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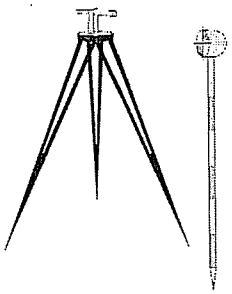

SWPPP

STORM WATER POLLUTION PREVENTION PLAN

PROJECT: Oak Tree Apartments

JOB #: SY #1385

DATE: 4-19-21

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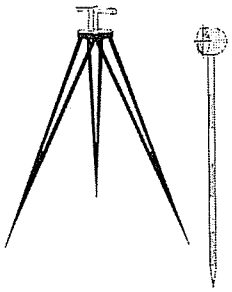


PROJECT: Oak Tree Apartments

Section 1: Background

A: DOCUMENT DESCRIPTION:

This document, (Storm Water Pollution Prevention Plan "SWPPP") was prepared in compliance with the "New York State Department of Environmental Conservation SPDES General Permit for Storm Water Discharges from Construction Activities" (Permit No. GP-0-20-001, Effective 1-29-20) for construction of a 228 unit residential apartment complex with several buildings, parking lots, community center and pool on a 14.48 acre parcel located in the Town of Haverstraw, New York.

This "SWPPP" includes text and site plan drawings as listed in Part III.B of GP-0-20-001 that describes the existing condition of the site and the proposed and estimated conditions during and after construction. The actual conditions of the Storm Water Management measures maintained during construction will be identified, recorded and made part of Appendix D.

The following is a list and brief description of the sections of this text as identified in the Table of Contents:

Sections 1 & 2: Background and Description of the pre construction site conditions and the conditions that are predicted to occur during and after the project construction.

Section 3, Appendix A: Storm Water Management Report dated 4-19-21 (or revision thereafter) and outlines the improvements planned to control storm water runoff in terms of quantity and quality. Documents in support of and referenced in Sections 1 & 2.

Section 3, Appendix B: The certifications of the project operator and the project contractors responsible for the implementation of this plan.

Section 3, Appendix C: The construction activity initiation and completion dates form to be completed by the contractor as the project in constructed.

Section 3, Appendix D: Blank Storm Water Pollution Prevention Plan Observation Report to be completed by the contractor after each inspection conducted and as described in Section 1.C.2.ii.1 of this text.

Section 3, Appendix E: A copy of the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (Permit No. GP-0-20-0012, Effective 1-29-20) The contractor is responsible for maintaining compliance with this permit.

Section 3, Appendix F: A completed copy of the project's Notice of Intent and the MS4 acceptance form have been submitted to the NYSDEC on _____.

Section 3, Appendix G: A blank copy of the projects Notice of Termination That will be completed and submitted to NYSDEC following final stabilization of the site.

Compliance with the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (General Permit) includes, but not limited to, completing the following activities:

1) Retaining a copy of this SWPPP including text, appendices and drawings at the site until the date of final stabilization;
2) Posting a copy of the NOI and a project description at the construction site for public viewing and installation of a SWPPP mailbox on site;
3) Maintaining the SWPPP current as specified in Section III.C of the General Permit;
4) Submitting a certified Notice of Termination when the site has finally been stabilized and discharges from construction activities has been eliminated;
5) Maintaining a copy of the SWPPP by the operator for three years following the date of final stabilization.
6) Periodic Inspections of the Storm Drainage Retention/Detention Systems, pipes, catchbasins and pipe exhaust/ditch areas on site to be performed by a NYS Licensed P.E. as per the schedule outlined in the maintenance guidelines in the SWPPP.

The contractor shall refer to the NYSDEC SPDES General Permit for Storm Water Discharges from Construction Activities (Appendix E) for a complete listing of permit requirements for compliance.

B: PROJECT LOCATION:

This project is situated on the North side of Rosman approximately 220 feet East of the intersection of Rosman Road with Caruso Court in the Town of Haverstraw. This parcel is comprised of a single lot containing a total of 14.48 acres and is located in an OT-17 Zone in the Town of Haverstraw, NY. There exists a number of deteriorating small frame residences along Oak Tree Lane with the access drive culminating at Rosman Road in the same location as is proposed.

C: PROJECT DESCRIPTION:

1: Scope of Project

The applicant is proposing to demolish all developed buildings and pavement on site and then re-develop by creation of 228 apartments in 4 new buildings on site with a circular access drive and a number of parking lots to serve its residents. In addition, there will be a club house and pool, along with a new dog park and access trail around the developed area on site for recreation. This project will disturb greater than 5-acres and will require a phased construction plan be developed with a full Stormwater Pollution Prevention Plan (SWPPP) for this project.

There are a variety of deciduous, evergreen, fruit and nut trees on site and are indicated on the latest set of site plan drawings, last revised 4-19-21 (or revision thereafter) for this site. Efforts have been made to retain existing trees where feasible. The rest of the non-impervious area on site consists mainly of grassy/lawn areas as some of this project area has previously been developed. No wetlands areas have been known to exist, recognized or delineated on this site.

The project will disturb approximately 11.63 acres of the site. Soil disturbing activities will include: clearing and grubbing, installing stabilized construction entrances, wherever necessary; perimeter and other erosion and sediment controls; grading (cuts & fills); excavation for drainage, sanitary sewer and other utilities, infiltration systems, new building construction and preparation for final planting and seeding. All new, relocated or replacement plantings proposed on site are indicated on the Planting Plan for the Oak Tree project, last revised 4-19-21(or revision thereafter).

2: Storm Water Management Plan

i: Storm Water Quality

The Storm Water Quality objective is to ensure that the requirements of the NYSDEC SPDES General Permit regarding post-development storm water quality are met. The General Permit states that a storm water discharge "shall neither cause nor contribute to a violation of water quality standards as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Coded, Rules and Regulations of the State of New York". This objective has been met through the proposed construction of porous membranes for infiltration purposes in accordance with the Best Management Practices (BMP's) to maximize treatment of impervious surfaces.

***Management of storm water quality is discussed in Appendix A, "Technical Report, prepared by Sparaco & Youngblood, PLLC, dated 4-19-21 (or revision thereafter) by Sparaco & Youngblood, PLLC.**

ii: Maintenance of Temporary and Permanent Structures and Practices

1: Temporary

Temporary structures and practices, as described in the Sequence of Construction and Erosion Control Plan drawings will be installed and maintained through the duration of the project's construction. As required by the General Permit, structures and practices located in disturbed areas of the site will be inspected by a qualified individual at least every seven days. Areas of the site that have been finally stabilized will be inspected at least every month until the whole site has been stabilized. Following the inspections, certified inspection reports will be completed. Based on the results of the inspections, appropriate revisions to the SWPPP and its implementation will be completed within seven calendar days following the inspection.

Appendix D of this SWPPP includes blank inspection report forms to be used to complete the inspections and reports. Completed reports will be added to Appendix D and retained as part of this SWPPP.

2: Permanent

Permanent structures and measures employed to control the project's quality of storm water will require inspections and maintenance. These include storm water flow controlling structures (catch basins, pipes, etc.). The project operator will be responsible for inspecting and maintaining permanent storm water, management structures and practices. Inspections should be made every 6 months or after a storm that is 3 inches or greater by a NYS Licensed P.E. (see also Note #6 in compliance section above).

3: PROJECT PERMITS AND APPROVALS

Permits and approvals being sought for two new proposed lots at existing Tax Lot # 26.05-1-42 & 26.09-2-8 shall include but not limited to;

i: Town of Haverstraw
   a) Final Approval for Site Plan Entitled "Oak Tree Apartments" dated 4-19-21 or later revision thereafter.

ii: New York State Department of Environmental Conservation
   a) Storm Water SPDES Permit – NOI submitted _____.

iii: Rockland County Health Department

a) Health Department approval of a water main extension.
b) Health Department approval of a sewer main extension.

iv: Suez Water Company

v: Town of Haverstraw Joint Regional Sewer Board

a) Approval of the proposed sewer system.

1) SITE DESCRIPTION:

PROJECT NAME & LOCATION:

OAK TREE APARTMENTS
1-72 OAK TREE LANE &
22 ROSMAN ROAD
HAVERSTRAW, NY 10984

OWNER NAME AND ADDRESS:

OAK TREE APARTMENTS, LLC
16 SQUADRON BOULEVARD, SUITE #106
NEW CITY, NY 10956

APPLICANT NAME AND ADDRESS:

OAK TREE APARTMENTS
16 SQUADRON BOULEVARD, SUITE #106
NEW CITY, NY 10956

DESCRIPTION:

PROPOSED SITE PLAN FOR 228 UNITS IN 4 BUILDINGS FOR A 228-UNIT APARTMENT RESIDENTIAL DEVELOPMENT PROJECT ON A 14.48 ACRE SITE. TOTAL DISTURBANCE OF THE SITE IS APPROXIMATELY 11.63 ACRES.

SOIL DISTURBING ACTIVITIES WILL INCLUDE: CLEARING AND GRUBBING; INSTALLING STABILIZED CONSTRUCTION ENTRANCES, WHEREVER NECESSARY;PERIMETER AND OTHER EROSION AND SEDIMENT CONTROLS; GRADING (CUTS & FILLS);EXCAVATION FOR DRAINAGE, SANITARY SEWER, OTHER UTILITIES, AND BUILDING FOUNDATIONS; CONSTRUCTION OF ROAD AND DRIVEWAYS; AND PREPARATION FOR FINAL PLANTING AND SEEDING.

SITE AREA:

THE SITE IS APPROXIMATELY 14.48 ACRES, OF WHICH APPROXIMATELY 11.63 ACRES WILL BE DISTURBED BY CONSTRUCTION ACTIVITIES.

SITE VEGETATION:

THE SITE HAS BEEN PREVIOUSLY DEVELOPED AND CONTAINS A NUMBER OF EXISTING STRUCTURES (BUNGALOES, SHEDS, ETC.) AND AN EXISTING MACADAM DRIVEWAY ON SITE. THE SPACE BETWEEN THE AFOREMENTIONED ITEMS CONSIST MAINLY OF LAWN AND SOME MINOR VEGETATION/TREES. THE REST OF THE EXISTING SITE AREA CONSISTS OF WOODED AREAS AND ALL SIGNIFICANT TREES HAVE BEEN IDENTIFIED ON THE EXISTING CONDITIONS MAP. DUE TO THE CONSTRUCTION OF THE NEW APARTMENT BUILDINGS, ROADWAYS, PARKING LOTS AND RECREATION CENTER THERE WILL BE MORE IMPERVIOUS AREA ON SITE IN POST-CONSTRUCTION CONDITIONS AND AS A RESULT LESS GREEN SPACE. HOWEVER, THE APPLICANT WILL TAKE MEASURES TO PRESERVE AS MUCH GREEN SPACE AND EXISTING TREES AS POSSIBLE ON SITE IN ADDITION TO SUPPLEMENTING WITH NEW TREES/VEGETATION ONCE THE FINAL GRADING HAS BEEN COMPLETED. THE PROPOSED AREA OF VEGETATION TO REMAIN IS APPROXIMATELY 2.85 ACRES. DETAILED DESCRIPTION OF AREAS AND TREES TO BE REMOVED/ADDED ARE SHOWN ON SITE PLAN DRAWINGS PREPARED BY SPARACO & YOUNGBLOOD, PLLC, LAST REVISED 4-19-21 OR REVISION THEREAFTER.

WETLANDS:

THERE ARE NO KNOWN FEDERAL OR STATE WETLANDS ON THIS SITE.

100-YEAR FLOODPLAIN:

THERE ARE NO KNOWN FEDERAL OR STATE DELINEATED FLOODPLAINS ON THIS SITE.

SEQUENCE OF MAJOR ACTIVITIES:

**NOTE: REFER TO PLANS PREPARED BY SPARACO & YOUNGBLOOD, PLLC DATED 4-19-21 (OR REVISION THEREAFTER) FOR ALL SITE PLAN WORK INCLUDING LOCATION OF MATERIAL, WASTE, BORROW, EQUIPMENT STORAGE/STAGING AREAS, WHERE APPLICABLE.*

THE ORDER OF ACTIVITIES WILL BE AS FOLLOWS:

1. PROTECT ANY AREAS DESIGNATED ON THE PLANS (THAT REQUIRE PROTECTION) BY INSTALLING TEMPORARY SNOW FENCING.

2. CONSTRUCT STABILIZED CONSTRUCTION ENTRANCES, WHEREVER NECESSARY.

3. INSTALL EROSION CONTROL MEASURES APPROPRIATE TO EACH PHASE OF WORK, INCLUDING SILT FENCE, INLET PROTECTION, TEMPORARY BERMS, SWALES, AND TEMPORARY SEDIMENT TRAPS.

4. PERFORM CLEARING AND GRUBBING ACTIVITIES.

5. STOCKPILE TOPSOIL IN APPROVED LOCATIONS.

6. PERFORM GRADING, EXCAVATION, AND RELATED OPERATIONS.

7. CONSTRUCT WATER QUALITY/DETENTION BASINS.

8. CONSTRUCT DRAINAGE SYSTEM IMPROVEMENTS, ROADWAY IMPROVEMENTS AND STREET UTILITIES.

9. CONSTRUCT BUILDINGS AND DRIVEWAYS.

10. AS CONSTRUCTION PROCEEDS, ALL DISTURBED AREAS SHALL BE PAVED, SEEDED, SODDED, OR PLANTED AS SPECIFIED ON THE PLANS NO LATER THAN 14 DAYS FROM THE LAST CONSTRUCTION ACTIVITY IN THAT AREA TO PREVENT UNNECESSARY EROSION.

11. ONCE DISTURBED AREAS HAVE BEEN PROPERLY STABILIZED, TEMPORARY CONTROL MEASURES SHALL BE REMOVED.

12. REMOVE ACCUMULATED SEDIMENTS FROM PERMANENT STORMWATER MANAGEMENT FACILITIES.

NAME OF RECEIVING WATERS: MINISCEONGO CREEK AND EVENTUALLY THE HUDSON RIVER.

2) CONTROLS:

EROSION AND SEDIMENT CONTROLS

STABILIZATION PRACTICES:

TEMPORARY STABILIZATION:

TOPSOIL STOCK PILES AND DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR AT LEAST 14 DAYS WILL BE STABILIZED WITH TEMPORARY SEED AND MULCH NO LATER THAN 14 DAYS FROM THE LAST CONSTRUCTION ACTIVITY IN THAT AREA. AN APPLICATION RATE OF A HALF POUND OF RYE GRASS AND MULCHED WITH 100 POUNDS OF STRAW OR HAY PER 1,000 SQUARE FEET SHALL BE USED AS A TEMPORARY SEEDING AND MULCH APPLICATION ON SITE.

AREAS OF THE SITE WHICH ARE TO BE PAVED WILL BE TEMPORARILY STABILIZED BY APPLYING STONE SUB-BASE UNTIL PAVEMENT SYSTEM CAN BE APPLIED.

PERMANENT STABILIZATION:

DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES PERMANENTLY CEASE SHALL BE COVERED WITH FOUR (4) INCHES OF TOPSOIL AND STABILIZED WITH PERMANENT SEED NO LATER THAN 14 DAYS AFTER THE LAST CONSTRUCTION ACTIVITY. A MINIMUM OF FOUR (4) INCHES OF TOPSOIL SHALL BE APPLIED WITH AN APPLICATION OF 5-10-10 FERTILIZER WELL MIXED IN THE SOIL SHALL BE APPLIED AT A RATE OF 20 POUNDS PER 1,000 SQUARE FEET. A PERMANENT GRASS SEED MIX SHOULD CONTAIN THE FOLLOWING MIXTURES: 45% PERENNIAL RYE GRASSES, 25% KENTUCKY BLUE GRASSES AND 30% FINE LEAF FESCUES; AND SHOULD BE APPLIED AT A RATE OF A HALF POUND PER 1,000 SQUARE FEET AND A STRAW OR HAY MULCH SHOULD BE APPLIED AT A RATE OF 100 POUNDS PER 1,000 SQUARE FEET. PLEASE NOTE: PERMANENT SEEDING IS BEST APPLIED IN SPRING OR FALL SEASONS. SUMMER SEASON APPLICATIONS ARE ACCEPTABLE WITH PROPER WATERING TREATMENT. IT IS RECOMMENDED THAT SEEDING BE PERFORMED BETWEEN MARCH 1ST AND AUGUST 15TH FOR OPTIMAL SEED GERMINATION.

STRUCTURAL PRACTICES:

PROPOSED METHODS INCLUDE SILT FENCES, TEMPORARY DRAINAGE SWALES, TEMPORARY SEDIMENT TRAPS, INLET PROTECTION, ANTI-TRACKING PADS, DIVERSION DIKES, RIP-RAP AND TEMPORARY INTERCEPTOR BERMS. REFER TO THE SOIL EROSION & SEDIMENT CONTROL PLAN AND CONSTRUCTION DETAILS SHEETS FOR THE LOCATION AND CONSTRUCTION REQUIREMENTS OF THE PROPOSED STRUCTURAL PRACTICES.

STORMWATER MANAGEMENT PEAK FLOW ATTENUATION & WATER QUALITY

Area Hydrology:

We have prepared a hydrologic analysis of the 14.48-acre Oak Tree project located as described above in the Town of Haverstraw, NY.

Stormwater Analysis and proposed mitigation:

The scope of the Oak Tree project includes the demolition of the existing structures and pavement on site and redeveloped with a site plan for a 228 unit apartment complex containing a boulevard entrance and loop road with connector access and provision of 466 parking spaces at the subject site.

This project proposes a development disturbance area greater than an acre of disturbance, and therefore must meet state mandated requirements for water quality and "green" infrastructure best management practices.

We have reviewed the Rockland County Soil Survey conditions for this area and also performed deep hole and percolation testing and it appears that the soils where the Easterly drainage systems will be located will be amenable to underground infiltration/detention system designs. Our staff witnessed deep hole and percolation testing throughout the two sites on 10-30-18, 11-29-18 and 11-31-17. Areas throughout the site comprised of Fine and Gravelly Sandy Loams throughout the site. Areas tested in the Easterly half of the site were tested and witnessed by our staff indicated adequate permeability rates. Some areas tested in the Westerly portion of the site were not suitable for infiltration.

We have determined that drainage on this site generally drains in three different directions offsite and are indicated on the drainage area plans enclosed in the appendix.

Drainage discharges toward Study Points #1 & #2 consist of areas that drain to the North and West and eventually toward an apartment complex in an RG zone in the Town of Haverstraw and also lands owned by Suez Water to the West and North of the site.

Drainage discharges toward Study Points #3 & #4 consist of areas that drain to the North and East to a 36-inch RCP (Pt. 3) and eventually to a catchbasin located at the Northeasterly corner of Barnes Avenue (Pt. 4) in the Town of West Haverstraw.

Two separate storm water attenuation systems have been proposed on the East side of the site to mitigate against increases in discharge offsite in addition to providing water quality benefits in accordance with NYSDEC Stormwater regulations for all the new development on site.

Discharges to the Northwesterly end of the site (Sub-areas "Site-1A", "Site-1B and "Site-1C") will be mitigated via a reduction in total area in this direction, thus yielding reduced flows in developed conditions. The combined impervious areas toward study points 1 & 2 will yield greater than 25% reduction in impervious area for these previously developed areas, therefore will not require any further runoff reduction in these directions. However this area will still require that water quality pre-treatment compliance be provided. This will be achieved through a combination of "Envirohood" in line Oil Water Separators at each catchbasin, three water quality filters (see appendix) and a vegetated swale that will be proposed in conjunction with the overall reduction in impervious areas and total contributing runoff area in this direction. This system eventually will discharge to a 50-foot long level spreader and then overflow toward the existing apartment complex property to the West and Suez Water parcel to the North.

Discharges to the Southwesterly area on site (Sub-area "Site-2) will be mitigated by a reduction in total area in this direction, thus yielding reduced flows in developed conditions. Envirohood in line oil water separators will be provided for all catchbasins in this area as well as the rest of the site. Details to be provided in the site plan set prior to final approval.

Discharges to the Northeasterly end of the site (Sub-area "Site-5A") will be mitigated via Envirohood in-line Oil Water Separators at each catchbasin, two 8-foot diameter Hydro International First Defense High Capacity vortex separators for pre-treatment and after which toward a proposed underground retention/detention system in this area for water quality purposes. This system will require one hundred forty (140) Stormtech MC-4500 units with an outlet control structure for routing purposes. A 14-minute percolation rate for this area was determined during field testing performed on 11-29-18 and incorporated in our design along with a 4.0-inch diameter control orifice and a 6.28-foot (24-inch diameter overflow) wide service spillway weir.

As water in this system will be already subject to all the pre-treatment devices indicated above, no additional pre-treatment will be necessary upon discharge toward the larger above ground infiltration/detention basin just to the South and East of this system.

Discharges to the Southeasterly end of the site (Sub-areas "Site-3A" & "Site-4") will be mitigated via a proposed above ground retention/detention system in this area and will be controlled by a proposed outlet structure prior to release of storm flows offsite. The pond will include water quality elements including a forebay for pre-treatment purposes and a sand filter for water quality purposes and will also

function as a detention basin for discharges greater than the 1-year design storm. A 28-minute percolation rate for this area was determined during field testing performed on 11-29-18 and incorporated in our design along with 3.5-inch diameter control orifice and a 1.0-foot wide service spillway weir.

A full Storm Water Pollution Prevention Plan (SWPPP) will be required for this project and will be submitted in conjunction with this application.

We have also provided backup calculations demonstrating compliance with NYSDEC Runoff Reduction Volume (RRv) in the appendix. Deductions for the RRv and compliance with NYSDEC "green" practices were based upon use of impervious area reduction, infiltration systems, tree preservation and a reduction of driveway areas on site where possible to the extent practicable.

Refer to the Drainage Study prepared by Sparaco & Youngblood, PLLC dated 4-19-21 (or revision thereafter) for this project for additional details on peak flow attenuation, water quality mitigation and other specifications and backup references and calculations.

OTHER CONTROLS:

WASTE MATERIALS:

ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN SECURELY LIDDED METAL DUMPSTERS RENTED FROM THE _____, WHICH IS A SOLID WASTE MANAGEMENT COMPANY LOCATED IN _____ COUNTY. THE DUMPSTERS WILL MEET ALL TOWN OF *HAVERSTRAW*, _____ *ROCKLAND* COUNTY, AND NEW YORK STATE SOLID WASTE MANAGEMENT REGULATIONS. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE WILL BE DEPOSITED IN THE DUMPSTERS. THE DUMPSTERS WILL BE EMPTIED A MINIMUM OF TWICE PER WEEK OR MORE OFTEN IF NECESSARY, AND THE TRASH WILL BE HAULED OFF-SITE TO .NO CONSTRUCTION WASTE MATERIALS WILL BE BURIED ON SITE. ALL PERSONNEL WILL BE INSTRUCTED REGARDING THE CORRECT PROCEDURE FOR WASTE DISPOSAL. NOTICES STATING THESE PRACTICES WILL BE POSTED IN THE OFFICE TRAILER AND, THE INDIVIDUAL WHO MANAGES THE DAY TO-DAY SITE OPERATIONS, WILL BE RESPONSIBLE FOR SEEING THAT THESE PROCEDURES ARE FOLLOWED.

HAZARDOUS WASTE:

ALL HAZARDOUS WASTE MATERIALS WILL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATION OR BY THE MANUFACTURER. SITE PERSONNEL WILL BE INSTRUCTED IN THESE PRACTICES AND _____, THE INDIVIDUAL WHO MANAGES DAY-TO-DAY SITE OPERATIONS, WILL BE RESPONSIBLE FOR SEEING THAT THESE PRACTICES ARE FOLLOWED.

SANITARY WASTE:

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS A MINIMUM OF THREE TIMES PER WEEK BY _____, LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

STABILIZED CONSTRUCTION ENTRANCES WILL BE PROVIDED, WHERE NECESSARY, TO HELP REDUCE VEHICLE TRACKING OF SEDIMENTS. EXISTING PAVED ROADWAYS LOCATED ADJACENT TO THE CONSTRUCTION SITE ENTRANCES WILL BE SWEPT DAILY TO REMOVE ANY EXCESS MUD, DIRT OR ROCK TRACKED FROM THE SITE. DUMP TRUCKS HAULING MATERIAL FROM THE CONSTRUCTION SITE WILL BE COVERED WITH A TARPAULIN.

TIMING OF CONTROLS/MEASURES

AS INDICATED IN THE SEQUENCE OF MAJOR ACTIVITIES, THE STABILIZED CONSTRUCTION ENTRANCES AND OTHER SEDIMENT AND EROSION CONTROLS WILL BE CONSTRUCTED PRIOR TO EARTHWORK ACTIVITIES ON ANY PART OF THE SITE. AREAS WHERE CONSTRUCTION ACTIVITY TEMPORARILY CEASES FOR AT LEAST 14 DAYS WILL BE STABILIZED WITH A TEMPORARY SEED AND MULCH WITHIN 14 DAYS OF THE LAST DISTURBANCE. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN AREA, THAT AREA WILL BE STABILIZED WITH PERMANENT SEED AND MULCH. AFTER THE ENTIRE SITE IS STABILIZED, ACCUMULATED SEDIMENTS WILL BE REMOVED FROM THE SEDIMENT AND EROSION CONTROL STRUCTURES AND THE CONTROLS WILL BE REMOVED.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS

THE STORMWATER POLLUTION PREVENTION PLAN REFLECTS NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION REQUIREMENTS FOR STORM WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL, AS ESTABLISHED IN ARTICLE 17, TITLES 7, 8 AND ARTICLE 70 OF THE ENVIRONMENTAL CONSERVATION LAW. TO ENSURE COMPLIANCE, THIS PLAN WAS PREPARED IN ACCORDANCE WITH GUIDELINES ISSUED WITH THE SPDES GENERAL PERMIT (GP-0-15-002) FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES THAT ARE CLASSIFIED AS "ASSOCIATED WITH CONSTRUCTION ACTIVITY", PUBLISHED BY THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION.

3) MAINTENANCE/INSPECTION PROCEDURES DURING CONSTRUCTION:

EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES:

THE FOLLOWING ARE INSPECTION AND MAINTENANCE PRACTICES THAT WILL BE USED TO MAINTAIN EROSION AND SEDIMENT CONTROLS:

- ALL CONTROL MEASURES WILL BE INSPECTED AT LEAST ONCE EACH WEEK.

- ALL MEASURES WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE INITIATED WITHIN 24 HOURS OF REPORT.

- BUILT-UP SEDIMENT WILL BE REMOVED FROM SILT FENCE WHEN IT HAS REACHED ONE-THIRD THE HEIGHT OF THE FENCE.

- SILT FENCE WILL BE INSPECTED FOR DEPTH OF SEDIMENT, TEARS, TO SEE IF THE FABRIC IS SECURELY ATTACHED TO THE FENCE POSTS, AND TO SEE THAT THE FENCE POSTS ARE FIRMLY IN THE GROUND.

