ratio of z feet to one foot vertical.

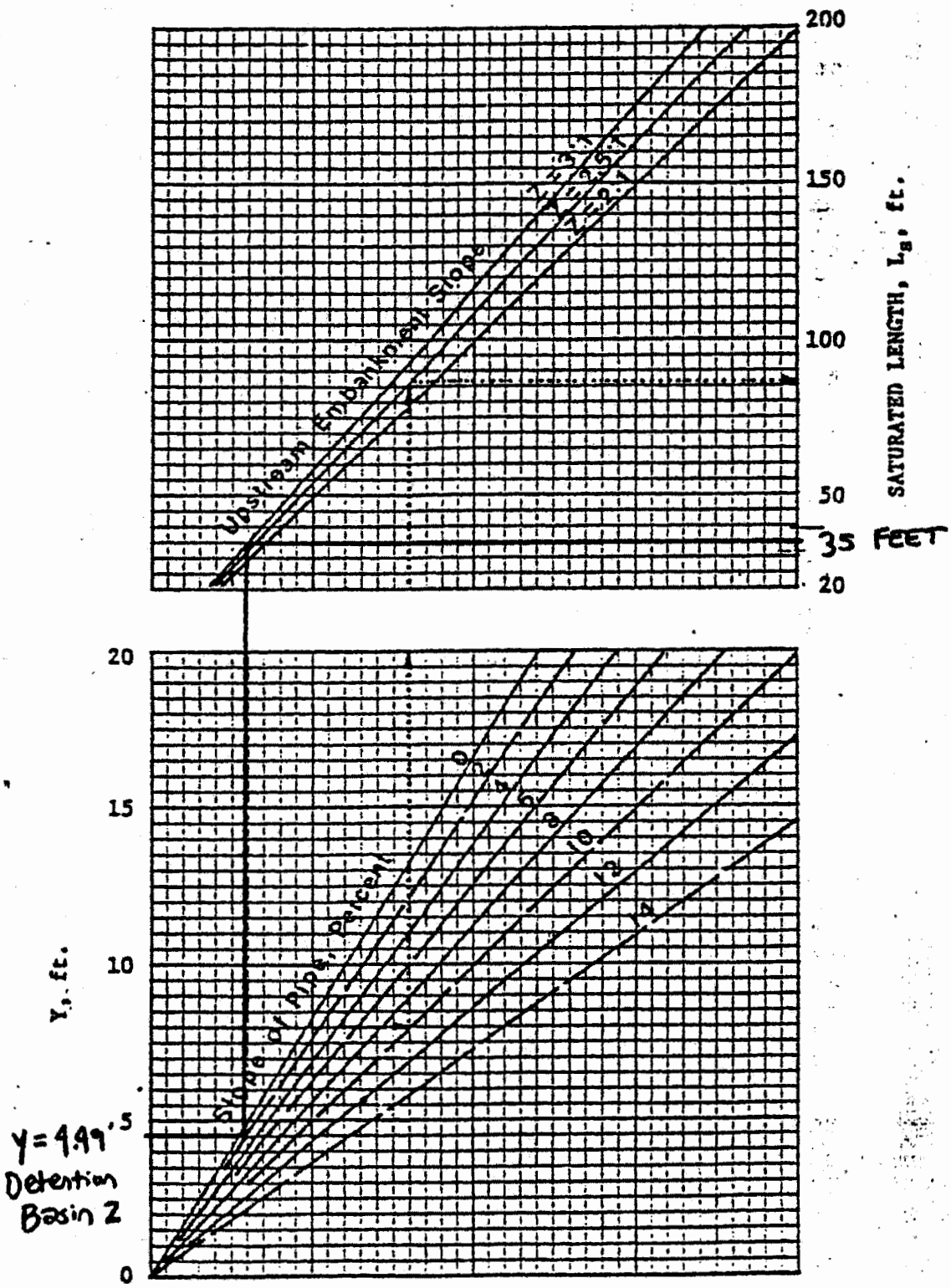
For Detention Basin #2 :

pipe slope = 1.25 %
y = 108.49 - 104.00 = 4.49
(THE 25-YR PEAK ELEVATION = 108.49 FT)
$z = 3$

$$L_s = 4.49(7)\left[1 + \frac{.0125}{0.25 - .0125}\right]$$

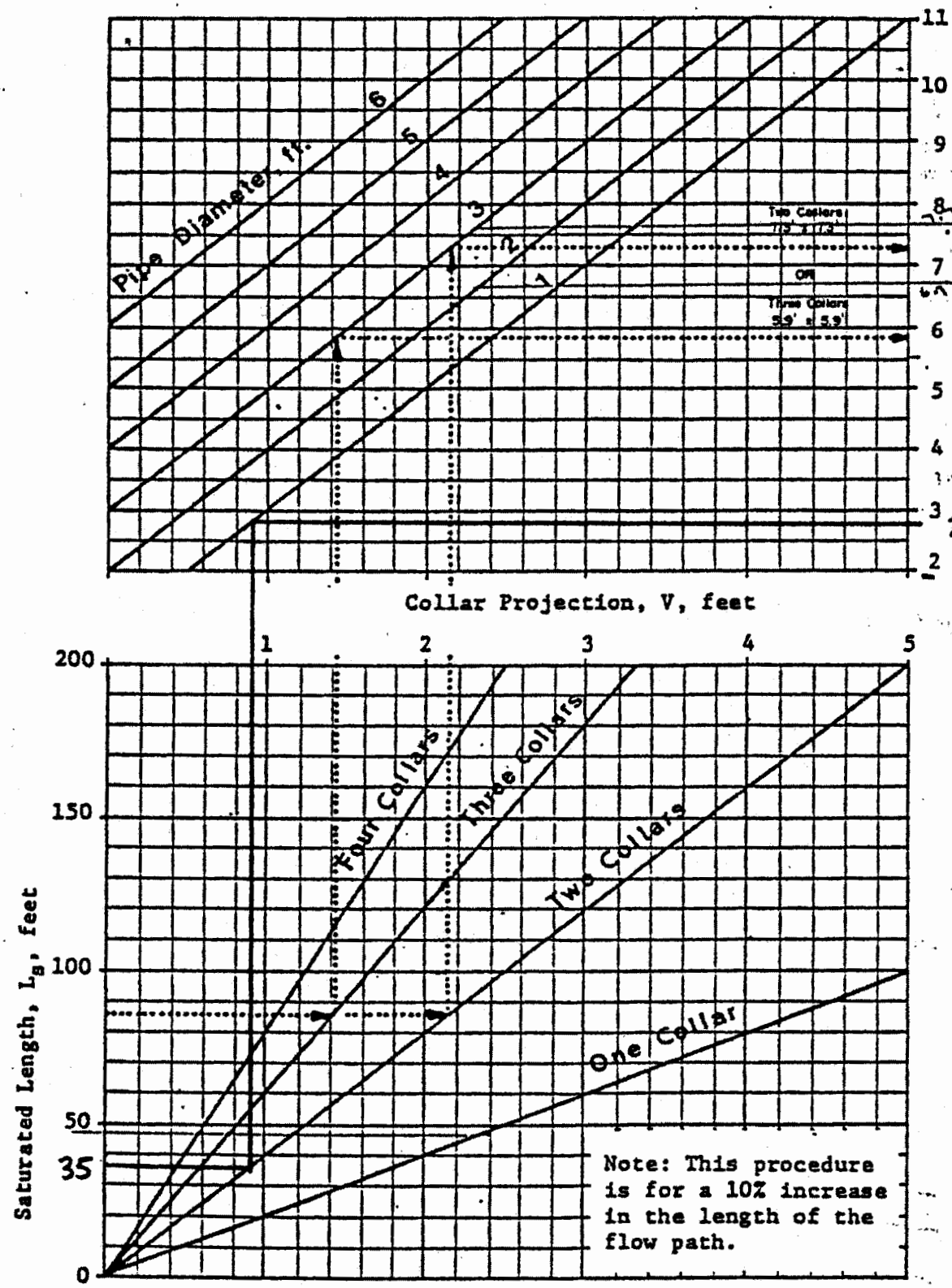
L_s = 33 FEET ✓

PIPE LENGTH IN SATURATED ZONE



ANTI-SEEP COLLAR DESIGN

3 OF 3
CHK'D
DCW 1/2/98



2-Collars, 2.8'x2.8' For Detention Basin #2 Since the minimum size is 4'x4', use 4'x4'.

APPENDIX E

OTHER MISCELLANEOUS EROSION AND SEDIMENT CONTROL CALCULATIONS

E.1 Hydraulic Stability Calculations and Riprap Evaluation for Site 4 Channels

E.2 Hydraulic Stability Calculations and Riprap Evaluation for Site 5 Channels

E.3 Inlet Grate Capacity Calculations - Site 5

E.4 Culvert Capacity Calculations - Site 5

E.5 Rock Apron Design - Site 4

E.6 Rock Apron Design - Site 5

E.1 HYDRAULIC STABILITY CALCULATIONS AND RIPRAP EVALUATION FOR SITE 4 CHANNELS

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER
NWSE	7602 - 0104
SUBJECT: Waterway Evaluations	
BASED ON: Quick TR-55 + Open channel Flow Eq.	DRAWING NUMBER
BY: JJB Revised 12/22/97 10/21/97	CHECKED BY: KMS 10/31/97
APPROVED BY	DATE

I. Purpose: To evaluate the need for erosion & sediment control practices within the diversion channels at site 4.

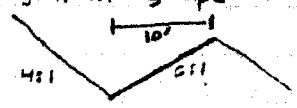
II. Approach: - Four channels will be evaluated and are as follows:

- Drainage Channel (DC) 1 & DC2 consist of the surface water diversion ditches constructed around the perimeter of the landfill cap. (see page 2 of 10)
- DC 3 & DC4 consist of the diversion bench constructed across the southeast slope of the landfill

- Using Quick TR-55, the estimated flow at the outlet of each drainage basin will be calculated. The 25-yr storm event will be used as the basis of design
- Based on the peak flow of the 25-yr storm event, the peak velocity of the flow in each DC will be estimated.

III. Assumptions:

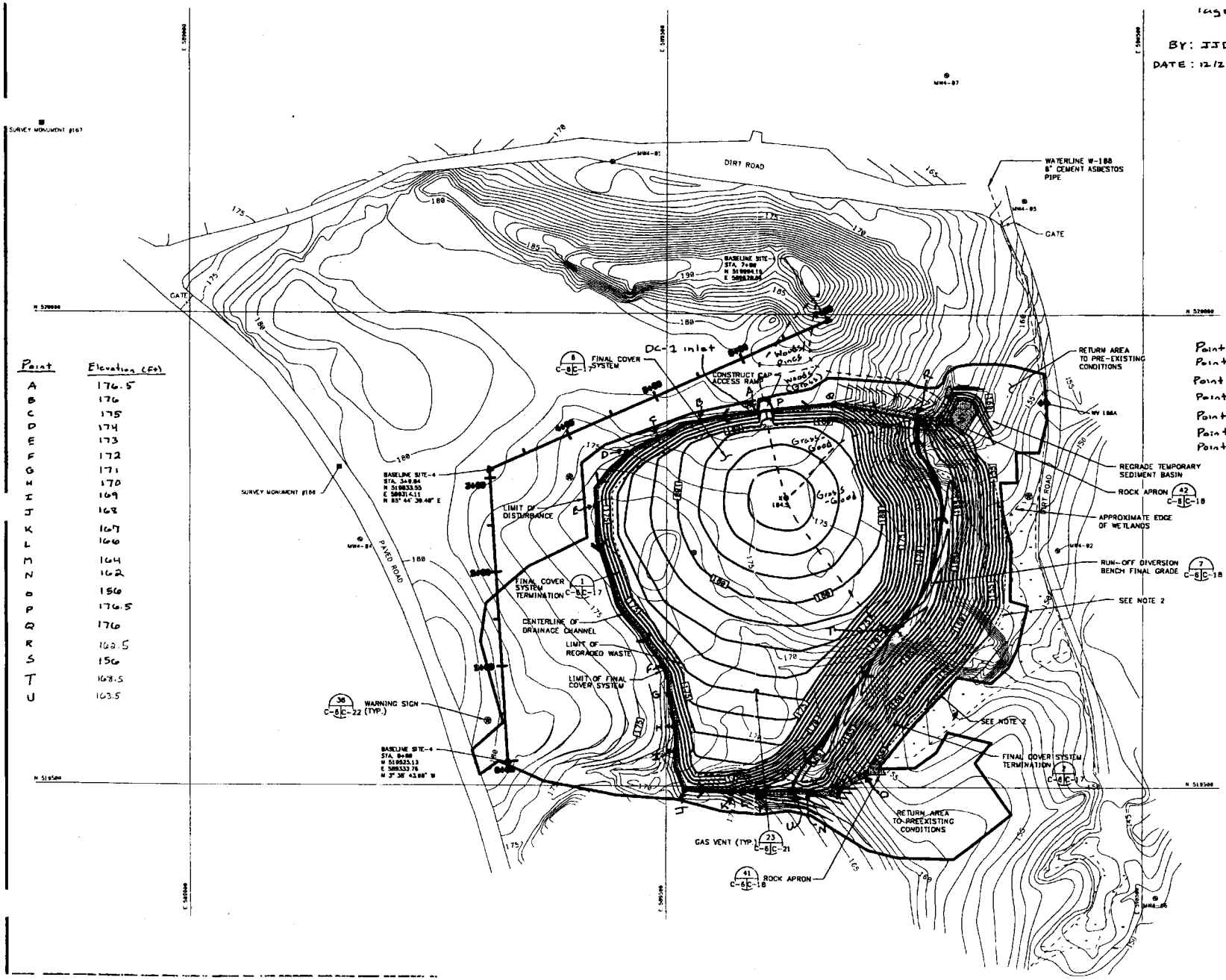
- Curve numbers for the areas draining to each DC will be calculated for the post-construction scenario.
- DCs 1&2 will be vegetated in native soil. Some weed growth will occur.
- DCs 3&4 will be vegetated in topsoil.
- The native soil at site 4 is primarily composed of sand & gravel.
- DCs 1&2 are trapezoidal in shape, with a 4-ft base & 4:1 side slopes.
- DCs 3&4 are triangular in shape with the following features:



Page 6 of 10

BY: JJB CHKD: DCW

DATE: 12/22/97 DATE: 12/29/97



Point	Elevation (Ft)
A	176.5
B	176
C	175
D	174
E	173
F	172
G	171
H	170
I	169
J	168
K	167
L	166
M	164
N	162
O	156
P	176.5
Q	176
R	168.5
S	156
T	168.5
U	163.5

Point A = DC-1 Inlet
Point O = DC-1 Outlet
Point P = DC-2 Inlet
Point S = DC-2 Outlet
Point T = DC-3 & DC-4 Inlet
Point R = DC-3 Outlet
Point U = DC-4 Outlet

Flow Direction

NOTES:

1. REFER TO T-2 FOR GENERAL NOTES.
2. REFER TO C-9 FOR WETLAND RESTORATION AREA PLAN.
3. REMOVE AND DISPOSE OF MATERIALS USED TO CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE AND DECON PAD. RESTORE AREAS TO ORIGINAL CONDITION AS APPROVED BY THE CONTRACTING OFFICER.
4. REMOVE ALL MATERIALS, EQUIPMENT AND SUPPLIES FROM THE CONSTRUCTION/LAYDOWN AREA. RESTORE THE AREA TO ORIGINAL CONDITION AS APPROVED BY THE CONTRACTING OFFICER.

0 50 100
SCALE IN FEET
CHECK GRAPHIC SCALE BEFORE USING

DEPARTMENT OF THE NAVY
PHILADELPHIA
NAVAL WEAPONS STATION EARLE

NAVAL FACILITIES ENGINEERING COMMAND
PENNSYLVANIA
LOUIS MECH., NEW JERSEY

NORTHERN DIVISION

LANDFILL CAPS FOR SITES 4 AND 5

FINAL GRADING PLAN, SITE 4

SEAL AREA

REV.	DESCRIPTION	PREP BY	DATE	APPRVD

DESIGN CSF
DRAWN DR
CHECKED BY DR
DATE DCN
CHK DCW
DATE 4/97
(FIRM NAME)
COMPANY
FIRM
RD
DR
OFFICER IN CHARGE

SAT TO DAT
CODE I.D. NO. 5089
SCALE
SPEC NO 84 -
CONTRACT CONTR NO
N62472-94-D-0398
NAVFAC DRAWING NO
SHEET 8 OF 28
SCALE DIS BY NC

CLIENT	JOB NUMBER
NSWE	7602-0104
SUBJECT: Waterway Evaluation	
BASED ON: Quick TR-55 & Open Channel Flow Eq.	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JTB 10/21/97	KMS 10/31/97		

Assumptions (cont.):

- The maximum allowable velocity for a sandy soil waterway-vegetated is 2.0 ft/s & 3.0 for a clay, clay loam, sandy clay, or silty clay type of soil.

IV. Calculations: A. Estimate Flow

1. DC 1: Assume peak flow is equivalent to that calculated for Drainage Area 1 in previous calculations. (see Attachment B.4)

$Q_{DC1} = 11$ cfs

2. DC 2: Calculate curve no. for area draining to DC 2. See page 2 of 10 for DC areas)

Planimeter scale: 1 inch = 100 ft.

Cover type	Area (IN^2)	Area (acres)	CN
Grass - Good	0.6040S	0.139	61
Woods/Grass - fair	0.5735	0.132	65
Woods/Pines - Fair	0.2635	0.060	60
		0.331 ⇒ Total Area	

Assume $T_c = 0.1$ hr (minimum time allowed for flow calc).

$Q_{DC2} = 1$ cfs (see p 4 of 10 and page 5 of 10 for TR-55 Spreadsheets) - Based on 25-yr storm

3. DC3: Calculate curve no. for DC 3 (area = 0.69 acres)

- There is only one cover type for the drainage area to DC 3 (grass-good). Therefore, CN = 61.

$Q_{DC3} = 1$ cfs (see page 6 of 10 for TR-55 spreadsheets) - Based on 25-yr storm.

Quick TR-55 Ver.5.46 S/N:
Executed: 10:11:59 10-22-1997

NWSE
Site 4

RUNOFF CURVE NUMBER DATA

::

Composite Area: DC 2

SURFACE DESCRIPTION	AREA (acres)	CN	
Grass - Good	0.14	61	
Woods/Grass - Fair	0.13	65	
Woods/Pines - Fair	0.06	60	
COMPOSITE AREA --->	0.33	62.4	(62)

::

Composite Area: DC 3

SURFACE DESCRIPTION	AREA (acres)	CN	
Grass - Good	0.69	61	
COMPOSITE AREA --->	0.69	61.0	(61)

::

BY: JJB CHKD. KMS
DATE: 10/21/97 DATE: 10/21/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE - Site 4 Landfill
Coltsneck, New Jersey
CTO 289: 7602-0104
Drainage Channel 2

CALCULATED
DISK FILE: DC2 .GPD

Drainage Area	(acres)	0.331 --->	0.0005 sq.mi.
Runoff Curve Number	(CN)	62	
Time of Concentration,Tc	(hrs)	.1	
* Rainfall Distribution	(Type)	III	
Pond and Swamp Areas	(%)	0 --->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
* Rainfall, P, 24-hr (in)	3.4	5.2	6.0
Initial Abstraction, Ia (in)	1.226	1.226	1.226
Ia/p Ratio	0.361	0.236	0.204
Unit Discharge, * qu (csm/in)	523	618	628
Runoff, Q (in)	0.57	1.56	2.09
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	0	0	1

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	539.846	661.942	661.942
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	458.913	596.829	596.829
* qu (csm)		523	618	628

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$
$$qp\ (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond\ \&\ Swamp\ Adj.)$$

BY: JJB
DATE: 10/21/97

CHKD: KNS
DATE: 10/31/97

* Reference Attachment B.4, Preliminary Information for Sites 4 & 5, for Rainfall Estimates & Distribution Type.

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE - Site 4 Landfill
Coltsneck, New Jersey
CTO 289: 7602/0104
Drainage Channel 3

CALCULATED
DISK FILE: DC3 .GPD

Drainage Area	(acres)	.69	--->	0.0011 sq.mi.
☆ Runoff Curve Number	(CN)	61		
Time of Concentration,Tc	(hrs)	.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	2	10	25
☆ Rainfall, P, 24-hr (in)	3.4	5.2	6
Initial Abstraction, Ia (in)	1.279	1.279	1.279
Ia/p Ratio	0.376	0.246	0.213
Unit Discharge, * qu (csm/in)	498	614	625
Runoff, Q (in)	0.53	1.49	2.01
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	0	1	1

Summary of Computations for qu

Ia/p	#1	0.350	0.100	0.100
C0	#1	2.355	2.473	2.473
C1	#1	-0.497	-0.518	-0.518
C2	#1	-0.120	-0.171	-0.171
qu (csm)	#1	539.846	661.942	661.942
Ia/p	#2	0.400	0.300	0.300
C0	#2	2.307	2.396	2.396
C1	#2	-0.465	-0.512	-0.512
C2	#2	-0.111	-0.132	-0.132
qu (csm)	#2	458.913	596.829	596.829
* qu (csm)		498	614	625

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

☆ Reference Attachment B.1.; Preliminary Information for Sites 4 & 5, for Rainfall Estimates & Distribution Type.

BY: JJB DATE: 10/21/97

CHKD: KNS DATE: 10/21/97

CLIENT	JOB NUMBER		
NSWE	7602-0104		
SUBJECT: Waterway Evaluations			
BASED ON: Quick TR-55 - Open Channel Flow Eq	DRAWING NUMBER		
BY Revised 12/22/97 JJB - 10/21/97	CHECKED BY KMS 10/31/97	APPROVED BY	DATE

IV. Calculations (cont.)

4. DC4: Assume $Q_{DC4} = Q_{DC3} = 1$ cfs (Note: Q_{DC1} includes the flow that is contributed by DC4. 1 cfs is the flow that is anticipated along the bench)

B. Calculate Velocities in Drainage

Estimate velocities based on manning's equation for open channel flow.

Assume the following flows:

$Q_{DC1\,(A+U)}$ = 11 cfs - Q_{DC4} = 11 - 1 = 10 cfs (for the drainage channel before its junction with DC4)

$Q_{DC1\,(UO)}$ = 11 cfs

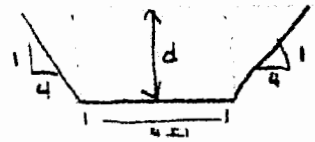
Q_{DC2} = 1 cfs

Q_{DC3} = 1 cfs

Q_{DC4} = 1 cfs

The spreadsheet on p. 8 of 10 presents the calculation of channel velocities. A sample calculation of channel velocity is presented as follows.

1. Trapezoidal Channel



Assume $d = 0.602$ Ft
$S = 0.83$ %
$n = 0.03$

$$\text{Area} = 4(d) + (1/2)(4d)(d) \cdot 2$$
$$= 4(0.602) + (1/2)(4)(0.602)^2 \cdot 2 = 3.86 \text{ Ft}^2$$

$$\text{Hydraulic Radius} = A / \text{wetted Perimeter}$$
$$= A / (4 + 2\sqrt{(4d)^2 + d^2}) = 3.86 / (4 + 2\sqrt{17(0.602)^2})$$
$$= 0.43 \text{ Ft}$$

Project: NWSE - Site 4 - Post Construction Conditions
Task: Estimation of Site 4 Channel Velocities
By: JJB **Chkd:** DCJ
Date: 12/24/97 **Date:** 12/29/97

DC 1

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Hyd. Rad. (ft)	n(3)	V (ft/s)
AB	60	0.5	0.83%	10.0	0.602	3.86	0.430	0.03	2.584
BC	50	1	2.00%	10.0	0.48	2.84	0.357	0.03	3.5
CD	40	1	2.50%	10.0	0.45	2.61	0.338	0.03	3.8
DE	70	1	1.43%	10.0	0.524	3.19	0.384	0.03	3.1
EF	190	1	0.53%	10.0	0.68	4.57	0.476	0.03	2.2
FG	30	1	3.33%	10.0	0.417	2.36	0.318	0.03	4.2
GH	35	1	2.86%	10.0	0.435	2.50	0.329	0.03	4.0
HI	27	1	3.70%	10.0	0.405	2.28	0.310	0.03	4.4
IJ	45	1	2.22%	10.0	0.465	2.72	0.348	0.03	3.7
JK	50	1	2.00%	10.0	0.48	2.84	0.357	0.03	3.5
KL	10	1	10.00%	10.0	0.309	1.62	0.247	0.03	6.2
LM	20	2	10.00%	10.0	0.309	1.62	0.247	0.03	6.2
MN	60	2	3.33%	10.0	0.417	2.36	0.318	0.03	4.2
NO	65	6	9.23%	11.0	0.333	1.78	0.263	0.03	6.2

DC 2

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Hyd. Rad. (ft)	n(3)	V (ft/s)
PQ	60	0.5	0.83%	1.0	0.165	0.77	0.143	0.03	1.2
QR	90	12	13.33%	1.0	0.075	0.32	0.070	0.03	3.1
RS	35	8	22.86%	1.0	0.065	0.28	0.061	0.03	3.7

DC 3

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(4)	Hyd. Rad. (ft)	n(3)	V (ft/s)
TR	240	6	2.50%	1.0	0.3	0.45	0.147	0.03	2.2

DC 4

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(4)	Hyd. Rad. (ft)	n(3)	V (ft/s)
TU	200	5	2.50%	1.0	0.3	0.45	0.147	0.03	2.2

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.
(3) Manning's Coeficient = 0.03, as given for a earth channel, winding, grass with some weeds. Chow, 1959. Open-Channel Hydraulics.
(4) A triangle channel is assumed with 4:1 and 6:1 side slopes.

CLIENT	JOB NUMBER
NSWE	7002-0109
SUBJECT: Waterway Evaluations	
BASED ON: Quick TR-55 + Open Channel Flow Eq.	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JTB 10/21/97	KMS 10/31/97		

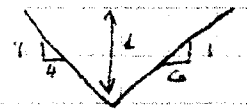
Mannings Equation

$$V = 1.49 (r_h)^{2/3} (\text{slope})^{1/2} / n = 1.49 (0.43)^{2/3} (0.0083)^{1/2} / 0.03$$

$$= 2.58 \text{ ft/s}$$

$$Q = V \cdot A = (3.86 \text{ ft}^2)(2.6 \text{ ft/s}) = 10.0 \text{ ft}^3/\text{s}$$

2. Triangular Channel



Assume:
$d = 0.30$
$n = 0.03$
$S = 2\%$

$$\text{Area} = \tfrac{1}{2}(d)(4d) + \tfrac{1}{2}(d)(6d)$$

$$= \tfrac{1}{2}(0.3)^2(4) + (\tfrac{1}{2})(6)(0.3)^2 = 0.45 \text{ ft}^2$$

$$\text{Wetted Perimeter} = \sqrt{(4d)^2 + (d)^2} + \sqrt{(6d)^2 + d^2}$$

$$= 1.237 + 1.825 = 3.062$$

$$r_H = 0.45 / 3.062 = 0.147 \text{ ft}$$

$$V = \frac{1.49 (r_h)^{2/3} (S)^{1/2}}{n} = \frac{1.49 (0.147)^{2/3} (0.025)^{1/2}}{0.03}$$

$$= 2.2 \text{ ft/s}$$

$$Q = VA = (2.2 \text{ ft/s})(0.48 \text{ ft}^2) = 1.056 \text{ ft}^3/\text{s}$$

CLIENT	JOB NUMBER
NSWE	7602-0104
SUBJECT: Waterway Evaluations	
BASED ON: Quick TR-55 & Open Channel Flow	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JJB 10/21/97	KMS 10/31/97		

V Conclusions

Based on a maximum allowable velocity of 2.0 ft/s & 3.0 ft/s for sandy and silty/clay type of soil, respectively, and based on the presented calculations, the following conclusions are made:

- DC 1 - The 2.0 ft/s velocity is exceeded in all locations. Other forms of E&SC practices are required for this sandy soil.
- DC2 - Riprap is recommended for segment QRS, because these segments exceed the allowable velocity for sandy soils. Although the slope of this segment exceeds the allowable slope for riprap (>10 %), the flow of the channel is minimal (1 cfs). Riprap is deemed appropriate for this circumstance.
- DCs 3 & 4 → E&SC measures are not needed for these diversion channels. Velocities & slopes are within acceptable standards.