- TEMPORARY AND PERMANENT SEEDING AND PLANTING WILL BE INSPECTED FOR BARE SPOTS, WASHOUTS, AND HEALTHY GROWTH.

- A MAINTENANCE INSPECTION REPORT WILL BE MADE AFTER EACH INSPECTION.

_____, SITE SUPERINTENDENT, WILL SELECT INDIVIDUALS WHO WILL BE RESPONSIBLE FOR INSPECTIONS, MAINTENANCE AND REPAIR ACTIVITIES, AND FILLING OUT THE INSPECTION AND MAINTENANCE REPORT. INSPECTION REPORTS SHALL SUMMARIZE:

1. NAME OF INSPECTOR
2. QUALIFICATIONS OF INSPECTOR
3. AREAS INSPECTED, INCLUDING MEASUREMENTS
4. OBSERVED CONDITIONS
5. CHANGES NECESSARY TO THE SWPPP

- PERSONNEL SELECTED FOR INSPECTION AND MAINTENANCE RESPONSIBILITIES WILL RECEIVE TRAINING FROM _____, THEY WILL BE TRAINED IN ALL THE INSPECTION AND MAINTENANCE PRACTICES NECESSARY FOR KEEPING THE EROSION AND SEDIMENT CONTROLS USED ON SITE IN GOOD WORKING ORDER.

4) NON-STORM WATER DISCHARGES:

IT IS EXPECTED THAT THE FOLLOWING NON-STORM WATER DISCHARGES WILL OCCUR FROM THE SITE DURING THE CONSTRUCTION PERIOD:

- WATER FROM WATER LINE FLUSHINGS.

- PAVEMENT WASH WATERS (WHERE NO SPILLS OR LEAKS OF TOXIC OR HAZARDOUS MATERIALS HAVE OCCURRED).

- UNCONTAMINATED GROUNDWATER (FROM DEWATERING ACTIVITIES).

5) INVENTORY FOR POLLUTION PREVENTION PLAN:

THE MATERIALS OR SUBSTANCES LISTED BELOW ARE EXPECTED TO BE PRESENT ON THE SITE DURING CONSTRUCTION:

CONCRETE
DETERGENTS
PAINTS (ENAMEL AND LATEX)
METAL STUDS
MASONRY BLOCK
ROOFING MATERIALS
METAL FASTENERS (NAILS, SCREWS, ETC...)
FERTILIZERS
PETROLEUM BASED PRODUCTS
CLEANING SOLVENTS
WOOD
TAR AND PAVING MATERIALS
INSULATING MATERIALS

6) SPILL CONTROL AND PREVENTION:

MATERIAL MANAGEMENT PRACTICES:

THE FOLLOWING ARE THE MATERIAL MANAGEMENT PRACTICES THAT WILL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES TO STORM WATER RUNOFF.

GOOD HOUSEKEEPING:

THE FOLLOWING GOOD HOUSEKEEPING PRACTICES WILL BE FOLLOWED ON SITE DURING THE CONSTRUCTION PROJECT:

- AN EFFORT WILL BE MADE TO STORE ONLY ENOUGH PRODUCT REQUIRED TO DO THE JOB.
- ALL MATERIALS STORED ON SITE WILL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR APPROPRIATE CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE.
- PRODUCTS WILL BE KEPT IN THEIR ORIGINAL CONTAINERS WITH THE ORIGINAL MANUFACTURER'S LABEL.
- SUBSTANCES WILL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.
- WHENEVER POSSIBLE, ALL OF A PRODUCT WILL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
- MANUFACTURERS' RECOMMENDATIONS FOR PROPER USE AND DISPOSAL WILL BE FOLLOWED.
- THE SITE SUPERINTENDENT WILL INSPECT DAILY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS ON SITE.

THESE PRACTICES WILL BE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS:

- PRODUCTS WILL BE KEPT IN ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.
- ORIGINAL LABELS AND MATERIAL SAFETY DATA SHEETS WILL BE RETAINED IN A LABELED BINDER; THEY CONTAIN IMPORTANT PRODUCT INFORMATION.
- IF SURPLUS PRODUCT MUST BE DISPOSED OF, MANUFACTURERS' OR LOCAL AND STATE RECOMMENDED METHODS FOR PROPER DISPOSAL WILL BE FOLLOWED.

PRODUCT SPECIFIC PRACTICES:

THE FOLLOWING PRODUCT SPECIFIC PRACTICES WILL BE FOLLOWED ON SITE.

PETROLEUM PRODUCTS:

ALL ONSITE VEHICLES WILL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE THE CHANCE OF LEAKAGE. PETROLEUM PRODUCTS WILL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT SUBSTANCES USED ON SITE WILL BE APPLIED ACCORDING TO THE MANUFACTURERS' RECOMMENDATIONS.

FERTILIZERS:

FERTILIZERS USED WILL BE APPLIED ONLY IN THE MINIMUM AMOUNTS RECOMMENDED BY THE MANUFACTURER. ONCE APPLIED, FERTILIZER WILL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORMWATER. STORAGE WILL BE IN A COVERED SHED. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER WILL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.

PAINTS:

ALL CONTAINERS WILL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE. EXCESS PAINT WILL NOT BE DISCHARGED TO THE STORM DRAINAGE SYSTEM, BUT WILL BE PROPERLY DISPOSED OF ACCORDING TO MANUFACTURERS' INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.

CONCRETE TRUCKS:

CONCRETE TRUCKS WILL NOT BE ALLOWED TO WASH OUT OR DISCHARGE SURPLUS CONCRETE OR DRUM WASH WATER ON THE SITE.

SPILL CONTROL PRACTICES:

IN ADDITION TO THE GOOD HOUSEKEEPING AND MATERIAL MANAGEMENT PRACTICES DISCUSSED IN THE PREVIOUS SECTIONS OF THIS PLAN, THE FOLLOWING PRACTICES WILL BE FOLLOWED FOR SPILL PREVENTION AND CLEANUP:

- MANUFACTURERS' RECOMMENDED METHODS FOR SPILL CLEANUP WILL BE CLEARLY POSTED AND SITE PERSONNEL WILL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES.
- MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP WILL BE KEPT IN THE MATERIAL STORAGE AREA ON SITE. EQUIPMENT AND MATERIALS WILL INCLUDE, BUT NOT BE LIMITED TO, BROOMS, DUST PANS, MOPS, RAGS, GLOVES, GOGGLES, KITTY LITTER, SAND, SAWDUST, AND PLASTIC AND METAL TRASH CONTAINERS SPECIFICALLY FOR THIS PURPOSE.

- ALL SPILLS WILL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY.

- THE SPILL AREA WILL BE KEPT WELL VENTILATED, AND PERSONNEL WILL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE.

- SPILLS OF TOXIC OR HAZARDOUS MATERIAL WILL BE REPORTED TO THE APPROPRIATE STATE OR LOCAL GOVERNMENT AGENCY, REGARDLESS OF THE SIZE OF THE SPILL.

- THE SPILL PREVENTION PLAN WILL BE ADJUSTED TO INCLUDE MEASURES TO PREVENT THIS TYPE OF SPILL FROM RE-OCCURRING AND HOW TO CLEAN UP THE SPILL IF THERE IS ANOTHER ONE. A DESCRIPTION OF THE SPILL, WHAT CAUSED IT, AND THE CLEANUP MEASURES WILL ALSO BE INCLUDED.

- _____, THE SITE SUPERINTENDENT RESPONSIBLE FOR THE DAY-TO-DAY SITE OPERATIONS, WILL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR. HE WILL DESIGNATE AT LEAST THREE OTHER SITE PERSONNEL WHO WILL RECEIVE SPILL PREVENTION AND CLEANUP TRAINING. THESE INDIVIDUALS WILL EACH BECOME RESPONSIBLE FOR A PARTICULAR PHASE OR PREVENTION AND CLEANUP. THE NAMES OF RESPONSIBLE SPILL PERSONNEL WILL BE POSTED IN THE MATERIAL STORAGE AREA AND IN THE OFFICE TRAILER ON SITE.

7) SPILL CONTROL AND PREVENTION LOG:

DATE OF SPILL:_____

MATERIAL SPILL:_____

SPILL CONTROL CAUSE:_____

CLEANUP AGENCY REPORTED (TOXIC/HAZARDOUS):_____

RE-OCCURRENCE PREVENTION MEASURE:_____

_____

8) SUPPORTING PLANS & ANALYSES:

1. SITE PLAN DRAWINGS, LAST REVISED 4-19-21 (OR REVISION THEREAFTER), INCLUDING A SOIL EROSION AND SEDIMENT CONTROL PLAN, PREPARED BY SPARACO & YOUNGBLOOD PLLC.

2. DRAINAGE STUDY PREPARED BY SPARACO & YOUNGBLOOD PLLC. DATED 4-19-21 (OR REVISION THEREAFTER).

9) POLLUTION PREVENTION PLAN CERTIFICATION:

(In accordance with NYSDEC SPDES General Permit # GP-0-20-001, Effective January 29, 2020)

I CERTIFY UNDER PENALTY OF LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHERED AND EVALUATED THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

SIGNED: _____
(OWNER OR AUTHORIZED REPRESENTATIVE)

PRINT NAME: _____ DATE: _____
(OWNER OR AUTHORIZED REPRESENTATIVE)

ADDRESS: _____

_____

_____

PHONE NUMBER: _____

10.) CONTRACTOR'S CERTIFICATION:

(In accordance with NYSDEC SPDES General Permit # GP-0-20-001, Effective January 29, 2020)

THE OWNER OR OPERATOR SHALL HAVE EACH CONTRACTOR AND SUBCONTRACTOR INVOLVED IN SOIL DISTURBANCE SIGN A COPY OF THE FOLLOWING CERTIFICATION STATEMENT BEFORE THEY COMMENCE ANY CONSTRUCTION ACTIVITY:

"I HEREBY CERTIFY THAT I UNDERSTAND AND AGREE TO COMPLY WITH THE TERMS AND CONDITIONS OF THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND AGREE TO IMPLEMENT ANY CORRECTIVE ACTIONS IDENTIFIED BY THE QUALIFIED INSPECTOR DURING A SITE INSPECTION. I ALSO UNDERSTAND THAT THE OWNER OR OPERATOR MUST COMPLY WITH THE TERMS AND CONDITIONS OF THE MOST CURRENT VERSION OF THE NEW YORK STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM ("SPDES") GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES AND THAT IT IS UNLAWFUL FOR ANY PERSON TO CAUSE OR CONTRIBUTE TO A VIOLATION OF WATER QUALITY STANDARDS. FURTHERMORE, I UNDERSTAND THAT CERTIFYING FALSE, INCORRECT OR INACCURATE INFORMATION IS A VIOLATION OF THE REFERENCED PERMIT AND THE LAWS OF THE STATE OF NEW YORK AND COULD SUBJECT ME TO CRIMINAL, CIVIL AND/OR ADMINISTRATIVE PROCEEDINGS."

RESPONSIBLE CORPORATE OFFICER/PARTNER SIGNATURE:

NAME AND ADDRESS AND PHONE NUMBER:

_____

_____

_____

SIGNATURE:_____ DATE:_____

PRINT NAME: _____

IDENTIFY THE SPECIFIC ELEMENTS OF THE SWPPP THE CONTRACTOR OR SUBCONTRACTOR IS RESPONSIBLE FOR:

_____

_____

_____

TRAINED CONTRACTOR FOR THE CERTIFIED CONTRACTOR OR SUBCONTRACTOR:

PRINT NAME:_____

TITLE:_____NYSDEC SWT#:_____

**Note: A copy of this signed contractor certification statement must be maintained at the SWPPP on site. Copies of the statement available in Appendix B.*

11.) CONSTRUCTION AND PHASING REQUIREMENTS:

1. ALL WORK ON THE PROJECT (INCLUDING SITE WORK AND BUILDING) SHALL BE UNDER THE DIRECTION AND RESPONSIBILITY OF A SINGLE DESIGNATED AUTHORITY, EITHER A PROJECT MANAGER OR GENERAL CONTRACTOR.

2. SHOP DRAWINGS, SCHEDULES, AND CONSTRUCTION PROCEDURES, INCLUDING TEMPORARY SHEETING, SHORING, SLOPE STABILIZATION, DEWATERING AND CLARIFICATION, ARE ALL TO BE SUBMITTED FOR THE ENGINEER'S APPROVAL PRIOR TO CONSTRUCTION.

3. PRIOR TO INITIATING ANY WORK, THE PROJECT MANAGER AND CONTRACTORS WILL MEET WITH ALL STATE AND LOCAL AGENCIES AS DIRECTED BY THE ENGINEER TO REVIEW PROCEDURES AND TO REVIEW THE REQUIREMENTS OF ALL STATE AND LOCAL PERMITS.

4. THE FOLLOWING IS THE REQUIRED GENERAL PHASING OF THE WORK. ALTERNATE MODIFIED PHASING MAY BE ACCEPTED, IF APPROVED BY THE ENGINEER, TO ACCOMMODATE THE CONTRACTOR'S SPECIFIC EQUIPMENT AND CONSTRUCTION PROCEDURES:

PHASING: SEE SECTION 1 SEQUENCE OF MAJOR ACTIVITIES.

12.) PERMANENT MAINTENANCE/INSPECTION PROCEDURES:

EROSION AND SEDIMENT CONTROL INSPECTION AND MAINTENANCE PRACTICES:

THE FOLLOWING ARE INSPECTION AND MAINTENANCE PRACTICES THAT WILL BE USED TO MAINTAIN PERMANENT EROSION AND SEDIMENT CONTROLS.

- ALL STORMWATER FACILITIES WILL BE MAINTAINED IN GOOD WORKING ORDER. IF A REPAIR IS NECESSARY, IT WILL BE INITIATED WITHIN 1 WEEK OF DETECTION.

- PERMANENT SEEDING AND PLANTING WILL BE INSPECTED ANNUALLY FOR BARE SPOTS, WASHOUTS, AND HEALTHY GROWTH AND REPAIRED IF NECESSARY.

- _____ WILL SELECT AND BE RESPONSIBLE FOR INDIVIDUALS WHO WILL BE PERFORMING INSPECTIONS, MAINTENANCE AND REPAIRS AND TO KEEP A LOG OF ALL INSPECTIONS AND WORK PERFORMED.

- PERSONNEL SELECTED FOR INSPECTION AND MAINTENANCE RESPONSIBILITIES WILL RECEIVE TRAINING FROM _____. THEY WILL BE TRAINED IN ALL THE INSPECTION AND MAINTENANCE PRACTICES NECESSARY FOR KEEPING THE EROSION AND SEDIMENT CONTROLS USED ON SITE IN GOOD WORKING ORDER.

- DURING CONSTRUCTION, AND UNTIL THE SITE HAS REACHED PERMANANT STABILIZATION, A WEEKLY INSPECTION BY A N.Y.S.D.E.C., DIVISION OF WATERS CERTIFICATE OF EROSION AND SEDIMENT CONTROL TRAINING HOLDER WILL BE MADE, AND A CHECKLIST WILL BE FILED BOTH IN THE ON SITE SWPPP BINDER (KEPT IN THE SWPPP MAILBOX) AND THE ENGINEERS OFFICE.

13.) MAINTENANCE OF PERMANENT STRUCTURES:

MAINTENANCE OF INFILTRATION BASINS:

1. INSPECT EVERY MAJOR RAINFALL.

2. INSPECT INLET/OUTLET STRUCTURE INTERIOR FOR DAMAGE AND FOR SEDIMENT IN SUMP EVERY 6 MONTHS.

3. REMOVE SEDIMENT FROM SUMP IF MORE THAN 3 INCHES DEEP.

14.) EVALUATION OF GREEN PRACTICES:

Area Reduction Practices:

1. Conservation of Natural Areas:

This 14.48 acre site has been previously developed with small structures and driveway areas with access via Oak Tree Lane from Rosman Road in the Town of Haverstraw. There will be some removal or disturbance of natural vegetation and trees required to develop the project, and it is feasible to conserve some significant area on this site. It appears approximately 9 acres were disturbed previously in the past and it is now proposed to disturb approximately 11.63 acres with the proposed development. This would provide conservation of approximately 2.85 acres on site which would remain undisturbed.

2. Riparian Buffers/Strips:

Not applicable for this site.

3. Tree Planting/Preservation:

Trees are proposed to be planted where practicable and saved where possible on site in conjunction with the proposed site layout.

4. Rooftop Disconnection:

Underground infiltration was utilized in favor of this practice to ensure runoff was controlled on site for the new proposed dwellings.

Volume Practices:

1. Infiltration Trench:

This practice was considered but soil tests on site indicated limited areas on site where infiltration practices could be used and the ideal areas on site were more suited for an above and underground infiltration basins rather than an infiltration trench.

2. Dry Well:

Dry wells are a viable alternative to infiltration basins at this site, however due to area limitations where the system could be placed, Stormtech Chambers were preferred in lieu of dry wells.

3. Infiltration Basin:

This practice was utilized on site where infiltration practices could be used in ideal areas on site to accommodate water quality, runoff reduction, channel protection and attenuation purposes.

4. Bioretention:

This design wasn't as efficient or practicable for this development as infiltration practices on site.

5. Dry Swale:

A vegetated swale was used in favor of a dry swale as a conservative provision along the Northwesterly end of the property to drain catchbasins in this area after pre-treatment with First Defense Vortex units.

6. Vegetated Swale:

A vegetated swale was utilized along the Northwesterly end of the property and is deemed a conservative supplemental provision.

7. Green Roof:

Proposing this type of design would be out of character in a residential neighborhood and be more difficult to maintain than the proposed infiltration basin systems on site.

8. Rain Garden:

The proposed infiltration basins were more practical for this use and required less maintenance long term.

9. Planters:

The proposed infiltration basins were more practical for this use and required less maintenance long term.

10. Cisterns/ Rain Barrels:

The proposed infiltration basins were more practical for this use. The applicant has no plans at this time to re-use rainwater for residential applications.

11. Porous Pavement:

Pervious pavers/pavement are a viable alternative to infiltration basins at this site in some areas. Infiltration basins were utilized in favor of the porous pavement since it was deemed more efficient to treat and capture drainage for this particular site at specific design points.

Appendix A:

Hydrologic Analysis
prepared by Sparaco & Youngblood,PLLC
dated 4-19-21.

SPARACO & YOUNGBLOOD, PLLC
*CIVIL ENGINEERING * LAND SURVEYING * SITE PLANNING*
P.O. Box #818; 18 N. Main Street Harriman, N.Y. 10926
(845) 782-8543 Fax (845) 782-5901
sparaco.steve@selsny.com
wdyls1@gmail.com

April 19, 2021

Planning Board
Town of Haverstraw
1 Rosman Road
Garnerville NY 10923

Att: Annette Hendrie, Chief Clerk to Planning Board

Re: Drainage Narrative (SY#1385)
1-72 Oak Tree Lane and 22 Rosman Road, Haverstraw, NY 10962
Tax Lots # 26.05-1-42 & 26.09-2-8

Dear Ms. Hendrie:

We have prepared a hydrologic analysis of the 14.3-acre Oak Tree project located as described above in the Town of Haverstraw, NY.

The scope of the Oak Tree project includes the demolition of the existing structures and pavement on site and redeveloped with a site plan for a 228 unit apartment complex containing a boulevard entrance and loop road with connector access and provision of 464 parking spaces at the subject site.

This project proposes a development disturbance area greater than an acre of disturbance, and therefore must meet state mandated requirements for water quality and "green" infrastructure best management practices.

We have reviewed the Rockland County Soil Survey conditions for this area and also performed deep hole and percolation testing and it appears that the soils where the Easterly drainage systems will be located will be amenable to underground infiltration/detention system designs. Our staff witnessed deep hole and percolation testing throughout the two sites on 10-30-18, 11-29-18 and 11-31-17. Areas throughout the site comprised of Fine and Gravelly Sandy Loams throughout the site. Areas tested in the Easterly half of the site were tested and witnessed by our staff indicated adequate permeability rates. Some areas tested in the Westerly portion of the site were not suitable for infiltration.

We have determined that drainage on this site generally drains in three different directions offsite and are indicated on the drainage area plans enclosed in the appendix.

Drainage discharges toward Study Points #1 & #2 consist of areas that drain to the North and West and eventually toward an apartment complex in an RG zone in the Town of Haverstraw and also lands owned by Suez Water to the West and North of the site.

Drainage discharges toward Study Points #3 & #4 consist of areas that drain to the North and East to a 36-inch RCP (Pt. 3) and eventually to a catchbasin located at the Northeasterly corner of Barnes Avenue (Pt. 4) in the Town of West Haverstraw.

Two separate storm water attenuation systems have been proposed on the East side of the site to mitigate against increases in discharge offsite in addition to providing water quality benefits in accordance with NYSDEC Stormwater regulations for all the new development on site.

Discharges to the Northwesterly end of the site (Sub-areas "Site-1A", "Site-1B and "Site-1C") will be mitigated via a reduction in total area in this direction, thus yielding reduced flows in developed conditions. The combined impervious areas toward study points 1 & 2 will yield greater than 25% reduction in impervious area for these previously developed areas, therefore will not require any further runoff reduction in these directions. However this area will still require that water quality pre-treatment compliance be provided. This will be achieved through a combination of "Envirohood" in line Oil Water Separators at each catchbasin, three water quality filters (see appendix) and a vegetated swale that will be proposed in conjunction with the overall reduction in impervious areas and total contributing runoff area in this direction. This system eventually will discharge to a 50-foot long level spreader and then overflow toward the existing apartment complex property to the West and Suez Water parcel to the North.

Discharges to the Southwesterly area on site (Sub-area "Site-2) will be mitigated by a reduction in total area in this direction, thus yielding reduced flows in developed conditions. Envirohood in line oil water separators will be provided for all catchbasins in this area as well as the rest of the site. Details to be provided in the site plan set prior to final approval.

Discharges to the Northeasterly end of the site (Sub-area "Site-5A") will be mitigated via Envirohood in-line Oil Water Separators at each catchbasin, two 8-foot diameter Hydro International First Defense High Capacity vortex separators for pre-treatment and after which toward a proposed underground retention/detention system in this area for water quality purposes. This system will require one hundred forty (140) Stormtech MC-4500 units with an outlet control structure for routing purposes. A 14-minute percolation rate for this area was determined during field testing performed on 11-29-18 and incorporated in our design along with a 4.0-inch diameter control orifice and a 6.28-foot (24-inch diameter overflow) wide service spillway weir.

As water in this system will be already subject to all the pre-treatment devices indicated above, no additional pre-treatment will be necessary upon discharge toward the larger above ground infiltration/detention basin just to the South and East of this system.

Discharges to the Southeasterly end of the site (Sub-areas "Site-3A" & "Site-4") will be mitigated via a proposed above ground retention/detention system in this area and will be controlled by a proposed outlet structure prior to release of storm flows offsite. The pond will include water quality elements including a forebay for pre-treatment purposes and a sand filter for water quality purposes and will also function as a detention basin for discharges greater than the 1-year design storm. A 28-minute percolation rate for this area was determined during field testing performed on 11-29-18 and incorporated in our design along with 3.5-inch diameter control orifice and a 1.0-foot wide service spillway weir.

Our analysis includes storms ranging from the 1-year to the 100-year design. Refer to the Summary Table below for a comparison of Existing and Developed Conditions Discharges from the site.

Summary Table # 1 – Oak Tree drainage to the Northwest (Pt. #1) for Existing and Developed Conditions:

	Storm Frequency (in years)					
Conditions	**1**	**2**	**5**	**10**	**25**	**100**
Pre-Dev. Discharges (cfs)	2.28	4.27	7.30	9.18	12.14	22.48
Post-Dev. Discharges (cfs)	1.66	2.89	4.62	5.66	7.22	12.36
Net Change:	-0.62	- 1.38	- 2.68	- 3.52	- 4.92	- 10.12

Summary Table # 2 – Oak Tree drainage to the Southwest (Pt. #2) for Existing and Developed Conditions:

	Storm Frequency (in years)					
Conditions	**1**	**2**	**5**	**10**	**25**	**100**
Pre-Dev. Discharges (cfs)	0.25	0.47	0.78	0.96	1.23	2.11
Post-Dev. Discharges (cfs)	0.17	0.31	0.50	0.61	0.77	1.30
Net Change:	- 0.08	- 0.16	- 0.28	- 0.35	-0.46	- 0.81

Summary Table # 3 – Oak Tree and offsite drainage to the East (Pt. #3) to a field inlet conveying discharges through an existing 36-inch RCP toward Barnes Avenue for Existing and Developed Conditions:

	Storm Frequency (in years)					
Conditions	**1**	**2**	**5**	**10**	**25**	**100**
Pre-Dev. Discharges (cfs)	11.95	19.43	29.95	36.30	45.62	75.83
Post-Dev. Discharges (cfs)	9.69	15.19	22.90	27.30	33.67	71.81
Net Change:	- 2.26	- 4.24	- 7.05	- 9.00	- 11.95	- 4.02

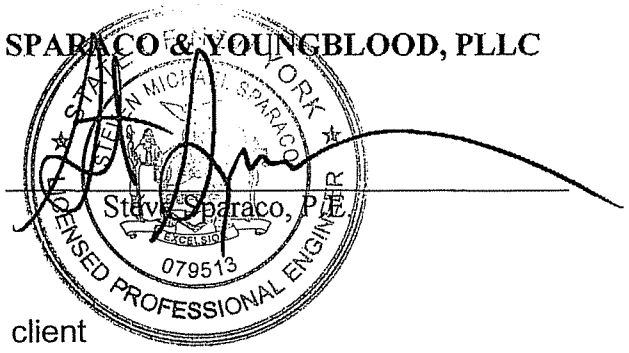
Summary Table # 4 – Oak Tree and offsite drainage toward the Northeast (Pt. #4) to a common municipal drainage point (Curb Inlet) at the NE corner of Barnes Avenue for Existing and Developed Conditions:

	Storm Frequency (in years)					
Conditions	**1**	**2**	**5**	**10**	**25**	**100**
Pre-Dev. Discharges (cfs)	16.12	27.58	44.98	55.27	70.59	121.08
Post-Dev. Discharges (cfs)	12.85	21.67	34.43	41.90	52.98	103.38
Net Change:	-3.27	- 5.91	- 10.55	- 13.37	- 17.61	- 17.70

Attached are drainage area maps, drainage calculations and backup Hec-1 output data in support of our analysis.

Very truly yours,

SPARACO & YOUNGBLOOD, PLLC



Steve Sparaco, P.E.

cc.: client

TABLE OF CONTENTS:

ENGINEERING METHODOLOGY:

Area Hydrology:

We have prepared a hydrologic analysis of the 14.48-acre Oak Tree project located as described above in the Town of Haverstraw, NY.

Methodology:

Four study points where discharges exit the site were analyzed (Study Point 1 through 4 -see attached drainage area maps) to evaluate site runoff under pre- and post- development conditions.

All drainage area delineations and any changes from existing to proposed conditions are indicated graphically on Drainage Area Maps provided in the Appendix.