References:

- Please refer to the references provided in Attachment B.1, Preliminary Information for Sites 4 & 5.
- The following information was obtained from previous calculations:
  - Rainfall Distribution & Rainfall Quantity - Attachment B.1
  - Assumptions regarding native soil - Attachment B.1
  - Drainage Area & peak Flow - Attachment B.4

CLIENT	JOB NUMBER
NSWE	7602-0104

SUBJECT: Determine Rip Rap sizing requirements

BASED ON	DRAWING NUMBER
NJ Regs + previous calcs	

BY	CHECKED BY REV, CHKD REV	APPROVED BY	DATE
JJB 10/22/97	KVS 11/03/97 12/29/98		

I. Purpose: To determine the required riprap sizing requirements to protect DC 1 & 2 from the erosive forces of water.

II Approach: Based on previous calculations and NJ's E+SC Standard for Rip rap, determine the appropriate design criteria. Critical sections of the waterway will be sized for rip rap as follows:

- DC 1 will be broken into 2 sections (segment AK and KO). For each section, the segment that has the highest slope will be used as the basis of design.
- DC 1 possesses two bends (IK & DE). IK will be evaluated because it is farther downstream & will subsequently convey more flow than DE.
- The larger of the two design parameters calculated for DC1's segments AK & KO will be used for DC2 segment QS. Although the slope of segment QS exceeds 10 %, the flow expected to be conveyed during the 25-yr storm event is 1 cfs which does not warrant a concrete-lined channel. Rip rap is viewed as an appropriate Ease device for this segment.

III. Assumptions:

- A Filter layer will be used per NJ regs.
- Angular rip rap will be used
- For first iteration, assume channels KL, LM, MN, NO, QR, & RS will be lined with D_{50} = 9" riprap with a mannings $n = 0.038$

CLIENT	JOB NUMBER
NSWE	7002-0104

SUBJECT: Determine Rip Rap Size Requirements

BASED ON	DRAWING NUMBER
NJ regs & previous calcs.	

BY	CHECKED BY REV. CHK'D DCW 12/4/97	APPROVED BY	DATE
JJB 10/22/97	KNS 11/03/97		

IV Calculations

(A) DC-1 design parameters:

$Q_{HI} = 10$ cfs — base of channel = 4 ft

Slope(HI) = 0.037 — side slopes of channel = 4:1 z = 4

$R_{o(IK)} = 45$ ft — channel depths + other data are presented on p. 3 of 9

Slope(NO) = 0.923

$Q_{NO} = 11$ cfs

Straight channel (segment HI)

base / depth = 4 / 0.405 = 9.877

From curve 4.12-2 (page 4 of 9), P/R ≅ 24

From curve 4.12-3 (page 5 of 9), d_{50} ≅ 3.5 inches

From curve 4.12-1 (page 6 of 9), $n = 0.032$

$d_{max} = 1.5(d_{50}) = (1.5)(3.5) = 5.25$ in

riprap thickness = $2 \cdot d_{50} = 7.0$ in

Channel Bend (segment IK)

B_s = base + 2(z)(d) = 4 + (2)(4)(0.465) = 7.72

B_s/R_o = 7.72 / 45 = 0.172

From Curve 4.12-4 (see page 7 of 9), F_B = 1.02 < 1.1

∴ no bend factor needed. No bend factor will be applied to segment DE as well.

Straight Channel (segment NO)

b/d = 4/0.379 = 10.55

From curve 4.12-2, P/R ≅ 24

From curve 4.12-3, d_{50} = 7.8 in ~ say 9.0 in

From curve 4.12-1, $n = 0.038$

d_{max} = (1.5)(9.) = 13.5 in

rip rap thickness = (2)(9) = 18 in

Project: NWSE - Site 4 - Post Construction Conditions
Task: Estimation of Site 4 Channel Velocities
By: JJB **Chkd:** DCW
Date: 12/24/97 **Date:** 12/29/97

DC 1

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Hyd. Rad. (ft)	n(3)(5)	V (ft/s)
AB	60	0.5	0.83%	10.0	0.602	3.86	0.430	0.03	2.584
BC	50	1	2.00%	10.0	0.48	2.84	0.357	0.03	3.5
CD	40	1	2.50%	10.0	0.45	2.61	0.338	0.03	3.8
DE	70	1	1.43%	10.0	0.524	3.19	0.384	0.03	3.1
EF	190	1	0.53%	10.0	0.68	4.57	0.476	0.03	2.2
FG	30	1	3.33%	10.0	0.417	2.36	0.318	0.03	4.2
GH	35	1	2.86%	10.0	0.435	2.50	0.329	0.03	4.0
HI	27	1	3.70%	10.0	0.405	2.28	0.310	0.03	4.4
IJ	45	1	2.22%	10.0	0.465	2.72	0.348	0.03	3.7
JK	50	1	2.00%	10.0	0.48	2.84	0.357	0.03	3.5
KL	10	1	10.00%	10.0	0.352	1.90	0.276	0.038	5.3
LM	20	2	10.00%	10.0	0.352	1.90	0.276	0.038	5.3
MN	60	2	3.33%	10.0	0.473	2.79	0.353	0.038	3.6
NO	65	6	9.23%	11.0	0.379	2.09	0.293	0.038	5.3

DC 2

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Hyd. Rad. (ft)	n(3)(5)	V (ft/s)
PQ	60	0.5	0.83%	1.0	0.165	0.77	0.143	0.03	1.2
QR	90	12	13.33%	1.0	0.085	0.37	0.078	0.038	2.6
RS	35	8	22.86%	1.0	0.072	0.31	0.067	0.038	3.1

DC 3

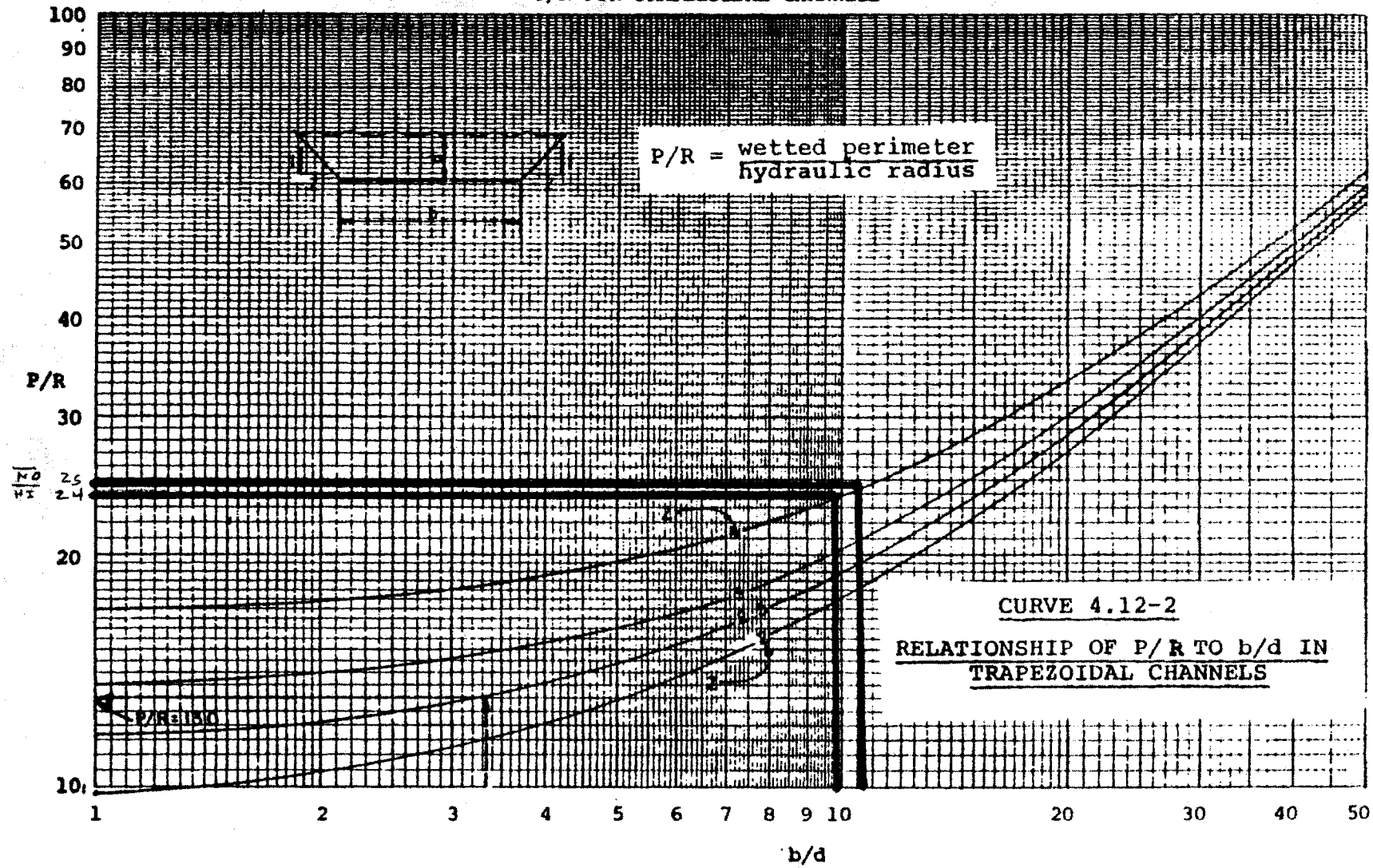
Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(4)	Hyd. Rad. (ft)	n(3)	V (ft/s)
TR	240	6	2.50%	1.0	0.3	0.45	0.147	0.03	2.2

DC 4

Segment	Distance (ft)	Δ Elevation (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(4)	Hyd. Rad. (ft)	n(3)	V (ft/s)
TU	200	5	2.50%	1.0	0.3	0.45	0.147	0.03	2.2

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.
(3) Manning's Coeficient = 0.03, as given for a earth channel, winding, grass with some weeds. Chow, 1959. Open-Channel Hydraulics.
(4) A triangle channel is assumed with 4:1 and 6:1 side slopes.
(5) Assume n = 0.038 for channels KL, LM, MN, NO, QR, and RS.

P/R FOR TRAPEZOIDAL CHANNELS

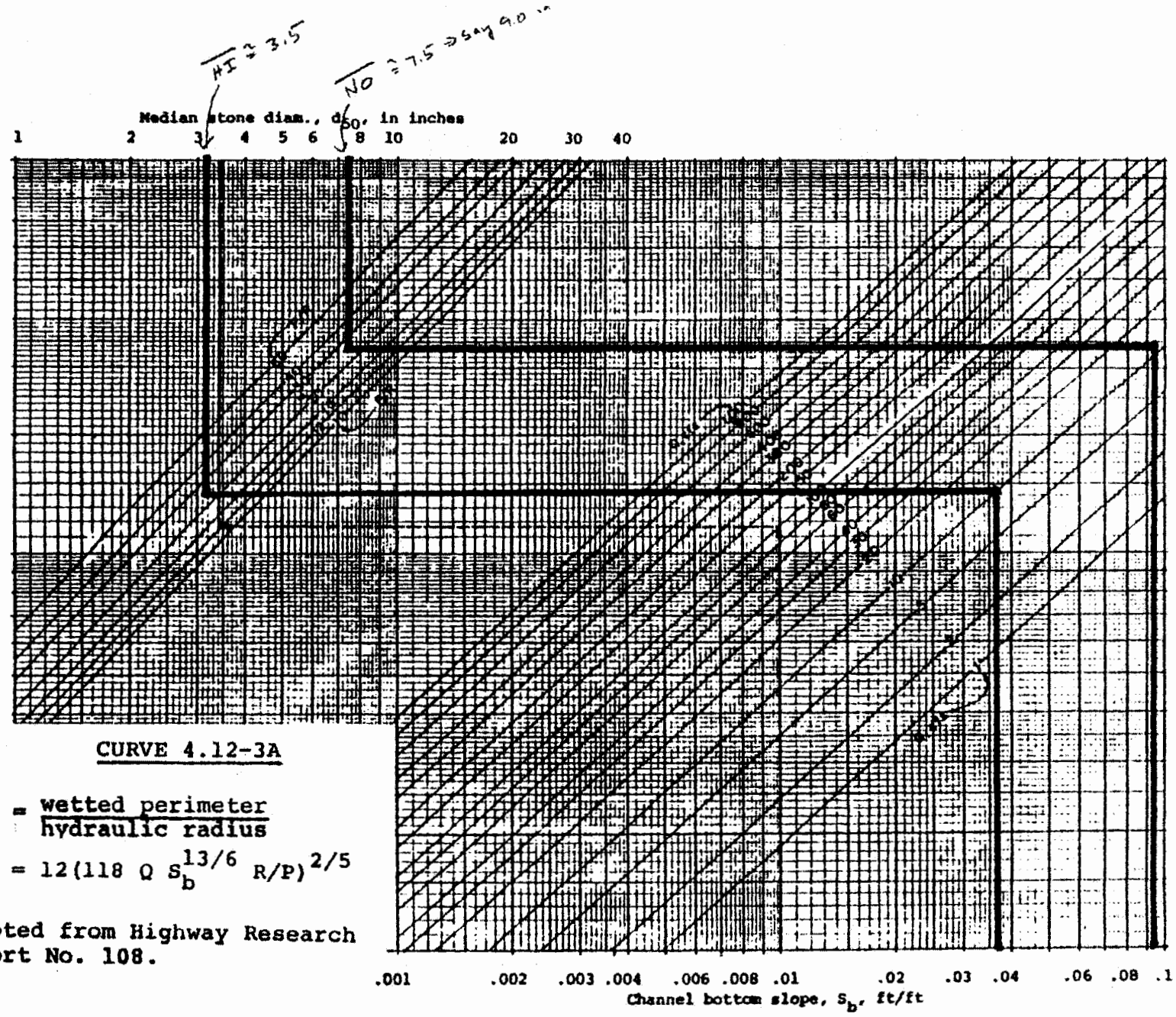


CURVE 4.12-2

RELATIONSHIP OF P/R TO b/d IN TRAPEZOIDAL CHANNELS

BY: JJB DATE: 12/27/97 CHKD: DCW DATE: 12/29/97

MEDIAN RIPRAP DIAMETER FOR STRAIGHT TRAPEZOIDAL CHANNELS



CURVE 4.12-3A

$$P/R = \frac{\text{wetted perimeter}}{\text{hydraulic radius}}$$

$$d_{50} = 12(118\ Q\ S_b^{13/6}\ R/P)^{2/5}$$

Adapted from Highway Research Report No. 108.

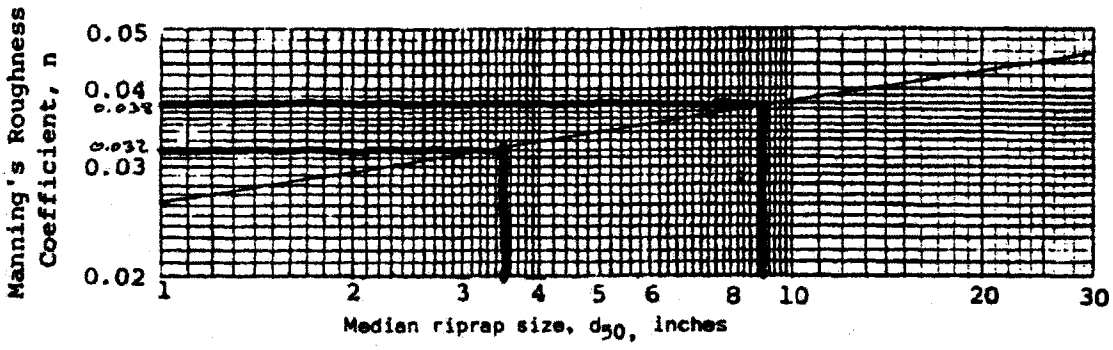
BY: RJB DATE: 12/27/97

CHKD: DCW DATE: 12/29/97

This procedure is based on the assumption that the channel is already designed and the remaining problem is to determine the riprap size that would be stable in the channel. The designer would first determine the channel dimensions by the use of Manning's equation. The "n" value for use in Manning's equation is obtained by estimating a riprap size and then determining the corresponding "n" value for the riprapped channel from $n = 0.0395\ d_{50}^{\ 1/6}$, where d_{50} is in feet, or by using Curve 4.12-1, below, where d_{50} is in inches.

CURVE 4.12-1

MANNING'S "n" FOR RIPRAP-LINED CHANNELS



When the channel dimensions are known, the riprap can be designed (or an already completed design may be checked) as follows:

Trapezoidal Channels

1. Calculate the b/d ratio and enter Curve 4.12-2 to find the P/R ratio.

2. Enter Curve 4.12-3 with S_b, Q, and P/R to find median riprap diameter, d_{50}, for straight channels.

3. Enter Curve 4.12-1 to find the actual "n" value corresponding to the d_{50} from step 2. If the estimated and actual "n" values do not reasonably agree, another trial must be made.

4. For channels with bends, calculate the ratio B_s/R_o, where B_s is the channel surface width and R_o is the radius of the bend. Enter Curve 4.12-4 and find the bend factor, F_B. Multiply the d_{50} for straight channels by the bend factor to determine riprap size to be used in bends. If the d_{50} for the bend is less than 1.1 times the d_{50} for the straight channel, then the size for straight channel may be used in the bend; otherwise, the larger stone size calculated for the bend shall be used. The riprap shall extend across the full channel section and shall extend upstream and downstream from the ends of the curve a distance equal to five times the bottom width.

5. Enter Curve 4.12-5 to determine maximum stable side slope of riprap surface. In Curve 4.12-5, the side slope is established so that the riprap on the side slope is as stable as that on the bottom. If for any reason it is desirable to make the side slopes steeper than what is given by Curve 4.12-5, the size of the riprap can be increased and the side slopes made steeper by using the following procedures:

   a. Compute d_{50} and maximum stable side slope as above.

   b. Enter Curve 4.12-6 with the computed side slope to determine K for that side slope.

   c. Enter Curve 4.12-6 with the desired side slope to determine K'.

   d. Compute riprap size for desired slope by the formula:

$$d_{50}' = d_{50}\frac{K}{K'}$$

6. Maximum side slopes, 2:1.

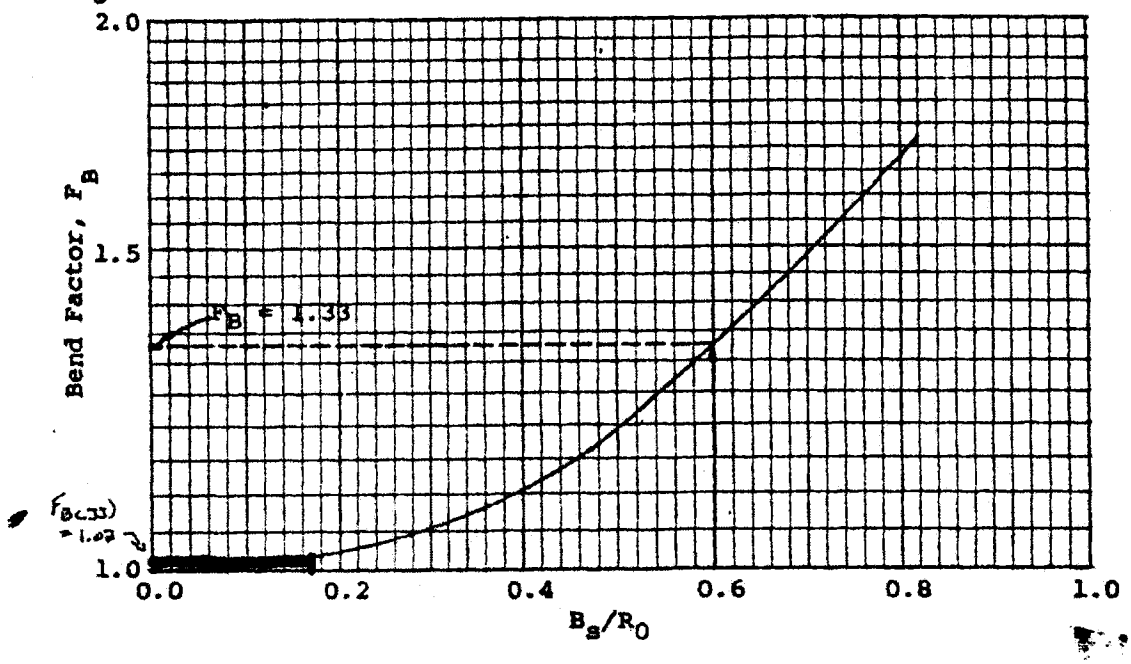
By: JJS CHKD: DCW
Date: 12/27/97 Date: 12/27/97

CURVE 4.12-4

RIPRAP SIZE CORRECTION FACTOR FOR FLOW IN CHANNEL BENDS

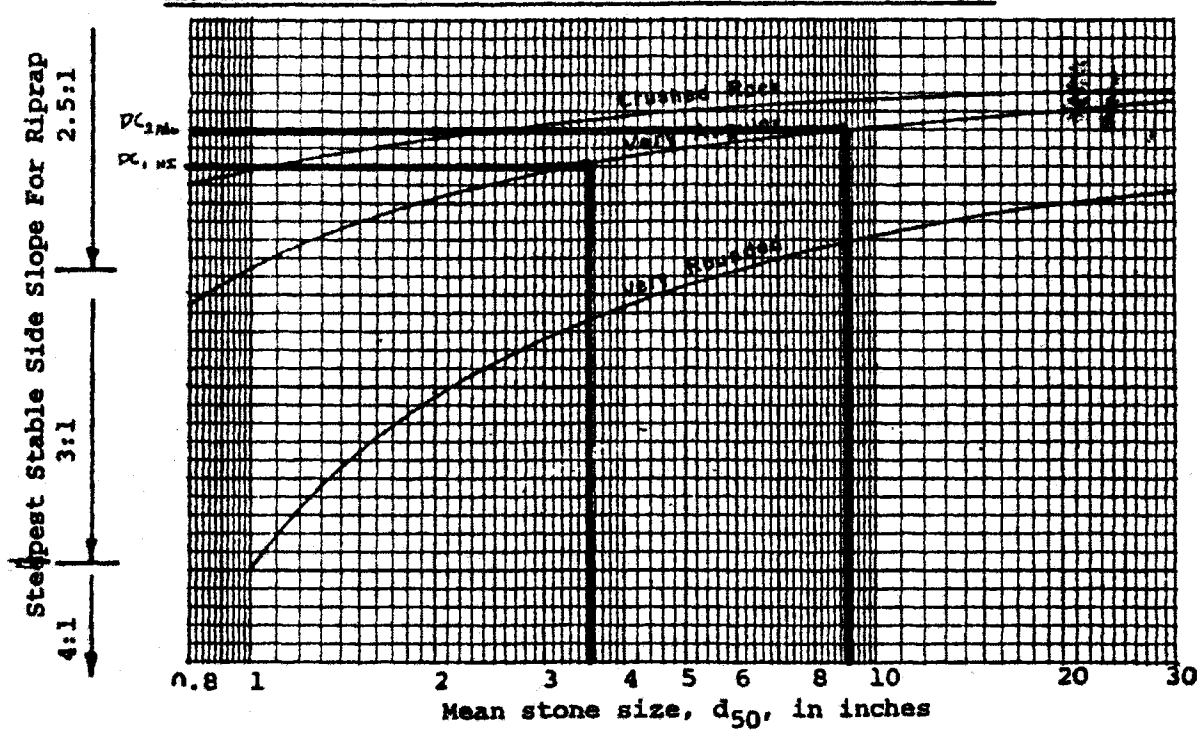
d_{50}(for bend) = d_{50}(for straight) X F_B
B_s = channel surface width
R_o = mean radius of bend

Adapted from Highway Research Report No. 108.



CURVE 4.12-5

MAXIMUM RIPRAP SIDE SLOPE WITH RESPECT TO RIPRAP SIZE



BY: JJB CHKD
DATE: 10/22/87 DATE

CLIENT	JOB NUMBER
NWSE	7602-0104
SUBJECT: Determine Riprap Sizing Requirements	
BASED ON: NJ Regs & prev. calcs	DRAWING NUMBER
BY: JJB 10/22/97 / CHECKED BY: KWS 11/03/97	APPROVED BY / DATE

IV Calculations (cont)

Slope Stability.

From curve 4.12-5 (p. 7 of 9), rip rap of $d_{50} = 3.5$ & 9 in will be stable on 4:1 side slope.

Filter Layer

- Use a filter layer that meets the requirements of a geotextile riprap filter (standard specification 919.06-2) in NJ DOT Standard Specifications for Road & Bridge Construction, 1996.

V Conclusions:

- For DC 1, two sizes of riprap will be used. For segment AK①, riprap will meet the following specifications

  d_{50} = 3.5 inches

  d_{max} = 5.25 inches

  thickness of riprap = 7.0 inches

  For segment KO, riprap will meet the following specifications

  d_{50} = 9.0 in

  d_{max} = 13.5 in

  thickness of riprap = 18 inches

- For DC 2 - segment QS riprap will meet the specifications of segment KO of DC-1.

- No bend factor is required for bends of DC 1 & 2

- A geotextile riprap filter will be used

① Refer to page 2 of 10 of Waterway Evaluation, Appendix E.1

CLIENT	JOB NUMBER
NSWE	7602-0104

SUBJECT: Determine Riprap Sizing Requirements

BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
JJB 10/22/97	KJS 10/03/97		

VI References

- Refer to the references provided in Attachment B.1.
- Waterway Evaluation calcs, Attachment E.1

E.2 HYDRAULIC STABILITY CALCULATIONS AND RIPRAP EVALUATION FOR SITE 5 CHANNELS

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER		
NWS EARLE	7602		
SUBJECT: SITES - DRAINAGE CHANNEL EVALUATIONS			
BASED ON: NJ REGULATIONS + PREVIOUS CALCS		DRAWING NUMBER	
BY: LMShipkin 11/5/97	CHECKED BY: KMS 11/6/97	APPROVED BY	DATE

Purpose: To determine suitable lining materials (vegetation, riprap) for the drainage channels surrounding sites based on anticipated flow rates and velocities

Guidance Document: Standards for Soil Erosion and Sediment Control in New Jersey, April 1987, NJ State Soil Conservation Committee

Approach: Cap was divided into drainage areas to determine peak flows for individual channel segments. Peak flows were calculated using Pond Pack by Haestad methods.

CLIENT	JOB NUMBER		
NWS EARLE	71602		
SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATIONS			
BASED ON: NJ DEP & PREV CALCS		DRAWING NUMBER	
BY: LMS 11/5/97	CHECKED BY: 11/6/97	APPROVED BY	DATE

I. Calculation of Peak Discharges

The cap was divided into six drainage areas as shown on Attachment #1

Flow calculations for Areas 4 & 5 can be found in the design calculations associated with the culverts which drain these areas. The flows calc were

Area 4: 9 cfs
Area 5: 2 cfs

These flows become additive with those calculated for Areas 3 and 2 respectively.

There is no channel associated with Area 6, so flow calculations were not performed.

Area	Planimeter Reading	Scale	Area
Area 1	5.70	1" = 100'	1.31 ac
Area 2	14.95	1" = 100'	3.43 ac
Area 3	5.50	1" = 100'	1.26 ac

CN = 98 for impervious surfaces
CN = 61 for good/grassed area

See page 3/10 for calculation of curve numbers for each drainage area by HydroCad

Assume t_c for all drainage areas is 0.1 hr (minimum time allowed for flow calculation)

For the 25-year storm event, the rainfall is 6"
Peak flows are provided on pages 4, 5, 6/10 for areas 1, 2, 3 respectively.

Quick TR-55 Ver.5.46 S/N:
Executed: 11:53:13 11-05-1997

NWS EARLE
NEW JERSEY
SITE 5

RUNOFF CURVE NUMBER DATA

::

Composite Area: DRAINAGE AREA 1

SURFACE DESCRIPTION	AREA (acres)	CN	
ASPHALT, IMPERVIOUS	1.31	98	
COMPOSITE AREA --->	1.31	98.0	(98)

::

Composite Area: DRAINAGE AREA 2

SURFACE DESCRIPTION	AREA (acres)	CN	
GRASS, GOOD	3.43	61	
COMPOSITE AREA --->	3.43	61.0	(61)

::

Composite Area: DRAINAGE AREA 3

SURFACE DESCRIPTION	AREA (acres)	CN	
GRASS, GOOD	1.26	61	
COMPOSITE AREA --->	1.26	61.0	(61)

::

By: LMS
Date: 11/5/97

Checked: KMS
Date: 11/6/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWS EARLE
NEW JERSEY
SITE 5
DRAINAGE AREA 1

CALCULATED
DISK FILE: EARLE5 .GPD

Drainage Area	(acres)	1.31	--->	0.0020 sq.mi.
Runoff Curve Number	(CN)	98		
Time of Concentration,Tc	(hrs)	0.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	0.041	0.041	0.041
Ia/p Ratio	0.007	0.000	0.000
Unit Discharge, * qu (csm/in)	662	0	0
Runoff, Q (in)	5.76	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	8	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	661.942	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	661.942	0.000	0.000
* qu (csm)		662	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

By: LMS
Date: 11/5/97

Checked: [illegible]
Date: 11/6/[illegible]

5|10

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWS EARLE
NEW JERSEY
SITE 5
DRAINAGE AREA 2

CALCULATED
DISK FILE: EARLE5 .GPD

Drainage Area	(acres)	3.43	--->	0.0054 sq.mi.
Runoff Curve Number	(CN)	61		
Time of Concentration,Tc	(hrs)	0.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	1.279	1.279	1.279
Ia/p Ratio	0.213	0.000	0.000
Unit Discharge, * qu (csm/in)	625	0	0
Runoff, Q (in)	2.01	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	7	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	661.942	0.000	0.000
Ia/p	#2	0.300	0.000	0.000
C0	#2	2.396	0.000	0.000
C1	#2	-0.512	0.000	0.000
C2	#2	-0.132	0.000	0.000
qu (csm)	#2	596.829	0.000	0.000
* qu (csm)		625	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

By: LMS Checked: KMS
Date: 11/5/97 Date: 11/6/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NWS EARLE
NEW JERSEY
SITE 5
DRAINAGE AREA 3

CALCULATED
DISK FILE: EARLE5 .GPD

Drainage Area	(acres)	1.26	--->	0.0020 sq.mi.
Runoff Curve Number	(CN)	61		
Time of Concentration,Tc	(hrs)	0.1		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	1.279	1.279	1.279
Ia/p Ratio	0.213	0.000	0.000
Unit Discharge, * qu (csm/in)	625	0	0
Runoff, Q (in)	2.01	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	661.942	0.000	0.000
Ia/p	#2	0.300	0.000	0.000
C0	#2	2.396	0.000	0.000
C1	#2	-0.512	0.000	0.000
C2	#2	-0.132	0.000	0.000
qu (csm)	#2	596.829	0.000	0.000
* qu (csm)		625	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$
$$qp\ (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond\ \&\ Swamp\ Adj.)$$

By: LMS Checked: K...
Date: 11/5/97 Date: 11/6/97

CLIENT	JOB NUMBER		
NWS EARLE	7602		
SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATIONS			
BASED ON: NJ REAS & PREV CALCS		DRAWING NUMBER	
BY: LMS 11/5/97	CHECKED BY: KMS 11/6/97	APPROVED BY	DATE

Velocity of flow in each channel can be calculated from Manning's Equation.

$$V = \frac{1.49(R)^{2/3}(S)^{1/2}}{N} \quad (ft/s)$$

where
R = Hydraulic Radius
S = Channel Slope
N = Manning's Constant

Areas 1 & 4 are surrounded by a curb which forces all runoff into catch basins which outlet at the end of the respective channel sections. As such, flow through these two channels is minimal, and calculations of velocity for purposes of designing a channel lining need not be performed. Channels 1 & 4 will be vegetated with stone only at the discharge of the catch basin.

Velocity calculations for Areas 2, 3, 5 are summarized on the spread sheet provided on page 9/10. Values used were obtained as follows:
Channel Slopes were determined during cap design and are as follows:

Area 2	0.82%
Area 3	1.20%
Area 5	0.82%

CLIENT	JOB NUMBER
NWS EARLE	7602
SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATIONS	
BASED ON: NJ REGS & PREV CALCS	DRAWING NUMBER
BY: LMS 11/5/97 / CHECKED BY: KMS 11/6/97	APPROVED BY / DATE

Flowrates were previously calculated, but for areas 2 & 3 the flows from the culverts draining S&H, respectively, were added

Channel	Contributing Drainage Areas	Q
#2	#2 (70cfs) + #5 (20cfs)	9
#3	#3 (20cfs) + #5 (90cfs)	111
#5	#5 (20cfs)	2

For areas 4 and 5 see calculations dated 11/3/97 by KMS

Typically Mannings n = 0.03 for grass maintained channels, however, due to shallow depth of flow expected, the channel lining will have a greater impact as far as retarding flow. This increased retardance results in n values being greater than 0.03.

In order to determine the n values shown in the spreadsheet, several iterations of the calculations were performed using nomographs to determine n. (See Attachment 2 for these iterations - method from Appendix A&e of the NJ Regulations)

The flow velocities resulting from the 25-year storm event are:

Channel	Velocity (ft/sec)
#2	2.23
#3	2.71
#5	0.80

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Channel Velocities
By: LMS **Chkd:** KMS
Date: 11/5/97 **Date:** 11/6/97

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#2	731	0.82%	9	0.620	4.030	9.130	0.441	0.035	2.23
#3	571	1.20%	11	0.630	4.060	9.160	0.443	0.035	2.71
#5	430	0.82%	2	0.043	2.500	7.590	0.329	0.08	0.80

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT	JOB NUMBER
NWS EARLE	71602
SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATIONS	
BASED ON: NJREGS & PREV CALCS	DRAWING NUMBER
BY: LMS 11/5/97 / CHECKED BY: KMS 11/6/97	APPROVED BY / DATE

Section 4.3 (NJ SESC) provides maximum permissible flow velocities as a function of the most erodible soil texture exposed in the channel and the type of vegetation expected

Native Site Material/vegetated 2.0 ft/sec

Imported Topsoil/vegetated 2.5 ft/sec
(See Attachment #3, Ref 1 page 4.3.1)

Conclusions:

Channel #2 can be topsoiled to improve the soil and vegetated

Channel #5 can be vegetated utilizing native site material

Channel #3 will require rip rap lining

References

1. Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, April 1987.

2. Pond Pack, Haestad Methods, 1989.

Attachment #1

PRELIMINARY

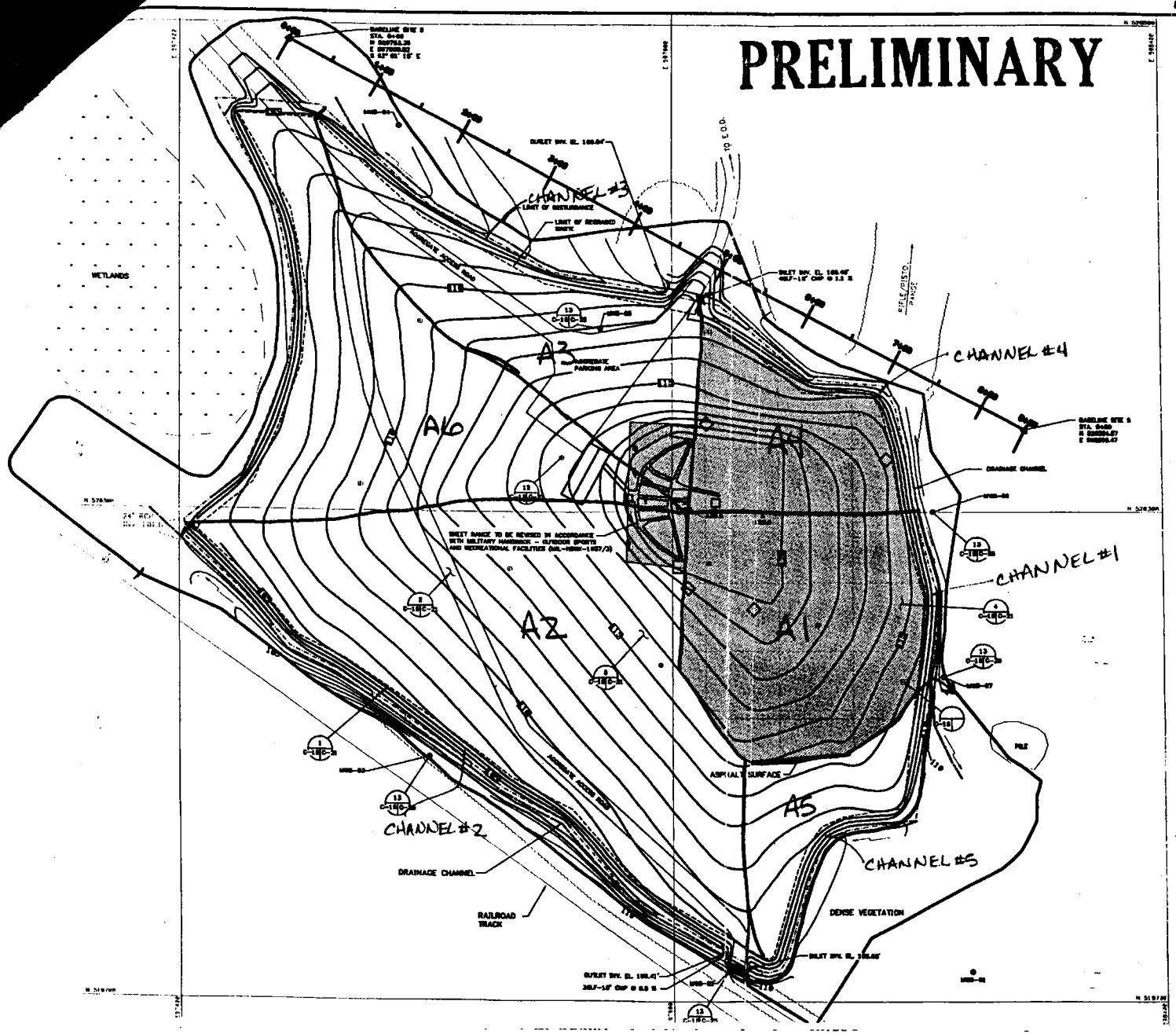


TABLE 1
EXISTING MONITORING WELLS TO BE MODIFIED

MONITORING WELL ID	EXISTING TYPE	MODIFICATION
MW5-03	STICK-UP	FLUSH MOUNT
MW5-03	STICK-UP	FLUSH MOUNT
MW5-05	STICK-UP	FLUSH MOUNT
MW5-06	STICK-UP	FLUSH MOUNT
MW5-07	STICK-UP	FLUSH MOUNT

11/6/97

NORTHERN DIVISION
LANDFILL CAPS FOR SITES 4 AND 5
FINAL GRADING PLAN, SITE 5

REFER TO T-2 FOR GENERAL LEGEND.

REFER TO T-2 FOR GENERAL NOTES.

CHECK GRAPHIC SCALE BEFORE USING

M62472- -C-

Project: NWSE - Site 5 - Post Construction Conditions **Page 8 of**
Task: Estimation of Site 5 Channel Velocities
By: LMS **Chkd:**
Date: 11/4/97 **Date:**

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#2	731	0.82%	9	0.570	3.610	8.730	0.414	0.03	2.50
#3	571	1.20%	11	0.580	3.640	8.760	0.416	0.03	3.03
#5	430	0.82%	2	0.250	1.270	6.090	0.209	0.03	1.58

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

Iteration #1

n=0.03

Channel #5 is off the scale, so recalc w/ n=0.1

Recalc #2 w/ n= 0.035
#3 w/ n= ~~0.039~~ 0.035
based on Fig A6-4

By: LMS
Date: 11/5/97

Checked: KMS
Date: 11/6/97

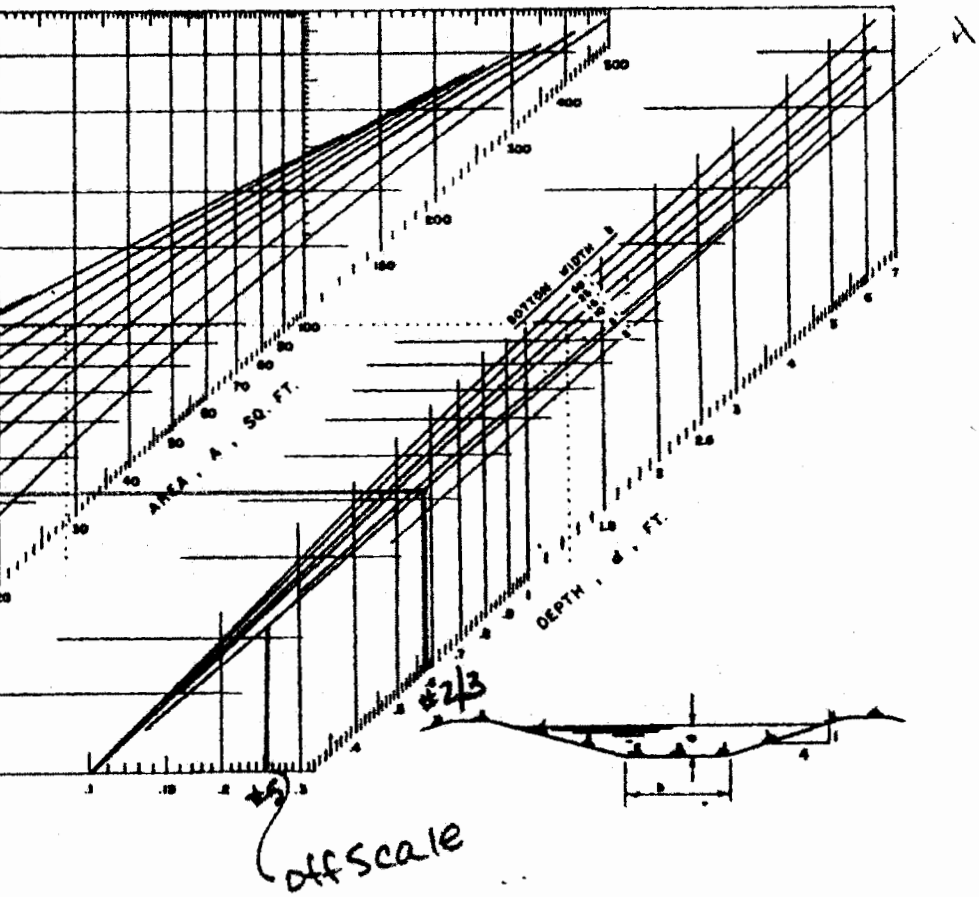
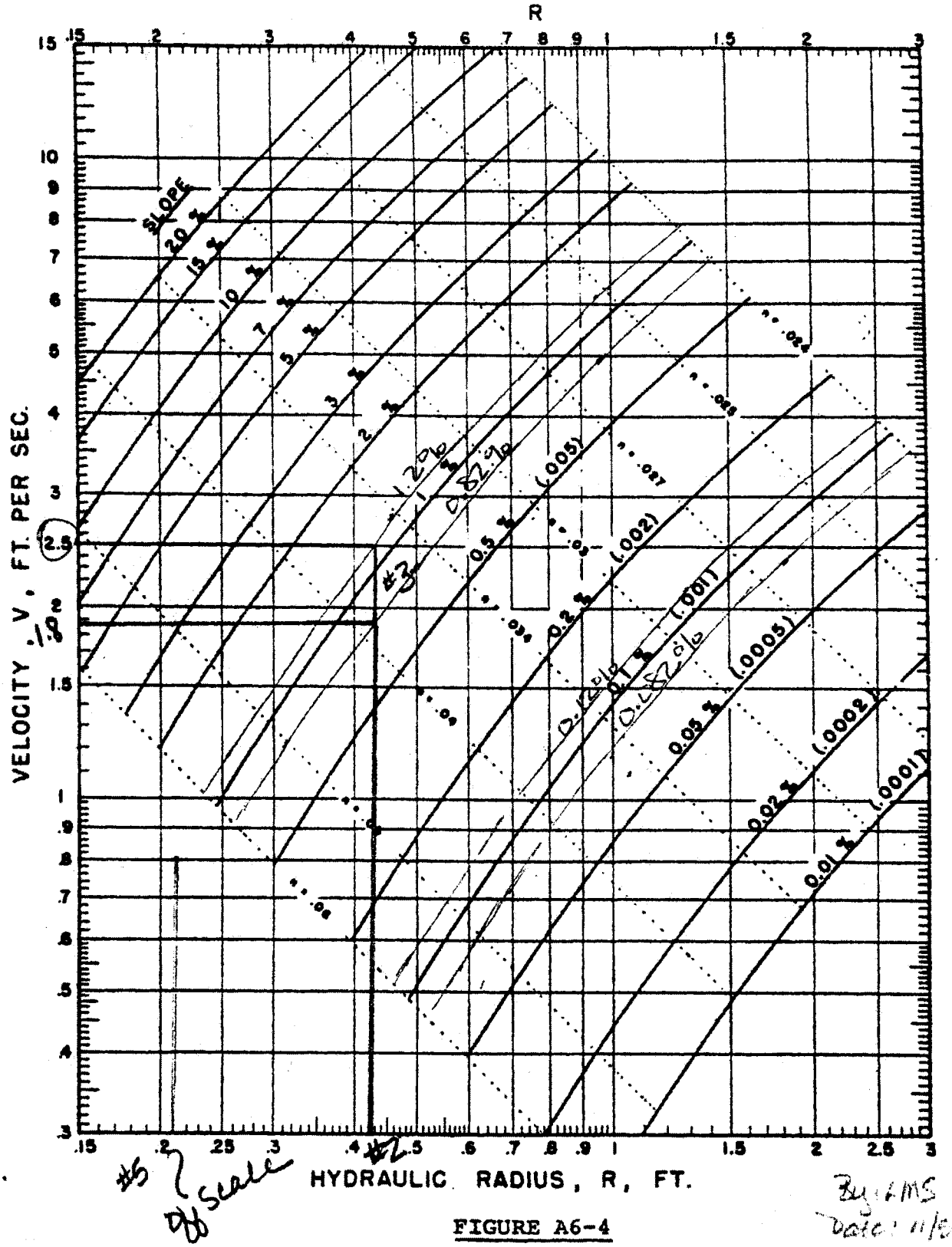


FIGURE A6-7

APEZOIDAL CHANNELS WITH 4 TO 1 SIDE SLOPES



By: AMS Checked:
Date: 11/5/97 Date:

FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Channel Velocities
By: LMS **Chkd:** KMS
Date: 11/4/97 **Date:** 11/6/97

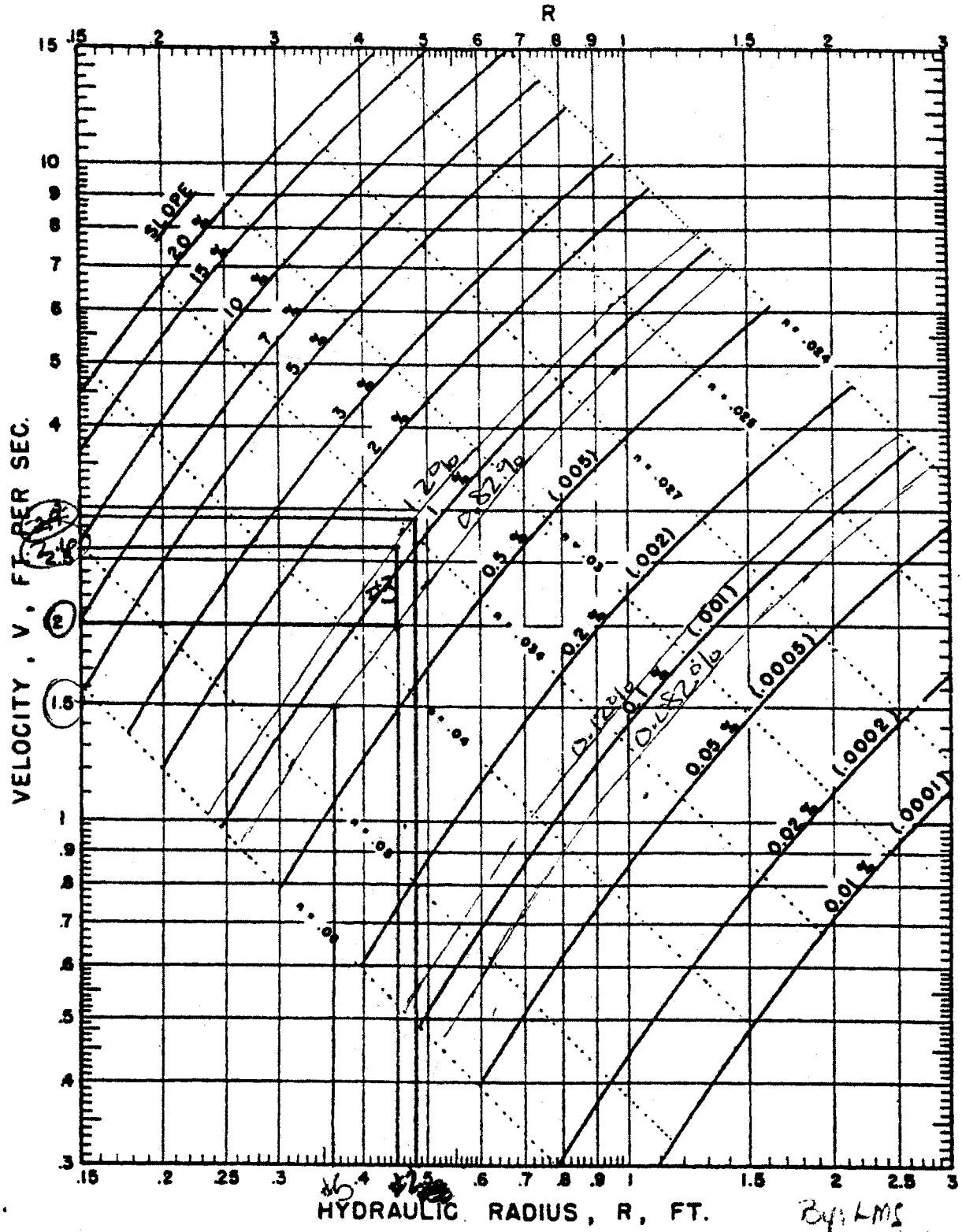
Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)	
#2	731	0.82%	9	0.620	4.030	9.130	0.441	0.035	2.23	(2)
#3	571	1.20%	11	0.630	4.060	9.160	0.443	0.035	2.71	(2.0)
#5	430	0.82%	2	0.49	2.92	8.041	0.363	0.1	0.69	(1.5)

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

Iteration #2

Differences in V calc for channels 2 & 3 is insignificant & probably due to rounding.

Recalc #5 w/ n = 0.08



By: LMS
Date: 11/5/87

Checked: KM
Date: 11/6/

FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

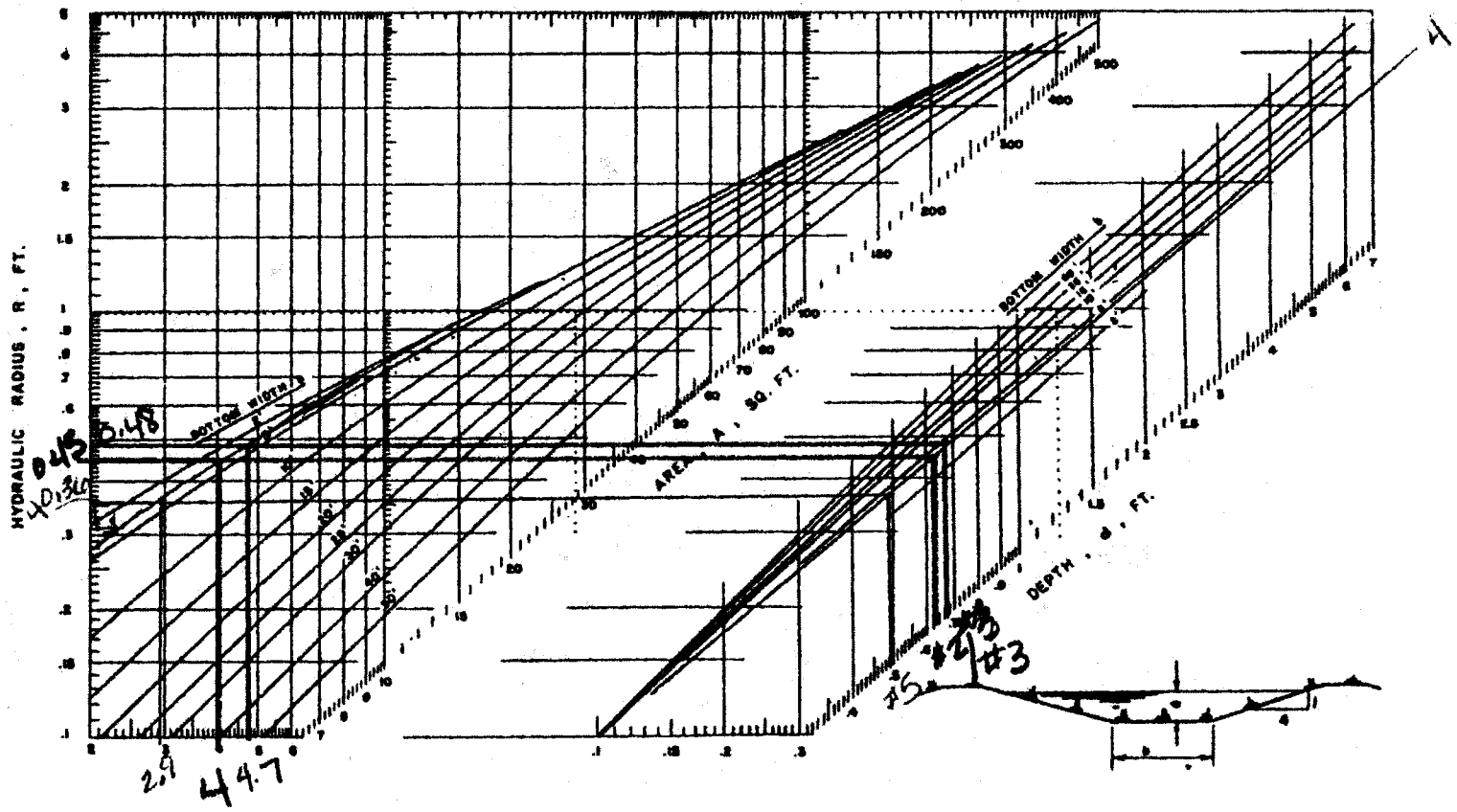


FIGURE A6-7

DIMENSIONS OF TRAPEZOIDAL CHANNELS WITH 4 TO 1 SIDE SLOPES

By: LMS Checked: CM
Date: 11/6/87 Dated 11/6/

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Channel Velocities
By: LMS **Chkd:**
Date: 11/4/97 **Date:**

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#2	731	0.82%	0						#DIV/0!
#3	571	1.20%	0						#DIV/0!
#5	430	0.82%	2	0.43	2.50	7.590	0.329	0.08	0.80

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

Iteration #3 n=0.08

(Even though Iteration #2 showed an n Value btw 0.04 & 0.05 for Channel #5, when any of these values were used, the corresponding R Value was off the scale. ~~There~~ Resulting in the use of n=0.08