A hydrologic analysis was performed utilizing procedures outlined in the Soil Conservation Service (SCS) publication Technical Report 55 (TR-55). SCS hydrographs were developed utilizing hydrographs consisting of a 24-hour rainfall event using an SCS Type-III rainfall distribution and unit hydrograph parameters, including drainage area, curve number (CN), time of concentration, and percent impervious.

Time of concentration travel paths on site were insignificant and diminimus as they pertain to this project upon review of the area hydrology thru this site. A 10-minute minimum was used for existing conditions and a 5-minute minimum time of concentration was used for proposed conditions for all developed subareas on site. A 6-minute lag time from the site and discharges collected at the 36-inch RCP at (Study Point #3) to the NE catchbasin at Barnes Avenue (Study Point #4) was utilized for existing and developed conditions in this model.

Curve number calculations were based on hydrologic soil data obtained from available Rockland County Soils Maps. Refer to the Appendix for supporting soils data.

The Army Corps of Engineers hydrologic analysis computer program HEC-1 was utilized to generate runoff hydrographs for the 1, 2, 5, 10, 25 and 100-year frequency storms for pre and post-development conditions. This program was also utilized to perform hydrograph routings and additions to design the required mitigative facilities for developed conditions.

Stormwater Analysis and proposed mitigation:

The scope of the Oak Tree project includes the demolition of the existing structures and pavement on site and redeveloped with a site plan for a 228 unit apartment complex containing a boulevard entrance and loop road with connector access and provision of 464 parking spaces at the subject site.

This project proposes a development disturbance area greater than an acre of disturbance, and therefore must meet state mandated requirements for water quality and "green" infrastructure best management practices.

We have reviewed the Rockland County Soil Survey conditions for this area and also performed deep hole and percolation testing and it appears that the soils where the Easterly drainage systems will be located will be amenable to underground infiltration/detention system designs. Our staff witnessed deep hole and percolation testing throughout the two sites on 10-30-18, 11-29-18 and 11-31-17. Areas throughout the site comprised of Fine and Gravelly Sandy Loams throughout the site. Areas tested in the Easterly half of the site were tested and witnessed by our staff indicated adequate permeability rates. Some areas tested in the Westerly portion of the site were not suitable for infiltration.

We have determined that drainage on this site generally drains in three different directions offsite and are indicated on the drainage area plans enclosed in the appendix.

Drainage discharges toward Study Points #1 & #2 consist of areas that drain to the North and West and eventually toward an apartment complex in an RG zone in the Town of Haverstraw and also lands owned by Suez Water to the West and North of the site.

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A full Storm Water Pollution Prevention Plan (SWPPP) will be required for this project and will be submitted in conjunction with this application.

Soils Information:

1.) Deep hole and Percolation Testing
2.) Rockland County Soils Information

Sparaco Engineering and Land Surveying PC
26 Fireman Memorial Drive - Suite 210
Pomona, NY 10970

Phone: (845) 362-1966
Fax: (845) 362-1987
Email: info@selsny.com

Test Hole Log

Site: Oak Tree
Job # SY-1385
Date: 11/29/18
Name: Sean Kirsky / Bill Johnson

Weather Cond.: Partly Cloudy

Sheet No: 1 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #1	TEST HOLE #2	TEST HOLE #3	TEST HOLE #4	TEST HOLE #5	TEST HOLE #7
1	3	Humus	Humus	Humus	Blacktop	Humus	Humus
	6						
	9		Sandy Loam		Loam	Loam	Loam
	12						
2	15	Dark loam		Sandy Loam		Grad. by	Some Bould. Hard
	18					Some Boulders	
	21						
	24						
3	27						
	30						
	33						
	36						
4	39		Grey Clay Loam w/Bould.				
	42	46" Sepage					
	45						
	48						
5	51						
	54						
	57				Silty Loam Hard		
	60						
6	63	Sandy Clay		Humus			
	66						
	69			Gravelly Loam			
	72						
7	75						
	78						
	81						
	84	85" Boulders					
PERC. RATE		Some					
DEPTH TO G. W.							

Notes:

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Test Hole Log

Site: Oak Tree
Job #: SY-1350
Date: 10/29/18
Name: WMW & SK

Weather Cond.: CLOUDY 50°

Sheet No: 2 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE 1	TEST HOLE 2	TEST HOLE 3	TEST HOLE #4	TEST HOLE #5	TEST HOLE #7
8	87	Sandy Clay	PERC.	PERC.	PERC.	PERC.	PERC.
	90			RQ. B			
	93						
	96						
9	99						
	102	Rock Test					
	105						
	108						
10	111	Gravelly loam w/Boulders					
	114						
	117						
	120						
11	123						
	126						
	129						
	132						
12	135			SAND			
	138						
	141						
	144						
13	147		BOT. NO WATER OR ROCK	BOT. NO ROCK OR WATER	BOT. NO ROCK NO WATER	Bot. No Rock No Water	BOT. NO ROCK NO WATER
	150						
	153						
	156						
14	159	Bot. No Rock No Water					
	162						
	165						
	168						
PERC. RATE							
DEPTH TO G. W.							

Notes:

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Community Sanitation and Food Protection

Percolation Test Data

See instructions on reverse side.

Development/Site: Oak Tree (T/V/C) County: Rockland

Date: 11/29/18 Test Conducted By: Sean Kinsley

Test Hole No.	Test Hole Depth (Inches)	Lot No.	Soil Profile	Presoaking Date & Time	Time	Percolation Test Runs 1	2	3	4	5	6
#1	114"		See Soil log	3" above Top Nail 10:15	END						
					BEGIN						
					RESULT	N.G.					
#2	96"		" " "	2" above Tack 10:45	END	11:34	11:57	12:27:40	12:57:45		
					BEGIN	11:07	11:35	12:00:00	12:30:35		
					RESULT	27min	22min	:27:40	:27:10		
#3	96"		" " "	2" above tak 11:15	END	11:20	11:26	11:32	11:39	11:46:35	
					BEGIN	11:17	11:22	11:28	11:34	11:41:15	
					RESULT	3min	4min	4min	5min	5:15	14:51:05
#4	96"		See Soil Log	1" above Tac 1:40	END	13:47:45	13:58:30	14:08:10	14:22:45	14:34:25	~~14:51:05~~
					BEGIN	13:43:30	13:52:20	14:01:05	14:14:35	14:25:00	14:41:45
					RESULT	:4:15	:6:10	:7:05	:8:10	:9:25	9:20
#5	96"		" " "	2" above Tac 13:55	END	14:34:50	14:52:25	15:09:25			
					BEGIN	14:21:05	14:38:40	14:55:35			
					RESULT	:13:45	13:45	:13:50			
#7	96"		" " " Timed by Stopwatch	2" above Tac Soak	END	: :					
					BEGIN	15:27:05					
					RESULT	N.G.					

1. Begin time, end time and result in mintes for a water elevation change from 6" to 5" above the bottom of the test hole.

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Test Hole Log

Site: OAK TREE
Job #: SY-1385
Date: 10/30/18
Name: WMJ & SK

Weather Cond.: CLEAR 40°

Sheet No: 1 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #6	TEST HOLE #8	TEST HOLE #9	TEST HOLE #10	TEST HOLE #17	TEST HOLE #19
1	3	HUMUS	HUMUS	HUMUS	HUMUS	HUMUS	HUMUS
	6					SANDY LOAM	
	9		FILL	BROWN LOAM			SANDY LOAM
	12				SANDY LOAM		
2	15						
	18						
	21	FILL TOPSOIL & BOULD					PERC
	24						
3	27		GREY SILT LOAM :: HARD				
	30						
	33						
	36						
4	39		SOME BOULDERS	SILT LOAM HARD		SILT LOAM SOME BOULDERS	SILT LOAM SOME BOULDERS
	42						
	45						
	48						
5	51	CLAY LOAM		ROCKY			
	54						
	57						
	60				SILT LOAM HARD		
6	63					PERC	
	66						
	69						
	72						
7	75						BOT. N/ ROCK NO WATER
	78						
	81						
	84						
PERC. RATE							
DEPTH TO G. W.							

Notes:

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Test Hole Log

Site: OAKTREE
Job #: SY-1385
Date: 10/30/18
Name: WMJ & SJK

Weather Cond.: CLEAR 40°

Sheet No: 2 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #6	TEST HOLE #8	TEST HOLE #9	TEST HOLE #10	TEST HOLE #17	TEST HOLE
8	87	SILT LOAM	PERC				
	90						
	93						
	96		PERC				
9	99						
	102						
	105						
	108						
10	111					SEEP	
	114						
	117						
	120						
11	123						
	126						
	129						
	132						
12	135						
	138						
	141						
	144	NO ROCK NO WATER		NO ROCK NO WATER	NO ROCK NO WATER	NO ROCK	
13	147						
	150						
	153						
	156		NO ROCK NO WATER				
14	159						
	162						
	165						
	168						
PERC. RATE							
DEPTH TO G. W.							

Notes:

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Community Sanitation and Food Protection

Percolation Test Data

See instructions on reverse side

Development/Site: Oak Tree (T/V/C) County: Rockland

Date: 11/30/18 Test Conducted By: Sean Kinsley

Test Hole No.	Test Hole Depth (Inches)	Lot No.	Soil Profile	Presoaking Date & Time	Time	Percolation Test Runs 1	2	3	4	5	6
#6	96"		See Soil Log	2" above 10:21	END						
					BEGIN						
					RESULT	N.G.					
#8	96"		" " "	.2 above 11:21	END						
					BEGIN						
					RESULT	N.G					
#9	96"		" " "	.2 above 11:40	END	13:08:45	13:47:00	13:47:00	14:29:50		
					BEGIN	12:37:00	13:11:55	13:11:55	13:53:30		
					RESULT	:31:45	:36:05	:36:05	:36:20		
#10	96"		" " "	1½" Above 12:01	END	12:59:00	13:08:46	13:36:55	14:26:40	15:30:25	
					BEGIN	12:22:50	12:32:55	12:57:55	13:39:10	14:34:20	
					RESULT	:36:10	:10:50	:39:00	:37:30	54:05	N.G.
#17	~~96"~~ 72"		" " "	2" Above 13:16	END			39:00			
					BEGIN						
					RESULT	N.G.					
#19	36"		" " "	2" Above 13:48	END						
					BEGIN						
					RESULT	N.G.					

1. Begin time, end time and result in mintes for a water elevation change from 6" to 5" above the bottom of the test hole.

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Test Hole Log

Site: Oak Tree
Job #: SY-1385
Date: 11/31/18
Name: Sean Kingsley / Bill Johnson
Weather Cond.:
Sheet No: 1 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #14	TEST HOLE #13	TEST HOLE #12	TEST HOLE #11	TEST HOLE #15	TEST HOLE #20
1	3	Humus	Humus	Humus	Humus	Humus	Humus
	6						
	9	Fill w/ Cobbley Loamy	Clay Loam	Clay Loam Fill	Loam Fill	Loam Fill	
	12						
2	15			Humus			
	18					Clay Loam w/ Boulders HARD	
	21						
	24						Clay Loam
3	27						
	30	Humus					
	33						
	36			Perc.			
4	39	Clay Loam	Silt Loam w/ Cobbles		Sand		
	42						
	45			Clay Loam			
	48						
5	51						
	54						
	57						
	60						
6	63						
	66				Perc.		
	69						
	72	Loam					
7	75			Bot. No Rock No Water			
	78						
	81						
	84						
PERC. RATE							
DEPTH TO G. W.							

Notes:

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Fax: (845) 362-1987
Email: info@selsny.com

Test Hole Log

Site: Oak Tree
Job #: SY-1385
Date: 11/31/18
Name: Sean Kinsley / Bill Johnson

Weather Cond.:

Sheet No: 2 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #14	TEST HOLE #13	TEST HOLE #12	TEST HOLE #11	TEST HOLE #15	TEST HOLE #20
8	87		SOME BOULDER	SANDY LOAM	SANDY LOAM	PERC.	PERC.
	90						
	93						
	96						
9	99						
	102						
	105						
	108						
10	111						
	114						
	117						
	120			NO ROCK	NO ROCK NO WATER	NO ROCK NO WATER	
11	123		PERC.				
	126						
	129						
	132						
12	135						
	138						
	141						
	144	Bottom No Rock No Water				NO ROCK NO WATER	NO ROCK NO WATER
13	147						
	150						
	153						
	156						
14	159						
	162						
	165						
	168						
PERC. RATE							
DEPTH TO G. W.							

Notes: 15' No Rock No WATER

SW ① ② ③ ④

PERC. #20 @ 7:20

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Community Sanitation and Food Protection

Percolation Test Data

See instructions on reverse side.

Development/Site: Oak Tree (T/V/C) County: Rockland

Date: 10/31/18 Test Conducted By: Sean Kinsley

Test Hole No.	Test Hole Depth (Inches)	Lot No.	Soil Profile	Presoaking Date & Time	Time	Percolation Test Runs 1	2	3	4	5	6
#14	84"		See Soil Log	2" Above 10:02	END						
					BEGIN						
					RESULT	N.G.					
#13	132"		" " "	2" Above 11:00	END						
					BEGIN						
					RESULT	N.G.					
#12	30"		" " "	2" Above 11:23	END	12:23:40	12:55:40	13:27:34			
					BEGIN	11:57:20	12:26:15	12:57:25			
					RESULT	26:40	29:25	30:09			
#11	72"		" " "	2" Above 12:08	END						
					BEGIN	13:30:15					
					RESULT	N.G.					
#15	96"		" " "	2" Above 12:35	END						
					BEGIN	14:02:07					
					RESULT	N.G.					
#20	96"		" " " Stopwatch	2" Above 13:20	END						
					BEGIN	14:01:20		N.G.			
					RESULT	37:20	40:00				

1. Begin time, end time and result in mintes for a water elevation change from 6" to 5" above the bottom of the test hole.

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Test Hole Log

Site: OAK TREE
Job #: SY-1385
Date: 10/31/18
Name: W. M. JOHNSON

Weather Cond.: CLEAR 50°

Sheet No: 1 | 2

DEPTH FEET	DEPTH INCHES	TEST HOLE #21	TEST HOLE	TEST HOLE	TEST HOLE	TEST HOLE	TEST HOLE
1	3	↑ HUMUS					
	6						
	9						
	12	↓					
2	15	↑ BROWN CLAY LOAM					
	18						
	21						
	24						
3	27	↑ GREY CLAY LOAM HARD					
	30						
	33						
	36						
4	39	↑					
	42						
	45						
	48						
5	51						
	54						
	57						
	60						
6	63						
	66						
	69						
	72						
7	75						
	78						
	81						
	84						
PERC. RATE							
DEPTH TO G. W.							

Notes:

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Fax: (845) 362-1987
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Test Hole Log

Site: OAK TREE
Job #: SY-1385
Date: 10/31/18
Name: WM, JT.

Weather Cond.: CLEAR 50°

Sheet No: 2 | 2

#21

DEPTH FEET	DEPTH INCHES	TEST HOLE	TEST HOLE	TEST HOLE	TEST HOLE	TEST HOLE	TEST HOLE
8	87	PERC					
	90						
	93						
	96						
9	99						
	102						
	105						
	108						
10	111						
	114						
	117						
	120						
11	123						
	126						
	129						
	132						
12	135						
	138						
	141						
	144						
13	147						
	150						
	153						
	156						
14	159						
	162						
	165						
	168						
PERC. RATE							
DEPTH TO G. W.							

SOME SAND STONE SOFT

Notes:

NEW YORK STATE DEPARTMENT OF HEALTH

Bureau of Community Sanitation and Food Protection

Percolation Test Data

See instructions on reverse side

Development/Site: Oak Tree (T/V/C) County: Rockland

Date: 10/31/18 Test Conducted By: Sean Kingsley

Test Hole No.	Test Hole Depth (Inches)	Lot No.	Soil Profile	Presoaking Date & Time	Time	Percolation Test Runs 1	2	3	4	5	6
#21			See Soil Log	2" Above stopwatch 13:29	END						
					BEGIN						
					RESULT	N. Gk					
					END						
					BEGIN						
					RESULT						
					END						
					BEGIN						
					RESULT						
					END						
					BEGIN						
					RESULT						
					END						
					BEGIN						
					RESULT						
					END						
					BEGIN						
					RESULT						

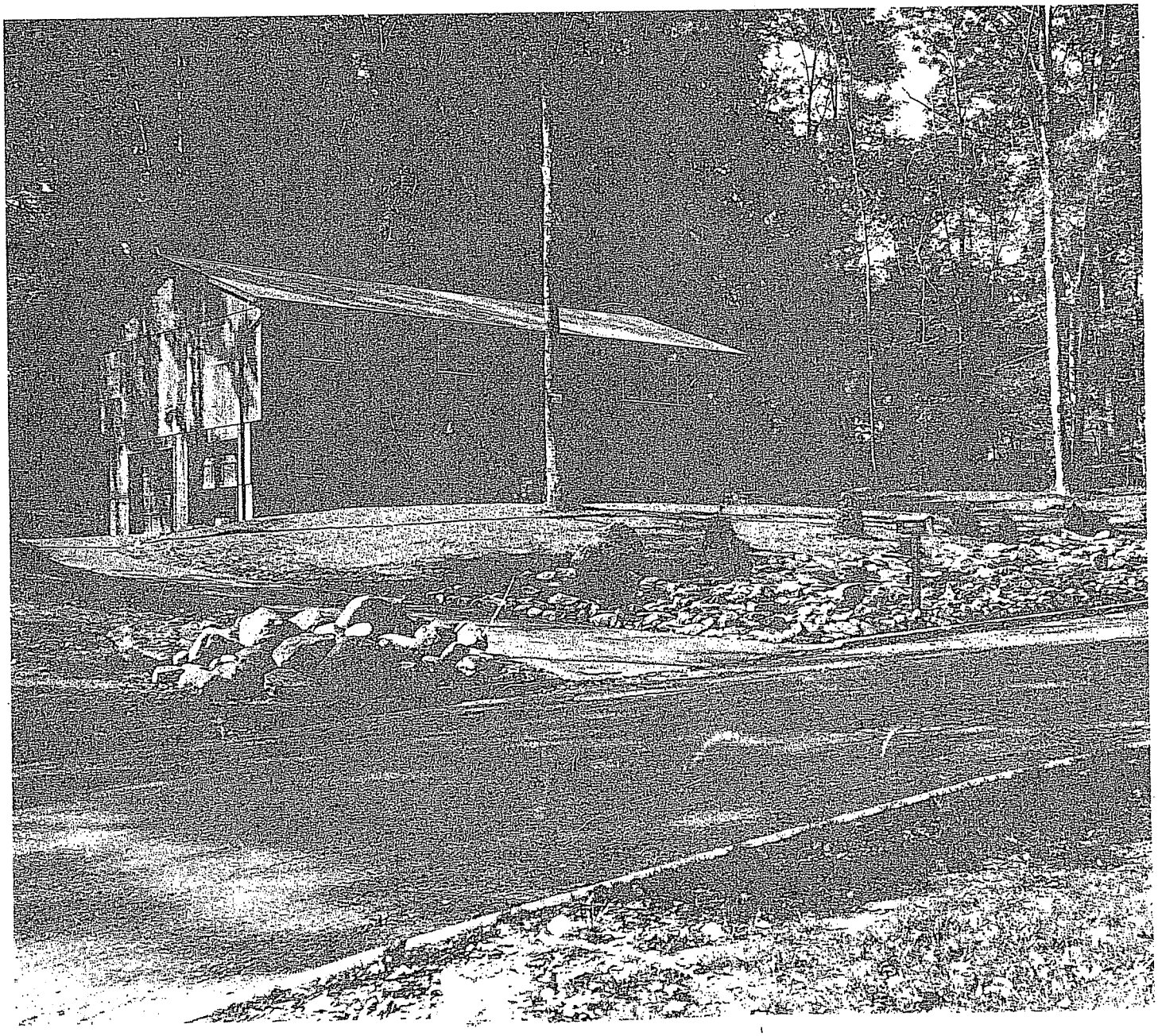
1. Begin time, end time and result in mintes for a water elevation change from 6" to 5" above the bottom of the test hole.

United States
Department of
Agriculture

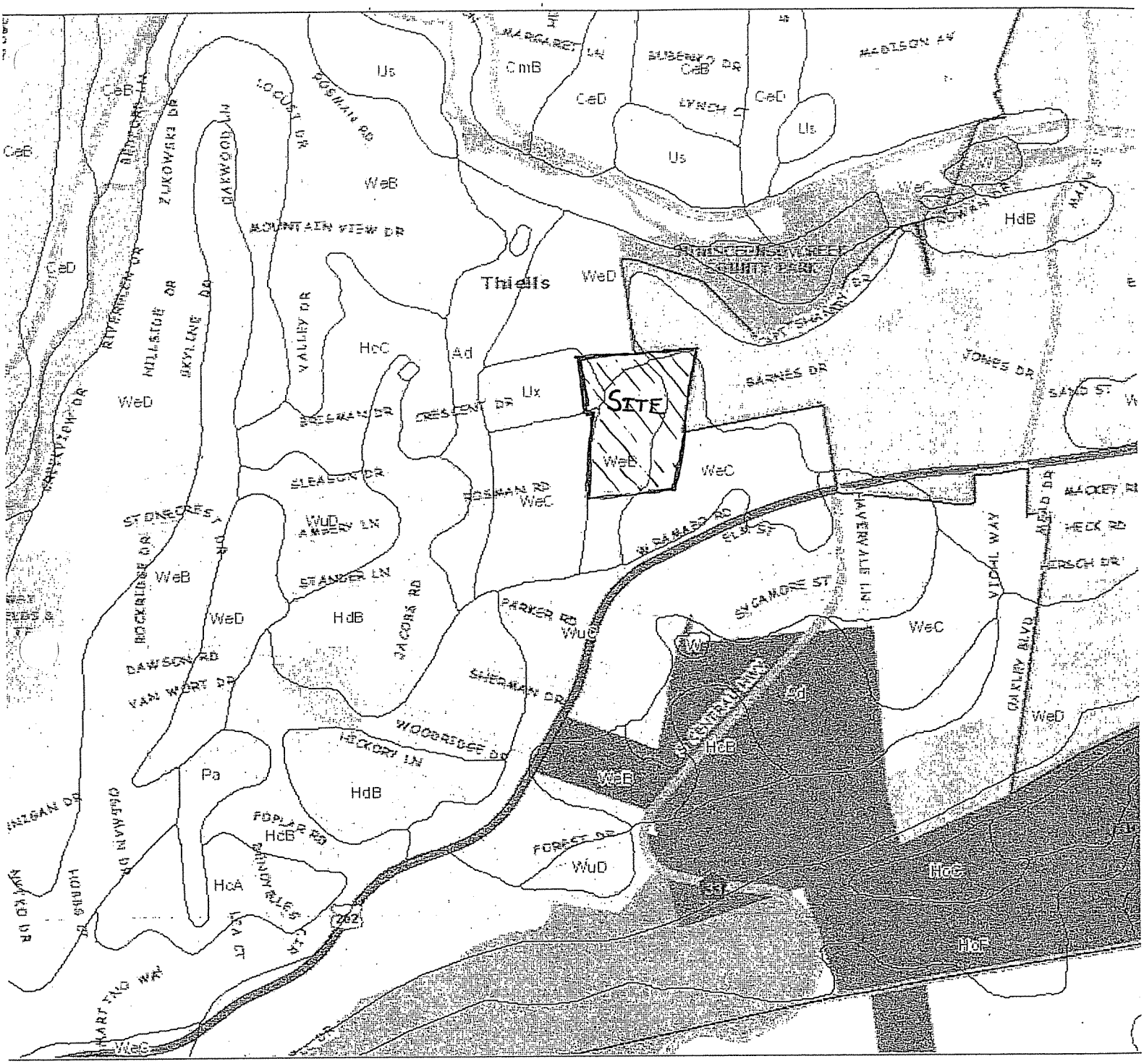
Soil
Conservation
Service

In cooperation with
Cornell University
Agricultural Experiment
Station

Soil Survey of Rockland County, New York



ArcGIS Web Map



Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Pt*, Pv*. Pits												
Ra---------- Rippowam	C	Frequent----	Brief-----	Oct-May	0-1.5	Apparent	Sep-Jun	>60	---	High-----	High-----	High.
ReA, ReB, ReC, ReD---------- Riverhead	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
RuB*, RuC*, RuD*: Riverhead--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Urban land.												
Sa---------- Sloan	B/D	Occasional	Brief-----	Nov-Jun	0-1.0	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
Ur*, Us, Uw. Udorthents												
Ux*. Urban land												
Wa---------- Wallington	C	None--------	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High-----	High-----	Moderate.
Wc---------- Watchaug	B	None--------	---	---	1.5-2.5	Apparent	Nov-Apr	>60	---	High-----	Low------	High.
WeA, WeB, WeC, WeD---------- Wethersfield	C	None--------	---	---	1.5-2.5	Perched	Feb-Apr	>60	---	Moderate	Low------	Moderate.
WuB*, WuC*, WuD*: Wethersfield-----	C	None--------	---	---	1.5-2.5	Perched	Feb-Apr	>60	---	Moderate	Low------	Moderate.
Urban land.												
YaB, YaC, YaD----- Yalesville	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	Moderate.
YuB*, YuC*, YuD*: Yalesville-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	Moderate.
Urban land.												

* See description of the map unit for composition and behavior characteristics of the map unit.