By: LMS Checked: Date: 11/5/97 Date: 11/6

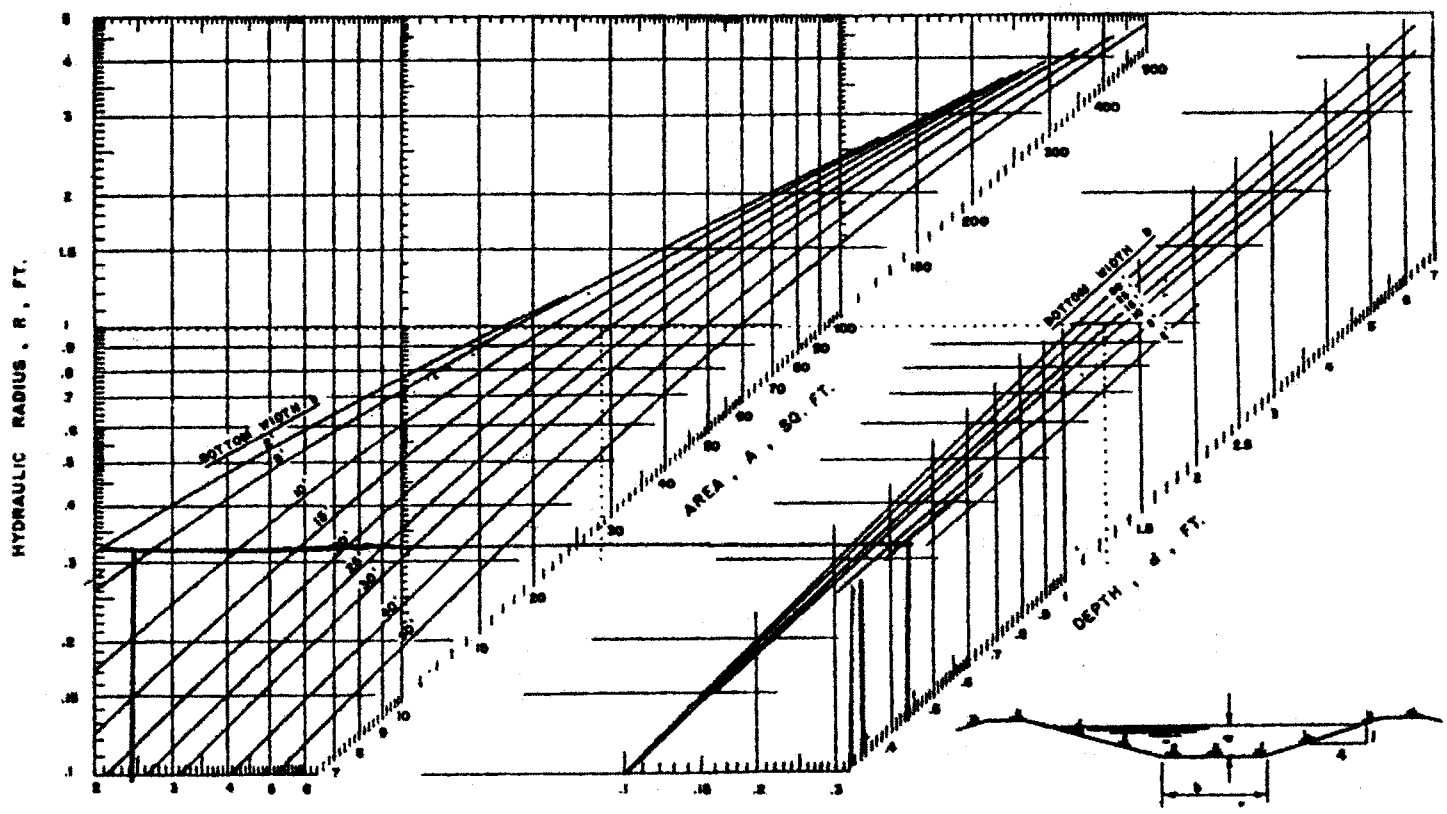
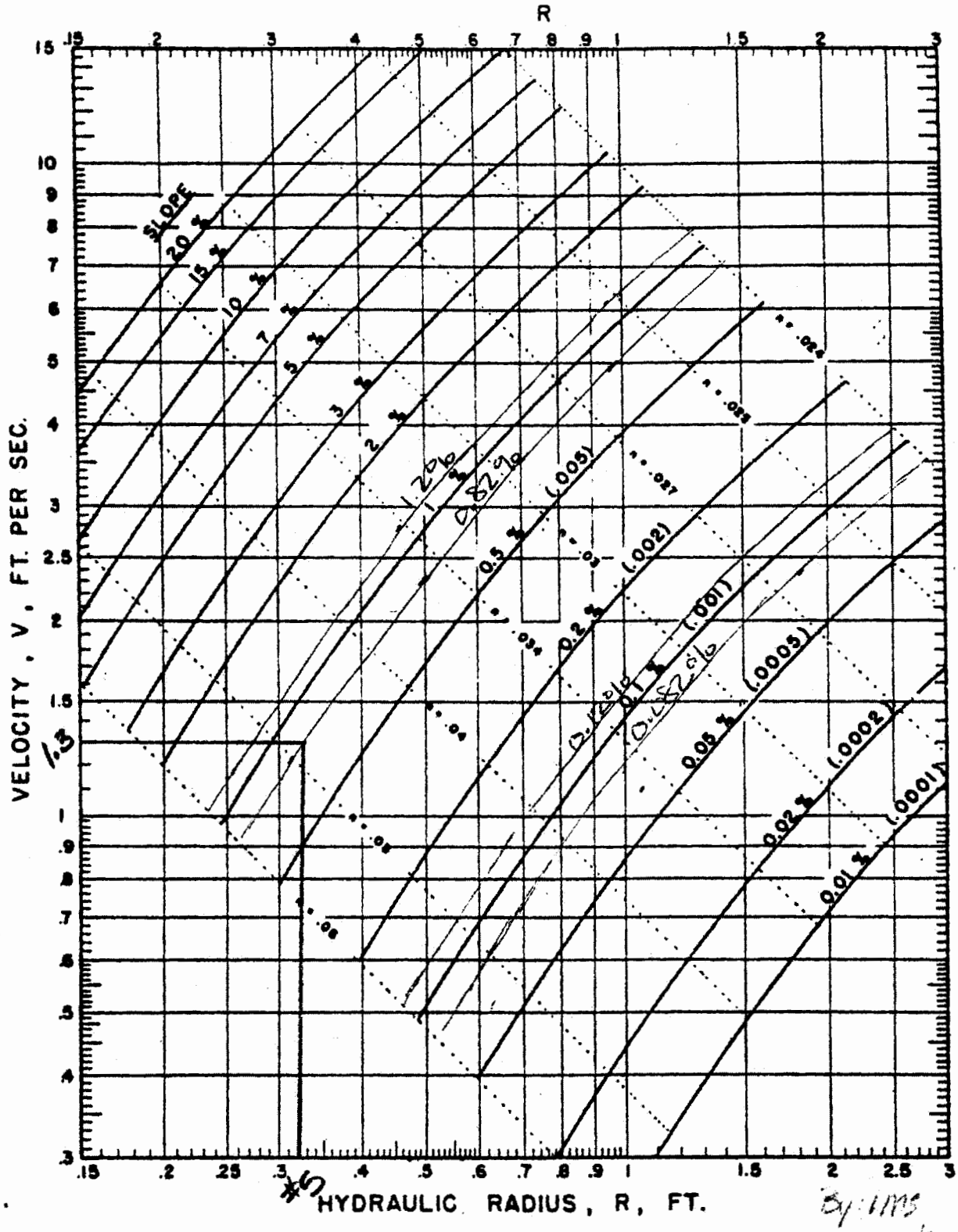


FIGURE A6-7

DIMENSIONS OF TRAPEZOIDAL CHANNELS WITH 4 TO 1 SIDE SLOPES

By: LMC Checked: KMS
Date: 11/16/87 Date: 11/16/87



By: JMS Checked: K
Date: 11/5/87 Date: 11/61

FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

ATTACHMENT #3

STANDARD
FOR
GRASSED WATERWAY

Definition

A natural or constructed watercourse shaped or graded in earth materials and stabilized with suitable vegetation for the safe conveyance of runoff water.

Purpose

To provide for the conveyance of excess surface water without damage by erosion or flooding.

Conditions Where Practice Applies

This practice applies to sites with drainage areas less than 200 acres where concentrated runoff requires vegetative protection or stone center lining to control erosion. Slope of waterway must be less than 10%. Some of the other practices that may be required with this practice are: (1) grade control structures, (2) subsurface drainage to permit the growth of suitable vegetation and to eliminate wet spots, (3) a section stabilized with stone or other material within the waterway, or (4) buried storm drain to handle frequently occurring storm runoff, base flow, or snowmelt.

Design Criteria

Capacity

Peak discharge values shall be determined by the following:

1. Rational Method - for peak discharge of uniform drainage areas as outlined in Technical Manual for Stream Encroachment, Trenton, N.J., Bureau of Flood Plain Management, August 1984.

2. SCS Technical Release No. 55.

The minimum capacity shall be that required to convey the peak runoff expected from a 10-year frequency storm.

25 yr - [illegible] soil areas

Velocity

The maximum permissible velocity for design flow will be determined by the most erodible soil texture exposed and the type of vegetation expected and maintained in the channel. The following table will be used in selecting the maximum permissible velocities:

SOIL TEXTURE	MAXIMUM PERMISSIBLE VELOCITY† (ft./sec.) CHANNEL VEGETATION	
	Vegetated*	Sod**
Sand, silt loam, sandy loam, loamy sand, loam, and muck	2.0	3.0
Silty clay loam, sandy clay loam	2.5	4.0
Clay, clay loam, sandy clay, silty clay	3.0	5.0

†Maximum Permissible Velocities are based on flow of clear water.

*Maximum permissible velocities for vegetated channels may be increased by 3 ft./sec. except for sands for sections where erosion control mat is installed according to manufacturer's recommendations. Erosion control mat is defined as a flexible mat of synthetic monofilaments bonded together to form a three dimensional web, highly resistant to environmental and chemical degradation.

**On well to excessively drained soils, the use of most cool season sod types will not survive without continued irrigation. Placement of sod in such areas must be approved by the District.

Vegetative Retardance Factors and Manning's "n" Value

The minimum capacity and maximum velocity shall be determined by using the appropriate vegetative retardance factors listed below. See Appendix A6 for example and charts for use in design.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT	JOB NUMBER		
NWS EARLE	7602		
SUBJECT: SITE 5 - DETERMINE RIP RAP SIZE FOR CHANNEL LINING			
BASED ON: NJDEGS & FREV CALCS		DRAWING NUMBER	
BY: LMS 11/5/97	CHECKED BY: KMS 11/6/97	APPROVED BY	DATE

Purpose: Determine size, gradation, and depth of riprap lining for channel #3 at Site 5.

Guidance Document: Standards for Soil Erosion and Sediment Control in New Jersey, April 1987, NJ State Soil Conservation Committee (NJSESC) (Reference #1)

Approach: Utilizing flow rates and velocities previously calculated, determine the appropriate riprap. (See Site 5 - Drainage Channel Evaluations by L. Shipley 11/5/97)

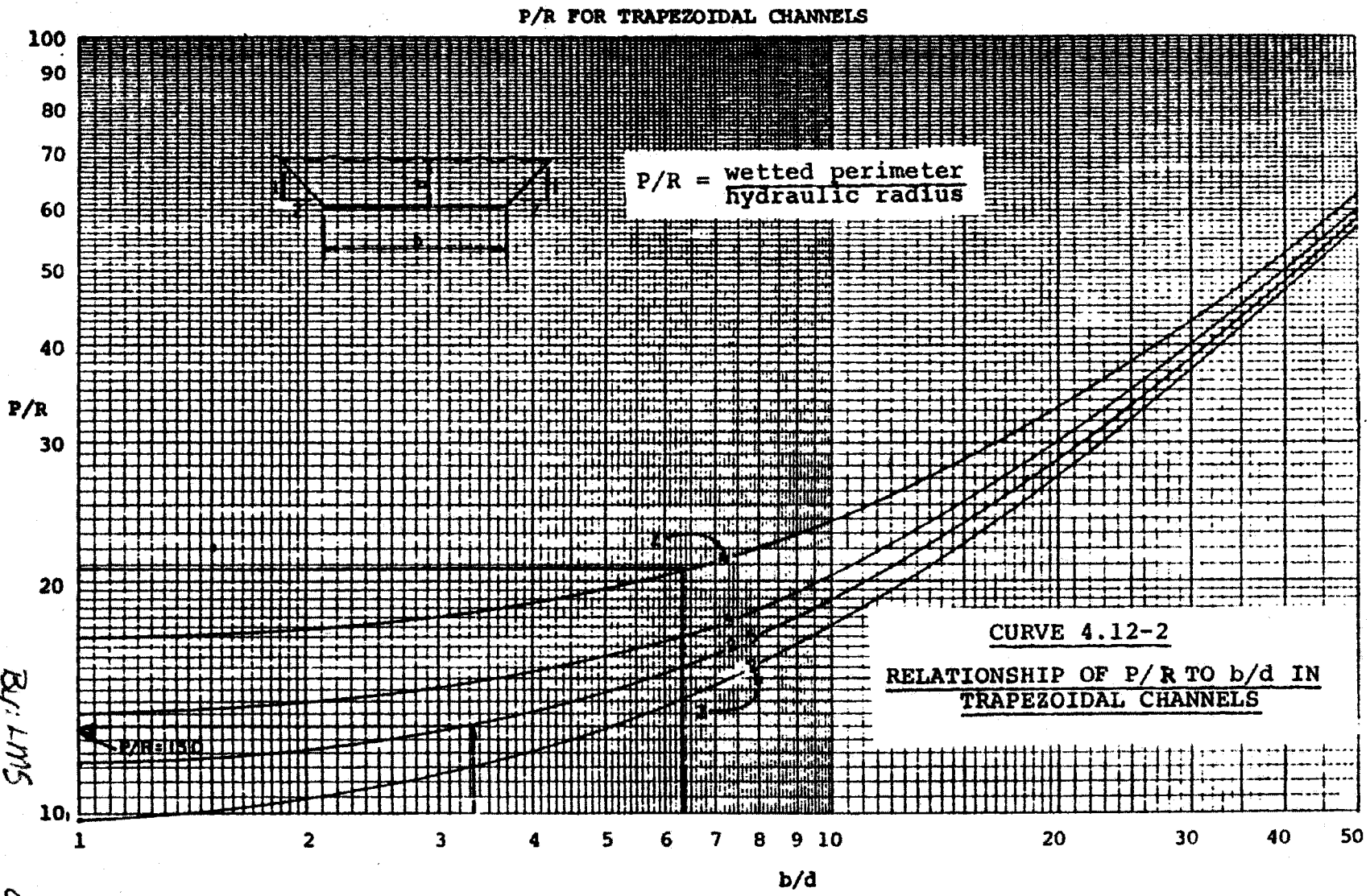
Assumptions: Angular Riprap will be used
A filter layer will be used

Shape: Trapezoidal
Bottom Width: 4' (b)
Side Slopes: 4H:1V (z)
Bottom Slope: 1.20% (S_o)
Flow: 11 cfs (Q)
Velocity: 2.71 ft/sec (V)
Depth of water: 0.63 ft (d)

Given: b/d = 6.35 Find P/R (Curve 4.12-2, page 2/6)
= 20.8

Given: S_o, Q, P/R Find d_{50} (Curve 4.12-3, page 3/6)
= 1.3" use 1.5"

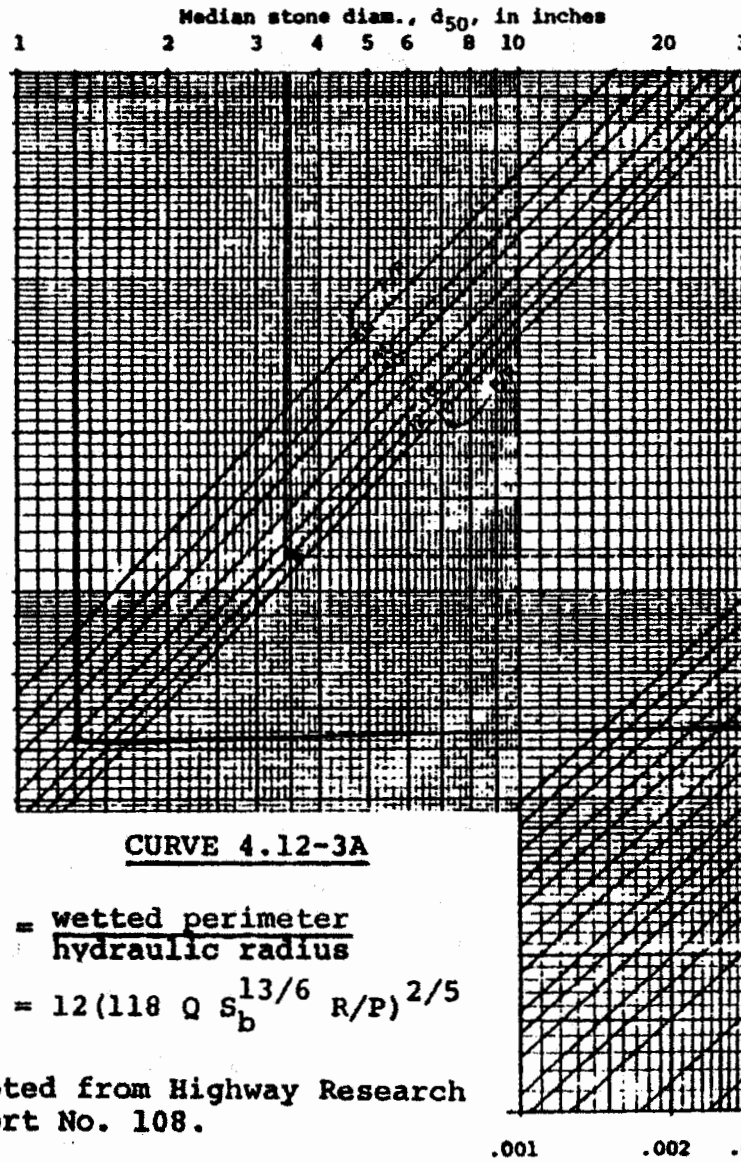
Given: d_{50} Find n (Curve 4.12-1, page 4/6)
n = 0.028



By: LMS
Date: 11/5/97
Checked:
Date:

Reference #1

2/6



CURVE 4.12-3A

$$P/R = \frac{\text{wetted perimeter}}{\text{hydraulic radius}}$$

$$d_{50} = 12(118\ Q\ S_b^{13/6}\ R/P)^{2/5}$$

Adapted from Highway Research Report No. 108.

By: LMS Date: 11/5/87

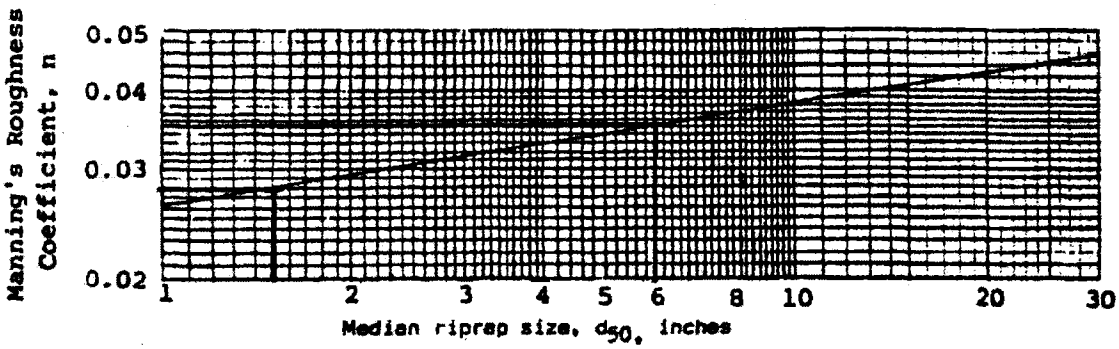
Checked: KM Date: 11/10

Reference #1

This procedure is based on the assumption that the channel is already designed and the remaining problem is to determine the riprap size that would be stable in the channel. The designer would first determine the channel dimensions by the use of Manning's equation. The "n" value for use in Manning's equation is obtained by estimating a riprap size and then determining the corresponding "n" value for the riprapped channel from $n = 0.0395\ d_{50}^{\ 1/6}$, where d_{50} is in feet, or by using Curve 4.12-1, below, where d_{50} is in inches.

CURVE 4.12-1

MANNING'S "n" FOR RIPRAP-LINED CHANNELS



When the channel dimensions are known, the riprap can be designed (or an already completed design may be checked) as follows:

Trapezoidal Channels

1. Calculate the b/d ratio and enter Curve 4.12-2 to find the P/R ratio.

2. Enter Curve 4.12-3 with S_b, Q, and P/R to find median riprap diameter, d_{50}, for straight channels.

3. Enter Curve 4.12-1 to find the actual "n" value corresponding to the d_{50} from step 2. If the estimated and actual "n" values do not reasonably agree, another trial must be made.

4. For channels with bends, calculate the ratio B_s/R_o, where B_s is the channel surface width and R_o is the radius of the bend. Enter Curve 4.12-4 and find the bend factor, F_B. Multiply the d_{50} for straight channels by the bend factor to determine riprap size to be used in bends. If the d_{50} for the bend is less than 1.1 times the d_{50} for the straight channel, then the size for straight channel may be used in the bend; otherwise, the larger stone size calculated for the bend shall be used. The riprap shall extend across the full channel section and shall extend upstream and downstream from the ends of the curve a distance equal to five times the bottom width.

5. Enter Curve 4.12-5 to determine maximum stable side slope of riprap surface. In Curve 4.12-5, the side slope is established so that the riprap on the side slope is as stable as that on the bottom. If for any reason it is desirable to make the side slopes steeper than what is given by Curve 4.12-5, the size of the riprap can be increased and the side slopes made steeper by using the following procedures:

   a. Compute d_{50} and maximum stable side slope as above.

   b. Enter Curve 4.12-6 with the computed side slope to determine K for that side slope.

   c. Enter Curve 4.12-6 with the desired side slope to determine K'.

   d. Compute riprap size for desired slope by the formula:

$$d_{50}' = d_{50}\frac{K}{K'}$$

6. Maximum side slopes, 2:1.

By: LMS Checked: KM
Date: 11/5/97 Date: 11/6/97

Reference #1

CLIENT	JOB NUMBER
NWS EARLE	7602

SUBJECT: SITE 5 - DETERMINE RIPRAP SIZE FOR CHANNEL LINING

BASED ON	DRAWING NUMBER
NJDEPES & PREV CALCS	

BY	CHECKED BY	APPROVED BY	DATE
LMS 11/5/97	KMS 11/6/97		

Given d_{50} Find Maximum Allowable Slope for channel side slopes to maintain stability

Curve 4.12-5 (See page 6/6)

max Allowable Slope 2.5:1

Current Design of 4:1 will remain stable

Determine Maximum Stone Size

$d_{max} = 1.5 d_{50}$ (Reference 1, pg 4.12.1)

$= 1.5 (1.5")$

$d_{max} = 2.25"$

Determine depth of riprap given that a filter fabric will be used at the stone/soil interface. Min allowable thickness is 6" (Reference 1, pg 4.12.2)

depth $= 2 d_{50} = 3"$

$\therefore$ depth $= 6"$

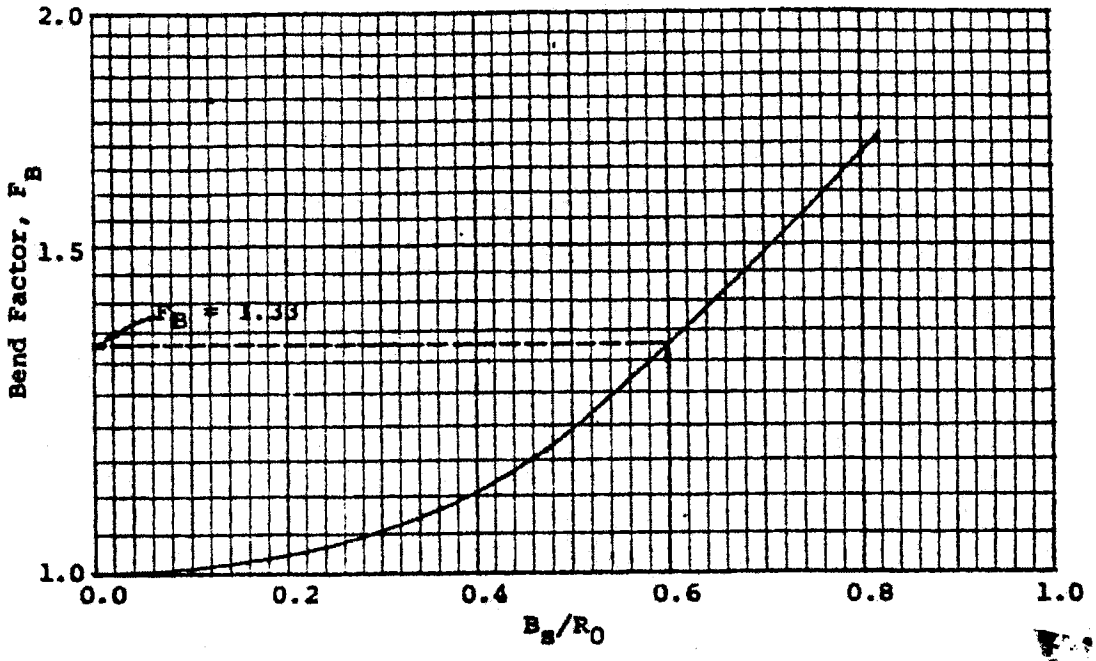
Due to the small riprap size calculated through this design, and based on engineering judgement, this channel will be top soiled and seeded, as this will bring the max permissible flow velocity up to 2.5 ft/sec and the peak 25-year flow velocity is 2.7 ft/sec. The value added by riprap the channel was [illegible]

CURVE 4.12-4

RIPRAP SIZE CORRECTION FACTOR FOR FLOW IN CHANNEL BENDS

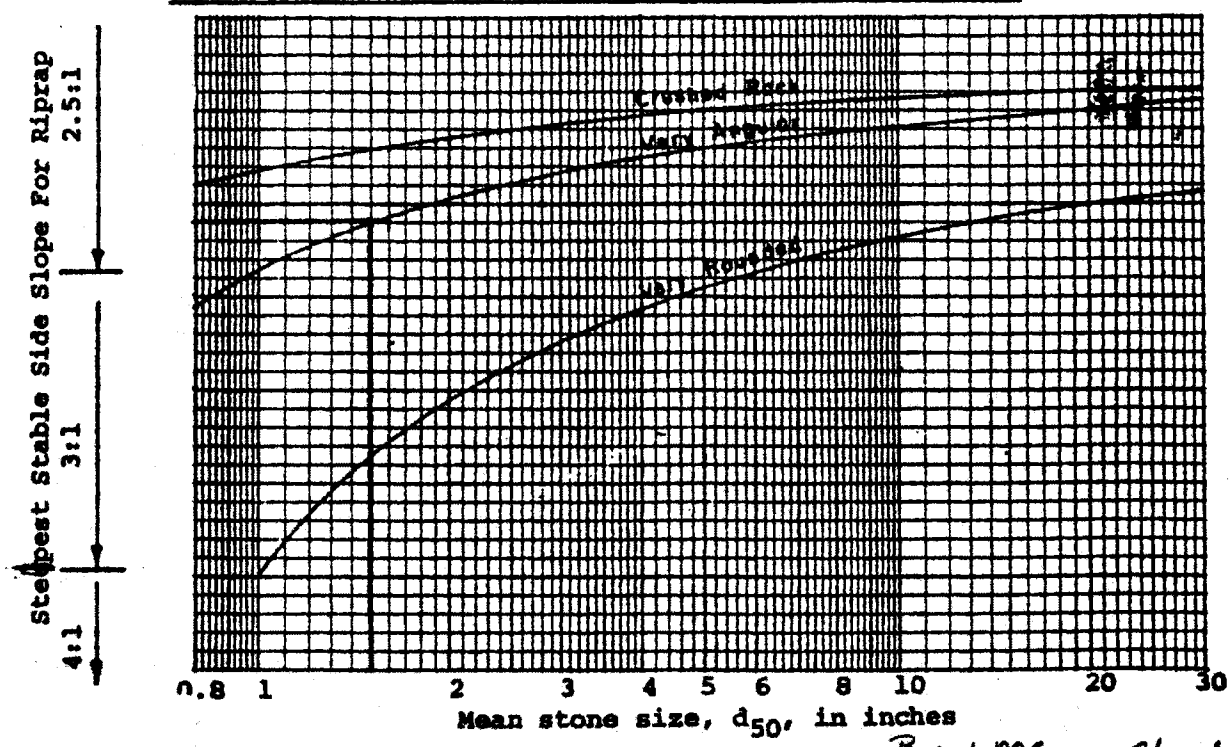
d_{50}(for bend) = d_{50}(for straight) X F_B
B_s = channel surface width
R_o = mean radius of bend

Adapted from Highway Research Report No. 108.



CURVE 4.12-5

MAXIMUM RIPRAP SIDE SLOPE WITH RESPECT TO RIPRAP SIZE



By: LMS Checked: KM.
Date: 11/5/97 Date: 11/6

Reference #1

CLIENT	JOB NUMBER
NWS EARLE	7602

SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATION - SED BASIN #2

BASED ON	DRAWING NUMBER		
NJ REGULATIONS			
BY	CHECKED BY	APPROVED BY	DATE
KMS 12/23/97	LMS 12/23/97		

Purpose: To determine suitable lining materials (vegetation, riprap) for the drainage channels surrounding Site 5 based on anticipated flow rates and velocities.

Guidance Document: Standards for Soil Erosion and Sediment Control in New Jersey, April 1987, NJ State Soil Conservation Committee.

Approach: PEAK FLOW WAS DETERMINED FOR THE DRAINAGE AREA THAT WOULD BE DIRECTED TO THE DRAINAGE CHANNEL DISCHARGING TO SEDIMENT BASIN #2. (see Attachment 1)

$Q_p = 8$ cfs. D.A. 2 POST CONSTRUCTION

Velocity of flow in the channel can be calculated from Manning's Equation:

$$V = \frac{1.49 (R)^{2/3} (S)^{1/2}}{n} \quad (ft/s)$$

where

R = hydraulic Radius
S = Channel slope
N = Manning's constant

Velocity calculations are summarized on the spread sheets provided in Attachment 2. Values used were obtained as follows:

CLIENT	JOB NUMBER
NWS EARLE	7602

SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATION - SED BASIN #2

BASED ON	DRAWING NUMBER
NJ REGULATIONS	

BY	CHECKED BY	APPROVED BY	DATE
KMS 12/23/97	LMS 12/23/97		

Channel slope was determined during cap design and is:

$$S = 0.82\%$$

Flowrate was previously calculated:

$$Q_p = 8 \text{ cfs}$$

Typically manning's n = 0.03 for grass maintained channels. However, due to shallow depth of flow expected, the channel lining will have a greater impact as far as retarding flow. This increased retardance results in n values being greater than 0.03.

In order to determine the n value, several iterations of the calculations were performed using nomographs to determine n. (see Attachment 2 for these iterations - method from Appendix A6 of the NJ Regulations.

The flow velocity resulting from the 25-year Storm event is:

$$V = 1.2 \text{ ft/sec}$$

CLIENT	JOB NUMBER
NWS EARLE	7602

SUBJECT: SITE 5 - DRAINAGE CHANNEL EVALUATION - SED BASIN #2

BASED ON	DRAWING NUMBER
NJ REGULATIONS	

BY	CHECKED BY	APPROVED BY	DATE
KMS 12/23/97	LMS 12/23/97		

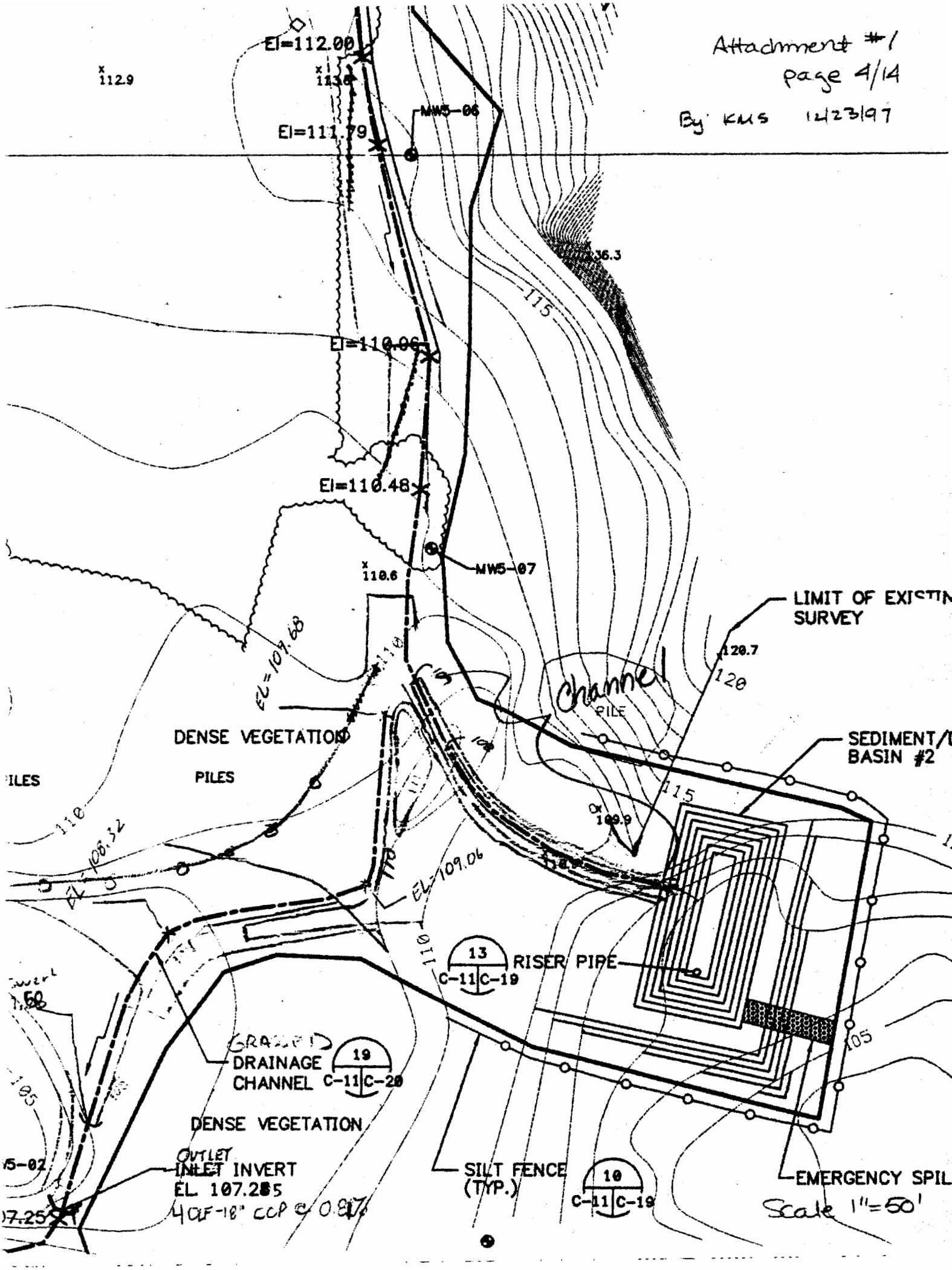
Section 4.3 (NJ Standards) provides maximum permissible flow velocities as a function of the most erodible soil texture exposed in the channel and the type of vegetation expected (see Attachment 3)

Native Soil material/vegetated 2.0 ft/sec

Conclusion

The channel can be vegetated utilizing the native site material.

Attachment #1
page 4/14
By KMS 12/23/97



Attachment #2
page 5/14

Iteration #1
Worksheet for Trapezoidal Channel

By: KMS 12/23/97

Project Description	
Project File	n:\data\bbrf780\files\earle1.fm2
Worksheet	Sediment Basin #2 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.082000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	4.00	ft
Discharge	8.00	ft^3/s

Results		
Depth	0.29	ft
Flow Area	1.49	ft^2
Wetted Perimeter	6.38	ft
Top Width	6.31	ft
Critical Depth	0.43	ft
Critical Slope	0.019336	ft/ft
Velocity	5.37	ft/s
Velocity Head	0.45	ft
Specific Energy	0.74	ft
Froude Number	1.95	
Flow is supercritical.		

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Sediment Basin #2 Channel Velocities
By: KMS **Chkd:**
Date: 12/23/97 **Date:**

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#1	150	0.82%	8	0.290	1.490	6.380	0.234	0.03	1.71

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

Iteration #1

Channel is off the scale, So recalc w/ n = 0.1

By: KMS 12/23/97

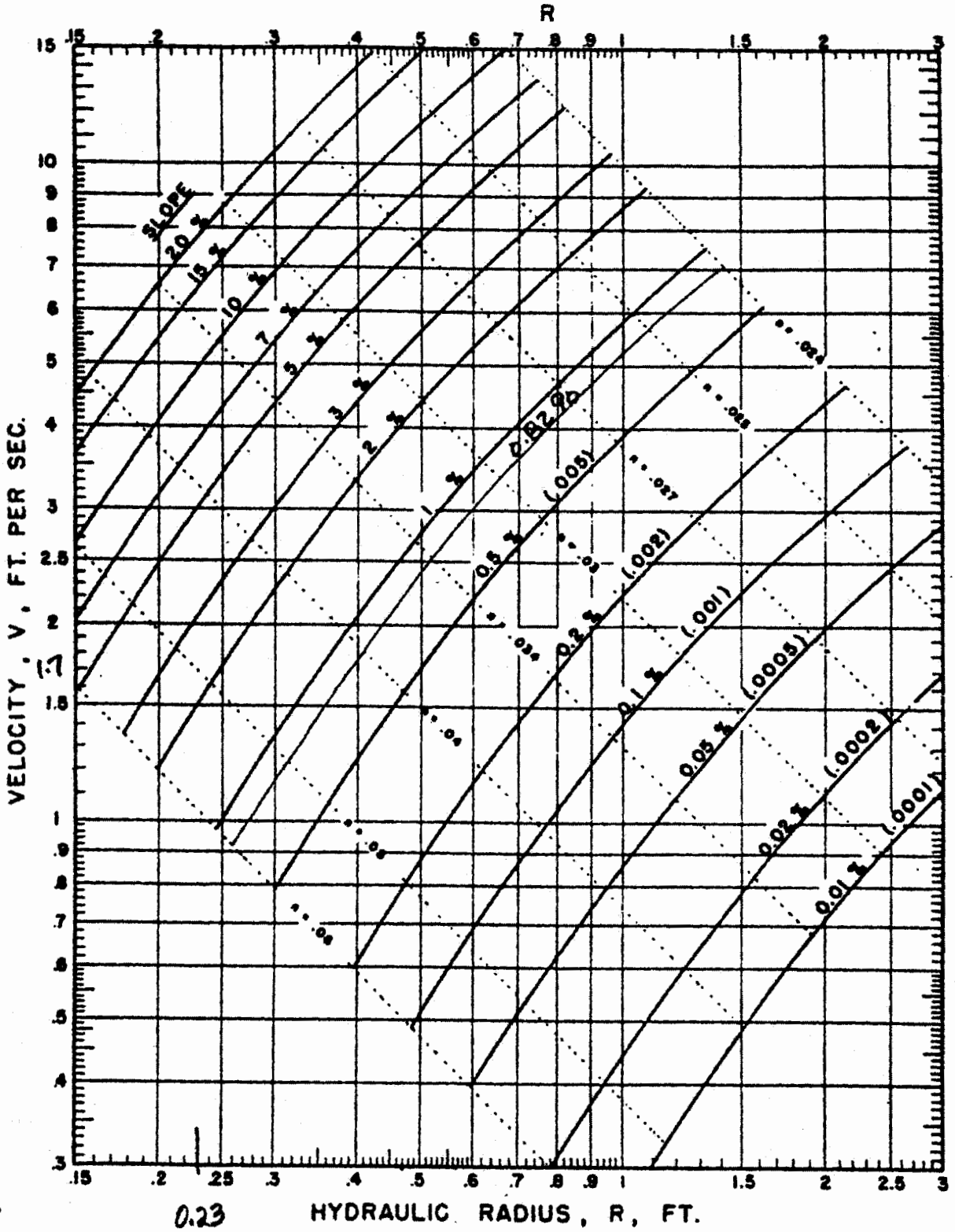


FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

NJ REGULATIONS

Iteration #2
Worksheet for Trapezoidal Channel

Project Description	
Project File	n:\data\bbrf780\files\earle1.fm2
Worksheet	Sediment Basin #2 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.100	
Channel Slope	0.082000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	4.00	ft
Discharge	8.00	ft^3/s

Results		
Depth	0.55	ft
Flow Area	3.45	ft^2
Wetted Perimeter	8.57	ft
Top Width	8.44	ft
Critical Depth	0.43	ft
Critical Slope	0.214841	ft/ft
Velocity	2.32	ft/s
Velocity Head	0.08	ft
Specific Energy	0.64	ft
Froude Number	0.64	
Flow is subcritical.		

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Sediment Basin #2 Channel Velocities
By: KMS **Chkd:**
Date: 12/23/97 **Date:**

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#1	150	0.82%	8	0.550	3.450	8.570	0.403	0.1	0.74 (1.8)

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

Iteration #2

Recalc w/ n= 0.05

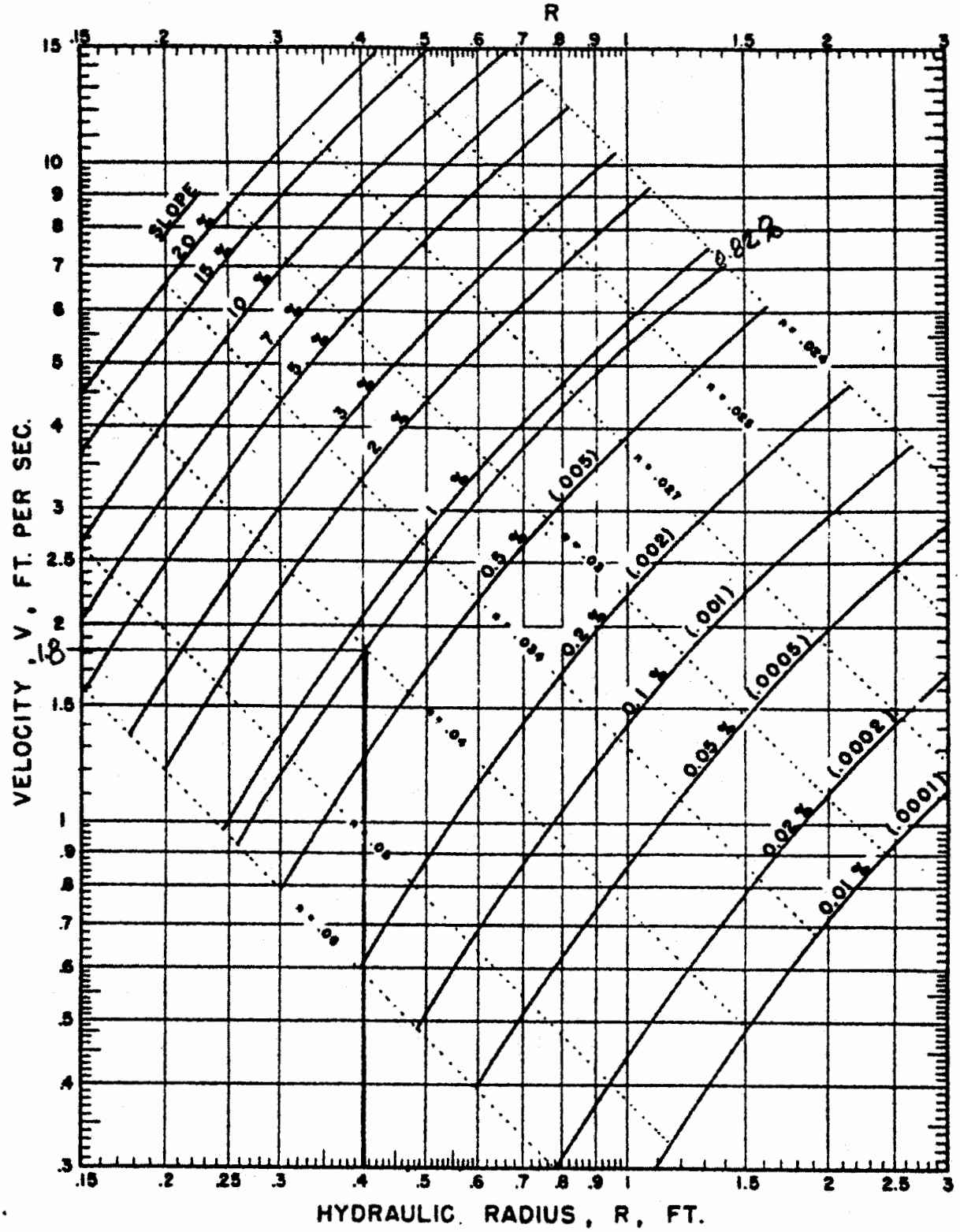


FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

New Jersey Regulations

By: KMS 12/23/97

Iteration #3
Worksheet for Trapezoidal Channel

Project Description	
Project File	n:\data\bbrf780\files\earle1.fm2
Worksheet	Sediment Basin #2 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.050	
Channel Slope	0.082000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	4.00	ft
Discharge	8.00	ft^3/s

Results		
Depth	0.38	ft
Flow Area	2.12	ft^2
Wetted Perimeter	7.16	ft
Top Width	7.06	ft
Critical Depth	0.43	ft
Critical Slope	0.053712	ft/ft
Velocity	3.78	ft/s
Velocity Head	0.22	ft
Specific Energy	0.60	ft
Froude Number	1.22	
Flow is supercritical.		

Project: NWSE - Site 5 - Post Construction Conditions
Task: Estimation of Site 5 Sediment Basin #2 Channel Velocities
By: KMS **Chkd:**
Date: 12/23/97 **Date:**

Channel	Distance (ft)	Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Wetted Perim (ft)	Hyd. Rad. (ft)	n	V (ft/s)
#1	150	0.82%	8	0.380	2.120	7.160	0.296	0.05	1.20

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

By KNS 12/23/9

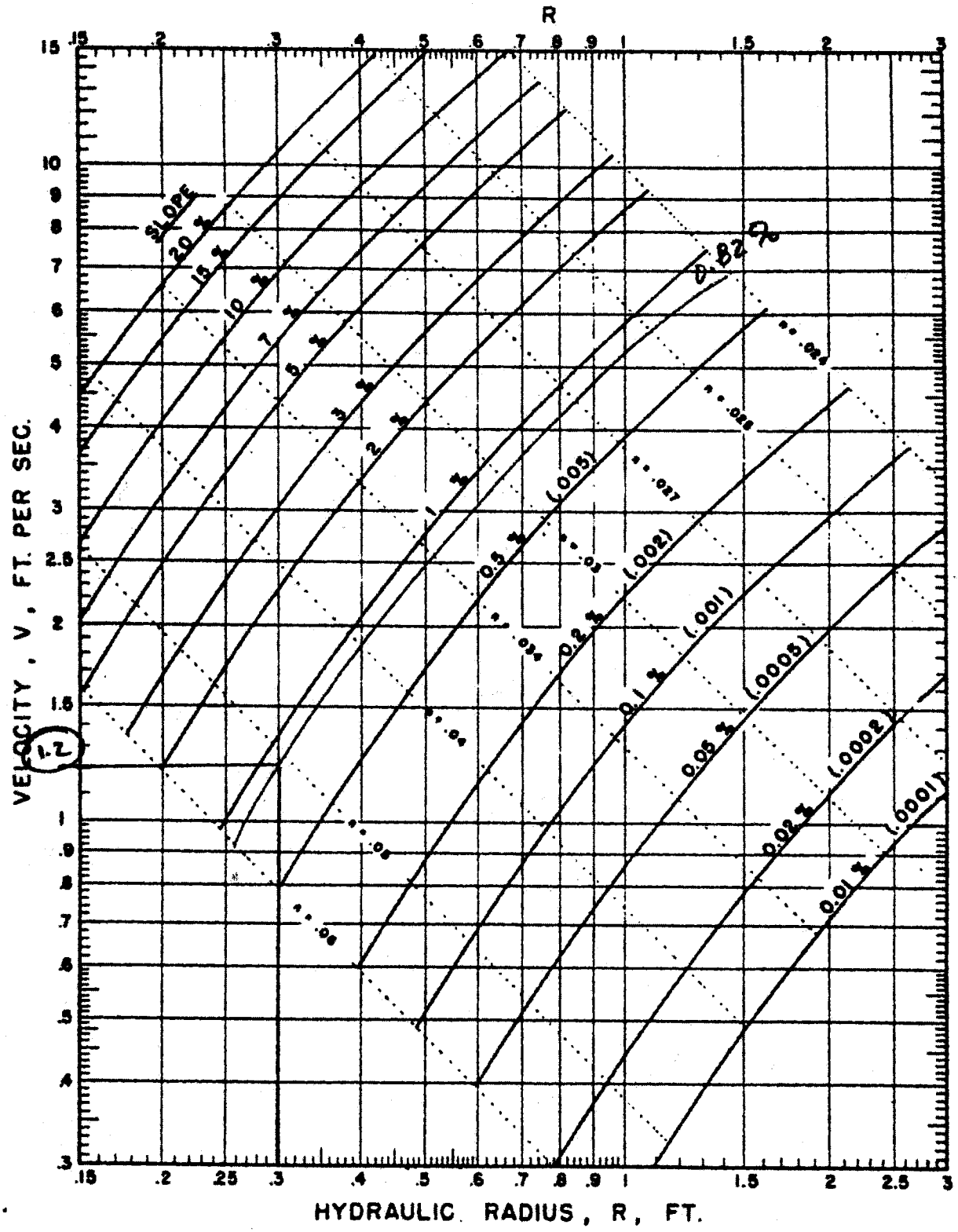


FIGURE A6-4

SOLUTION OF THE MANNING FORMULA FOR RETARDANCE E (VERY LOW VEGETAL RETARDANCE

New Jersey Regulations

STANDARD FOR GRASSED WATERWAY

Definition

A natural or constructed watercourse shaped or graded in earth materials and stabilized with suitable vegetation for the safe conveyance of runoff water.

Purpose

To provide for the conveyance of excess surface water without damage by erosion or flooding.

Conditions Where Practice Applies

This practice applies to sites with drainage areas less than 200 acres where concentrated runoff requires vegetative protection or stone center lining to control erosion. Slope of waterway must be less than 10%. Some of the other practices that may be required with this practice are: (1) grade control structures, (2) subsurface drainage to permit the growth of suitable vegetation and to eliminate wet spots, (3) a section stabilized with stone or other material within the waterway, or (4) buried storm drain to handle frequently occurring storm runoff, base flow, or snowmelt.

Design Criteria

Capacity

Peak discharge values shall be determined by the following:

1. Rational Method - for peak discharge of uniform drainage areas as outlined in Technical Manual for Stream Encroachment, Trenton, N.J., Bureau of Flood Plain Management, August 1984.

2. SCS Technical Release No. 55.

The minimum capacity shall be that required to convey the peak runoff expected from a 10-year frequency storm.

25 yr - [illegible]

Velocity

The maximum permissible velocity for design flow will be determined by the most erodible soil texture exposed and the type of vegetation expected and maintained in the channel. The following table will be used in selecting the maximum permissible velocities:

SOIL TEXTURE	MAXIMUM PERMISSIBLE VELOCITY† (ft./sec.) CHANNEL VEGETATION: Vegetated*	Sod**
Sand, silt loam, sandy loam, loamy sand, loam, and muck	2.0	3.0
Silty clay loam, sandy clay loam	2.5	4.0
Clay, clay loam, sandy clay, silty clay	3.0	5.0

†Maximum Permissible Velocities are based on flow of clear water.

*Maximum permissible velocities for vegetated channels may be increased by 3 ft./sec. except for sands for sections where erosion control mat is installed according to manufacturer's recommendations. Erosion control mat is defined as a flexible mat of synthetic monofilaments bonded together to form a three dimensional web, highly resistant to environmental and chemical degradation.

**On well to excessively drained soils, the use of most cool season sod types will not survive without continued irrigation. Placement of sod in such areas must be approved by the District.

Vegetative Retardance Factors and Manning's "n" Value

The minimum capacity and maximum velocity shall be determined by using the appropriate vegetative retardance factors listed below. See Appendix A6 for example and charts for use in design.

New Jersey Regulation

E.3 INLET GRATE CAPACITY CALCULATIONS - SITE 5

CLIENT NSWC	JOB NUMBER 7602
SUBJECT INLET GRATE CAPACITIES AT SITE 5	
BASED ON TR-55	DRAWING NUMBER
BY KMS 11/04/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

OBJECTIVE: TO CALCULATE THE INLET GRATE CAPACITIES AT THE SITE 5 PARKING AREA.

APPROACH: FIRST, CALCULATE DRAINAGE AREAS TO EACH INLET FROM THE ASPHALT AREA. THEN CALCULATE Q_{25} TO EACH INLET USING TR-55. FINALLY, CALCULATE WEIR FLOW AND ORIFICE FLOW FOR EACH INLET.