Curve Number Calculations:

SPARACO & YOUNGBLOOD, PLLC
18 NORTH MAIN STREET
HARRIMAN, NY 10926
845-782-8543

Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-1*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			1	70
C	Lawn / Open Space - Good Condition	74			2.2	162.8
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.94	92.12
				Totals =	4.14	324.92

CN (weighted) = total product / total area = 324.92 / 4.14 = 78.48309179

Use CN = 78

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency..... yr.			
Rainfall, P (24 - hour) ..... in.			
Runoff, Q ..... in.			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

SPARACO & YOUNGBLOOD, PLLC
18 NORTH MAIN STREET
HARRIMAN, NY 10926
845-782-8543

Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-1*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ☒ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.1	7
C	Lawn / Open Space - Good Condition	74			0.56	41.44
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.16	15.68
				Totals =	0.82	64.12

CN (weighted) = total product / total area = 64.12 / 0.82 = 78.19512195

Use CN = **78**

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

SPARACO & YOUNGBLOOD, PLLC
18 NORTH MAIN STREET
HARRIMAN, NY 10926
845-782-8543

Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-1A*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ☒ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.08	5.92
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.36	35.28
				Totals =	0.44	41.2

CN (weighted) = total product / total area = 41.2 / 0.44 = 93.63636364

Use CN = **94**

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

SPARACO & YOUNGBLOOD, PLLC
18 NORTH MAIN STREET
HARRIMAN, NY 10926
845-782-8543

Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-1B*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.43	31.82
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.13	12.74
				Totals =	0.56	44.56

CN (weighted) = total product / total area = 44.56 / 0.56 = 79.57142857

Use CN = **80**

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-1C*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0	0
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.07	6.86
				Totals =	0.07	6.86

CN (weighted) = total product / total area = 6.86 / 0.07 = 98

Use CN = **98**

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-2*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.18	13.32
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.13	12.74
				Totals =	0.31	26.06

CN (weighted) = total product / total area = 26.06 / 0.31 = 84.06451613

Use CN = **84**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency			
Rainfall, P (24 - hour)			
Runoff, Q			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-2*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.09	6.66
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.09	8.82
				Totals =	0.18	15.48

CN (weighted) = total product / total area = 15.48 / 0.18 = 86

Use CN = **86**

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-3*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.7	49
C	Lawn / Open Space - Good Condition	74			2.13	157.62
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.73	71.54
				Totals =	3.56	278.16

CN (weighted) = total product / total area = 278.16 / 3.56 = 78.13483146

Use CN = **78**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency. . . . . yr.			
Rainfall, P (24 - hour) . . . . . in.			
Runoff, Q . . . . . in.			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-3*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.16	11.2
C	Lawn / Open Space - Good Condition	74			0	0
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.00	0
				Totals =	0.16	11.2

CN (weighted) = total product / total area = 11.2 / 0.16 = 70

Use CN = 70

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-3A*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ☒ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.48	35.52
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			1.84	180.32
				Totals =	2.32	215.84

CN (weighted) = total product / total area = 215.84 / 2.32 = 93.03448276

Use CN = **93**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency . . . . . yr.			
Rainfall, P (24 - hour) . . . . . in.			
Runoff, Q . . . . . in.			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-4*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.61	42.7
C	Lawn / Open Space - Good Condition	74			0.3	22.2
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.00	0
				Totals =	0.91	64.9

CN (weighted) = total product / total area = 64.9 / 0.91 = 71.31868132

Use CN = 71

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-4*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.4	28
C	Lawn / Open Space - Good Condition	74			1.33	98.42
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.17	16.66
				Totals =	1.9	143.08

CN (weighted) = total product / total area = 143.08 / 1.9 = 75.30526316

Use CN = 75

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr.			
Rainfall, P (24 - hour)	in.			
Runoff, Q	in.			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-5*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			2.5	175
C	Lawn / Open Space - Good Condition	74			2.18	161.32
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.88	86.24
				Totals =	5.56	422.56

CN (weighted) = total product / total area = 422.56 / 5.56 = 76

Use CN = 76

2. Runoff

Storm #1	Storm #2	Storm #3

Frequency. . . . . yr.
Rainfall, P (24 - hour) . . . . . in.
Runoff, Q . . . . . in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-5*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			1.8	126
C	Lawn / Open Space - Good Condition	74			1.83	135.42
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.14	13.72
				Totals =	3.77	275.14

CN (weighted) = total product / total area = 275.14 / 3.77 = 72.98143236

Use CN = 73

2. Runoff

Frequency	yr.
Rainfall, P (24 - hour)	in.
Runoff, Q	in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **19-Apr-21**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing [Developed] CN for Sub-basin: *Site-5A*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			0.62	45.88
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			3.64	356.72
				Totals =	4.26	402.6

CN (weighted) = total product / total area = 402.6 / 4.26 = 94.50704225

Use CN = **95**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency. . . . . yr.			
Rainfall, P (24 - hour) . . . . . in.			
Runoff, Q . . . . . in.			

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **17-Sep-19**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing | Developed CN for Sub-basin: *Off-1*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres ☐ mi² ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0.5	35
C	Lawn / Open Space - Good Condition	74			0.93	68.82
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			6.42	629.16
				Totals =	7.85	732.98

CN (weighted) = total product / total area = 732.98 / 7.85 = 93.37324841

Use CN = 93

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency	yr.		
Rainfall, P (24 - hour)	in.		
Runoff, Q	in.		

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY-1385** By: SMS Date: **17-Sep-19**

Location: **Town of Haverstraw, NY** Checked: Date:

Shade one: Existing | Developed CN for Sub-basin: *Off-2*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ■ acres □ mi² □ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			1	70
C	Lawn / Open Space - Good Condition	74			1.62	119.88
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			0.70	68.6
				Totals =	3.32	258.48

CN (weighted) = total product / total area = 258.48 / 3.32 = 77.85542169

Use CN = 78

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency	yr.		
Rainfall, P (24 - hour)	in.		
Runoff, Q	in.		

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

WQ TABLE OF CONTENTS:

Water Quality Analysis Backup Calculations:

- *Water Quality Summary Sheet*
- *Reference: Exhibit 4-III: Unit Peak Discharge (qu) for SCS type III rainfall distribution (from TR-55 manual)*
- *Reference: Figure 8.5 Detention Time vs. Discharge Ratios (from NYSDEC Water Quality Manual)*

The following Data provided for Subareas "Site-1","Site-1A"," Site-1B", "Site-1C" & "Site-2":

1.) Title Sheet
2.) Plan Views and Details for each Detention System
3.) Peak Discharge Calculations
4.) Volume Calculations
5.) Summary Table WQ-1: Water Quality Calculations

The following Data provided for Subareas "Site-5A" & "Site-3A":

6.) Title Sheet
7.) Plan Views and Details for each Detention System
8.) Peak Discharge Calculations
9.) Volume Calculations
10.) Summary Table WQ-1: Water Quality Calculations
11.) Summary Table WQ-2: Runoff Reduction Volume Calculations
12.) Channel Protection Calculations
13.) Elevation vs. Discharge Summary Chart ("Site-5A" subarea only)

- *Proprietary Structures and Details used for Pre-Treatment on site*
- *State of New Jersey MTD Lab Certification for First Defense Stormwater Treatment Device used on site.*

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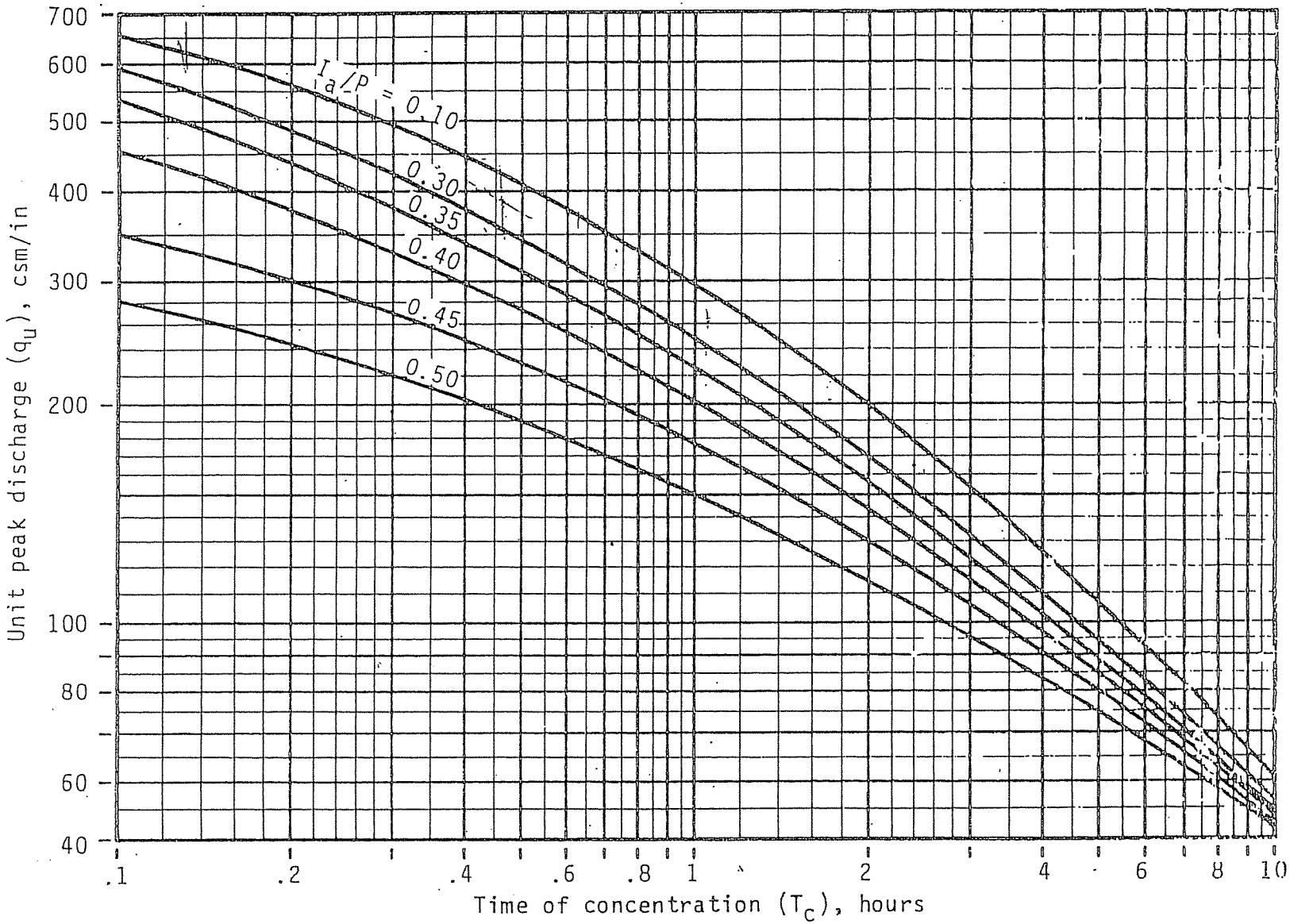
Summary Table: Water Quality Volume Summary Chart

Project: **Oak Tree Apartments**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Date: 19-Apr-21

Subarea Name	Total Area (ft^2)	Impervious Area (ft^2)	Pre-Treatment WQ Volume Required	Pre-Treatment WQ Volume Provided	Pre-Treatment Device Applied	WQ Volume Required (ac-ft)	WQ Volume Provided (ac-ft)	WQ Treatment Device Applied	RRv Volume Required (ac-ft)	RRv Volume Provided (ac-ft)	Cpv Volume Required (ac-ft)	Cpv Volume Provided (ac-ft)
Site-1	0.82	0.16	N/A	0.002 ac-ft	Grass Swale	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-1A	0.44	0.36	0.67 cfs	1.06 cfs	FD Vortex	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-1B	0.56	0.13	0.32 cfs	1.06 cfs	FD Vortex	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-1C	0.07	0.07	0.12 cfs	1.06 cfs	FD Vortex	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-2	0.18	0.09	N/A	N/A	Envirohood	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-3	0.16	0.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Site-3A & 4	4.22	2.01	0.219 ac-ft	0.243 ac-ft	Forebay	0.219	0.219	Infiltration Basin	0.062	0.062	0.272	0.272
Site-5	3.77	0.14	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A
Site-5A	4.26	3.64	6.50 cfs	7.52 cfs	FD Vortex	0.378	0.378	Underground Infiltration	0.112	0.112	0.447	0.447
Total:	14.48	6.60				0.60	0.60		0.17	0.17	0.72	0.72

Exhibit 4-III: Unit peak discharge (q_u) for SCS type III rainfall distribution



Compute Stream Channel Protection Volume, (Cp_v) (see Section 4.3 and Appendix B)

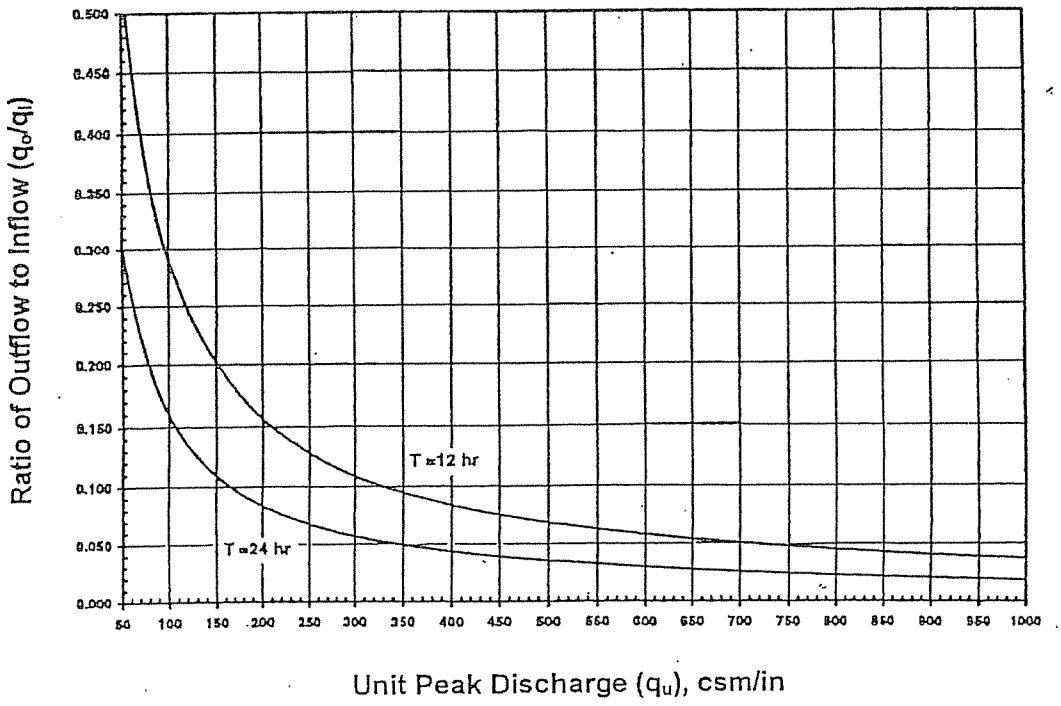
For stream channel protection, provide 24 hours of extended detention (T) for the one-year event.

Compute Channel Protection Storage Volume

First, determine the value of the unit peak discharge (q_u) using TR-55 and Type II Rainfall Distribution

- Initial abstraction (Ia) for CN of 78 is 0.564: [Ia = (200/CN - 2)]
- Ia/P = (0.564)/ 2.3 inches = 0.245
- T_c = 0.35 hours
- Using the above data, q_u = 570 csm/in (cubic feet per second per square mile per year)

Figure 8.5 Detention Time vs. Discharge Ratios (Source: MDE, 2000)



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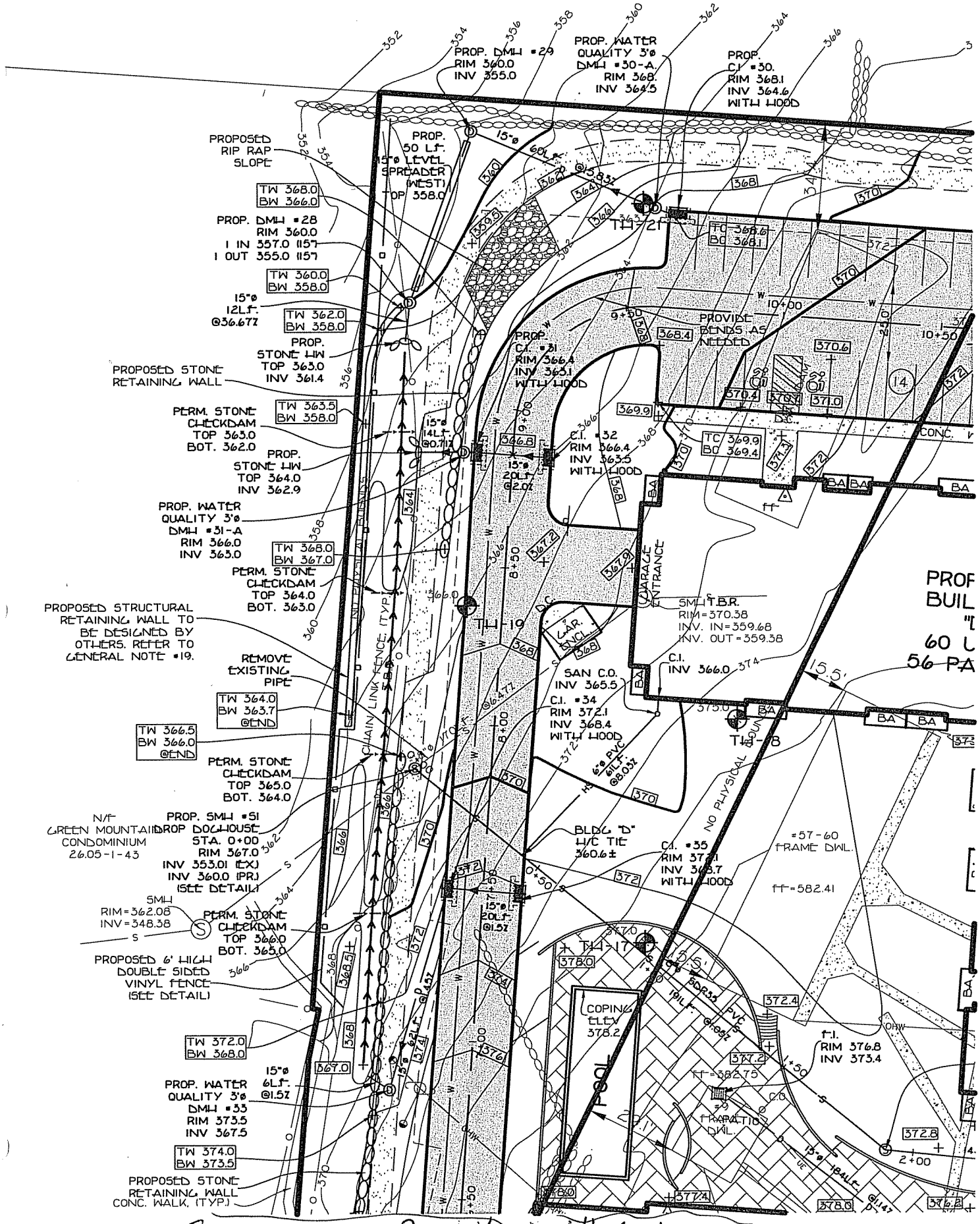
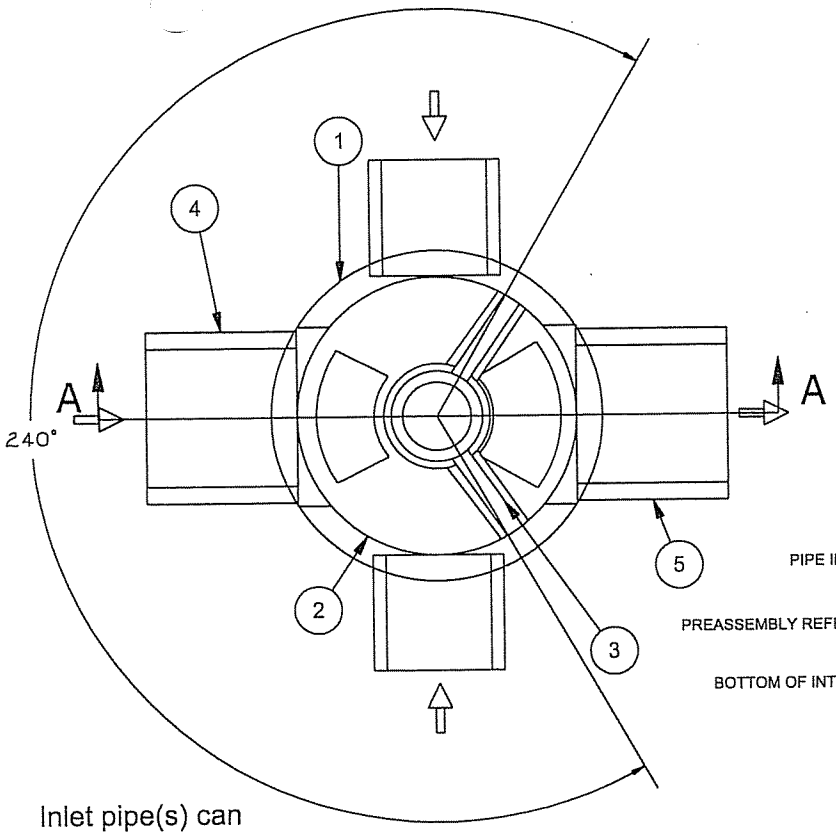
WATER QUALITY CALCULATIONS

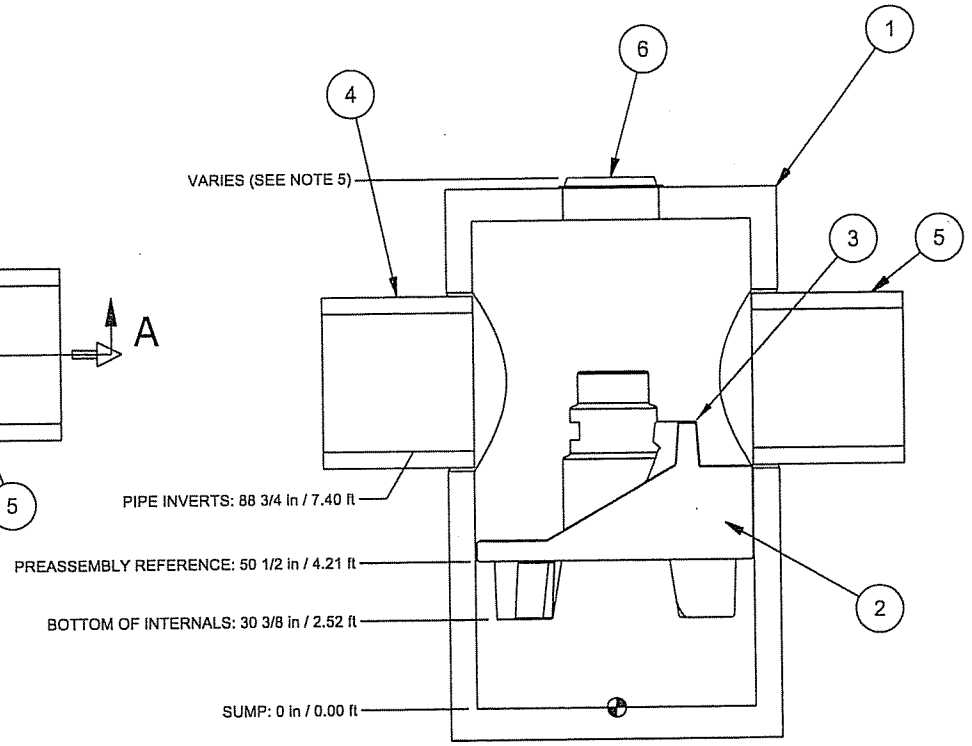
Project:	**Oak Tree (SY-1385)**
Location:	**Haverstraw, NY**
Drainage Sub-area:	**SITES 1, 1A , 1B, 1C & 2**
Date:	**19-Apr-21**
By:	**SMS**



OAK TREE PLAN VIEW 1"=40'
"SITE-1, SITE1A, SITE1B, SITE1C" SUBAREAS
2.1.912



Inlet pipe(s) can enter anywhere within 240° arc.



SECTION A-A

Notes

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRMRIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REV	BY	DATE	DESCRIPTION
-	JLL3	3/16/16	FIRST RELEASE

REVISION HISTORY

Date	Scale
3/16/2016	3/6"=1'

Drawn	Checked	Approved
JLL3		

Title

8-FT DIAMETER
FIRST DEFENSE® HC

GENERAL ARANGEMENT

GENERAL NOTES:
1. General Arrangement drawings only. Contact Hydro International for site specific fabrication drawings.
2. The diameter of the inlet & outlet pipes may be no more than 48".
3. Multiple inlet pipes possible (refer to project plans).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plans).
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

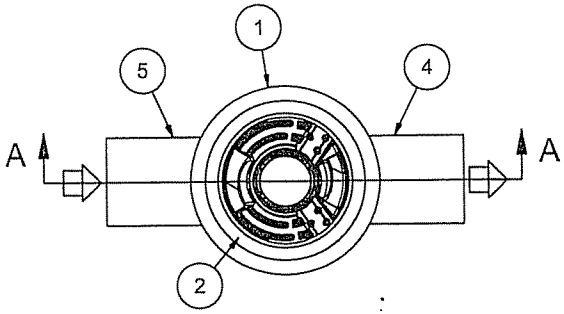
PRODUCT SPECIFICATIONS:
A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall convey the Peak On-line Flow Rates of up to 30 cfs without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.
D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range

Parts List		
ITEM	SIZE (in)	DESCRIPTION
1	96	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	48	MAXIMUM INLET PIPE (BY OTHERS)
5	48	MAXIMUM OUTLET PIPE (BY OTHERS)
6	30	FRAME AND COVER (OR GRATE) (ROUND)

Hydro International

Stormwater Solutions
94 Hutchins Drive
Portland, Maine 04102
Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

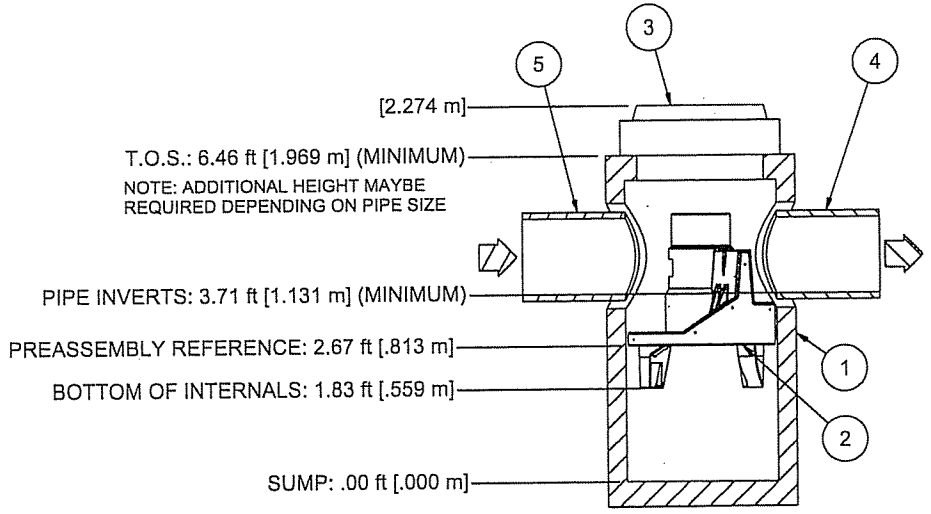
CAD Ref: F8HC-MAX
Project No. xx-xxxx
DrawingNo. F8HCS1 Rev.



PLAN VIEW

HYDRO FRAME AND COVER (INCLUDED)

GRADE RINGS BY OTHERS AS REQUIRED



SECTION A-A

PRODUCT SPECIFICATION:

1. Peak Hydraulic Flow: 15.0 cfs (424 l/s)
2. Min Sediment Storage Capacity: 0.4 cu. yd. (0.3 cu. m.)
3. Oil Storage Capacity: 125 gal. (473 liters)
4. Maximum Inlet/Outlet Pipe Diameters: 18 in. (450 mm)
5. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
6. For more product information including regulatory acceptances, please visit https://hydro-int.com/en/products/first-defense

GENERAL NOTES:

1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 18".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plan.s)
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PARTS LIST

ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	36	900	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	18 (MAX)	450 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	18 (MAX)	450 (MAX)	INLET PIPE (BY OTHERS)

PROJECTION

IF IN DOUBT ASK

COMMENTS:

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.

2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.