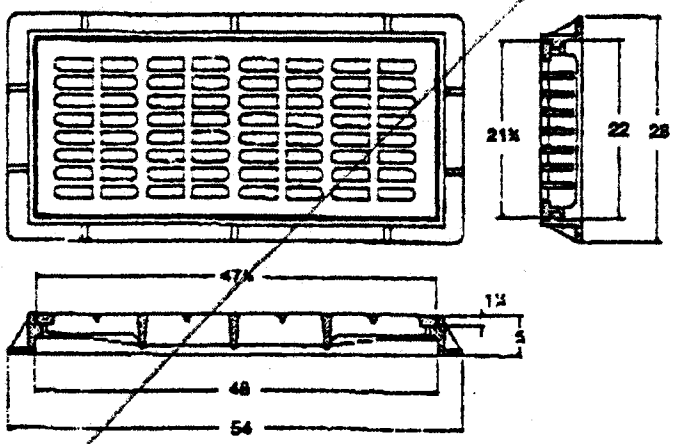
CONDITIONS:

- ASPHALT COVER CN = 98. ✓
- TIME OF CONCENTRATION T_c = 5 min. ✓
- ASSUME A HEAD OF 0.5 FEET. ✓
- DIMENSIONS OF INLET BASED ON STATE OF NEW JERSEY DEPARTMENT OF TRANSPORTATION PATTERN NUMBER 3432 (see page 2 of 8)
- HEIGHT OF CURB AROUND PARKING AREA IS 8 inches.
- FREQUENCY OF STORM = 25 YEARS ✓
- Rainfall (P) is 6 inches for 25 YEAR ✓
- Rainfall Distribution = TYPE III ✓

State of New Jersey
Department of Transportation

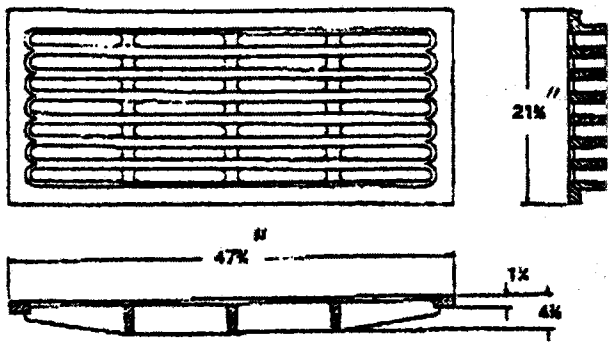
TYPE A INLET

BICYCLE GRATE



PATTERN NUMBER 3405

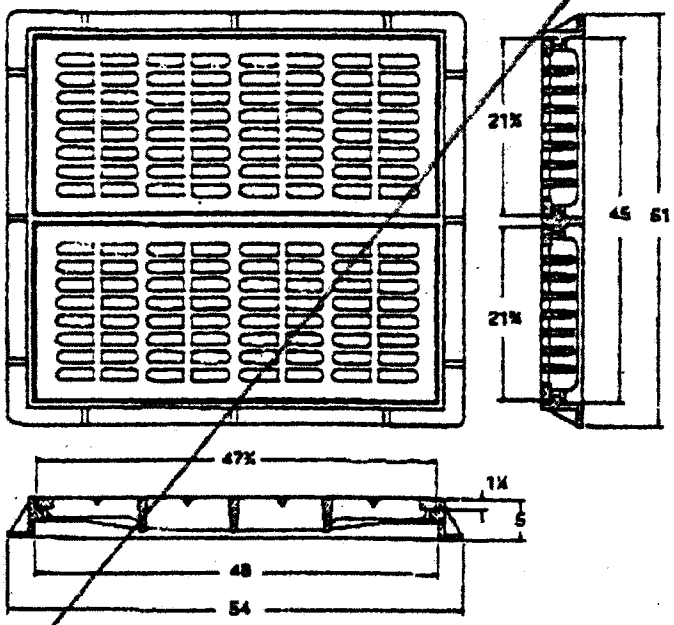
STREAM FLOW GRATE



★ PATTERN NUMBER 3432

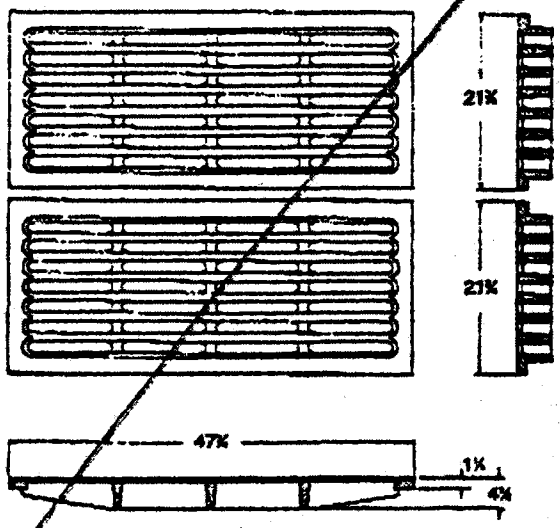
TYPE E INLET

BICYCLE GRATE



PATTERN NUMBER 3425

STREAM FLOW GRATE



PATTERN NUMBER 3440

BRIDGESTATE FOUNDRY CORPORATION Tel: 609-346-4300 Fax: 609-346-1149

CLIENT NSWE	JOB NUMBER 7602
SUBJECT INLET GRATE CAPACITIES AT SITE 5	
BASED ON TR-55	DRAWING NUMBER
BY KMS 11/04/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

CALCULATIONS:

A. ESTIMATE FLOW. DETERMINE DRAINAGE AREAS

AREA A: 18.34 in² scale 1"=40' ⇒ 0.67 acres ✓
(see page 4 of 8 for Area)

AREA B: 32.77 in² scale 1"=40' ⇒ 1.2 acres ✓
(see page 4 of 8 for Area)

Assumed CN = 98 for an impervious layer ✓
T_c = 0.083 hours ✓

DETERMINE 25-YEAR STORM FLOWS FOR EACH AREA:
Q_A = 4 cfs ✓ (see page 5 AND 6 for TR-55
Q_B = 7 cfs ✓ spreadsheets)

B. CALCULATE WEIR FLOW AND ORIFICE FLOW.

INLET GRATE CAPACITIES ARE CALCULATED USING THE FOLLOWING EQUATIONS:

WEIR FLOW: $Q = CLH^{1.5}$

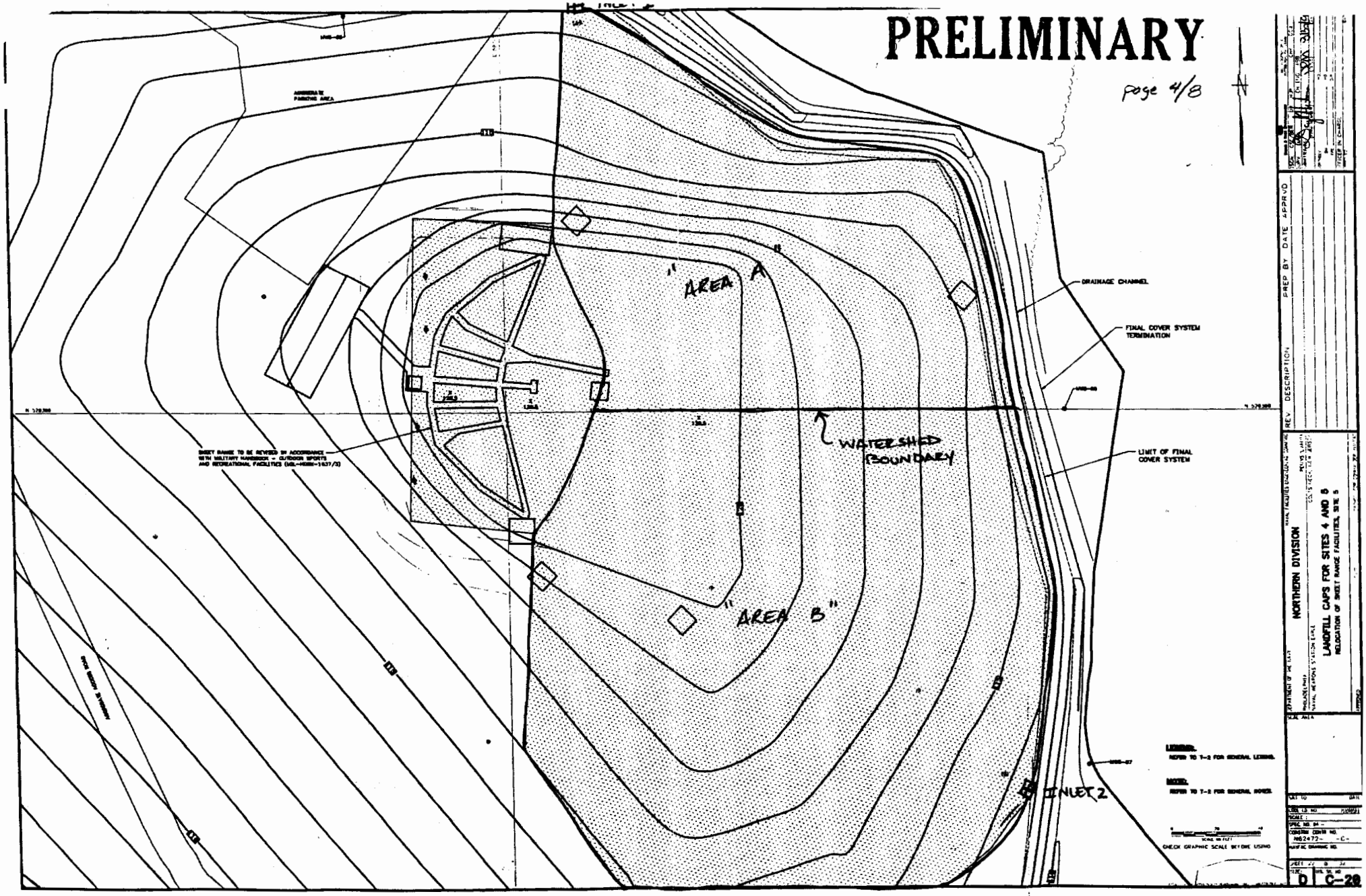
C = PAVED WEIR Coefficient = 3.1
L = Length of inlet frame exposed to flow (ft)
H = head (ft)

ORIFICE FLOW: $Q = CA(2gH)^{0.5}$

C = orifice coefficient = 0.60
A = open area of inlet grate (ft²)
g = gravitational constant H = head (ft)

PRELIMINARY

page 4/8



Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE - Site 5 Landfill
Coltsneck, New Jersey
CTO 289: 7624
Parking Lot Drainage Area A

CALCULATED
DISK FILE: EARLE3 .GPD

Drainage Area	(acres)	0.67	--->	0.0010 sq.mi.
Runoff Curve Number	(CN)	98		
Time of Concentration,Tc	(hrs)	0.083		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	0.041	0.041	0.041
Ia/p Ratio	0.007	0.000	0.000
Unit Discharge, * qu (csm/in)	682	0	0
Runoff, Q (in)	5.76	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	Q_A = 4	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	682.355	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	682.355	0.000	0.000
* qu (csm)		682	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$
qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

By: KMS Checked: BER
DATE: 11/04/97 DATE: 11/5/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE - Site 5
Coltsneck, New Jersey
CTO 289: 7624
Parking Lot Drainage Area B

CALCULATED
DISK FILE: EARLE4 .GPD

Drainage Area	(acres)	1.2	--->	0.0019 sq.mi.
Runoff Curve Number	(CN)	98		
Time of Concentration,Tc	(hrs)	0.083		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	0.041	0.041	0.041
Ia/p Ratio	0.007	0.000	0.000
Unit Discharge, * qu (csm/in)	682	0	0
Runoff, Q (in)	5.76	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs) Q_B =	7	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	682.355	0.000	0.000
Ia/p	#2	0.100	0.000	0.000
C0	#2	2.473	0.000	0.000
C1	#2	-0.518	0.000	0.000
C2	#2	-0.171	0.000	0.000
qu (csm)	#2	682.355	0.000	0.000
* qu (csm)		682	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$
qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

By: KMS CHECKED: BEK
DATE: 11/04/97 DATE: 11/5/97

CLIENT NSWE	JOB NUMBER 7602
SUBJECT INLET GRATE CAPACITIES AT SITE 5	
BASED ON TR-55	DRAWING NUMBER
BY KMS 11/04/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

INLET 1:

25 YEAR PEAK DISCHARGE TO INLET 1 FROM AREA A = 4 cfs.

INLET GRATE CAPACITY

WIER FLOW: $Q = C L H^{1.5}$

$L = 47.75'' + 21.75'' + 21.75''$
$= 91.25'' = 7.6'$

$= (3.1)(7.6')(0.5')^{1.5}$

$Q = 8.3$ cfs $> Q_A$ 25 yr $= 4$ cfs

ORIFICE FLOW: $Q = CA(2gH)^{1/2}$

$A = \left(\frac{47.75}{12}\right)\left(\frac{21.75}{12}\right)$

$= (0.6)(7.2)(2 \times 32.2 \times 0.5)^{1/2}$

$A = 7.2\ ft^2$

$Q = 24.5$ cfs

INLET 2:

25 year PEAK DISCHARGE TO INLET 2 FROM AREA B = 7 CFS

INLET GRATE CAPACITY

WIER FLOW $Q = CLH^{1.5}$
$= 8.3$ cfs $>$ 7 CFS Q_B

ORIFICE FLOW $Q = CA(2gH)^{1/2}$
$= 24.5$ cfs

CLIENT NSWE	JOB NUMBER
SUBJECT INLET GRATE CAPACITIES AT SITE 5	
BASED ON TR-55	DRAWING NUMBER
BY KMS 11/04/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

CONCLUSION

- INLET 1 IS IN WEIR OPERATION WITH A CAPACITY OF 8.3 cfs WHICH IS GREATER THAN THE PEAK DISCHARGE OF 4 cfs.
- INLET 2 IS IN WEIR OPERATION WITH A CAPACITY OF 8.3 cfs WHICH IS GREATER THAN THE PEAK DISCHARGE OF 7 cfs.

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NAVY NWS EARLE	JOB NUMBER 7602
SUBJECT CAPACITY OF CULVERTS DRAINING INLET BOXES	
BASED ON	DRAWING NUMBER
BY DCW 12/31/97 / CHECKED BY BER 12/31/97	APPROVED BY / DATE 12/31/97

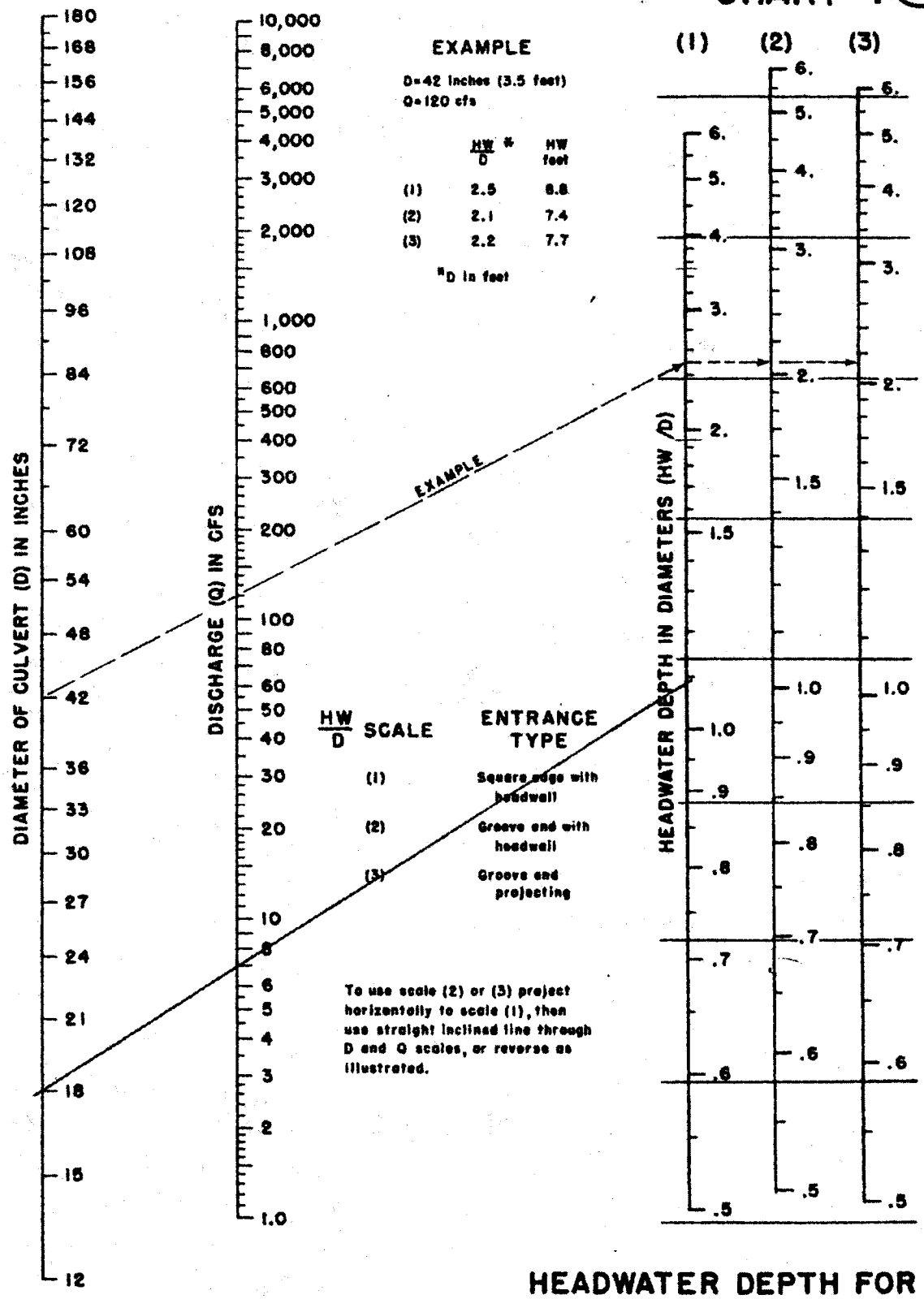
OBJECTIVE CONFIRM THE SIZE OF THE 18" CULVERT DISCHARGING WATER FROM THE INLETS PLACED ON THE EDGE OF THE PAVED SKEET RANGE AREA AT SITE 5 NWS EARLE.

APPROACH
- USE THE CALCULATED PEAK DISCHARGE RATES FOR THE 25-YR STORM FOR EACH OF THE TWO INLET BOXES IN THE CALCULATION: INLET GRATE CAPACITIES AT SITES BY KMS DATED 11/04/97.
- SINCE THE PIPE IS VERY SHORT ≈ 4' ASSUME OUTLET CONTROL OF CULVERT DOES NOT CONTROL, AND BECAUSE THE CALCULATED DEPTH OF FLOW IN THE OUTLET CHANNEL IS LESS THAN 1.0 FT. (DRAINAGE CHANNEL EVAL. - SITE 5 LTS 11/6
- ASSUME WATER CAN ENTER THE INLET BOX AT THE PEAK FLOW SINCE THE INLET GRATE CAPACITIES ARE ADEQUATE.
- ASSUME CONTROLLING CAPACITY OF THE PIPE IS SIMILIAR TO INLET CONTROL OF A PIPE AND HEADWALL. USE CHARTS IN HDS 5 (FHWA 1985) TO DETERMINE THE HEAD WATER IN INLET BOX. CHECK TO SEE HEADWATER DOES NOT REACH THE GRATE

CALCULATION
- THE PEAK DISCHARGES ARE 4 CFS AND 7 CFS. CHECK ONLY 7CFS (WORST CASE) ✓
- ASSUMING THE WORST ENTRANCE CONDITION THE HW/D = 1.1 ≈ 19.8" (SEE PAGE 2) ✓
- THE ALLOWABLE HEADWATER IS 3'-6" (SEE PAGE 3)
  ∴ THE CAPACITY IS OK ✓

CHECK: BER 12/31/97

CHART 1



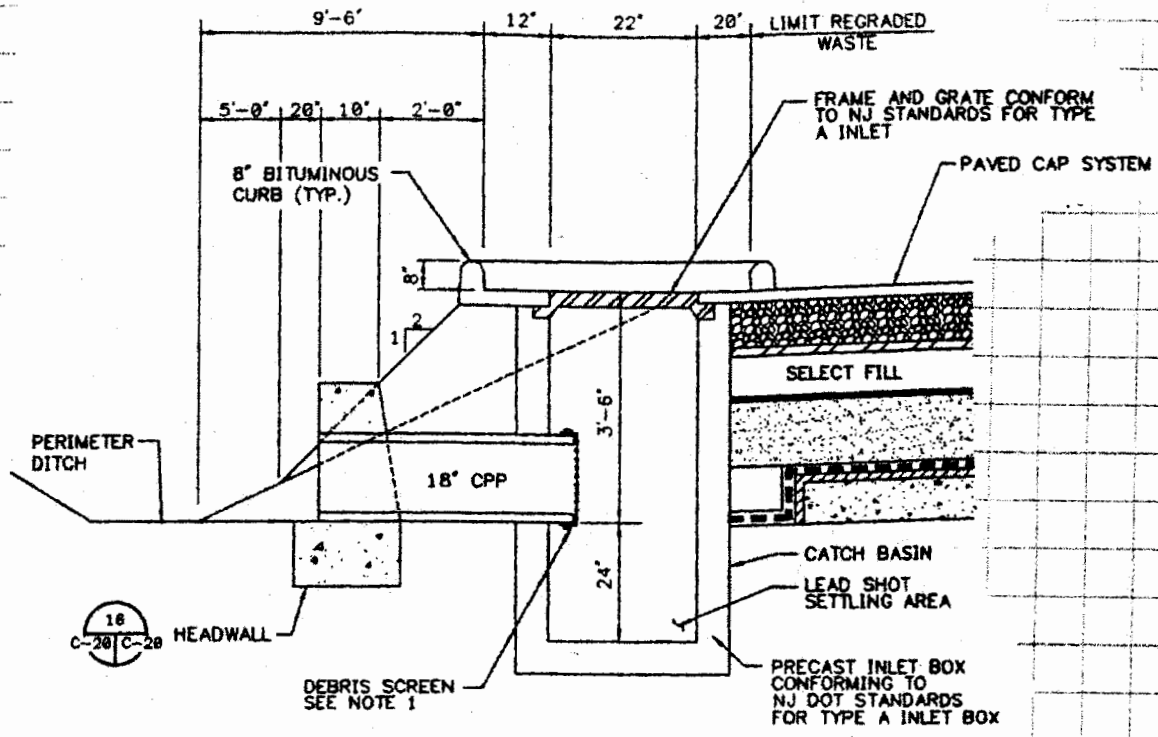
HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

CALCULATION WORKSHEET Order No. 19118 (01-91)

CLIENT NAVY NWS EARLE	JOB NUMBER 7602
SUBJECT CAC	
BASED ON	DRAWING NUMBER
BY DCW 12/31/97 / CHECKED BY BER 12/31/97	APPROVED BY / DATE 12/31/97



SECTION A C-20 C-20

E.4 Culvert Capacity Calculations - Site 5

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWE	JOB NUMBER 7602
SUBJECT CALCULATIONS OF PEAK FLOWS OF DRAINAGE AREAS	
BASED ON TR-55	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
KMS 12/22/97	KMS 12/23/97		

OBJECTIVE: TO DETERMINE THE FLOW FROM A 25-YEAR STORM EVENT IN THE LANDFILL AREA AT SITE 5 TO THE CULVERTS.

APPROACH: CALCULATE FLOW FROM WATERSHED AREAS IN A 25-YEAR STORM EVENT.

CONDITIONS:

COVER DESCRIPTIONS

GRAY AREAS IMPERVIOUS/ ASPHALT

WHITE AREAS: OPEN GRASS

SHADED AREAS: DENSE VEGETATION

CN FOR POST CONSTRUCTION = 61
(SOIL TYPE B/ OPEN GRASS - GOOD CONDITION)

tc = 5 minutes for both areas

Q based on a 25-year storm

Rainfall = 6 inches

CLIENT NSWE	JOB NUMBER 7602
SUBJECT CALCULATIONS OF PEAK FLOWS OF DRAINAGE AREAS	
BASED ON TR-55	DRAWING NUMBER
BY KMS 12/22/97 / CHECKED BY LMS 12/23/97	APPROVED BY / DATE

ANALYSIS

ESTIMATE FLOW:

	AREA	SCALE	AREA
AREA A (p 3/6)	8.2 in²	1" = 100'	1.9 acres
Asphalt	0.6 acres	CN = 98	
Dense Grass	0.6 acres	CN = 58	
Open Grass	0.7 acres	CN = 61	
AREA B (p 4/6)	5.4 in²	1" = 100'	1.2 acres
Open Grass	0.7 acres	CN = 61	
Dense Grass	0.5 acres	CN = 58	

AREA A 1.9 ACRES CN = 72

AREA B 1.2 ACRES CN = 59.8

Assume t_c = 0.08 hrs

USING TR-55: PEAK FLOW DURING 25 YEAR STORM:

Q_A = 6 CFS (see page 5/6)

Q_B = 2 CFS (see page 6/6)

REFERENCES:

1. HARSTAD METHODS - QUICK TR-55

By: KMS
DATE: 12/22/97

checked: WMS
date: 12/23/97

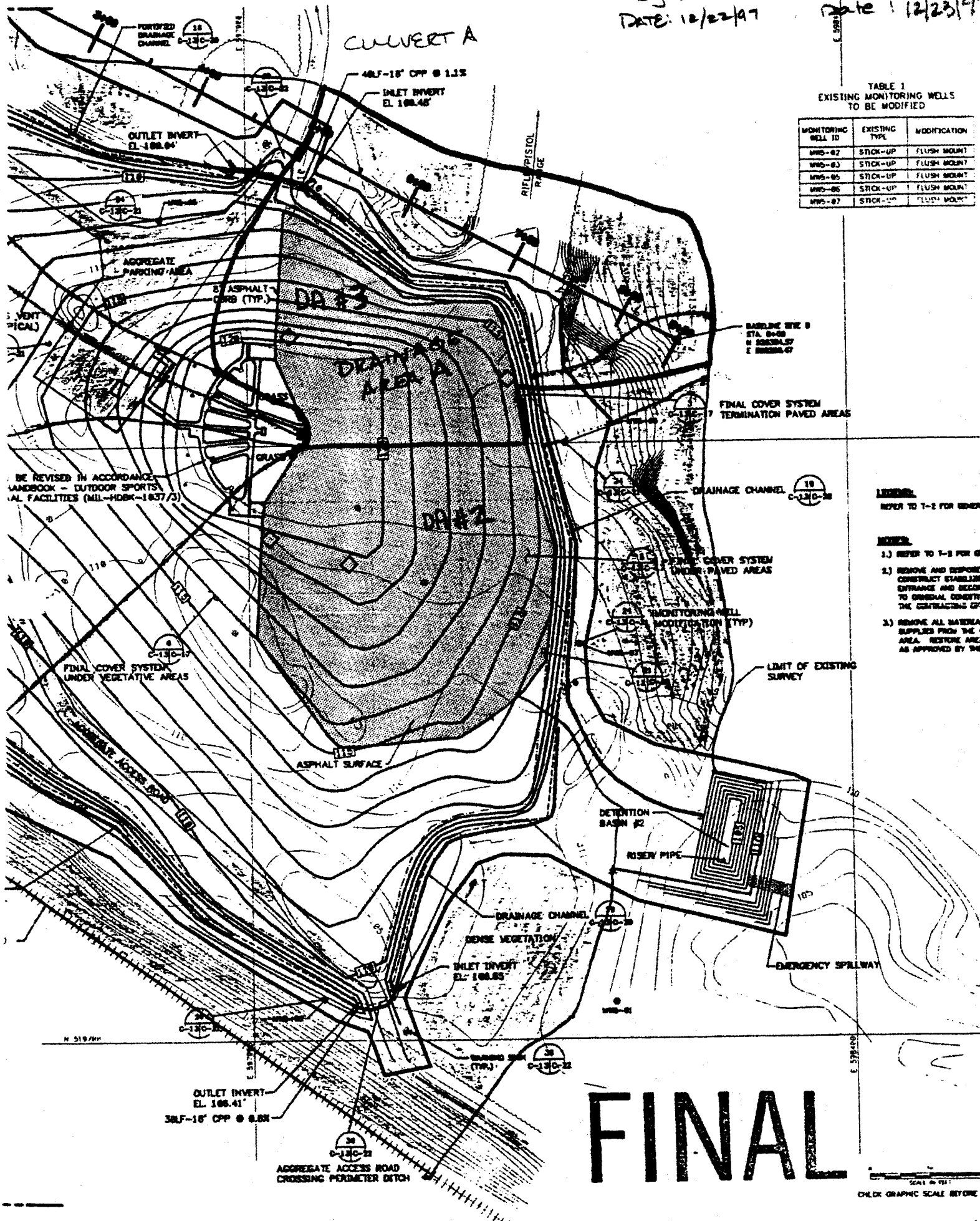


TABLE 1
EXISTING MONITORING WELLS
TO BE MODIFIED

MONITORING WELL ID	EXISTING TYPE	MODIFICATION
MW5-82	STICK-UP	FLUSH MOUNT
MW5-83	STICK-UP	FLUSH MOUNT
MW5-85	STICK-UP	FLUSH MOUNT
MW5-86	STICK-UP	FLUSH MOUNT
MW5-87	STICK-UP	FLUSH MOUNT

LEGEND:
REFER TO T-2 FOR GENER

NOTES:
1.) REFER TO T-2 FOR G
2.) REMOVE AND DISPOSE CONSTRUCT STABILIZE ENTRANCE AND SECO TO ORIGINAL CONDITI THE CONTRACTORS EX
3.) REMOVE ALL MATERIA SUPPLIED FROM THE AREA. RESTORE ARE AS APPROVED BY THE

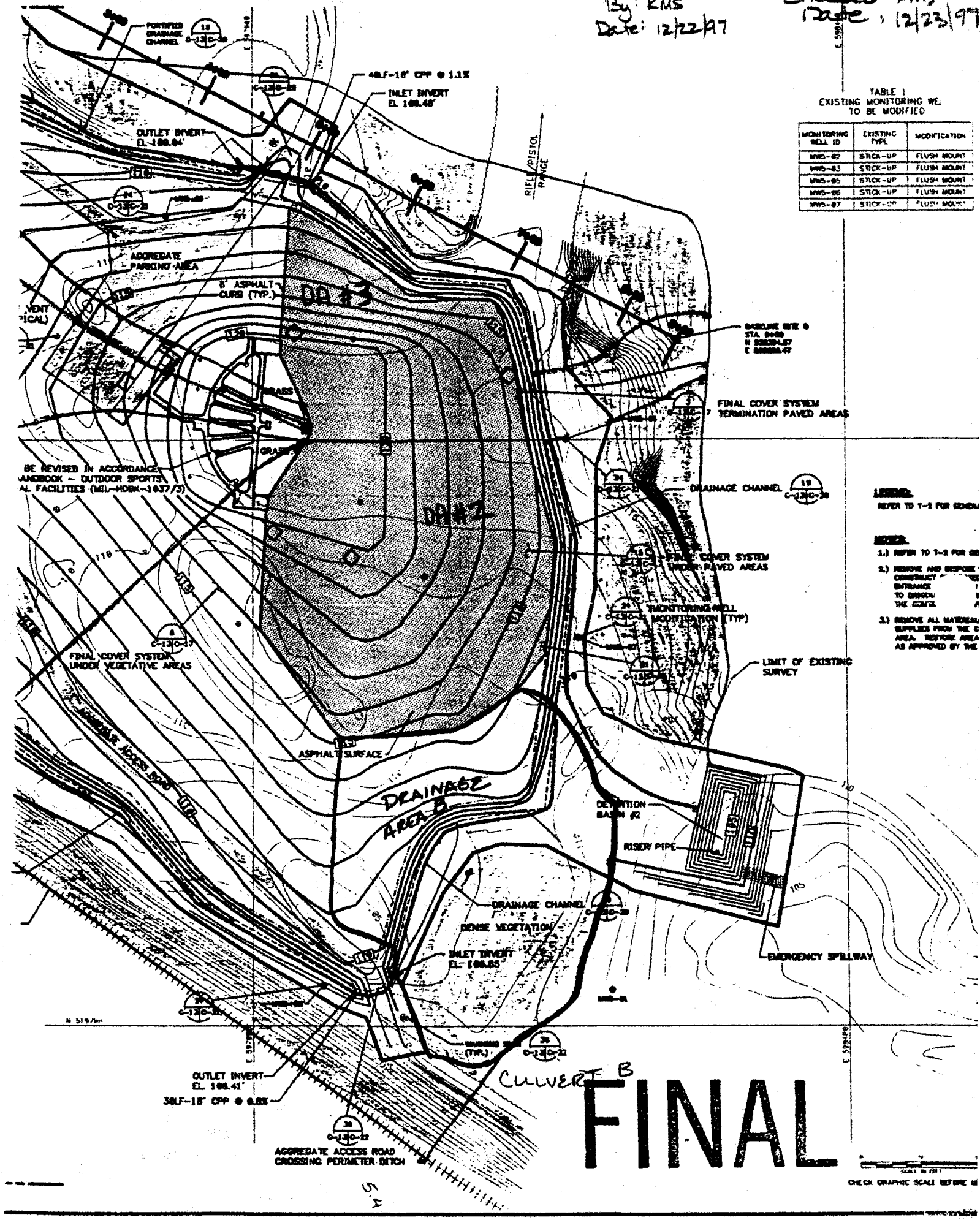
CHECK GRAPHIC SCALE BEFORE

By: KMS
Date: 12/22/97

Checked: LMS
Date: 12/23/97

TABLE 1
EXISTING MONITORING WE
TO BE MODIFIED

MONITORING WELL ID	EXISTING TYPE	MODIFICATION
MW5-82	STICK-UP	FLUSH MOUNT
MW5-83	STICK-UP	FLUSH MOUNT
MW5-85	STICK-UP	FLUSH MOUNT
MW5-86	STICK-UP	FLUSH MOUNT
MW5-87	STICK-UP	FLUSH MOUNT



By: KMS
DATE: 12/22/97

Checked: [illegible]
Date: 12/23/97

Quick TR-55 Version: 5.46 S/N:

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE Site 5 Area A

CALCULATED
DISK FILE: EARLE1 .GPD

Drainage Area	(acres)	1.90	--->	0.0030 sq.mi.
Runoff Curve Number	(CN)	072		
Time of Concentration, Tc	(hrs)	0.08		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	0.778	0.778	0.778
Ia/p Ratio	0.130	0.000	0.000
Unit Discharge, * qu (csm/in)	678	0	0
Runoff, Q (in)	2.99	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	6	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	686.043	0.000	0.000
Ia/p	#2	0.300	0.000	0.000
C0	#2	2.396	0.000	0.000
C1	#2	-0.512	0.000	0.000
C2	#2	-0.132	0.000	0.000
qu (csm)	#2	628.861	0.000	0.000
* qu (csm)		678	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$

qp (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond & Swamp Adj.)

Quick TR-55 Version: 5.46 S/N:

By: KMS Checked: LMS
DATE: 12/22/97 Date: 12/23/9

>>>>> GRAPHICAL PEAK DISCHARGE METHOD <<<<<

NSWE Site 5 Area B

CALCULATED
DISK FILE: EARLE2 .GPD

Drainage Area	(acres)	1.2	--->	0.0019 sq.mi.
Runoff Curve Number	(CN)	59		
Time of Concentration,Tc	(hrs)	0.08		
Rainfall Distribution	(Type)	III		
Pond and Swamp Areas	(%)	0	--->	0.0 acres

	Storm #1	Storm #2	Storm #3
Frequency (years)	25		
Rainfall, P, 24-hr (in)	6		
Initial Abstraction, Ia (in)	1.390	1.390	1.390
Ia/p Ratio	0.232	0.000	0.000
Unit Discharge, * qu (csm/in)	648	0	0
Runoff, Q (in)	1.84	0.00	0.00
Pond & Swamp Adjustment Factor	1.00	1.00	1.00
PEAK DISCHARGE, qp (cfs)	2	0	0

Summary of Computations for qu

Ia/p	#1	0.100	0.000	0.000
C0	#1	2.473	0.000	0.000
C1	#1	-0.518	0.000	0.000
C2	#1	-0.171	0.000	0.000
qu (csm)	#1	686.043	0.000	0.000
Ia/p	#2	0.300	0.000	0.000
C0	#2	2.396	0.000	0.000
C1	#2	-0.512	0.000	0.000
C2	#2	-0.132	0.000	0.000
qu (csm)	#2	628.861	0.000	0.000
* qu (csm)		648	0	0

* Interpolated for computed Ia/p ratio (between Ia/p #1 & Ia/p #2)
If computed Ia/p exceeds Ia/p limits, bounding limit for Ia/p is used.

$$\log(qu) = C0 + (C1 * \log(Tc)) + (C2 * (\log(Tc))^2)$$
$$qp\ (cfs) = qu(csm) * Area(sq.mi.) * Q(in.) * (Pond\ \&\ Swamp\ Adj.)$$

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT NSWE	JOB NUMBER 7602
SUBJECT CULVERT DESIGN	
BASED ON HYDRAULIC DESIGN	DRAWING NUMBER
BY KMS 11/14/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

Revised 12/22/97 BER 12/30/97

OBJECTIVE: TO DETERMINE IF A 25-YEAR STORM EVENT WILL OVERTOP THE CULVERTS SPILLING ONTO THE ROAD.

APPROACH: CALCULATE THE CONTROL HEADWATER ELEVATION OF EACH CULVERT AND COMPARE TO THE ELEVATION OF THE ROADWAY. BASED ON HYDRAULIC DESIGN OF HIGHWAY CULVERTS BY THE U.S. DEPARTMENT OF TRANSPORTATION (DOT), SEPTEMBER 1985.

CONDITIONS:

CULVERT A 18" DIAMETER
40 LF
OUTLET Elevation 108.04'
INLET Elevation 108.48'
FLOW 6 CFS

CULVERT B 18" DIAMETER
40 LF
OUTLET ELEVATION 107.25'
INLET ELEVATION 107.58'
FLOW 2 CFS

ANALYSIS

USING CULVET DESIGN FORM FROM DOT, SEPTEMBER 1985.
PAGE 2 OF 8

PROJECT: NSWC EARLE SITE 5

STATION: CULVERTS A/B

SHEET 2 OF 10

CULVERT DESIGN FORM

DESIGNER / DATE: CMS / 12/22/97

REVIEWER / DATE: BER / 12/30/97

HYDROLOGICAL DATA

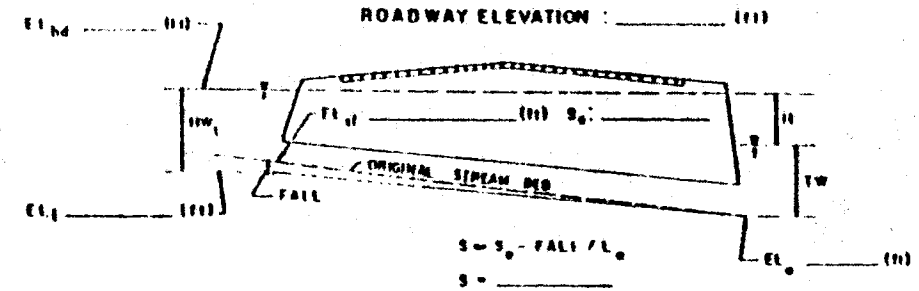
SEE ADDL SHTS.

- [ ] METHOD: RATIONAL
- [ ] DRAINAGE AREA: X ( ) STREAM SLOPE
- [ ] CHANNEL SHAPE
- [ ] ROUTING ( ) OTHER

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
25	6	0
25	2	0

ROADWAY ELEVATION: _____ (ft)



$S = S_o - FALL / L_o$

$S =$

$L_o =$

CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE ENTRANCE

CULVERT DESCRIPTION	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HW$_i$/D (2)	HW$_i$	FALL (3)	EL$_{hi}$ (4)	TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	h_o	H (7)	EL$_{ho}$ (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
A: CIRCULAR PIPE 18"-d	6	6	0.96	1.44	0	109.9	0.46	0.9	1.2	1.2	0.5	0.38	109.6	109.9	3.4	
B: CIRCULAR PIPE 18"-d	2	2	0.5	0.75	0	108.3	0.28	0.6	1.05	1.05	0.5	0.04	108.3	108.3	1.13	

HEADWATER CALCULATIONS — INLET CONTROL: HW$_i$/D, HW$_i$, FALL, EL$_{hi}$; OUTLET CONTROL: TW, d_c, $\frac{d_c+D}{2}$, h_o, h_o, H, EL$_{ho}$

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW$_i$/D = HW/D OR HW$_i$/D FROM DESIGN CHARTS

(3) FALL = HW$_i$ - (EL$_{hd}$ - EL$_{of}$); FALL IS ZERO FOR CULVERTS ON GRADE

(4) EL$_{hi}$ = HW$_i$ + EL$_i$ (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL

(6) h_o = TW or (d_c + D/2) (WHICHEVER IS GREATER)

(7) $H = \left[1 + h_o + (29n^2 L) / R^{1.33}\right] V^2 / 2g$

(8) EL$_{ho}$ = EL$_o$ + H + h_o

SUBSCRIPT DEFINITIONS:

a. APPROXIMATE
f. CULVERT FACE
hd. DESIGN HEADWATER
hi. HEADWATER IN INLET CONTROL
ho. HEADWATER IN OUTLET CONTROL
i. INLET CONTROL SECTION
o. OUTLET
of. STREAMBED AT CULVERT FACE
tw. TAILWATER

COMMENTS / DISCUSSION:

CULVERT BARREL SELECTED:

SIZE: _____

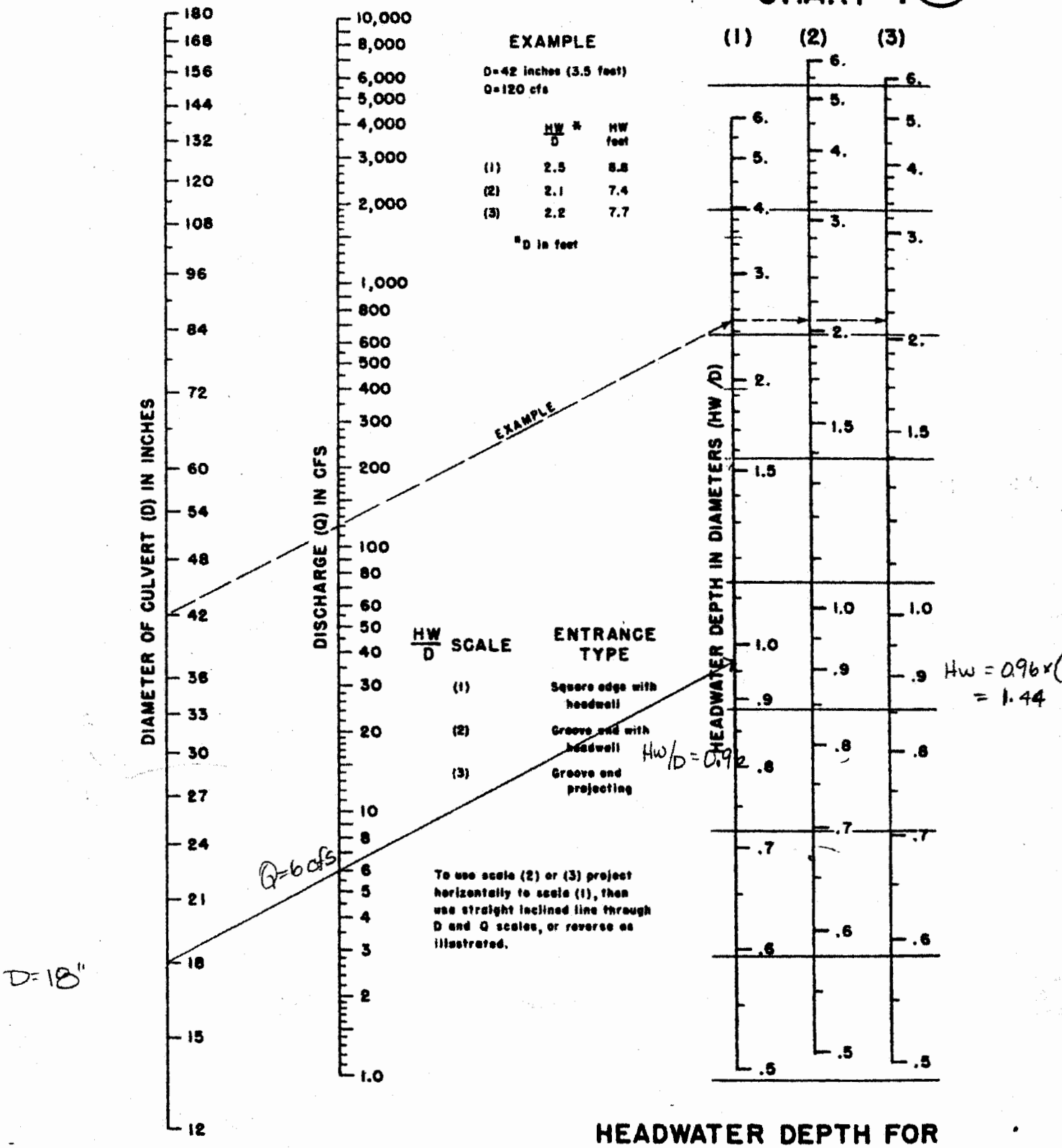
SHAPE: _____

MATERIAL: _____ n _____

ENTRANCE: _____

By: LMS Checked DEK
DATE: 12/22/97 DATE 12/30/97

CHART 1



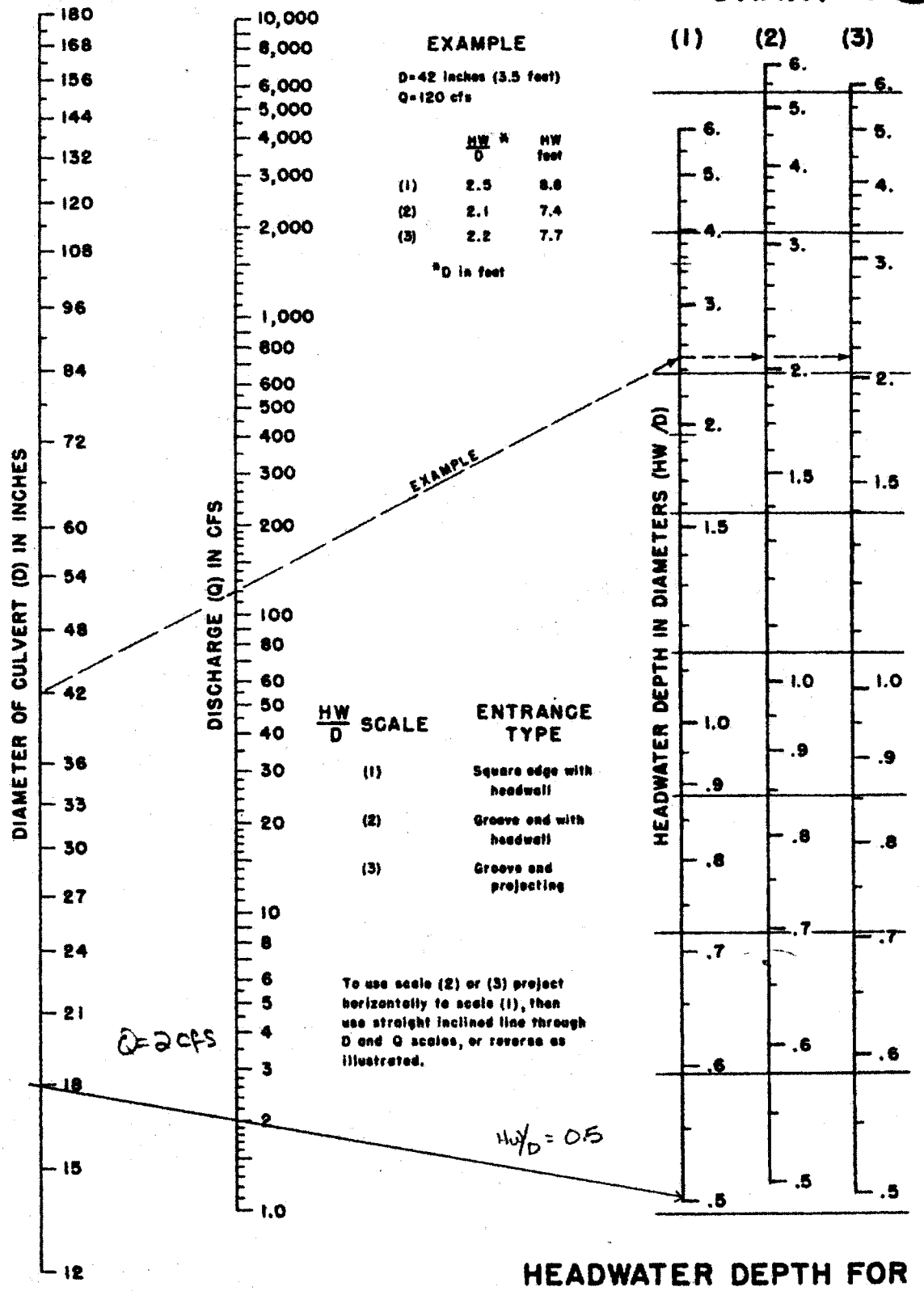
HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

DATE · 12/22/97 DMC 12/30/97

CHART 1



HEADWATER SCALES 2 & 3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

Culvert A Site 5 Tailwater Depth
Worksheet for Trapezoidal Channel

Project Description	
Project File	n:\data\bbrf780\files\earle1.fm2
Worksheet	Culvert at Site 5 to calculate tailwater
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.011000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	4.00	ft
Discharge	6.00	ft^3/s

Results			
Depth	0.46	ft	⟸ Tw
Flow Area	2.72	ft^2	
Wetted Perimeter	7.83	ft	
Top Width	7.72	ft	
Critical Depth	0.36	ft	
Critical Slope	0.027548	ft/ft	
Velocity	2.20	ft/s	
Velocity Head	0.08	ft	
Specific Energy	0.54	ft	
Froude Number	0.65		
Flow is subcritical.			

DATE: 12/22/97 — 12/30/97

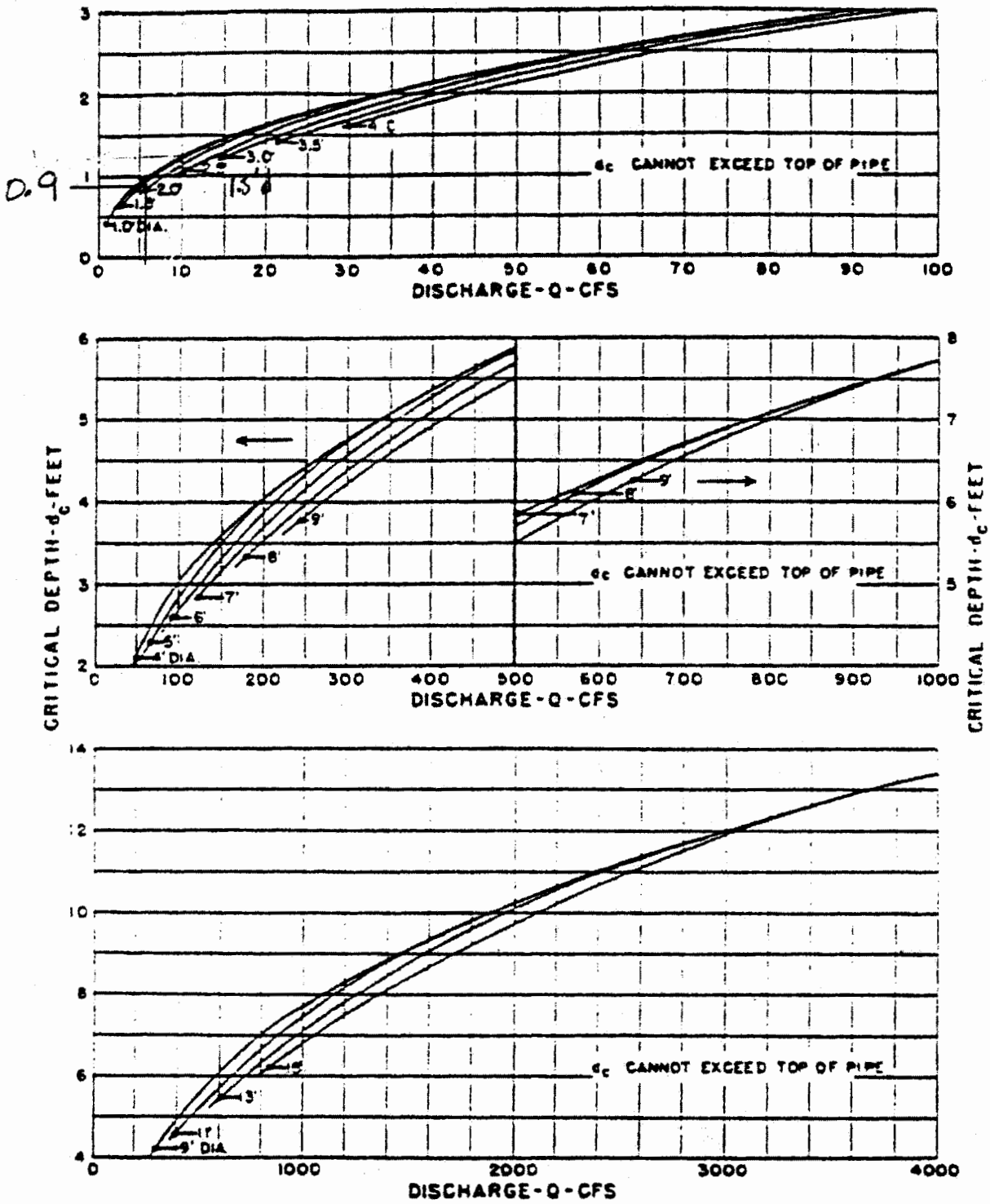
Culvert B Site 5 Tailwater Depth
Worksheet for Trapezoidal Channel

Project Description	
Project File	n:\data\bbrf780\files\earle1.fm2
Worksheet	Culvert at Site 5 to calculate tailwater
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.035	
Channel Slope	0.008000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	4.00	ft
Discharge	2.00	ft^3/s

Results		
Depth	0.28	ft ← Tw
Flow Area	1.42	ft^2
Wetted Perimeter	6.29	ft
Top Width	6.22	ft
Critical Depth	0.19	ft
Critical Slope	0.033211	ft/ft
Velocity	1.41	ft/s
Velocity Head	0.03	ft
Specific Energy	0.31	ft
Froude Number	0.52	
Flow is subcritical.		

CHART 4



BUREAU OF PUBLIC ROADS

JAN. 1964

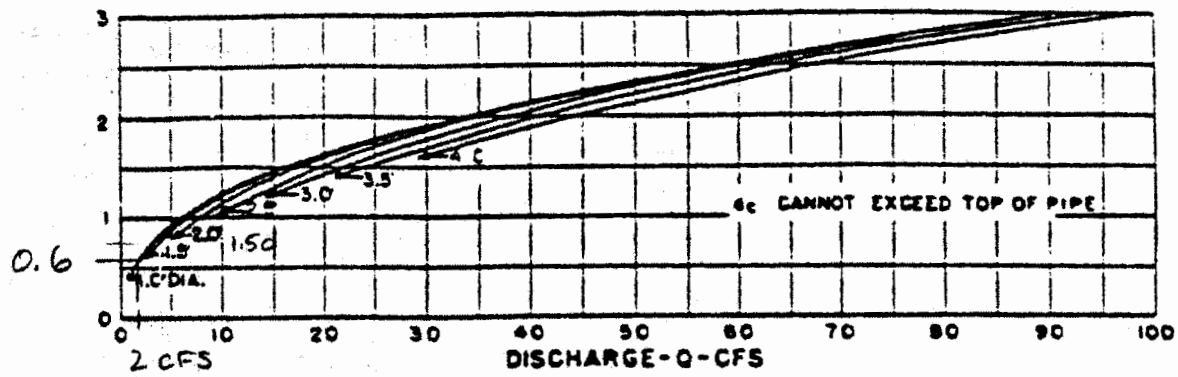
CULVERT A

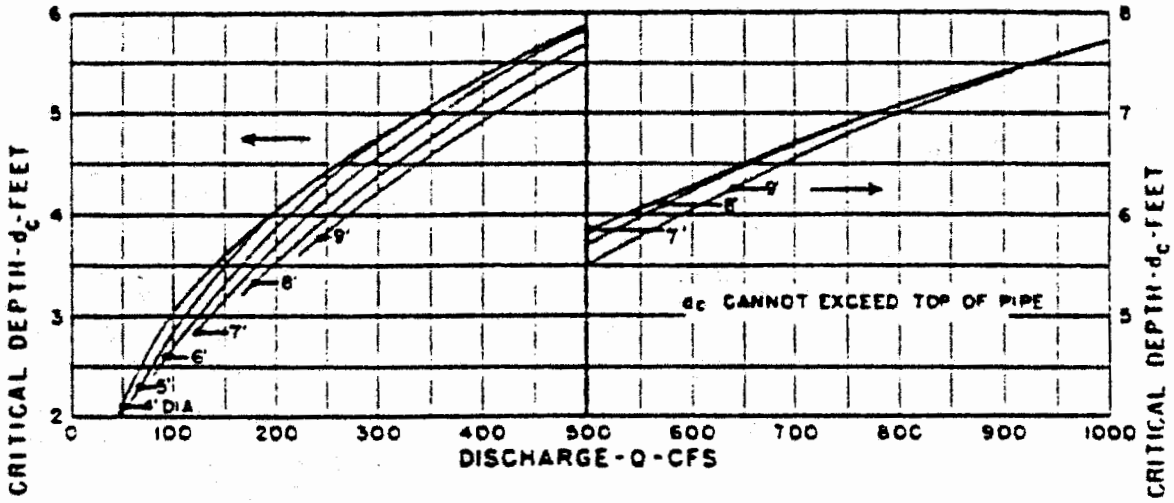
CRITICAL DEPTH
CIRCULAR PIPE

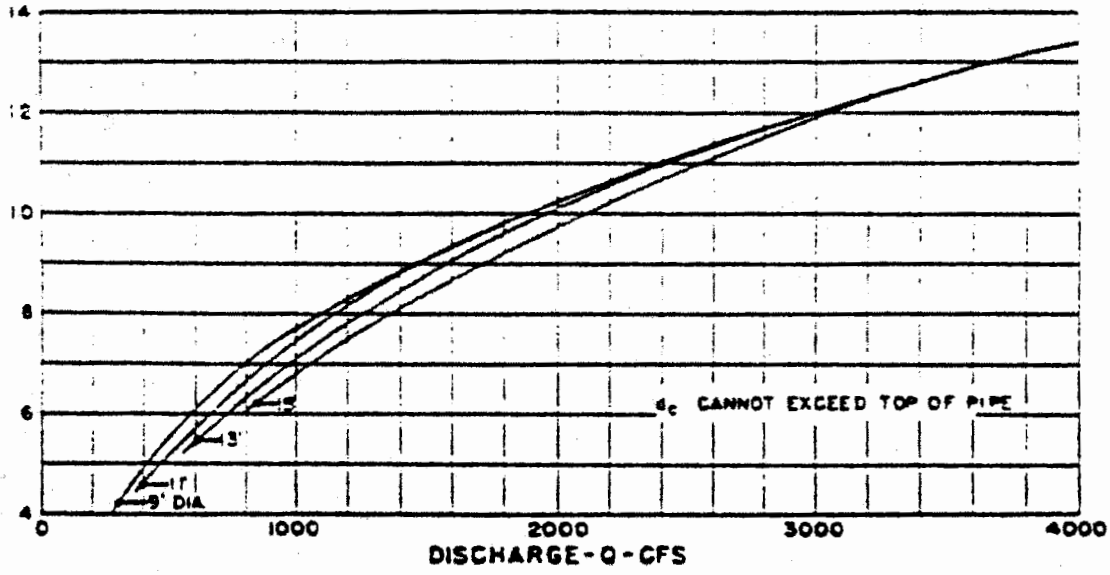
REFERENCE #1

DATE 4/04/91 DATE: 11/5/91

CHART 4







BUREAU OF PUBLIC ROADS

JAN. 1964

CULVERT B

CRITICAL DEPTH
CIRCULAR PIPE

REFERENCE #1

BY: KMS DATE: 11/04/97 CHECKED: JCK DATE: 11/5/97 page 4/10

TABLE 12 - ENTRANCE LOSS COEFFICIENTS

Outlet Control, Full or Partly Full Entrance head loss

$$H_e = k_e \left(\frac{V^2}{2g} \right)$$

Type of Structure and Design of Entrance	Coefficient k_e
Pipe, Concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, sq. cut end	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.2
Square-edge	0.5
Rounded (radius = 1/12D)	0.2
Mitered to conform to fill slope	0.7
*End-Section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side-or slope-tapered inlet	0.2
Pipe, or Pipe-Arch, Corrugated Metal	
Projecting from fill (no headwall)	0.9 -E 505
Headwall or headwall and wingwalls square-edge	0.5
Mitered to conform to fill slope, paved or unpaved slope	0.7
*End-Section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side-or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges to radius of 1/12 barrel dimension, or beveled edges on 3 sides	0.2
Wingwalls at 30° to 75° to barrel	
Square-edged at crown	0.4
Crown edge rounded to radius of 1/12 barrel dimension, or beveled top edge	0.2
Wingwall at 10° to 25° to barrel	
Square-edged at crown	0.5
Wingwalls parallel (extension of sides)	
Square-edged at crown	0.7
Side-or slope-tapered inlet	0.2

*Note: "End Section conforming to fill slope," made of either metal or concrete, are the sections commonly available from manufacturers. From limited hydraulic tests they are equivalent in operation to a headwall in both inlet and outlet control. Some end sections, incorporating a closed taper in their design have a superior hydraulic performance. These latter sections can be

REFERENCE #1

CLIENT NSWC	JOB NUMBER 7602
SUBJECT CULVERT DESIGN	
BASED ON HYDRAULIC DESIGN	DRAWING NUMBER
BY KMS 11/04/97 / CHECKED BY BER 11/5/97	APPROVED BY / DATE

Revised 12/22/97 BER 12/30/97

Conclusion:

THE CONTROL HEADWATER ELEVATIONS FOR EACH CULVERT ARE:

CULVERT A 109.9 FEET

CULVERT B 108.3 FEET

THE ELEVATION OF THE ACCESS ROADS AT EACH CULVERT ARE:

AT CULVERT A: ELEVATION 112 FEET

AT CULVERT B: ELEVATION 109 FEET

THEREFORE, DURING A 25-YEAR STORM EVENT THE RAINFALL RUNOFF WOULD NOT FLOW OVER THE ROAD AT EITHER CULVERT A OR B.