3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

DATE:	SCALE:
10/7/2019	1:30

DRAWN BY:	CHECKED BY:	APPROVED BY
ER	MRJ	

Title

3-ft DIAMETER

FIRST DEFENSE HIGH CAPACITY

GENERAL ARRANGEMENT

Hydro International

hydro-int.com

HYDRO INTERNATIONAL

DO NOT SCALE DRAWING
STEEL FABRICATION TOLERANCES
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

LINEAR	ANGULAR
000 - 012in = ±0.04in	000 - 120in = ±1°
012 - 024in = ±0.06in	120 - 240in = ±0.5°
024 - 048in = ±0.08in	240in >>>> = ±0.25°
048 - 120in = ±0.12in	
120in >>>> = ±0.20in	

WEIGHT:	MATERIAL:
N/A	

STOCK NUMBER:

DRAWING NO.: FDHC GA-3

SHEET SIZE:	SHEET:	Rev:
B	1 OF 1	-

SPARACO AND YOUNGBLOOD, PLLC
P.O. Box #818, 18 North Main Street
Harriman, NY 10926
845-782-8543

Summary Table #WQ-1:Water Quality Volume Calculations

Project: **Oak Tree (SY-1385)**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Water Quality Calculations

NYSDEC Required Storage Volume:

Site Area to the West:

Sub-Areas: *SITE-1*, *SITE-1A*, *SITE-1B*, *SITE-1C*, *SITE-2*

Existing Total Area to the West (Study Points 1 & 2:	4.45 ac
Existing Impervious Area:	1.07 ac

Existing	Total Area (ac)	Impervious Area (ac)
SITE-1	4.14	0.94
SITE-2	0.31	0.13
	4.45	1.07

Percent Impervious: 24.04%

Developed Conditions Total Area to the West (Study Points 1 & 2:	2.07 ac
Developed Impervious Area:	0.8 ac
Existing Impervious area to remain:	0 ac
Existing Impervious area to be removed:	1.07 ac
Proposed Impervious area:	0.8 ac
Net reduction in impervious area:	0.27 ac

Developed	Total Area (ac)	Impervious Area (ac)
SITE-1	0.82	0.16
SITE1A	0.44	0.35
SITE1B	0.56	0.13
SITE1B	0.07	0.07
SITE-2	0.18	0.09
	2.07	0.8

Percent Impervious: 38.65%

Step 1: Calculate percent reduction in impervious areas: 0.27 / 1.07 x 100
Percent reduction in impervious areas: **25.23%**

Water Quality compliance with GP-0-20-001:

*The Water Quality Volume treatment objective for redevelopment activity has been addressed for development draining toward Study Points #1 and #2 as per Part I.C.2.c by option #1, which requires a reduction of impervious area in this direction by at least **25%** of the total disturbed, impervious area. However, the soil restoration criteria in Section 5.1.6 of the design manual must be applied to all new pervious areas.*

***No WQv or RRv required due to a 25% or more reduction in impervious areas in this direction. All flows decreased offsite this direction.**

Summary Table #WQ-1:Water Quality Volume Calculations

Project: **Oak Tree**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Water Quality Calculations

NYSDEC Required Storage Volume:

Sub-Area: *Site-1*

Data:

P:	1.3	= 90% Rainfall Event Number from Figure #1	
Rv:	0.22559	= 0.05 + 0.009(I) (Min. Rv =0.2)	Use Rv = 0.22559
I:	19.51	= Impervious coverage percentage	
A:	0.82	= Site Area to Basin (in acres)	

WQv: **0.020** = Req'd Water Quality Volume (in ac-ft)

$$= \frac{(P)(Rv)(A)}{12}$$

Pre Treatment provided (10%) for a grass swale

Pre-treatment vol. provided: **0.002** ac-ft

Water Quality Volume (WQv) Water Quality Peak Flow (Qp) Calculation W

Project:	Oak Tree Apartments
Location:	SubArea "Site-1A" Haverstraw, NY
Date:	April 19, 2021
Designer:	Ian Kuchman & Steve Sparaco

TR-55 AND TR-20 RAINFALL DISTRIBUTION TYPE=	II			
($R=I_a/P$) $C_1=A*R^2+B*R+C$		A	B	C
Coefficients for unit peak discharge equation	C_0	-2.2349	0.4759	2.5273
Coefficients for unit peak discharge equation	C_1	1.5555	-0.7081	-0.5584
Coefficients for unit peak discharge equation	C_2	0.6041	0.0437	-0.1761

INPUT CRITERIA: *TRIBUTARY (TREATED) AREA*

	ABBREVIATION	*UNITS*	*VALUES*
TOTAL DEVELOPED (GREATER OF DISTURBED OR TRIBUTARY) AREA	A	acres	0.44
IMPERVIOUS SURFACE AREA	I	acres	0.36
NYSDEC 90% RAINFALL EVENT NUMBER (1)	P	inches	1.30
TIME OF CONCENTRATION	T_c	hours	0.083

CALCULATIONS:

WATER QUALITY VOLUME (2)(3)

REQUIRED WATER QUALITY VOLUME $WQ_v=3630*P(0.05*A+0.9*I)$	WQ_v	acres-ft	0.037
REQUIRED WATER QUALITY VOLUME (100% FOR NEW DEVELOPMENT)	WQ_v	cu. ft.	1,633

WATER QUALITY PEAK FLOW (4)

RUNOFF VOLUME $Q=WQ_v/(A*3600)$	Q	inches	1.022
$CN=1000/(10+5*P+10*Q-10(Q^2+1.25*Q*P)^{\frac{1}{2}})$	CN		97
CN ROUNDED	CN		97.000
CN < or = 98	CN		97
INITIAL ABSTRACTION, I_a = *200/CN-2*	I_a	inches	0.062
RATIO, $R = I_a/P$	R		0
$C_0 = A*R^2+B*R+C$	C_0		2.545
$C_1 = A*R^2+B*R+C$	C_1		-0.589
$C_2 = A*R^2+B*R+C$	C_2		-0.173
UNIT PEAK DISCHARDGE, $qu = 10^{(C_0+C_1*Log(T_c)+C_2*(log(T_c))^2)}$	q_u	$cfs/mi^2/in$	954
REQUIRED NEW DEVELOPMENT WATER QUALITY PEAK FLOW, $Q_p=qu*A*Q/640$	Q_p	cfs	**0.670**

MAXIMUM TREATMENT CAPACITY OF MANUFACTURED TREATMENT DEVICE (MTD)	**1.060**
* *FD-3HC*	

References:

(1) Refer to Section 4.2 Water Quality Volume (WQv) Figure 4.1 "90% Rainfall in New York State" in the New York State Stormwater Design Manual, last revised August 2015.

(2) Refer to Sections 4.1 and 4.2 for Water Quality Volume (WQv) calculations in the New York State Stormwater Design Manual, last revised August 2015.

(3) Refer to Section 9.3.2 "Sizing Criteria" for Water Quality Volume (WQv) calculations for Redevelopment Projects in the New York State Stormwater Design Manual, last revised August 2015.

(4) Refer to Appendix B.2 "Water Quality Peak Flow Calculation" in the New York State Stormwater Design Manual, last revised August 2010.

Water Quality Volume (WQv) Water Quality Peak Flow (Qp) Calculation W

Project:	Oak Tree Apartments
Location:	SubArea "Site-1B" Haverstraw, NY
Date:	April 19, 2021
Designer:	Ian Kuchman & Steve Sparaco

TR-55 AND TR-20 RAINFALL DISTRIBUTION TYPE= II

(R=I_a/P) C_i=AR^2+B*R+C*		A	B	C
Coefficients for unit peak discharge equation	C_0	-2.2349	0.4759	2.5273
Coefficients for unit peak discharge equation	C_1	1.5555	-0.7081 *	-0.5584
Coefficients for unit peak discharge equation	C_2	0.6041	0.0437	-0.1761

INPUT CRITERIA: *TRIBUTARY (TREATED) AREA*

	ABBREVIATION	*UNITS*	*VALUES*
TOTAL DEVELOPED (GREATER OF DISTURBED OR TRIBUTARY) AREA	A	acres	0.56
IMPERVIOUS SURFACE AREA	I	acres	0.13
NYSDEC 90% RAINFALL EVENT NUMBER (1)	P	inches	1.30
TIME OF CONCENTRATION	T_c	hours	0.083

CALCULATIONS:

WATER QUALITY VOLUME (2)(3)

REQUIRED WATER QUALITY VOLUME WQ_v=3630*P(0.05*A+0.9*I)	WQ_v	acres-ft	0.016
REQUIRED WATER QUALITY VOLUME (100% FOR NEW DEVELOPMENT)	WQ_v	cu. ft.	684

WATER QUALITY PEAK FLOW (4)

RUNOFF VOLUME Q=WQ_v/*(A*3600)*	Q	inches	0.337
CN=1000/(10+5*P+10*Q-10(Q^2+*1.25*Q*P*)^{½})	CN		85
CN ROUNDED	CN		85.000
CN < or = 98	CN		85
INITIAL ABSTRACTION, I_a = *200/CN-2*	I_a	inches	0.353
RATIO, R = I_a/P	R		0
C_0 = A*R^2 +B*R +C	C_0		2.492
C_1 = A*R^2 +B*R +C	C_1		-0.636
C_2 = A*R^2 +B*R +C	C_2		-0.120
UNIT PEAK DISCHARDGE, qu = 10^(C_0+C_1*Log(T_c)+C_2*(log(T_c))^2)	q_u	cfs/mi^2/in	1,095
REQUIRED NEW DEVELOPMENT WATER QUALITY PEAK FLOW, Q_p=qu*A*Q/640	Q_p	cfs	**0.322**

MAXIMUM TREATMENT CAPACITY OF MANUFACTURED TREATMENT DEVICE (MTD)	**1.060**

* *FD-3HC*

References:

(1) Refer to Section 4.2 Water Quality Volume (WQv) Figure 4.1 "90% Rainfall in New York State" in the New York State Stormwater Design Manual, last revised August 2015.

(2) Refer to Sections 4.1 and 4.2 for Water Quality Volume (WQv) calculations in the New York State Stormwater Design Manual, last revised August 2015.

(3) Refer to Section 9.3.2 "Sizing Criteria" for Water Quality Volume (WQv) calculations for Redevelopment Projects in the New York State Stormwater Design Manual, last revised August 2015.

(4) Refer to Appendix B.2 "Water Quality Peak Flow Calculation" in the New York State Stormwater Design Manual, last revised August 2010.

Water Quality Volume (WQv) Water Quality Peak Flow (Qp) Calculation W

Project:	Oak Tree Apartments
Location:	SubArea "Site-1C" Haverstraw, NY
Date:	April 19, 2021
Designer:	Ian Kuchman & Steve Sparaco

TR-55 AND TR-20 RAINFALL DISTRIBUTION TYPE=	II			
($R=I_a/P$) $C_i=A*R^2+B*R+C$		A	B	C
Coefficients for unit peak discharge equation	C_0	-2.2349	0.4759	2.5273
Coefficients for unit peak discharge equation	C_1	1.5555	-0.7081	-0.5584
Coefficients for unit peak discharge equation	C_2	0.6041	0.0437	-0.1761

INPUT CRITERIA: *TRIBUTARY (TREATED) AREA*

	ABBREVIATION	*UNITS*	*VALUES*
TOTAL DEVELOPED (GREATER OF DISTURBED OR TRIBUTARY) AREA	A	acres	0.07
IMPERVIOUS SURFACE AREA	I	acres	0.07
NYSDEC 90% RAINFALL EVENT NUMBER (1)	P	inches	1.30
TIME OF CONCENTRATION	T_c	hours	0.083

CALCULATIONS:

WATER QUALITY VOLUME (2)(3)

REQUIRED WATER QUALITY VOLUME $WQ_v=3630*P(0.05*A+0.9*I)$	WQ_v	acres-ft	0.007
REQUIRED WATER QUALITY VOLUME (100% FOR NEW DEVELOPMENT)	WQ_v	cu. ft.	314

WATER QUALITY PEAK FLOW (4)

RUNOFF VOLUME $Q=WQ_v/(A*3600)$	Q	inches	1.235
$CN=1000/(10+5*P+10*Q-10(Q^2+1.25*Q*P)^{½})$	CN		99
CN ROUNDED	CN		99.000
CN < or = 98	CN		98
INITIAL ABSTRACTION, $I_a = 200/CN-2$	I_a	inches	0.041
RATIO, $R = I_a/P$	R		0
$C_0 = A*R^2+B*R+C$	C_0		2.540
$C_1 = A*R^2+B*R+C$	C_1		-0.579
$C_2 = A*R^2+B*R+C$	C_2		-0.174
UNIT PEAK DISCHARGE, $qu = 10^{(C_0+C_1*Log(T_c)+C_2*(log(T_c))^2)}$	q_u	$cfs/mi^2/in$	917
REQUIRED NEW DEVELOPMENT WATER QUALITY PEAK FLOW, $Q_p=qu*A*Q/640$	Q_p	cfs	**0.124**

MAXIMUM TREATMENT CAPACITY OF MANUFACTURED TREATMENT DEVICE (MTD)	**1.060**

** FD-3HC*

References:

(1) Refer to Section 4.2 Water Quality Volume (WQv) Figure 4.1 "90% Rainfall in New York State" in the New York State Stormwater Design Manual, last revised August 2015.

(2) Refer to Sections 4.1 and 4.2 for Water Quality Volume (WQv) calculations in the New York State Stormwater Design Manual, last revised August 2015.

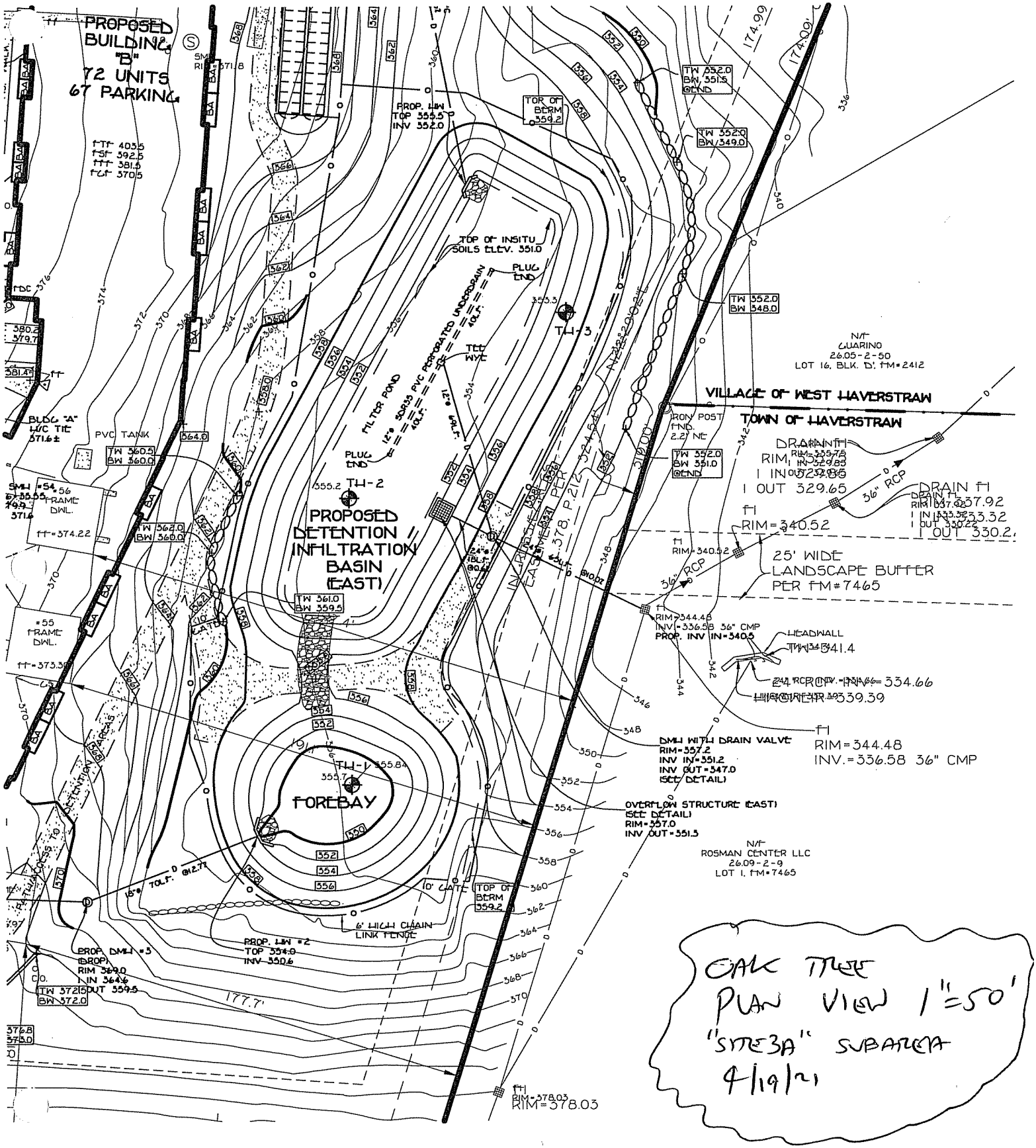
(3) Refer to Section 9.3.2 "Sizing Criteria" for Water Quality Volume (WQv) calculations for Redevelopment Projects in the New York State Stormwater Design Manual, last revised August 2015.

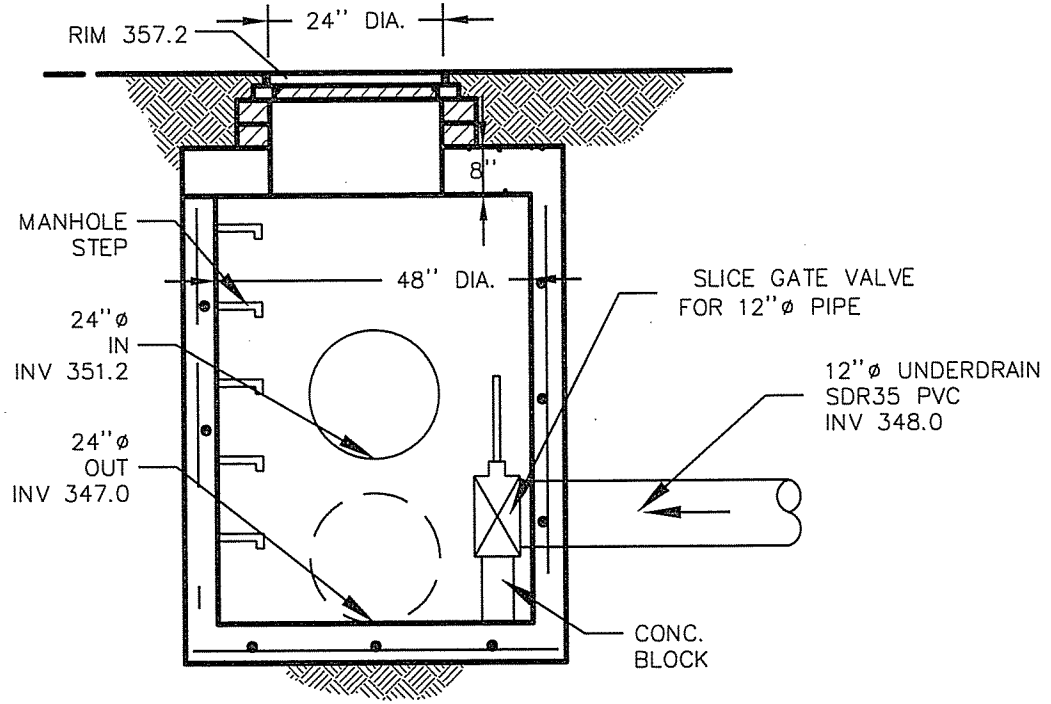
(4) Refer to Appendix B.2 "Water Quality Peak Flow Calculation" in the New York State Stormwater Design Manual, last revised August 2010.

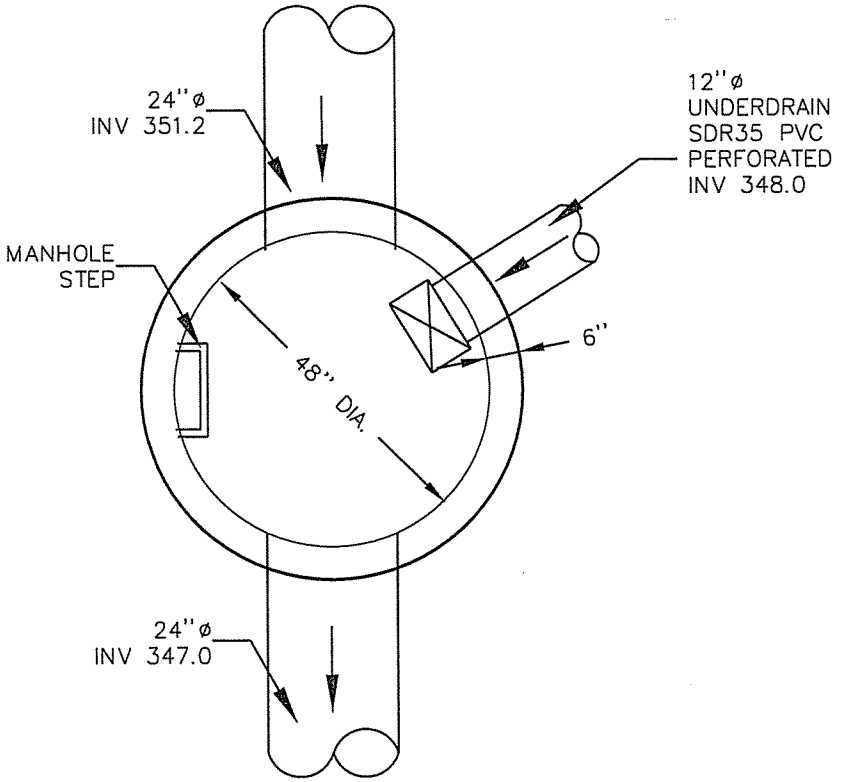
SPARACO AND YOUNGBLOOD, PLLC
P.O. Box #818, 18 North Main Street
Harriman, NY 10926
845-782-8543

WATER QUALITY CALCULATIONS

Project:	**Oak Tree SY#1385**
Location:	**Haverstraw, NY**
Drainage Sub-area:	**Site-3A & Site-4**
Date:	**19-Apr-21**
By:	**SMS**

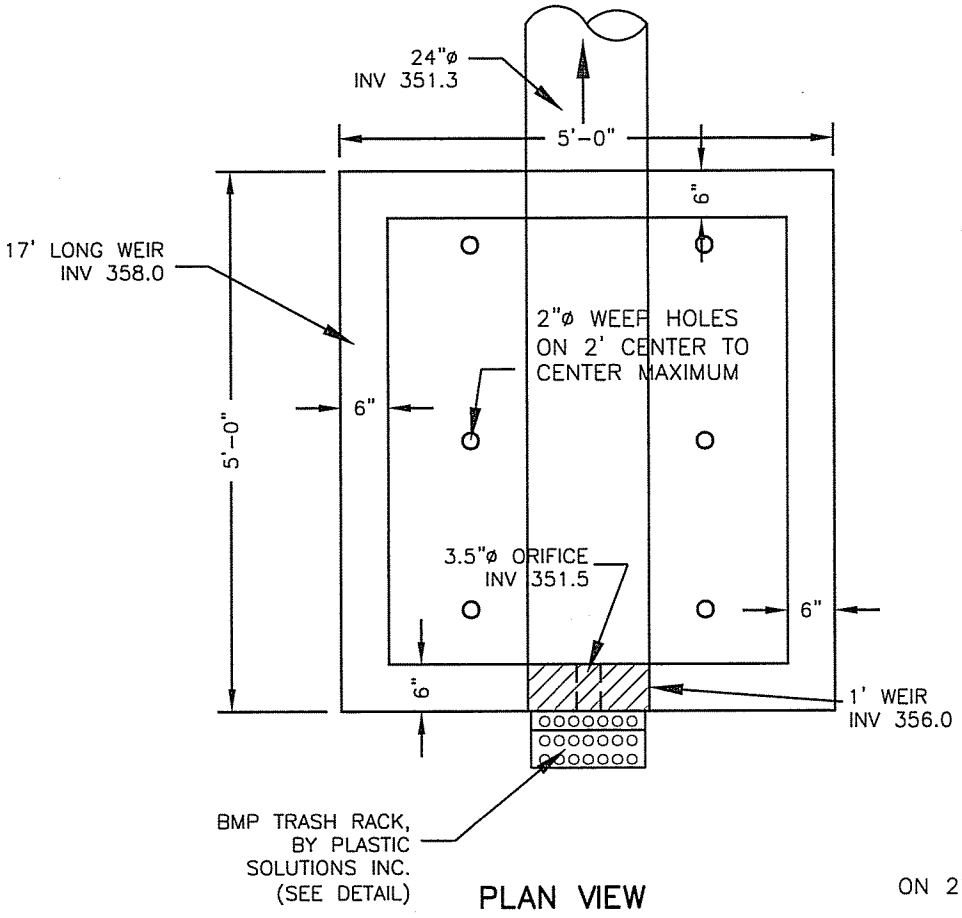

PROPOSED BUILDING "B" 72 UNITS 67 PARKING
FFE 405.5
FSF 392.5
FFF 381.5
FGF 370.5
PROP. LW TOP 355.5 INV 352.0
TOP OF BERM 359.2
TW 352.0 BW 351.5 @END
TW 352.0 BW 349.0
TOP OF INSITU SOILS ELEV. 351.0
PLUG END
TH-3
TEE WYE
TW 352.0 BW 348.0
N/F GUARINO 26.05-2-50 LOT 16, BLK. D, FM=2412
VILLAGE OF WEST HAVERSTRAW
TOWN OF HAVERSTRAW
IRON POST FND. 2.2' NE
TW 352.0 BW 351.0 @END
DRAIN FI RIM=339.78 I IN=329.83 I OUT 329.65
DRAIN FI RIM=337.92 I IN=333.32 I OUT 330.22
36" RCP
FI RIM=340.52
25' WIDE LANDSCAPE BUFFER PER FM#7465
BLDG "A" LVC TIE 371.6±
PVC TANK
TW 360.5 BW 360.0
SMH =54.56 67.35.55 179.9 371.6
FRAME DWL.
FF=374.22
TW 362.0 BW 360.0
TH-2
PROPOSED DETENTION / INFILTRATION BASIN (EAST)
TW 361.0 BW 359.5
12"ø SDR35 PVC PERFORATED UNDERDRAIN 406.1'
FILTER POND
PLUG END
24" RCP @0.5%
INV. OUT 336.00
N 24°-32'-20" W 324.64'
INVERT OF EASEMENT PER 378 P.212
FI RIM=344.48 INV=336.58 36" CMP PROP. INV IN=340.5
HEADWALL TW=341.4
24" RCP INV.=334.66
MH CENTER 339.39
DMH WITH DRAIN VALVE RIM=357.2 INV IN=351.2 INV OUT=347.0 (SEE DETAIL)
OVERFLOW STRUCTURE (EAST) (SEE DETAIL) RIM=357.0 INV OUT=351.5
FI RIM=344.48 INV.=336.58 36" CMP
N/F ROSMAN CENTER LLC 26.09-2-9 LOT 1, FM=7465
FOREBAY
TH-1
DETENTION AREA 5B
10' WIDE ACCESS TO
15"ø TGP. D @12.7%
6' HIGH CHAIN LINK FENCE
TOP OF BERM 359.2
PROP. LW #2 TOP 354.0 INV=350.6
PROP. DMH #3 (PROP) RIM 369.0 I IN 364.6 TW 372.5 OUT 359.5 BW 372.0
177.7'
FI RIM=378.03
174.99'
174.00'
CALC TREE PLAN VIEW 1"=50' "SITE 3A" SUBAREA 4/19/21



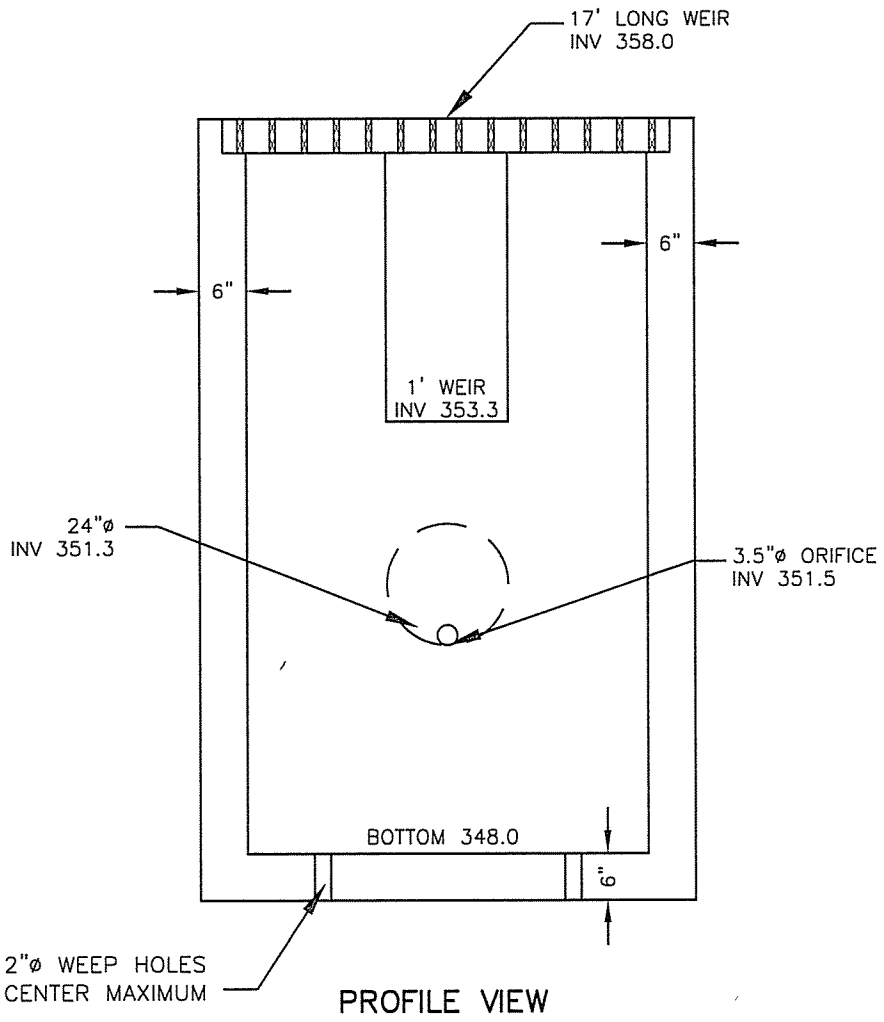


UNDERDRAIN MANHOLE (EAST)

N.T.S.