References

1.) HYDRAULIC DESIGN OF HIGHWAY CULVERTS, U.S. DEPARTMENT OF TRANSPORTATION, FEDERAL HIGHWAY ADMINISTRATION, SEPTEMBER 1985.

E.5 Rock Apron Design - Site 4

CLIENT		JOB NUMBER	
SUBJECT NWSE EARLE - SITE 4 CONDUIT OUTLET PROTECTION			
BASED ON		DRAWING NUMBER	
BY BER	CHECKED BY DCW 12/31/97	APPROVED BY	DATE 12/11/97

OBJECTIVE : TO PROVIDE A STABLE AREA AT THE OUTLET OF A CONDUIT IN WHICH THE EXIT VELOCITY FROM THE CONDUIT IS REDUCED TO A VELOCITY CONSISTENT WITH A STABLE CONDITION IN THE DOWNSTREAM CHANNEL.

APPROACH : USE THE EXIT VELOCITY FROM THE ROUTING CALCULATIONS FOR EACH SEDIMENT/DETENTION BASIN AND THE STANDARD EQUATIONS FROM THE CONDUIT OUTLET PROTECTION SECTION IN THE NEW JERSEY E+S MANUAL TO PROPERLY SIZE THE APRONS.

RELEVANT EQUATIONS :

(1) $$L_a = \frac{1.8\,Q}{D_o^{3/2}} + 7\,D_o$$

where, L_a = length of the apron
D_o = the maximum inside culvert width in feet
Q = the pipe discharge in cfs.

(2) For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3\,D_o + L_a$$

where, W = width of the apron

(3) $$d_{50} = \frac{0.02}{TW}\left(\frac{Q}{D_o}\right)^{4/3}$$

where, d_{50} = median stone diameter in feet
$TW = 0.2\,D_o$

CLIENT	JOB NUMBER
SUBJECT: NWSE EARLE - SITE 4 CONDUIT OUTLET PROTECTION	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 12/31/97		12/11/97

ASSUMPTIONS : ASSUME THE TAILWATER ELEVATION FOR EACH CONDUIT OUTLET IS LESS THAN 0.5 D_o.

CALCULATIONS :

SEDIMENT / DETENTION BASIN #1 :

Q_{PEAK} = 8.62 cfs (Peak Outflow from Routing Calculations)
D_o = 1.5 FT

$$L_a = \frac{1.8\,(8.62)}{(1.5)^{3/2}} + 7\,(1.5)$$

L_a = 19.0 FT

$W = 3D_o + L_a$
$W = 3\,(1.5) + 19$
W = 23.5 FT

$$d_{50} = \frac{0.02}{0.2\,D_o}\left(\frac{Q}{D_o}\right)^{4/3}$$

$$d_{50} = \frac{0.02}{(0.2 \times 1.5)}\left(\frac{8.62}{1.5}\right)^{4/3}$$

d_{50} = 0.70 FT

CLIENT		JOB NUMBER	
SUBJECT NWSE EARLE - SITE 4 CONDUIT OUTLET PROTECTION			
BASED ON		DRAWING NUMBER	
BY BER	CHECKED BY DCW 12/31/97	APPROVED BY	DATE 12/11/97

SEDIMENT/DETENTION BASIN # 2 :

Q_{PEAK} = 3.29 cfs (Peak Outflow from Routing Calculations)
D_o = 1.0 FT

$$L_a = \frac{1.8\,(3.29)}{(1.0)^{3/2}} + 7\,(1.0)$$

L_a = 13.0 FT

$W = 3D_o + L_a$
$W = 3\,(1) + 13$
W = 16 FT

$$d_{50} = \frac{0.02}{0.2\,D_o}\left(\frac{Q}{D_o}\right)^{4/3}$$

$$d_{50} = \frac{0.02}{(0.2 \times 1)}\left(\frac{3.29}{1}\right)^{4/3}$$

d_{50} = 0.50 FT

REFERENCES :

(1) NEW JERSEY EROSION AND SEDIMENT CONTROL MANUAL, SECTION 4.14.1 CONDUIT OUTLET PROTECTION.

CLIENT NWSE - EARLE		JOB NUMBER 7602	
SUBJECT SWALE OUTLET APRONS - SITE 4			
BASED ON		DRAWING NUMBER	
BY BER	CHECKED BY DCW 12/31/97	APPROVED BY	DATE 12/17/97

OBJECTIVE : TO PROVIDE A STABLE AREA AT THE END OF THE PROPOSED SWALES IN ORDER TO REDUCE THE EXIT VELOCITY TO BE CONSISTENT WITH A STABLE CONDITION.

APPROACH : USE THE EXIT VELOCITIES FROM THE RIPRAP EVALUATION CALCULATIONS AND THE HYDRAULIC JUMP EQUATIONS TO CALCULATE THE LENGTH. ONCE THE LENGTH OF THE JUMP IS KNOWN, RIPRAP WILL BE PLACED AND EXTENDED TO THIS TRANSITION LENGTH.

RELEVANT EQUATIONS :

(1) $N_F = \frac{V_1}{\sqrt{g D_1}}$ (Reference 2)

where, N_F = the Froude number for the upstream rapid flow
V_1 = upstream velocity, fps
g = gravitational constant
D_1 = upstream channel depth, ft.

(2) $\frac{D_2}{D_1} = \frac{1}{2}\left(\sqrt{8N_F^2 + 1} - 1\right)$ (Reference 2)

where, D_2 = downstream depth, ft.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT SWALE OUTLET APRONS - SITE 4	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 12/31/97	APPROVED BY / DATE 12/17/97

CALCULATIONS:

DRAINAGE CHANNEL 1 (DC 1):

$$N_F = \frac{5.30}{\sqrt{(32.2)(0.379)}} = 1.52$$

FROM SECTION E.1 (REF 1):
$D_1 = 0.379$ FT
$V_1 = 5.3$ FPS

$$\frac{D_2}{0.379} = \frac{1}{2}\left(\sqrt{8(1.52)^2+1} - 1\right)$$

$D_2 = 0.65$ FT

FROM FIG. 6-30 (REF. 2): $L/D_2 = 4$ $\therefore$ $L = 2.60$ FT

DRAINAGE CHANNEL 2 (DC 2):

$$N_F = \frac{3.3}{\sqrt{(32.2)(0.07)}} = 2.2$$

FROM SECTION E.1 (REF 1):
$D_1 = 0.07$ FT
$V_1 = 3.30$ FPS

$$\frac{D_2}{0.07} = \frac{1}{2}\left(\sqrt{8(2.2)^2+1} - 1\right)$$

$D_2 = 0.19$ FT

FROM FIG. 6-30 (REF. 2): $L/D_2 = 4.5$ $\therefore$ $L = 0.86$ FT

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT SWALE OUTLET APRONS - SITE 4	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 12/31/97	APPROVED BY / DATE 12/17/97

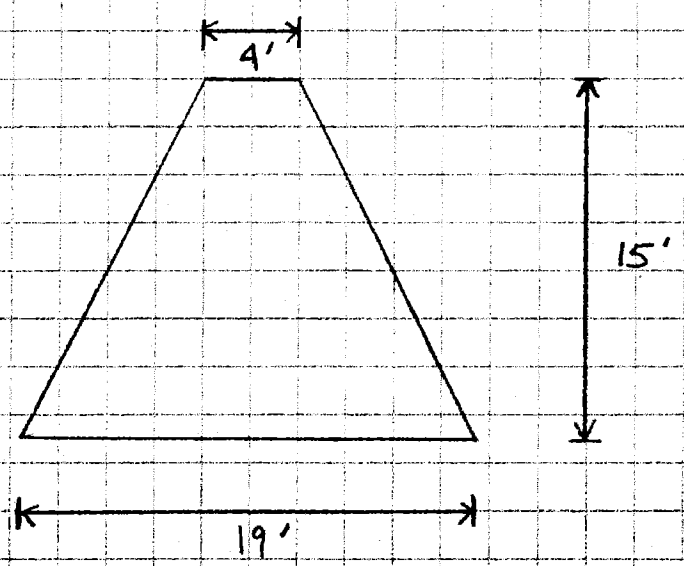
CONCLUSIONS :

IN ORDER TO BE CONSERVATIVE, AT THE END OF DRAINAGE CHANNELS 1 + 2, A 15-FOOT MINIMUM APRON LENGTH SHALL BE PLACED. THE APRON SHALL FLARE OUT TO THE FOLLOWING WIDTH :

WIDTH AT OUTLET = W = 3Do + La

ASSUME THAT 3Do = 4'

∴ W = 4 + 15 = 19 FT



REFERENCES :

(1) NWSE Earle Final Design Submission, Volume III of III, Appendix E, Section E.1 Hydraulic Stability Calculations for Site 4 Channels.

(2) Applied Hydraulics in Engineering by Henry M. Morris + James M. Wiggert, Second Edition

E.6 Rock Apron Design - Site 5

CALCULATION WORKSHEET Order No. 19116 (01-91)

CLIENT		JOB NUMBER	
SUBJECT NWSE EARLE - SITE 5 CONDUIT OUTLET PROTECTION			
BASED ON		DRAWING NUMBER	
BY BER	CHECKED BY DCW 12/30/97	APPROVED BY	DATE 12/27/97

OBJECTIVE : TO PROVIDE A STABLE AREA AT THE OUTLET OF A CONDUIT IN WHICH THE EXIT VELOCITY FROM THE CONDUIT IS REDUCED TO A VELOCITY CONSISTENT WITH A STABLE CONDITION IN THE DOWNSTREAM CHANNEL.

APPROACH : USE THE EXIT VELOCITY FROM THE ROUTING CALCULATIONS FOR EACH SEDIMENT/DETENTION BASIN AND THE STANDARD EQUATIONS FROM THE CONDUIT OUTLET PROTECTION SECTION IN THE NEW JERSEY E+S MANUAL TO PROPERLY SIZE THE APRONS.

RELEVANT EQUATIONS :

(1) $$L_a = \frac{1.8\,Q}{D_o^{3/2}} + 7D_o$$

where, L_a = length of the apron
D_o = the maximum inside culvert width in feet
Q = the pipe discharge in cfs

(2) For tailwater elevation less than the elevation of the center of the pipe,

$$W = 3D_o + L_a$$

where, W = width of apron at the outlet end

(3) $$d_{50} = \frac{0.02}{TW}\left(\frac{Q}{D_o}\right)^{4/3}$$

where, d_{50} = median stone diameter in feet
$TW = 0.2\,D_o$ for areas where tailwater cannot be determined

CLIENT	JOB NUMBER		
SUBJECT: NWSE EARLE - SITE 5 CONDUIT OUTLET PROTECTION			
BASED ON		DRAWING NUMBER	
BY: BER	CHECKED BY: DCW 12/30/97	APPROVED BY	DATE: 12/27/97

ASSUMPTIONS : ASSUME THE TAILWATER ELEVATION FOR EACH CONDUIT OUTLET IS LESS THAN $0.5 D_o$.

CALCULATIONS :

SEDIMENT/DETENTION BASIN #2 :

$Q_{PEAK} = 1.68$ cfs (Peak outflow from Routing Calculations)
$D_o = 1.0$ FT

$$L_a = \frac{1.8(1.68)}{(1.0)^{3/2}} + 7(1.0)$$

$L_a = 10.0$ FT

$W = 3D_o + L_a$
$W = 3(1.0) + 10$
$W = 13$ FT

$$d_{50} = \frac{0.02}{(0.2 \times 1.0)} \left(\frac{1.68}{1.0}\right)^{4/3}$$

$d_{50} = 0.20$ FT

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITES	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

OBJECTIVE : TO PROVIDE A STABLE AREA AT THE END OF THE EMERGENCY SPILLWAYS AND WHERE THE DRAINAGE TRENCHES EMPTY INTO THE BASINS.

APPROACH :

(1) ASSUME A TRAPEZOIDAL CHANNEL FOR EACH SCENARIO AND USE MANNING'S EQUATION TO CALCULATE THE DEPTH AND VELOCITY OF OUTFLOW. THE 25-YEAR POST-DEVELOPMENT BASIN OUTFLOW FROM THE ROUTINGS SHALL BE USED AS THE Q INPUT. THE ROUGHNESS COEFFICIENT SHALL = 0.038 BASED ON TYPE II RIPRAP (D_{50} = 9.0") . ASSUME THE CHANNEL SLOPE = THE EMBANKMENT SLOPE = 3:1 = 0.33 FT/FT. ASSUME THE SIDESLOPES OF THE TRAPEZOIDAL CHANNEL = 4:1 . ONCE THE DEPTH AND VELOCITY ARE CALCULATED, USE THE HYDRAULIC JUMP EQUATIONS TO CALCULATE THE LENGTH OF THE JUMP. ONCE THIS LENGTH IS KNOWN, RIPRAP WILL BE PLACED AND EXTENDED TO THIS TRANSITION LENGTH.

RELEVANT EQUATIONS : (1) $N_F = \frac{V_1}{\sqrt{gD_1}}$ (REFERENCE 2)

where, N_F = Froude number for upstream rapid flow
g = gravitational constant
D_1 = upstream channel depth

(2) $D_2/D_1 = (\sqrt{8N_F^2+1} - 1)/2$ (REFERENCE 2)

where, D_2 = downstream depth, ft.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

CALCULATIONS :

DETENTION BASIN #1 : DETERMINE ROCK APRON SIZE FOR THE AREA WHERE THE DRAINAGE TRENCH AND THE 24" RCP PIPE DISCHARGE INTO THE BASIN.

FOR THE DRAINAGE TRENCH → $Q_{25} = 9$ CFS (REF. SECTION E.2)
$n = 0.038$
Channel Slope = 0.33
Bottom Width Channel = 4 FT
Sideslopes = 4:1

FROM THE SPREADSHEET : $V = 7.68$ FPS
$D = 0.24$ FT

$$N_F = \frac{7.68}{\sqrt{(32.2)(.24)}} = 2.76$$

$$\frac{D_2}{0.24} = \frac{\left(\sqrt{8(2.76)^2 + 1} - 1\right)}{2}$$

$$D_2 = 0.82 \text{ FT}$$

FROM FIG. 6-30 : $L/D_2 = 5.0$
(REF 2 - P.14 of 15) $L = 4.1$ FT

PROJECT: **EARLE - SITE 5**
DETENTION BASIN #1

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	9.1	0.24	1.19	0.199	0.038	7.680

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

(DB-1 CONT)

FOR THE CULVERT DISCHARGE : $Q_{25} = 8$ CFS
(Assume a Trapezoidal Channel since the discharge from the culvert will spread out upon exiting the culvert.)

$n = 0.038$
Channel Slope = 0.33
Bottom Width Channel = 4 FT
Sideslopes = 4:1

FROM THE SPREADSHEET : $V = 7.36$ FPS
$D = 0.223$ FT

$$N_F = \frac{7.36}{\sqrt{(32.2)(0.223)}} = 2.75$$

$$\frac{D_2}{0.223} = \frac{\left(\sqrt{8(2.75)^2+1} - 1\right)}{2}$$

$$D_2 = 0.76$$

FROM FIG 6-30 (REF 2) : $L/D_2 = 5.0$
(P. 14 OF 15) $L = 3.8$ FT

IN ORDER TO BE CONSERVATIVE, PLACE A 20 FT x 20 FT APRON ON THE BOTTOM OF THE BASIN WHERE THE DRAINAGE TRENCH AND THE CULVERT CARRYING OFF-SITE RUNOFF DISCHARGE. THE 20 FT APRON WILL ALSO ACCOUNT FOR THE TWO CHANNELS COMING INTO THE SAME LOCATION FROM DIFFERENT DIRECTIONS.

PROJECT: EARLE - SITE 5
DETENTION BASIN #1 - OFF-SITE CULVERT DISCHARGE

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	8.0	0.223	1.09	0.187	0.038	7.361

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

DETENTION BASIN # 2 : DETERMINE ROCK APRON SIZE FOR THE AREA WHERE THE DRAINAGE TRENCH DISCHARGES INTO THE BASIN AND AT THE END OF THE EMERGENCY SPILLWAY.

FOR THE DRAINAGE TRENCH : $Q_{25} = 8$ CFS (REF. DA 2)
$n = 0.038$
Channel Slope = 0.33 FT/FT
Bottom Width Channel = 4 FT
Sideslopes = 4 : 1

FROM THE SPREADSHEET : $V = 7.36$ FPS
$D = 0.223$ FT

$$N_F = \frac{7.36}{\sqrt{(32.2)(0.223)}} = 2.75$$

$$\frac{D_2}{0.223} = \frac{\left(\sqrt{8(2.75)^2+1} - 1\right)}{2}$$

$$D_2 = 0.76 \text{ FT}$$

FROM FIG. 6-30 (REF. 2) (P. 14 OF 15) : $L/D_2 = 5.1$
$L = 3.88$ FT

IN ORDER TO BE CONSERVATIVE, PLACE A 15 FT X 15 FT PAD ON THE BOTTOM OF THE BASIN WHERE THE DRAINAGE TRENCH DISCHARGES.

PROJECT: **EARLE - SITE 5**
DETENTION BASIN #2

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)(1)	Area (ft^2)(2)	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	8.0	0.223	1.09	0.187	0.038	7.361

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT NUSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

(DB-2 CONT.)

FOR THE EMERGENCY SPILLWAY : Q_{25} OUTFLOW = 1.68 cfs

$n = 0.038$

Channel Slope = 0.33 FT/FT

Bottom Width Channel = 4 FT (CONSERVATIVE)

Sideslopes = 4 : 1

FROM THE SPREADSHEET : $V = 4.27$ FPS

$D = 0.09$ FT

$$N_F = \frac{4.27}{\sqrt{(32.2)(0.09)}} = 2.51$$

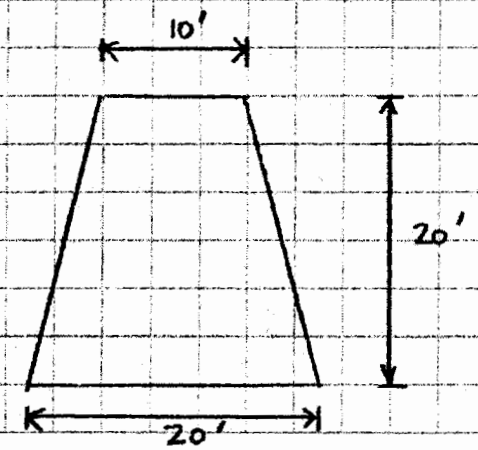
$$\frac{D_2}{0.09} = \frac{\left(\sqrt{(8(2.51)^2 + 1} - 1\right)}{2}$$

$D_2 = 0.28$ FT

FROM FIG. 6-30 (REF. 2) : $L/D_2 = 4.5$

(P. 14 OF 15) $L = 1.26$ FT

IN ORDER TO BE CONSERVATIVE, PLACE AN APRON THAT MEETS THE FOLLOWING DIMENSIONS :



PROJECT: **EARLE - SITE 5**
DETENTION BASIN #2 : EMERGENCY SPILLWAY

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	1.7	0.09	0.39	0.083	0.038	4.277

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY 1/2/98	APPROVED BY / DATE 12/29/97

DETENTION BASIN # 3 : DETERMINE ROCK APRON SIZE FOR THE AREA WHERE THE DRAINAGE TRENCH DISCHARGES INTO THE BASIN AND AT THE END OF THE EMERGENCY SPILLWAY.

FOR THE DRAINAGE TRENCH : Q_{25} = 11 CFS (DA 3)
n = 0.038
Channel slope = 0.33 FT/FT
Bottom Width Channel = 4 FT
Sideslopes = 4:1

FROM THE SPREADSHEET : V = 8.16 FPS
D = 0.27 FT

$$N_F = \frac{8.16}{\sqrt{(32.2)(0.27)}} = 2.77$$

$$\frac{D_2}{0.27} = \frac{\left(\sqrt{8(2.77)^2+1} - 1\right)}{2}$$

$$D_2 = 0.93 \text{ FT}$$

FROM FIG. 6-30 (REF 2) (P. 14 OF 15) : $L/D_2 = 5.0$
$L = 4.65$ FT

IN ORDER TO BE CONSERVATIVE, PLACE A 15 FT × 15 FT APRON AT THE BOTTOM OF THE BASIN WHERE THE DRAINAGE TRENCH DISCHARGES.

PROJECT: **EARLE - SITE 5**
DETENTION BASIN #3 -DRAINAGE TRENCH DISCHARGE AREA

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	11.0	0.267	1.35	0.218	0.038	8.164

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

CLIENT NWSE - EARLE	JOB NUMBER
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER
BY BER / CHECKED BY DCW 1/2/98	APPROVED BY / DATE 12/29/97

(DB-3 CONT.)

FOR THE EMERGENCY SPILLWAY : Q_{25} OUTFLOW = 0.82 CFS
$n = 0.038$
Channel Slope = 0.33 FT/FT
Bottom Width Channel = 4 FT
Sideslopes = 4:1

FROM THE SPREADSHEET : $V = 3.32$ FPS
$D = 0.06$ FT

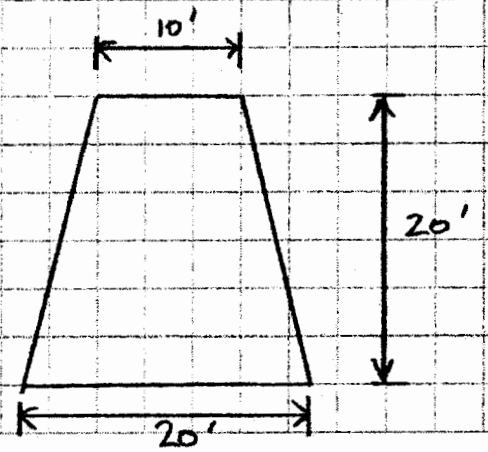
$$N_F = \frac{3.32}{\sqrt{(32.2)(0.06)}} = 2.4$$

$$\frac{D_2}{0.06} = \frac{\left(\sqrt{8(2.4)^2+1} - 1\right)}{2}$$

$$D_2 = 0.18 \text{ FT}$$

FROM FIG. 6-30 (REF 2) : $L/D_2 = 4.4$
(P. 14 OF 15) $L = 0.80$ FT

IN ORDER TO BE CONSERVATIVE, PLACE AN APRON THAT MEETS THE FOLLOWING DIMENSIONS:



PROJECT: **EARLE - SITE 5**
DETENTION BASIN #3 - EMERGENCY SPILLWAY

BY: BER **CHKD:**
DATE: 12/31/97 **DATE:**

Slope (%)	Q (cfs)	Depth (ft)[1]	Area (ft^2)[2]	Hyd. Rad. (ft)	n	V (ft/s)
33.00%	0.8	0.06	0.25	0.057	0.038	3.320

(1) Depth of water during peak flow during 25-yr storm during post-construction conditions.
(2) A trapezoidal channel is assumed with a 4 foot base, 4:1 side slopes.

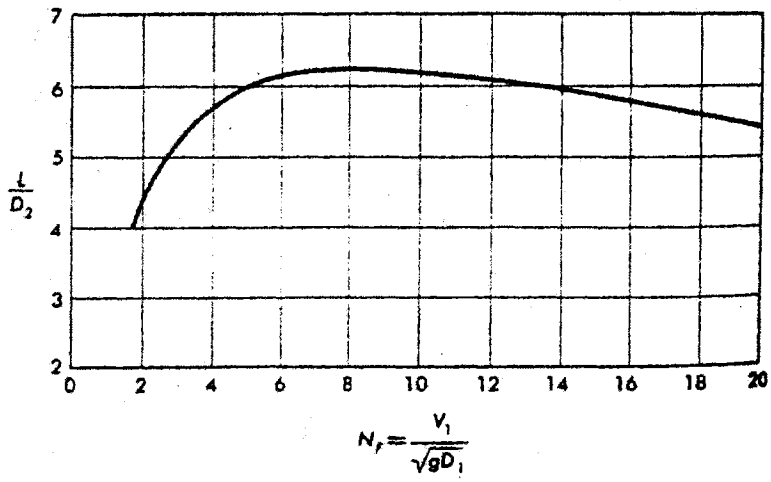


Fig. 6–30. Length of hydraulic jump.

CLIENT NWSE - EARLE	JOB NUMBER 7602
SUBJECT ROCK APRON DESIGN - SITE 5	
BASED ON	DRAWING NUMBER

BY	CHECKED BY	APPROVED BY	DATE
BER	DCW 1/2/98		12/29/97

REFERENCES :

(1) NWS Earle Final Design Submission, Volume III of III.

(2) Applied Hydraulics in Engineering by Henry M. Morris & James M. Wiggert, Second Edition.