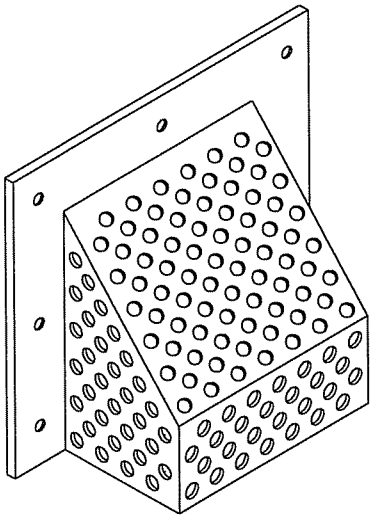
PLAN VIEW



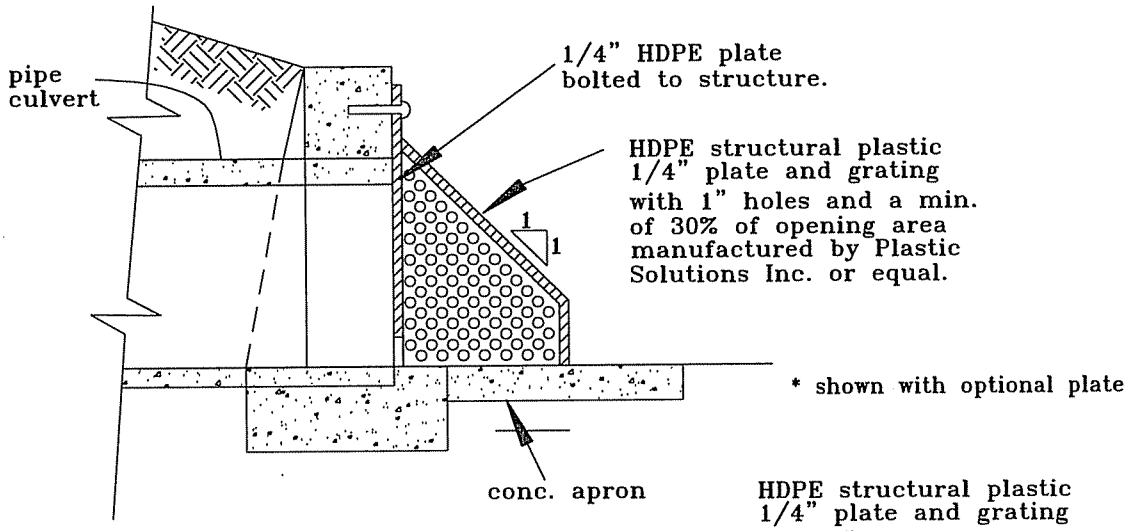
PROFILE VIEW

OVERFLOW STRUCTURE (EAST) DETENTION BASIN

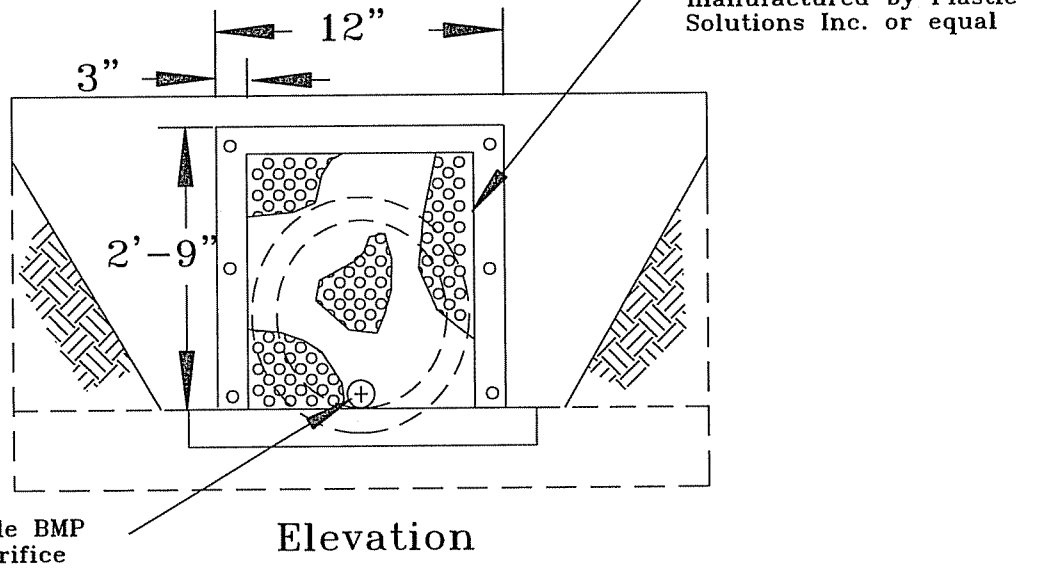
NTS



Isometric



Section



Elevation

BMP TRASH RACK

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Worksheet 2: Runoff Curve Number and Runoff

Project: **Oak Tree SY#1385** By: SMS Date: **19-Apr-21**

Location: **Haverstraw, NY** Checked: Date:

Shade one: Existing Developed CN for Sub-basin: *Site-3A & Site-4*

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 Table 2-2	CN Figure 2.3	CN Figure 2.4	Area ☒ acres ☐ mi^2 ☐ %	Product of CN X AREA
B	Woods - Good Condition	55			0	0
B	Lawn / Open Space - Good Condition	61			0	0
C	Woods - Good Condition	70			0	0
C	Lawn / Open Space - Good Condition	74			2.21	163.54
D	Woods - Good Condition	77			0	0
D	Lawn / Open Space - Good Condition	80			0	0
	Impervious Surfaces	98			2.01	196.98
				Totals =	4.22	360.52

CN (weighted) = total product / total area = 360.52 / 4.22 = 85.43127962

Use CN = **85**

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency			
Rainfall, P (24 - hour)			
Runoff, Q			

Frequency ..... yr.
Rainfall, P (24 - hour) ..... in.
Runoff, Q ..... in.

(Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

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Worksheet 4: Graphical Peak Discharge Method

Project: **Oak Tree SY#1385** By: SMS
Location: **Haverstraw, NY** Date: 19-Apr-21

Shade one: Existing **Developed** q_p req'd for Sub-basin: *Site-3A & Site-4*

1. Data:

Drainage Area.....Am = 0.0066 mi^2 (acres/640)
Runoff Curve Number.....CN = 85 From Worksheet #2 (or calibrated Hec-1 Curve Number)
Time of Concentration.....T_c = 0.083 hr (From Worksheet #3)
Runoff Distribution Type..... = III (I, IA, II, III)
Pond and Swamp areas spread throughout watershed.....= 0 percent of A_m (% acres or mi2 covered)

		Storm #1	Storm #2	Storm #3
2.	Frequency..... yr.	1		
3.	Rainfall, P (24 - hour)..... in.	2.5		
4.	Initial Abstraction, I_a ..... in. [I_a = 0.2*S] [S = 1000/CN -10]....1.71	0.341		
5.	Compute I_a/P..... in.	0.136		
6.	Unit Peak Discharge, qu.....csm/in. (Use Tc and Ia/P with exhibit 4-III)	650		
7.	Runoff, Q ..... in. [$Q=(P-0.2S)^2/(P-0.8S)$]	1.21		
8.	Pond and Swamp Adjustment Factor, F_p... % (Use percent pond and swamp area with Table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1		
9.	Peak Discharge, q_p.....cfs (Where $q_p=q_u A_m Q F_p$)	5.2		

Forebay Pond Volume for: Site-3A & Site-4

STAGE (elev. In ft.)	DIFFERENCE IN STAGE EL. (ft.)	AREA OF CONTOUR (ft2)	AVG. AREA OF CONTOUR (ft2)	VOLUME SYSTEM (cubic feet)	VOLUME SYSTEM (ac-ft)	
350.00		1397.00				
	2.00		1161.00	2322	0.0533	
352.00		2322.00				
	2.00		1715.00	3430	0.0787	
354.00		3430.00				
	2.00		2415.00	4830	0.1109	
356.00		4830.00				
					0.2429	Total Volume Forebay

* Note: Total Volume Forebay to be sized at 100% WQv for Pre-Treatment prior to entry into Infiltration system

WQv Required:	0.219 ac-ft		
Forebay Volume Provided:	0.243 ac-ft at elev:	355.00 ft.	Therefore acceptable.

Detention Pond Volume for: Site-3A & Site-4

STAGE (elev. In ft.)	DIFFERENCE IN STAGE EL. (ft.)	AREA OF CONTOUR (ft2)	AVG. AREA OF CONTOUR (ft2)	VOLUME SYSTEM (cubic feet)	VOLUME SYSTEM (ac-ft)	VOLUME SYSTEM (ac-ft)	
350.00		0.00					
	1.00		3764.50	3764.5	0.0864	0.0864	
351.00		7529.00					
	1.00		4416.00	4416	0.1014	0.1878	
352.00		8832.00					
	2.00		5806.50	11613	0.2666	0.4544	
354.00		11613.00					
	2.00		7310.00	14620	0.3356	0.7900	
356.00		14620.00					
	2.00		12778.50	25557	0.5867	1.3767	
358.00		25557.00					
	0.50		13938.50	6969.25	0.1600	1.5367	
358.50		27877.00					
					1.5367	1.5367	Total Volume Pond

SEEPAGE BASIN DATA:

Outflow:

Stage 0.1 Only

Seepage Area (A) = Exterior Area of Base

Stages 1-8

Seepage Area (A) = Sum (Previous Seepage Area)

Percolation Rate (V) = 1 inch per 28 Minutes (See Perc test results for test holes 2 (28 min) and est hole 3 (6 min)

= 0.000050 ft/sec

Outflow Rate (Q) = Seepage Area (A) x Percolation Rate (V)

Basin Outflow:

SEEPAGE BASIN STAGE VS. OUTFLOW

Stage	Elev	Seepage Area (ft^2)	Percolation Rate (feet/sec)	Outflow Rate (cfs)
0.00	350.00	-	0.000050	0.00000
1	351.00	7,529.0	0.000050	**0.37346**
2	352.00	8,832.0	0.000050	0.43810
3	354.00	11,613.0	0.000050	0.57604
4	356.00	14,620.0	0.000050	0.72520
5	358.00	25,557.0	0.000050	1.26771
6	358.50	27,877.0	0.000050	1.38279

*Use the bottom of Basin for Outflow Rate for conservative result.

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Summary Table #WQ-1:Water Quality Volume Calculations

Project: **Oak Tree SY#1385**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Water Quality Calculations

NYSDEC Required Storage Volume:

Sub-Area: *Site-3A & Site-4*

Data:

P:	1.3	= 90% Rainfall Event Number from Figure #1	
Rv:	0.478673	= 0.05 + 0.009(I) (Min. Rv =0.2)	Use Rv = 0.478672986
I:	47.63	= Impervious coverage percentage	
A:	4.22	= Site Area to Basin (in acres)	

WQv: **0.219** = Req'd Water Quality Volume (in ac-ft)

$$= \frac{(P)(Rv)(A)}{12}$$

Pre Treatment required (20% if percolation rate less than 2-inches per hour and 100% if less than 2-inches per hour):

Percolation Rate:	28	minutes for 1 inch drop.	
Volume percentage required:	100	percent	
Pre-treatment volume Req'd:	0.219	ac-ft	
Pre-treatment Vol. provided:	0.243	ac-ft	ok

Set required WQv Elev:

		Elev. (ft.)	Cumulative Volume
Infiltration System Invert Elevation (I_{EL}) =		350.0	(ac-ft)
Water Quality Storage Elevation Range:	High:	353.00	0.4544
	Low:	350.00	0.0000
		Diff. =	0.4544

Minimum WQ Volume required above permanent pool = **0.2188** ac-ft

Interpolated Volume Change = (Higher Cumulative Volume - Req'd WQ Volume over Perm. Pool)/Diff. In Volume in Range

Interpolated Volume Change = (0.4544 - 0.2188)/ 0.4544

Interpolated Volume Ratio = 0.5184

Interpolated Elevation Change = 353.00 - (0.5184 x 3.00)

Interpolated Elevation Change = 351.44 ft.

Minimum Water Quality Volume High Elevation = 351.44 ft.

Set Water Quality Volume Elevation = 351.50 ft.

**Note: Total Storage at elevation: 351.50 is 0.2272 ac-ft, which is greater than req. 0.2188 ac-ft.* ok

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Summary Table #WQ-2:Runoff Reduction Volume Calculations

Project: **Oak Tree SY#1385**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Runoff Reduction Volume Calculations

NYSDEC Required Runoff Reduction Volume for : Sub-Area: *Site-3A & Site-4*

Data: Entire Subarea

P:	1.3	= 90% Rainfall Event Number from Figure #1
Rv:	0.950	= 0.05 + 0.009(I) (I=100 percent)
Aic:	2.01	= Impervious cover targeted for runoff reduction (in acres)
Ai:	0.603	= (S)(Aic) (in acres)
S:	0.3	= Hydrologic Soil Group (HSG) Specific Reduction Factor

HSG Type "A" = 0.55
HSG Type "B" = 0.4
HSG Type "C" = 0.3
HSG Type "D" = 0.2

RR_{V1}: **0.062** = Req'd Runoff Reduction Volume (in ac-ft)
$= \frac{(P)(Rv)(Ai)}{12}$

Provided Volume in Retention system: **0.227 ac-ft** *up to WQv Elevation.* **ok, greater than required RR_{V1}:**

***Note: Current NYSDEC regulations allow RRv for 100% of WQv when using infiltration practices.**

Total Available Volume in system: *1.537 ac-ft*

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Channel Protection Storage Volume (Cp_v): Calculation:

Project: **Oak Tree SY#1385** By: SMS
Location: **Haverstraw, NY** Date: 19-Apr-21

Data:

Water Quality Orifice Invert. . . . . = 350.00 ft.
Water Quality Storage Elevation. . . . . = 351.50 ft.

		Sub-basin:	Site-3A & Site-4
1. Unit Peak Discharge, q_u. . . . . =	(csm/in.)		650
Duration Time, T.....T =	(hr .)		24
Runoff, Q . . . . . =	(in.)		1.21
Drainage Area.....Am =	(mi^2)		0.0066
Drainage Area (in acres) = A_m x 640 = A =	(acres)		4.22

2. Find (q_o/q_i) from Figure 8.5. . . . . 0.03
(q_o/q_i = Peak outflow/Peak Inflow discharge)

3. Calculate V_s/V_r 0.642
[$V_s/V_r = 0.683-1.43(q_o/q_i) + 1.64 (q_o/q_i)^2 -0.804 (q_o/q_i)^3$]

			Total V_s	
4. Solve for V_s	(ac-ft)	0.2721	**0.2721**	(ac-ft)
[$V_s=Cp_v = (V_s/V_r)$ x Q x A/12]	(cubic ft.)	11,854	11854	(cubic ft.)

5. Compute Average Release Rate = Q_{AVG} 0.14 (cfs)
[$Q_{AVG} = V_s$ /T*3600 sec/hr]

Calculate Required Channel Protection Volume Elevation ($Cp_V E$):

		Elev. (ft.)	Cumulative Volume (ac-ft)	Actual WQ Volume Reserved (ac-ft)	Net Volume (ac-ft)
Water Quality Volume Elevation (WQ_{vE}) =		351.50			
Channel Protection Storage Elevation Range:	High:	353.00	0.4544	0.0000	0.4544
	Low:	350.00	0.0000	0.0000	0.0000
	Diff. =		0.4544	0.0000	0.4544

Min. Channel Protection Volume required = 0.2721 ac-ft

Interpolated Volume Change = (Higher Net Volume - Req'd Cp Volume over WQv)/Diff. In Volume in Range
Interpolated Volume Ratio = (0.4544 - 0.2721)/ 0.4544
Interpolated Volume Ratio = 0.4011

Interpolated Elevation Change = 353.00 - (0.4011 x 3.00)
Interpolated Elevation Change = 351.80 ft.

Minimum Channel Protection Volume High Elevation = 351.80 ft.

Set Channel Protection Volume Elevation = 351.80 ft.

*Note: Total Storage at elevation: 351.80 is 0.2726 ac-ft, which is greater thai 0.2721 ac-ft.

Compute the required Cp_V-ED orifice:

Required Cpv = 0.2721 ac-ft.
Average ED release rate = 0.2721 x 43560 ft^2/ac / (24 hr x 3600 sec/hr)
Average ED release rate = 0.14 cfs

*Size Cpv-ED orifice
to release average of : 0.14 - 0.00 cfs

Qavg = **0.14** cfs

Average Cpv-ED orifice rate is:
Average head (h) = (WQ_{VE} - WQ_{PPE})/2

$$\text{Average h} = \frac{351.80 - 351.50}{2}$$

Average h = 0.15 ft.

**Use the orifice flow equation to calculate the required cross-sectional area and diameter for the Cp_V-ED orifice:

[Q=ca(sq. rt. (2gh))]
where:
c = 0.61
g = 32.2
Average h = 0.15
sqrt(2gh) = 3.108
a= 0.072 sq. ft. Based upon: [a=Q/c (sq. rt. (2gh))]

Calculate diameter of pipe based upon area = D = 0.304 ft. Based upon: [D = sq. rt. (4a/3.15159)]
D = 3.643 in.

For Design, Use a **3.50** in. dia. hole.	(1" dia. is minimum as per NYSDEC)

Orifice centerline elevation = Orifice invert + (Orifice size in feet/2)
Orifice centerline elevation = 351.50 + 0.15

Orifice centerline elevation = 351.65 ft.

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Project: **Oak Tree SY#1385**
Location: **Town of Haverstraw, NY**
JOB # SY-1385

By: SMS
Date: 19-Apr-21
Sub-Area: Site-3A & Site-4

Outlet Structure - Elevation vs. Discharge Calculations

Known Data:

Orifice #1:

Orifice Dia.:	3.50	in.
Invert El.:	351.50	ft.
Centerline El.:	351.65	ft.
A=	0.067	ft^2

Orifice #2:

Orifice Dia.:	0.00	in.
Invert El.:	353.30	ft.
Centerline El.:	353.30	ft.
A=	0.000	ft^2

Orifice #3:

Orifice Dia.:	0.00	in.
Invert El.:	355.00	ft.
Centerline El.:	355.00	ft.
A=	0.000	ft^2

Spillway #1 (Weir):

Spillway Inv. Elev.:	353.3	ft.
Spillway Top Elev.:	n/a	ft.
Spillway Length:	1.00	ft.

Spillway #2 (Top Struct.):

Spillway Inv. Elev.:	358.0	ft.
Spillway Top Elev.:	n/a	ft.
Spillway Length:	17.00	ft.

In Orifice Flow Eq. ;
Q=cA[sq. rt. (2gH)]

c=	0.61	(orifice #1)
c=	0.61	(orifice #2)
c=	0.61	(orifice #3)
c=	0.61	(orifice #4)
c=	0.61	(orifice #5)
g=	32.2	
H=	(See Below)	

c=	0.61	(orifice #6)
c=	0.61	(orifice #7)
c=	0.61	(orifice #8)
c=	0.61	(orifice #9)

In Weir Flow Eq. ;
Q=cLH**3/2

c=	3.0			
use L=	1.0	> than el.	353.30	ft.
H_4=	(See Below)			

H_1= Height over orifice centerline
H_2= Height over orifice #2 centerline
H_3= Height over orifice #3 centerline
H_4= Height over orifice #4 invert
H_{10}= Height over spillway #1 elevation
H_{11}= Height over spillway #2 elevation

** c=0.61 for square-edged orifice*
*** c=0.98 for orifice with well-rounded entry*
(Oct., 1959 Seelye Data Book for Civil Engineers)

Elevation vs. Discharge

Elev. (ft.)	*Orifice Flows to Orifice #1* H_1 (ft.)	Flow (cfs)	*Orifice Flows to Orifice #2* H_2 (ft.)	Flow (cfs)	*Orifice Flows to Orifice #3* H_3 (ft.)	One Pipe Flow (cfs)	*Orifice Flows to Orifice #4* H_5 (ft.)	Flow (cfs)	*Weir Flows over Spillway #1* H_{10} (ft.)	Flow (cfs)	*Weir Flows over Spillway #2* H_{11} (ft.)	Flow (cfs)	Totals Cumulative Flow (cfs)
351.50	0.0	0.00											**0.00**
351.70	0.1	0.08											**0.08**
351.90	0.3	0.16											0.16
352.10	0.5	0.22											0.22
352.30	0.7	0.26											0.26
352.50	0.9	0.30											0.30
352.70	1.1	0.34											0.34
352.90	1.3	0.37											0.37
353.10	1.5	0.39											0.39
353.30	1.7	0.42							0.0	0.00			**0.42**
353.50	1.9	0.45							0.2	0.27			**0.71**
353.60	2.0	0.46							0.3	0.49			0.95
353.70	2.1	0.47							0.4	0.76			1.23
353.80	2.2	0.48							0.5	1.06			1.54
354.00	2.4	0.50							0.7	1.76			2.26
354.20	2.6	0.52							0.9	2.56			3.08
354.40	2.8	0.54							1.1	3.46			4.00
354.60	3.0	0.56							1.3	4.45			5.01
354.80	3.2	0.58							1.5	5.51			6.09
355.00	3.4	0.60							1.7	6.65			7.25
355.20	3.6	0.62	1.9	0.00					1.9	7.86			**8.47**
355.40	3.8	0.63	2.1	0.00					2.1	9.13			9.76
355.60	4.0	0.65	2.3	0.00					2.3	10.46			11.11
355.80	4.2	0.67	2.5	0.00					2.5	11.86			12.53
356.00	4.4	0.68	2.7	0.00					2.7	13.31			13.99
356.20	4.6	0.70	2.9	0.00					2.9	14.82			**15.51**
356.40	4.8	0.71	3.1	0.00					3.1	16.37			17.09
356.60	5.0	0.73	3.3	0.00					3.3	17.98			18.71
356.80	5.2	0.74	3.5	0.00					3.5	19.64			20.39
357.00	5.4	0.76	3.7	0.00					3.7	21.35			22.11
357.20	5.6	0.77	3.9	0.00					3.9	23.11			**23.88**
357.40	5.8	0.78	4.1	0.00					4.1	24.91			25.69
357.60	6.0	0.80	4.3	0.00					4.3	26.75			27.55
357.80	6.2	0.81	4.5	0.00					4.5	28.64			29.45
358.00	6.4	0.82	4.7	0.00					4.7	30.57			**31.39**
358.20	6.6	0.84	4.9	0.00					4.9	32.54	0.2	4.56	**37.94**
358.40	6.8	0.85	5.1	0.00					5.1	34.55	0.4	12.90	**48.30**
358.60	7.0	0.86	5.3	0.00					5.3	36.60	0.6	23.70	61.17
358.80	7.2	0.87	5.5	0.00					5.5	38.70	0.8	36.49	**76.06**
359.00	7.4	0.89	5.7	0.00					5.7	40.83	1.0	51.00	92.71
359.20	7.6	0.90	5.9	0.00					5.9	42.99	1.2	67.04	110.93
359.40	7.8	0.91	6.1	0.00					6.1	45.20	1.4	84.48	130.59
359.60	8.0	0.92	6.3	0.00					6.3	47.44	1.6	103.22	151.58
359.80	8.2	0.93	6.5	0.00					6.5	49.72	1.8	123.16	173.81
360.00	8.4	0.95	6.7	0.00					6.7	52.03	2.0	144.25	197.22

Elev. Flow (cfs)	Orifice #1 Flow (cfs)	Orifice #2 Flow (cfs)	Orifice #3 Flow (cfs)	Weir #1 Flow (cfs)	Weir #2 Flow (cfs)	Total Flow (cfs)

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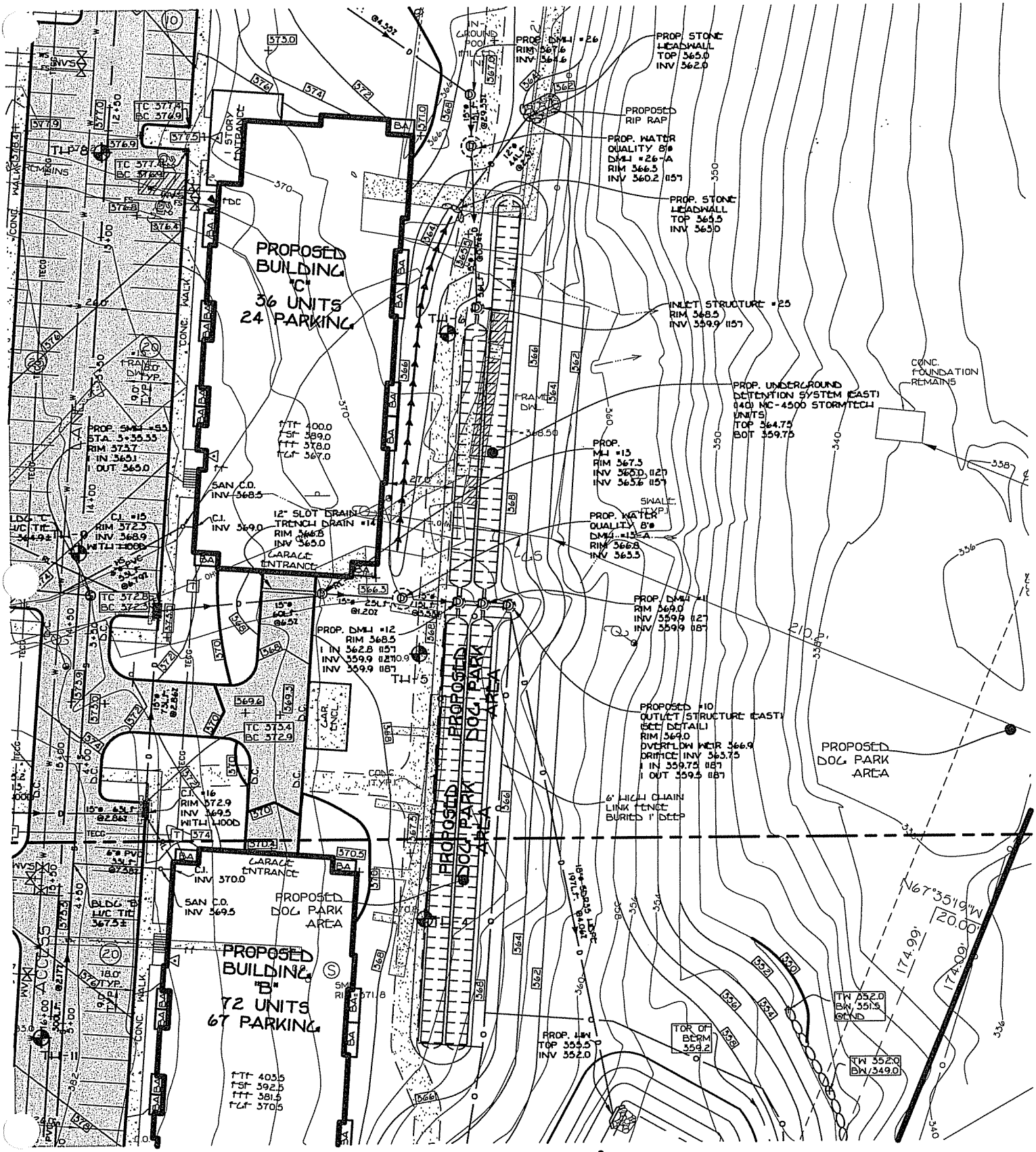
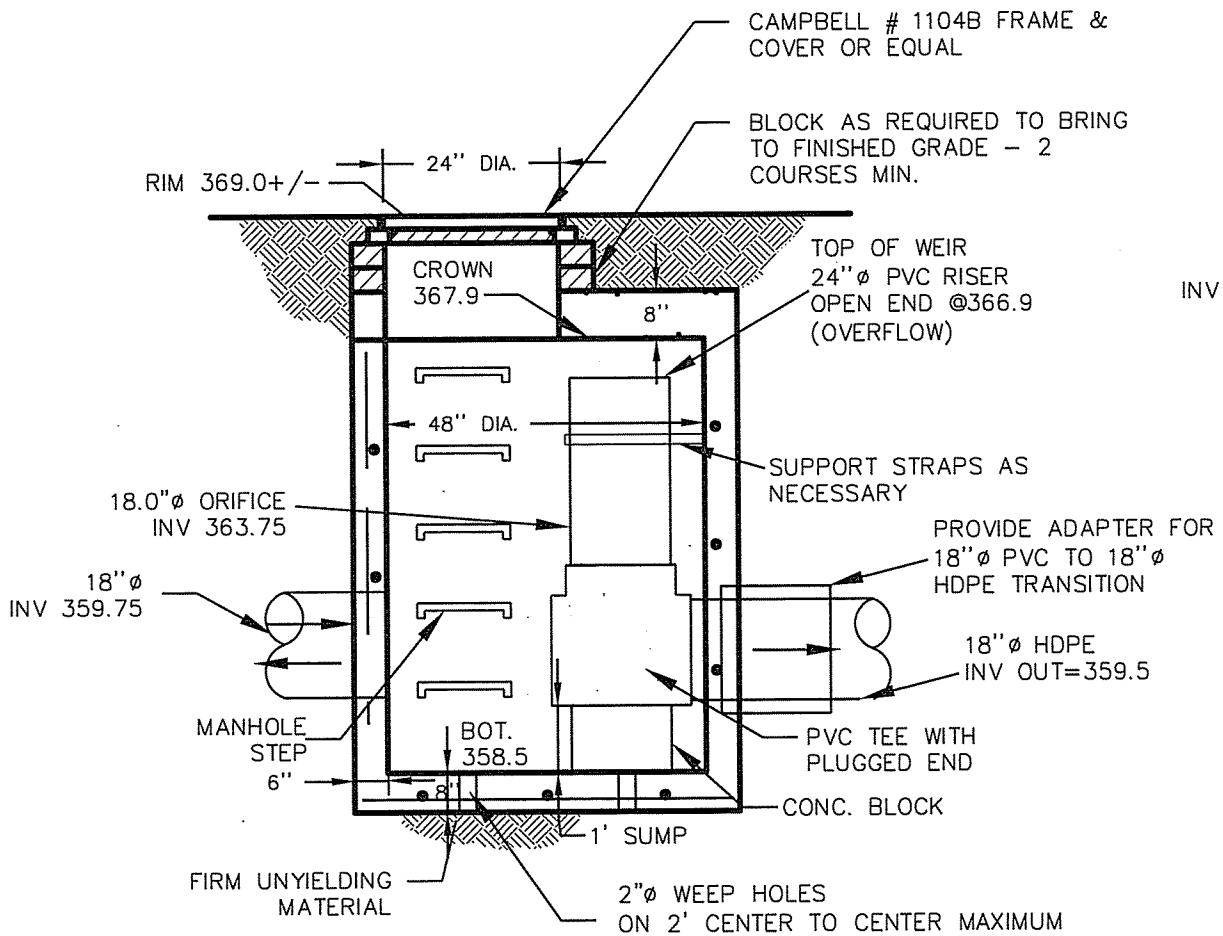
WATER QUALITY CALCULATIONS

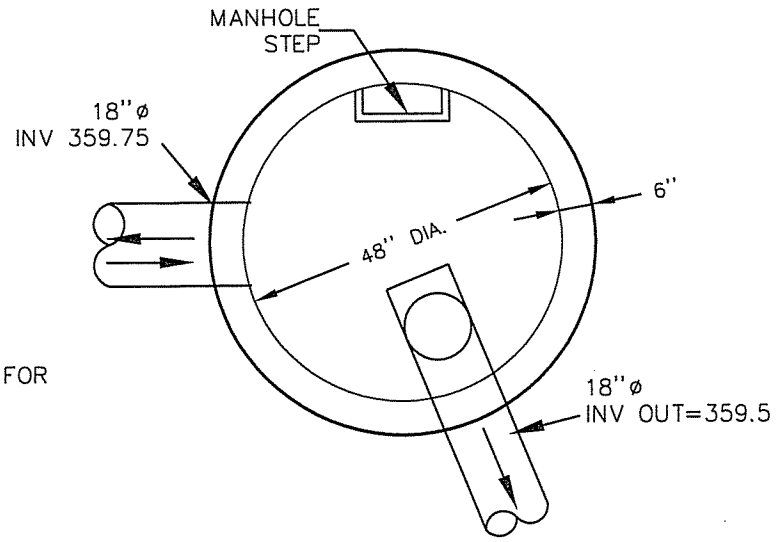
Project:	**Oak Tree**
Location:	**Haverstraw, NY**
Drainage Sub-area:	**Site-5A**
Date:	**19-Apr-21**
By:	**SMS**



OAK TREE
PLAN VIEW @ 1"=50'
"SITESA" SUBAREA
4/19/21



PROFILE VIEW



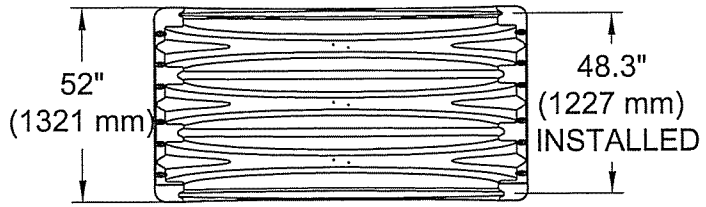
PLAN VIEW

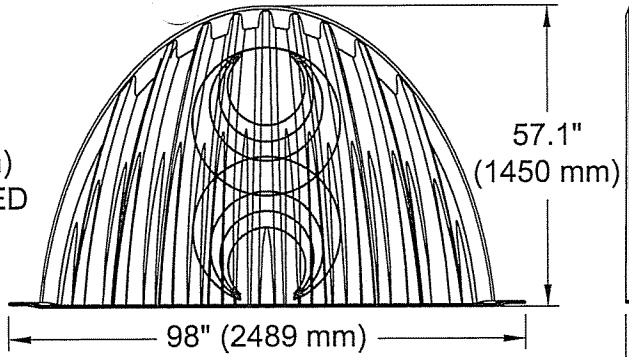
NOTES:

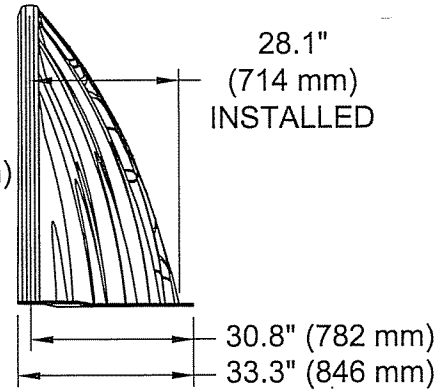
1. MANHOLE TO CONFORM TO A.S.T.M. C478 (LATEST REVISION).
2. PRECAST CONCRETE MANHOLES WITH RESILENT SEALS AT JOINTS.
3. MANUFACTURER SHALL CERTIFY ALL COMPONENTS MANHOLE FOR HS20 LOADING
4. RISER SECTION JOINTS SHALL BE FIELD–MORTARED
5. SHOP DRAWING TO BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO CONSTRUCTION.

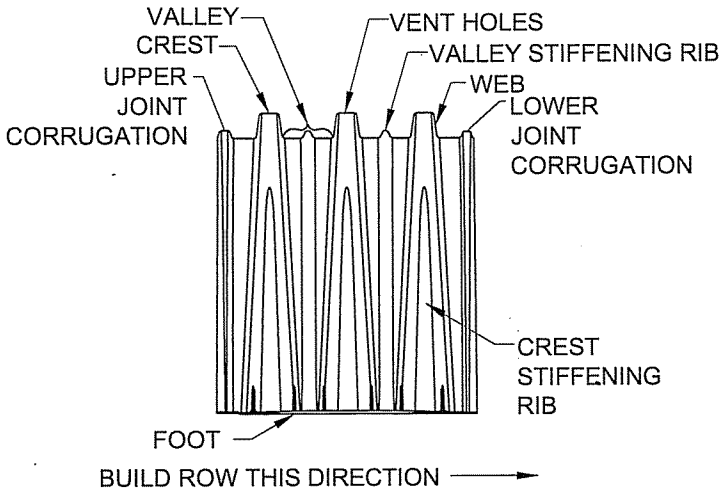
OUTLET STRUCTURE (EAST)–MC4500

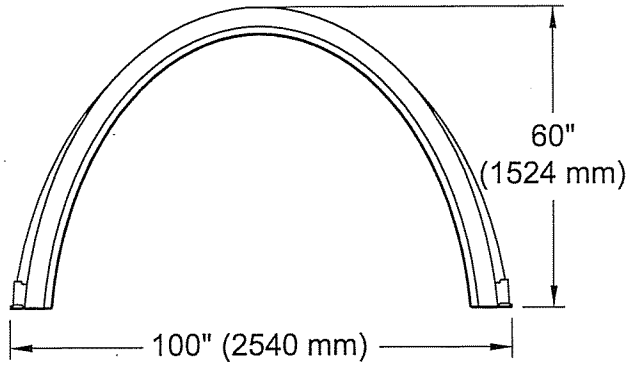
N.T.S.











NOMINAL CHAMBER SPECIFICATIONS

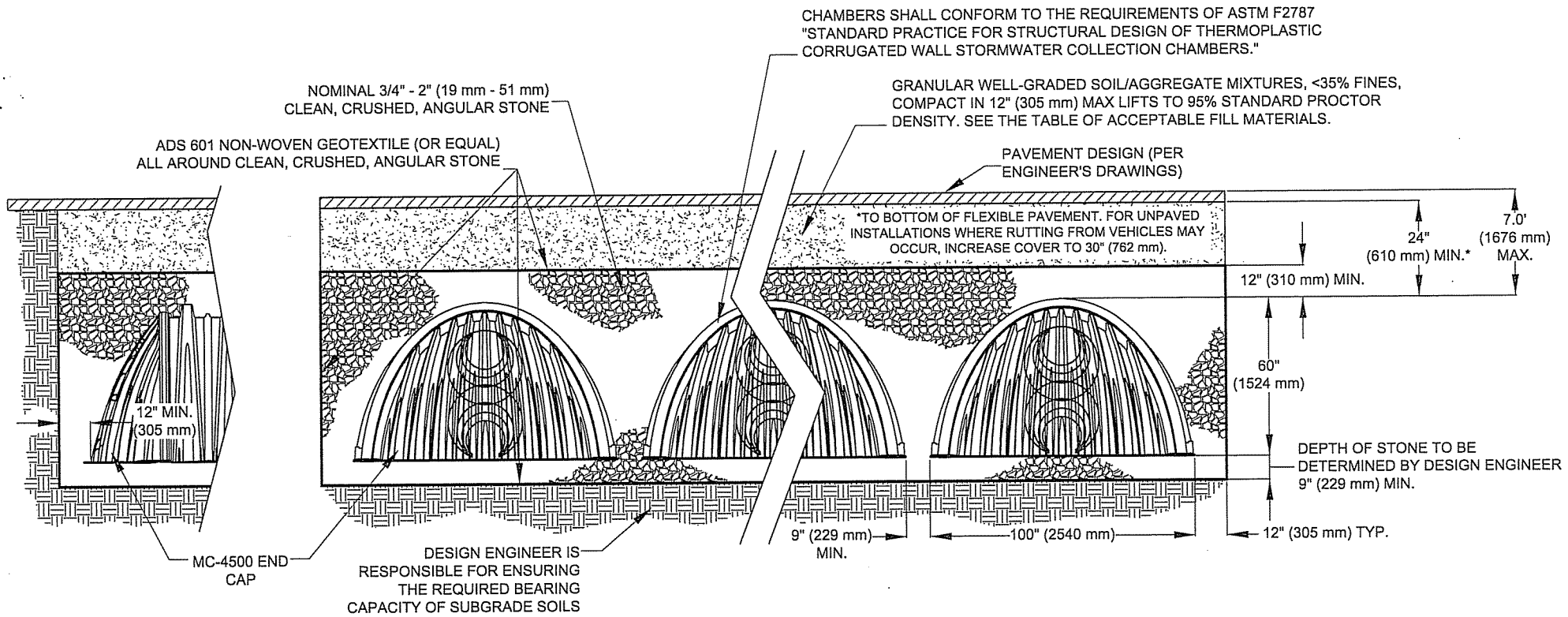
SIZE (W x H x INSTALLED LENGTH)	100.0" x 60.0" x 48.3" [2540 mm x 1524 mm x 1227 mm]
CHAMBER STORAGE	106.5 ft³ [3.01 m³]
MINIMUM INSTALLED STORAGE*	162.6 ft³ [4.60 m³]
NOMINAL WEIGHT	128 lbs [58 kg]

NOMINAL END CAP SPECIFICATIONS

SIZE (W x H x INSTALLED LENGTH)	98.0" x 57.1" x 28.1" [2489 mm x 1450 mm x 714 mm]
END CAP STORAGE	26.8 ft³ [0.76 m³]
MINIMUM INSTALLED STORAGE*	98.0 ft³ [2.78 m³]
NOMINAL WEIGHT	80 lbs [36 kg]

STORMTECH MC-4500 CHAMBER

N.T.S.



THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12 FOR EARTH AND LIVE LOADS, WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.

STORMTECH MC-4500 CROSS-SECTION

N.T.S.

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P.O. Box #818, 18 North Main Street
Harriman, NY 10926
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Worksheet 4: Graphical Peak Discharge Method

Project: **Oak Tree** By: SMS
Location: **Haverstraw, NY** Date: 19-Apr-21

Shade one: Existing **Developed** q_p req'd for Sub-basin: *Site-5A*

1. Data:

Drainage Area.....Am = 0.0067 mi^2 (acres/640)
Runoff Curve Number.....CN = 95 From Worksheet #2 (or calibrated Hec-1 Curve Number)
Time of Concentration.....T_c = 0.083 hr (From Worksheet #3)
Runoff Distribution Type..... = III (I, IA, II, III)
Pond and Swamp areas spread throughout watershed.....= 0 percent of A_m (% acres or mi2 covered)

		Storm #1	Storm #2	Storm #3
2.	Frequency..... yr.	1		
3.	Rainfall, P (24 - hour)..... in.	2.5		
4.	Initial Abstraction, I_a ..... in. [I_a = 0.2*S] [S = 1000/CN -10]....0.53	0.105		
5.	Compute I_a/P..... in.	0.042		
6.	Unit Peak Discharge, qu..... csm/in. (Use Tc and Ia/P with exhibit 4-III)	650		
7.	Runoff, Q ..... in. [$Q=(P-0.2S)^2/(P-0.8S)$]	1.96		
8.	Pond and Swamp Adjustment Factor, F_p... % (Use percent pond and swamp area with Table 4-2. Factor is 1.0 for zero percent pond and swamp area.)	1		
9.	Peak Discharge, q_p..... cfs (Where $q_p=q_u A_m Q F_p$)	8.5		

Project:

Chamber Model -	MC-4500	
Units -	Imperial	Click Here for Metric
Number of Chambers -	140	
Number of End Caps -	8	
Voids in the stone (porosity) -	40	%
Base of Stone Elevation -	359.00	ft
Amount of Stone Above Chambers -	12	in
Amount of Stone Below Chambers -	9	in

Include Perimeter Stone in Calculations

StormTech
Detention • Retention • Water Quality
A division of ADS

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Single End Cap (cubic feet)	Incremental Chambers (cubic feet)	Incremental End Cap (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch + EC and Stone (cubic feet)	Cumulative System (cubic feet)	Elevation (feet)
81	0.00	0.00	0.00	0.00	179.23	179.23	23635.36	365.75
80	0.00	0.00	0.00	0.00	179.23	179.23	23456.13	365.67
79	0.00	0.00	0.00	0.00	179.23	179.23	23276.90	365.58
78	0.00	0.00	0.00	0.00	179.23	179.23	23097.68	365.50
77	0.00	0.00	0.00	0.00	179.23	179.23	22918.45	365.42
76	0.00	0.00	0.00	0.00	179.23	179.23	22739.22	365.33
75	0.00	0.00	0.00	0.00	179.23	179.23	22559.99	365.25
74	0.00	0.00	0.00	0.00	179.23	179.23	22380.77	365.17
73	0.00	0.00	0.00	0.00	179.23	179.23	22201.54	365.08
72	0.00	0.00	0.00	0.00	179.23	179.23	22022.31	365.00
71	0.00	0.00	0.00	0.00	179.23	179.23	21843.09	364.92
70	0.00	0.00	0.00	0.00	179.23	179.23	21663.86	364.83
69	0.04	0.00	5.73	0.00	176.93	182.67	21484.63	364.75
68	0.12	0.01	16.25	0.08	172.69	189.03	21301.96	364.67
67	0.16	0.03	23.06	0.21	169.92	193.19	21112.94	364.58
66	0.21	0.05	29.22	0.38	167.39	196.99	20919.74	364.50
65	0.27	0.07	37.57	0.54	163.98	202.09	20722.76	364.42
64	0.45	0.09	63.39	0.70	153.59	217.68	20520.66	364.33
63	0.67	0.11	93.14	0.90	141.61	235.65	20302.98	364.25
62	0.80	0.14	111.86	1.13	134.03	247.02	20067.33	364.17
61	0.91	0.17	127.14	1.34	127.84	256.31	19820.31	364.08
60	1.00	0.19	140.41	1.53	122.45	264.39	19563.99	364.00
59	1.09	0.22	152.23	1.72	117.65	271.60	19299.60	363.92
58	1.16	0.24	162.89	1.93	113.30	278.12	19028.01	363.83
57	1.23	0.27	172.76	2.16	109.26	284.18	18749.89	363.75
56	1.30	0.30	181.96	2.38	105.49	289.83	18465.71	363.67
55	1.36	0.32	190.54	2.59	101.97	295.11	18175.88	363.58
54	1.42	0.35	198.62	2.78	98.67	300.07	17880.77	363.50
53	1.47	0.37	206.27	2.97	95.53	304.77	17580.70	363.42
52	1.53	0.39	213.52	3.15	92.56	309.23	17275.93	363.33
51	1.57	0.42	220.43	3.34	89.72	313.49	16966.70	363.25
50	1.62	0.44	226.99	3.52	87.02	317.54	16653.21	363.17
49	1.67	0.46	233.27	3.70	84.44	321.41	16335.68	363.08
48	1.71	0.48	239.28	3.87	81.97	325.12	16014.27	363.00
47	1.75	0.50	245.01	4.04	79.61	328.66	15689.15	362.92
46	1.79	0.53	250.50	4.20	77.35	332.05	15360.49	362.83
45	1.83	0.55	255.81	4.36	75.16	335.33	15028.44	362.75
44	1.86	0.56	260.88	4.52	73.07	338.47	14693.12	362.67
43	1.90	0.58	265.77	4.67	71.05	341.49	14354.65	362.58
42	1.93	0.60	270.46	4.81	69.12	344.39	14013.17	362.50
41	1.96	0.62	274.97	4.96	67.25	347.19	13668.78	362.42
40	2.00	0.64	279.32	5.10	65.46	349.88	13321.59	362.33
39	2.03	0.66	283.50	5.25	63.73	352.48	12971.71	362.25
38	2.05	0.67	287.53	5.39	62.06	354.98	12619.23	362.17
37	2.08	0.69	291.41	5.52	60.45	357.39	12264.26	362.08
36	2.11	0.71	295.13	5.66	58.91	359.70	11906.87	362.00
35	2.13	0.72	298.74	5.79	57.42	361.94	11547.17	361.92
34	2.16	0.74	302.21	5.92	55.97	364.11	11185.23	361.83
33	2.18	0.76	305.56	6.05	54.59	366.19	10821.12	361.75
32	2.21	0.77	308.77	6.17	53.25	368.19	10454.93	361.67
31	2.23	0.79	311.87	6.30	51.96	370.13	10086.73	361.58
30	2.25	0.80	314.84	6.41	50.72	371.98	9716.61	361.50
29	2.27	0.82	317.71	6.57	49.52	373.79	9344.62	361.42
28	2.29	0.84	320.46	6.73	48.35	375.54	8970.83	361.33
27	2.31	0.85	323.10	6.77	47.28	377.15	8595.30	361.25
26	2.33	0.86	325.63	6.87	46.23	378.73	8218.15	361.17
25	2.34	0.87	328.06	6.98	45.21	380.25	7839.42	361.08
24	2.36	0.89	330.39	7.08	44.24	381.71	7459.17	361.00
23	2.38	0.90	332.61	7.18	43.31	383.10	7077.46	360.92
22	2.39	0.91	334.74	7.28	42.42	384.44	6694.36	360.83
21	2.41	0.92	336.76	7.38	41.57	385.71	6309.92	360.75
20	2.42	0.93	338.70	7.47	40.76	386.93	5924.21	360.67
19	2.43	0.95	340.53	7.56	39.99	388.09	5537.28	360.58
18	2.44	0.96	342.28	7.65	39.25	389.19	5149.19	360.50
17	2.46	0.97	343.93	7.74	38.56	390.23	4760.00	360.42
16	2.47	0.98	345.49	7.82	37.90	391.21	4369.78	360.33

Oak Tree
SY-1385
19-Apr-21

VOLUME OF SC-4500 SYSTEM (ISOLATOR UNITS) FOR: ***Site-5A***

STAGE (elev. In ft.)	VOLUME PER UNIT (cubic feet)	VOLUME SYSTEM (ac-ft)
359.08	0.00	0.0000
359.75	0.00	0.0000
360.75	0.00	0.0000
361.75	0.00	0.0000
362.75	0.00	0.0000
363.75	0.00	0.0000
364.75	0.00	0.0000
365.75	0.00	0.0000

VOLUME OF SC-4500 SYSTEM (DETENTION UNITS) FOR: ***Site-5A***

STAGE (elev. In ft.)	VOLUME PER UNIT (cubic feet)	VOLUME SYSTEM (ac-ft)
359.08	0.00	0.0000
359.75	1613.04	0.0370
360.75	6309.92	0.1449
361.75	10821.12	0.2484
362.75	15028.44	0.3450
363.75	18749.89	0.4304
364.75	21484.63	0.4932
365.75	23635.36	0.5426

COMBINED VOLUME OF SC-4500 SYSTEM FOR: ***Site-5A***

STAGE (elev. In ft.)	VOLUME PER UNIT (cubic feet)	VOLUME SYSTEM (ac-ft)
359.08	0.00	0.0000
359.75	1613.04	0.0370
360.75	6309.92	0.1449
361.75	10821.12	0.2484
362.75	15028.44	0.3450
363.75	18749.89	0.4304
364.75	21484.63	0.4932
365.75	23635.36	0.5426

SEEPAGE BASIN DATA:

1) Chamber: 4.03 Ft. Long
8.17 Ft. Wide
140 = required number of chambers

Chamber End Cap base area: 15.6 sf
8 = required number of end caps

Area chambers: 4609.514 sf

Area end caps: 124.8 sf

Total Area for Percolation: **4734.314** sf

2) Storage:

Inside Area of Basin = πr^2 = $\pi (D/2)^2$

= 12.76 ft^2

= 0.00029 ac

= 0.0410 ac (for 140 LB)

3) Outflow:

Stage 0.1 Only

Seepage Area (A) = Exterior Area of Base

Stages 1-8

Seepage Area (A) = Sum (Previous Seepage Area)

Percolation Rate (V) = 1 inch per 14 Minutes

= 0.000099 ft/sec

Outflow Rate (Q) = Seepage Area (A) x Percolation Rate (V)

Basin Outflow:

SEEPAGE BASIN STAGE VS. OUTFLOW

Stage	Elev	Seepage Area (ft^2)	Percolation Rate (feet/sec)	Outflow Rate (cfs)
0.1	359.08	4,734.3	0.000099	0.46967
1	360.08	4,734.3	0.000099	0.46967
2	361.08	4,734.3	0.000099	0.46967
3	362.08	4,734.3	0.000099	0.46967
4	363.08	4,734.3	0.000099	0.46967
5	364.08	4,734.3	0.000099	0.46967

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Summary Table #WQ-1:Water Quality Volume Calculations

Project: **Oak Tree**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Water Quality Calculations

NYSDEC Required Storage Volume:

Sub-Area: *Site-5A*

Data:

P:	1.3	= 90% Rainfall Event Number from Figure #1
Rv:	0.81905	= 0.05 + 0.009(I) (Min. Rv =0.2) Use Rv = 0.81905
I:	85.45	= Impervious coverage percentage
A:	4.26	= Site Area to Basin (in acres)

WQv: **0.378** = Req'd Water Quality Volume (in ac-ft)

$$= \frac{(P)(Rv)(A)}{12}$$

Pre Treatment required (20% if percolation rate less than 2-inches per hour and 100% if more than 2-inches per hour):

Percolation Rate: 14 minutes for 1 inch drop.
Volume percentage required: 100 percent

***See First Defense Vortex calculations for Pre-Treatment**

Set required WQv Elev:

		Elev. (ft.)	Cumulative Volume
Infiltration System Invert Elevation (I_{EL}) =		82.5	(ac-ft)
Water Quality Storage Elevation Range:	High:	364.75	0.4932
	Low:	359.00	0.0000
	Diff. =		0.4932

Minimum WQ Volume required above permanent pool = **0.3780** ac-ft

Interpolated Volume Change = (Higher Cumulative Volume - Req'd WQ Volume over Perm. Pool)/Diff. In Volume in Range

Interpolated Volume Change = (0.4932 - 0.3780)/ 0.4932

Interpolated Volume Ratio = 0.2336

Interpolated Elevation Change = 364.75 - (0.2336 x 5.75)

Interpolated Elevation Change = 363.41 ft.

Minimum Water Quality Volume High Elevation = 363.41 ft.

Set Water Quality Volume Elevation = 363.50 ft.

**Note: Total Storage at elevation: 363.50 is 0.3860 ac-ft, which is greater than req. 0.3780 ac-ft.* ok

Water Quality Volume (WQv) Water Quality Peak Flow (Qp) Calculation W

Project:	Oak Tree Apartments
Location:	SubArea "Site-5A" Haverstraw, NY
Date:	April 21, 2021
Designer:	Ian Kuchman & Steve Sparaco

TR-55 AND TR-20 RAINFALL DISTRIBUTION TYPE= II

(R=I_a/P) C_1=AR^2+B*R+C*		A	B	C
Coefficients for unit peak discharge equation	C_0	-2.2349	0.4759	2.5273
Coefficients for unit peak discharge equation	C_1	1.5555	-0.7081	-0.5584
Coefficients for unit peak discharge equation	C_2	0.6041	0.0437	-0.1761

INPUT CRITERIA: *TRIBUTARY (TREATED) AREA*

	ABBREVIATION	UNITS	VALUES
TOTAL DEVELOPED (GREATER OF DISTURBED OR TRIBUTARY) AREA	A	acres	4.26
IMPERVIOUS SURFACE AREA	I	acres	3.64
NYSDEC 90% RAINFALL EVENT NUMBER (1)	P	inches	1.30
TIME OF CONCENTRATION	T_c	hours	0.083

CALCULATIONS:

WATER QUALITY VOLUME (2)(3)

REQUIRED WATER QUALITY VOLUME WQ_v=3630*P(0.05*A+0.9*I)	WQ_v	acres-ft	0.378
REQUIRED WATER QUALITY VOLUME (100% FOR NEW DEVELOPMENT)	WQ_v	cu. ft.	16,465

WATER QUALITY PEAK FLOW (4)

RUNOFF VOLUME Q=WQ_v/(A*3600)	Q	inches	1.065
CN=1000/(10+5*P+10*Q-10(Q^2+1.25*Q*P)^{½})	CN		98
CN ROUNDED	CN		98.000
CN < or = 98	CN		98
INITIAL ABSTRACTION, I_a = 200/CN-2	I_a	inches	0.041
RATIO, R = I_a/P	R		0
C_0 = A*R^2 +B*R +C	C_0		2.540
C_1 = A*R^2 +B*R +C	C_1		-0.579
C_2 = A*R^2 +B*R +C	C_2		-0.174
UNIT PEAK DISCHARDGE, qu = 10^(C_0+C_1*Log(T_c)+C_2*(log(T_c))^2)	q_u	cfs/mi^2/in	917
REQUIRED NEW DEVELOPMENT WATER QUALITY PEAK FLOW, Q_p=qu*A*Q/640	Q_p	cfs	**6.501**

MAXIMUM TREATMENT CAPACITY OF MANUFACTURED TREATMENT DEVICE (MTD)	**7.520**

* *FD-8HC*

References:

(1) Refer to Section 4.2 Water Quality Volume (WQv) Figure 4.1 "90% Rainfall in New York State" in the New York State Stormwater Design Manual, last revised August 2015.

(2) Refer to Sections 4.1 and 4.2 for Water Quality Volume (WQv) calculations in the New York State Stormwater Design Manual, last revised August 2015.

(3) Refer to Section 9.3.2 "Sizing Criteria" for Water Quality Volume (WQv) calculations for Redevelopment Projects in the New York State Stormwater Design Manual, last revised August 2015.

(4) Refer to Appendix B.2 "Water Quality Peak Flow Calculation" in the New York State Stormwater Design Manual, last revised August 2010.

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Summary Table #WQ-2:Runoff Reduction Volume Calculations

Project: **Oak Tree**
Location: **Haverstraw, NY**
JOB # SY-1385

By: SMS
Rev. Date: 19-Apr-21

Runoff Reduction Volume Calculations

NYSDEC Required Runoff Reduction Volume for : Sub-Area: *Site-5A*

Data: Entire Subarea

P:	1.3	= 90% Rainfall Event Number from Figure #1
Rv:	0.950	= 0.05 + 0.009(I) (I=100 percent)
Aic:	3.64	= Impervious cover targeted for runoff reduction (in acres)
Ai:	1.092	= (S)(Aic) (in acres)
S:	0.3	= Hydrologic Soil Group (HSG) Specific Reduction Factor

HSG Type "A" = 0.55
HSG Type "B" = 0.4
HSG Type "C" = 0.3
HSG Type "D" = 0.2

RR_{V1}: **0.112** = Req'd Runoff Reduction Volume (in ac-ft)
$= \frac{(P)(Rv)(Ai)}{12}$

Provided Volume in Stormceptor Chamber system: **0.386 ac-ft** *up to WQv Elevation.* **ok, greater than required RR_{v1}:**

***Note: Current NYSDEC regulations allow RRv for 100% of WQv when using infiltration practices.**

Total Available Volume in Stormceptor system: *0.543 ac-ft*

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Channel Protection Storage Volume (Cp_V): Calculation:

Project: **Oak Tree** By: SMS
Location: **Haverstraw, NY** Date: 19-Apr-21

Data:

Water Quality Orifice Invert. . . . . = 82.50 ft.
Water Quality Storage Elevation. . . . . = 363.50 ft.

			Sub-basin:	Site-5A
1.	Unit Peak Discharge, q_u. . . . . =	(csm/in.)		650
	Duration Time, T.....T =	(hr .)		24
	Runoff, Q . . . . . =	(in.)		1.96
	Drainage Area.....Am =	(mi^2)		0.0067
	Drainage Area (in acres) = A_m x 640 = A =	(acres)		4.26

2. Find (q_o/q_i) from Figure 8.5. . . . . 0.03
(q_o/q_i = Peak outflow/Peak Inflow discharge)

3. Calculate V_s/V_r 0.642
[$V_s/V_r = 0.683-1.43(q_o/q_i) + 1.64 (q_o/q_i)^2 -0.804 (q_o/q_i)^3$]

				Total V_s	
4.	Solve for V_s	(ac-ft)	0.4471	**0.4471**	(ac-ft)
	[V_s=Cp_v = (V_s/V_r) x Q x A/12]	(cubic ft.)	19,477	19477	(cubic ft.)

5. Compute Average Release Rate = Q_{AVG} 0.23 (cfs)
[Q_{AVG} = V_s /T*3600 sec/hr]

Calculate Required Channel Protection Volume Elevation ($Cp_V E$):

		Elev. (ft.)	Cumulative Volume (ac-ft)	Actual WQ ume Reser (ac-ft)	Net Volume (ac-ft)
Water Quality Volume Elevation (WQ_{vE}) =		363.50			
Channel Protection Storage Elevation Range:	High:	364.75	0.5426	0.0000	0.5426
	Low:	359.00	0.0000	0.0000	0.0000
	Diff. =		0.5426	0.0000	0.5426

Min. Channel Protection Volume required = 0.4471 ac-ft

Interpolated Volume Change = (Higher Net Volume - Req'd Cp Volume over WQv)/Diff. In Volume in Range

Interpolated Volume Ratio = (0.5426 - 0.4471)/ 0.5426

Interpolated Volume Ratio = 0.1759

Interpolated Elevation Change = 364.75 - (0.1759 x 5.75)

Interpolated Elevation Change = 363.74 ft.

Minimum Channel Protection Volume High Elevation = 363.74 ft.

Set Channel Protection Volume Elevation = 363.75 ft.

*Note: Total Storage at elevation: 363.75 is 0.4482 ac-ft, which is greater thai 0.4471 ac-ft.

Compute the required Cp_V-ED orifice:

Required Cpv = 0.4471 ac-ft.

Average ED release rate = 0.4471 x 43560 ft^2/ac / (24 hr x 3600 sec/hr)

Average ED release rate = 0.23 cfs

*Size Cpv-ED orifice
to release average of : 0.23 - 0.00 cfs

Qavg = 0.23 cfs

Average Cpv-ED orifice rate is:

Average head (h) = (WQ_{VE} - WQ_{PPE})/2

$$\text{Average h} = \frac{363.75 - 363.50}{2}$$

Average h = 0.13 ft.

***Use the orifice flow equation to calculate the required cross-sectional area and diameter for the Cp_V-ED orifice:*

[Q=ca(sq. rt. (2gh))]

where:

c = 0.61

g = 32.2

Average h = 0.13

sqrt(2gh) = 2.837

a= 0.130 sq. ft. ased upon: [a=Q/c (sq. rt. (2gh))]

Calculate diameter of pipe based upon area = D = 0.407 ft. ased upon: [D = sq. rt. (4a/3.15159)]

D = 4.887 in.

For Design, Use a 4.50 in. dia. hole.

(3" dia. is minimum as per NYSDEC)

Orifice centerline elevation = Orifice invert + (Orifice size in feet/2)

Orifice centerline elevation = 363.50 + 0.19

Orifice centerline elevation = 363.69 ft.

WQ PROPRIETARY INFO:

- *Proprietary Structures and Details used for Pre-Treatment on site*

  Envirohood
  First Defence High Capacity Vortex Structure

- *State of New Jersey MTD Lab Certification for First Defense Stormwater Treatment Device used on site.*

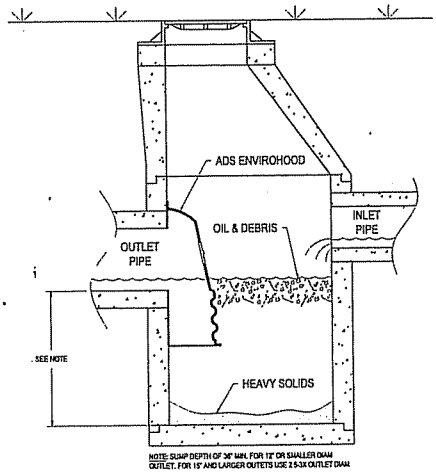
NYLOPLAST ENVIROHOOD SPECIFICATION

SCOPE

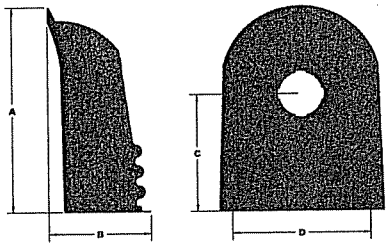
This specification describes the EnviroHood for use in stormwater conveyance systems.

REQUIREMENTS

- All hoods shall be constructed of polyethylene.
- The size and position of the hood shall be determined by the outlet pipe size as per manufacturer's recommendation.
- The bottom of the hood shall extend downward a minimum distance of 6" (15 cm) for pipes < 12" (30 cm).
- Installation hardware and instructions shall be provided by manufacturer.
- Installation shall be in accordance with Nyloplast installation procedures and those issues by local building/construction regulations.



TYPICAL INSTALLATION



STRUCTURE TYPE	OUTLET COVERED	PART NUMBER*	GENERAL DIMENSIONS in. (cm) A	B	C	D
48" (120 cm) Round Concrete	up to 18" (45 cm)	5818AGR	30.2 (75)	14.9 (35)	17.2 (45)	20.5 (50)
48"–54" (120–135 cm) Round Concrete	up to 24" (60 cm)	5824AGR	41.7 (105)	18.0 (45)	26.9 (70)	26.9 (70)
54"–60" (135–150 cm) Round Concrete	up to 30" (75 cm)	5830AGR	48.7 (120)	20.5 (50)	30.5 (75)	33.1 (85)
Flat Concrete	up to 18" (45 cm)	5818AGF	30.2 (75)	11.8 (30)	17.2 (45)	20.4 (50)
Flat Concrete	up to 24" (60 cm)	5824AGF	41.8 (105)	15.3 (40)	26.9 (70)	27.0 (70)
Flat Concrete	up to 30" (75 cm)	5830AGF	48.8 (120)	18.3 (45)	30.5 (75)	34.0 (85)
18" (45 cm) Nyloplast	up to 12" (30 cm)	5818AG0412	19.4 (50)	9.8 (25)	12.3 (30)	13.8 (35)
24" (60 cm) Nyloplast	up to 15" (40 cm)	5824AG0415	26.5 (65)	12.8 (30)	14.5 (35)	20.0 (50)
30" (75 cm) Nyloplast	up to 18" (45 cm)	5830AG0418	32.8 (85)	15.4 (40)	18.7 (45)	26.0 (65)

*Includes installation hardware

For more information on EnviroHood and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

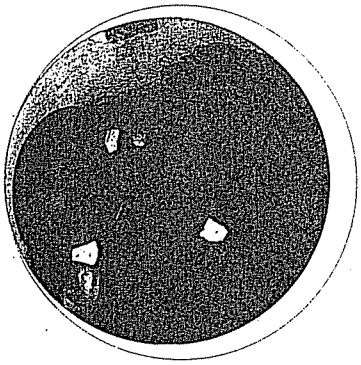
BRO 10853 07/12

Advanced Drainage Systems, Inc.
4640 Trueman Blvd., Hilliard, OH 43026
1-800-821-6710 www.ads-pipe.com

EnviroHood

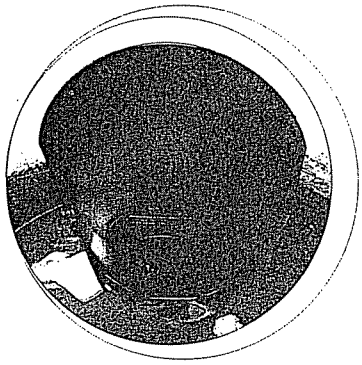
ADS

ENVIROHOOD STRUCTURE



The Nyloplast® EnviroHood™ is an innovative stormwater management device attached to the inside of a catch basin or manhole designed to prevent the outflow of floating debris and oil.

The need for cleaner stormwater has caused municipal leaders to demand forward-thinking solutions to improve their overall water quality. The EnviroHood offers lower installed costs and less intrusive installations than competitive devices.

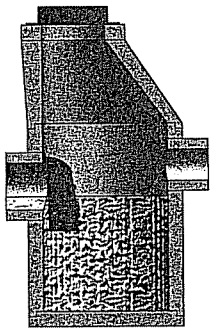


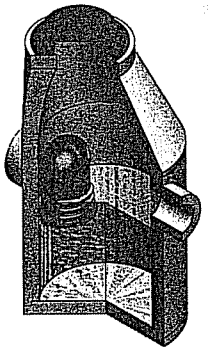
ENGINEERED FOR OPTIMAL PERFORMANCE

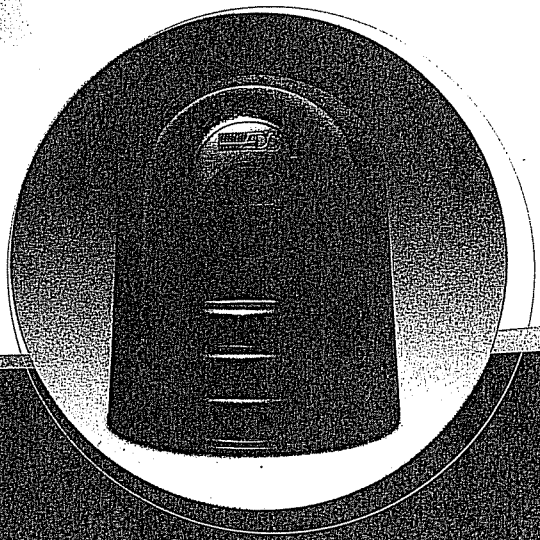
The innovative design incorporates the same proven corrugation technology used on ADS N-12® pipe products. This delivers maximum strength to weight ratio and ensures the structure is capable of supporting the hydraulic forces of a rainfall event.

FEATURES & BENEFITS:

- Molded from High Density Polyethylene (HDPE) for lightweight and sturdy design
- Corrugated design eliminates flat surfaces and provides increased structural capacity
- Effective low-cost solution for storm water treatment
- Easy to clean
- Highly corrosion-resistant for long service life







ADS Service: **ADS representatives are committed to providing you with the answers to all your questions, including specifications, installation and more.**

First Defense® High Capacity

A Simple Solution for your Trickiest Sites

Verified by NJCAT and NJDEP

Product Profile

The First Defense® High Capacity is an enhanced vortex separator that combines an effective stormwater treatment chamber with an integral peak flow bypass. It efficiently removes sediment total suspended solids (TSS), trash and hydrocarbons from stormwater runoff without washing out previously captured pollutants. The First Defense® High Capacity is available in several model configurations to accommodate a wide range of pipe sizes, peak flows and depth constraints (**Table 1**, next page).

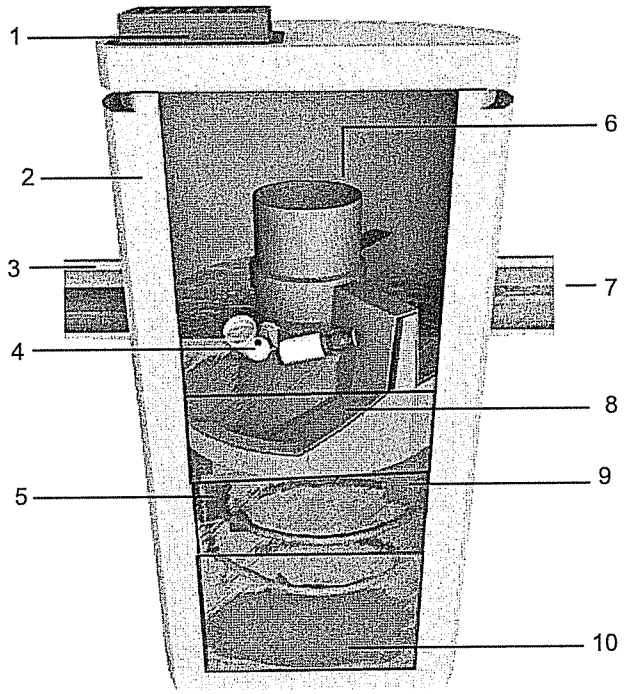
Applications

- Stormwater treatment at the point of entry into the drainage line
- Sites constrained by space, topography or drainage profiles with limited slope and depth of cover
- Retrofit installations where stormwater treatment is placed on or ed into an existing storm drain line
- retreatment for filters, infiltration and storage

Advantages

- Inlet options include surface grate or multiple inlet pipes
- Integral high capacity bypass conveys large peak flows without the need for "offline" arrangements using separate junction manholes
- Proven to prevent pollutant washout at up to 450% of its treatment flow
- Long flow path through the device ensures a long residence time within the treatment chamber, enhancing pollutant settling
- Delivered to site pre-assembled and ready for installation

Fig.1 The First Defense® High Capacity has internal components designed to efficiently capture pollutants and prevent washout at peak flows.



Components

1. Inlet Grate (optional)
2. Precast chamber
3. Inlet Pipe (optional)
4. Floatables Draw Off Slot (not pictured)
5. Inlet Chute
6. Internal Bypass
7. Outlet pipe
8. Oil and Floatables Storage
9. Outlet chute
10. Sediment Storage Sump

How it Works

The First Defense® High Capacity has internal components designed to remove and retain gross debris, total suspended solids (TSS) an hydrocarbons (**Fig.1**).

Contaminated stormwater runoff enters the inlet chute from a surface grate and/or inlet pipe. The inlet chute introduces flow into the chambe tangentially to create a low energy vortex flow regime (magenta arrow) that directs sediment into the sump while oils, floating trash and debri rise to the surface.

Treated stormwater exits through a submerged outlet chute located opposite to the direction of the rotating flow (blue arrow). Enhanced vorte separation is provided by forcing the rotating flow within the vessel to follow the longest path possible rather than directly from inlet to outlet.

her flows bypass the treatment chamber to prevent turbulence and washout of captured pollutants. An internal bypass conveys infrequer peak flows directly to the outlet eliminating the need for, and expense of, external bypass control structures. A floatables draw off slot function to convey floatables into the treatment chamber prior to bypass.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com

First Defense® High Capacity

Sizing & Design

s adaptable online treatment system works easily with large pipes, multiple inlet pipes, inlet grates and now, contains a high capacity bypass for the conveyance of large peak flows. Designed with site flexibility in mind, the First Defense® High Capacity allows engineers to maximize available site space without compromising treatment level.

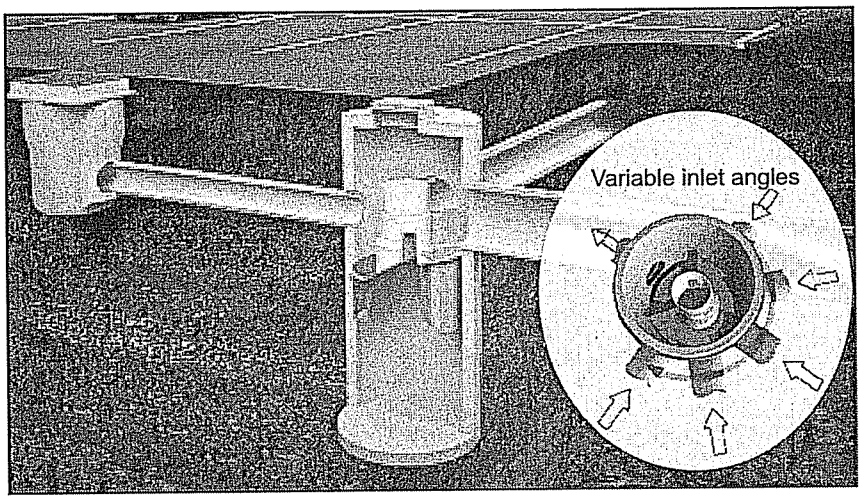


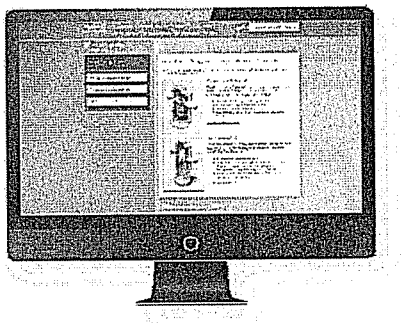
Fig 2. Works with multiple inlet pipes and grates

Inspection and Maintenance

body maintains our systems better than we do. To ensure optimal, ongoing device performance, be sure to recommend Hydro International as a preferred service and maintenance provider to your clients.

Call 1 (800) 848-2706 to schedule an inspection and cleanout or learn more at hydro-int.com/service

Sizing Calculator for Engineers



This simple online tool will recommend the best separator, model size and online/offline arrangement based on site-specific data entered by the user.

Go to hydro-int.com/sizing to access the tool.

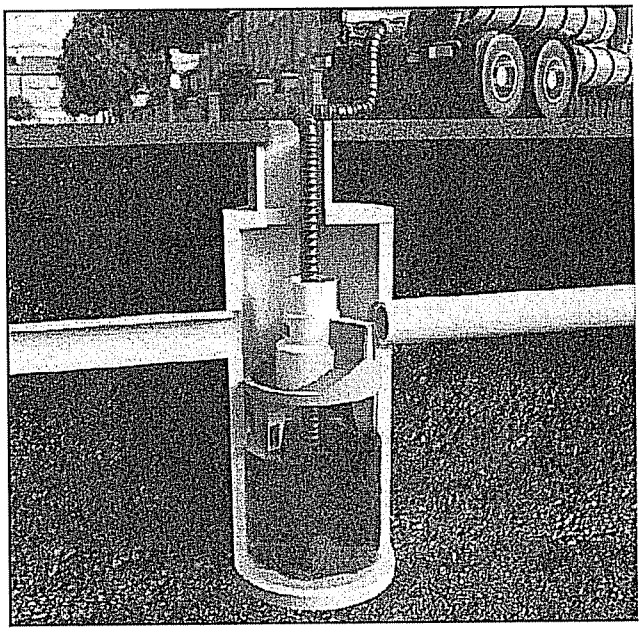


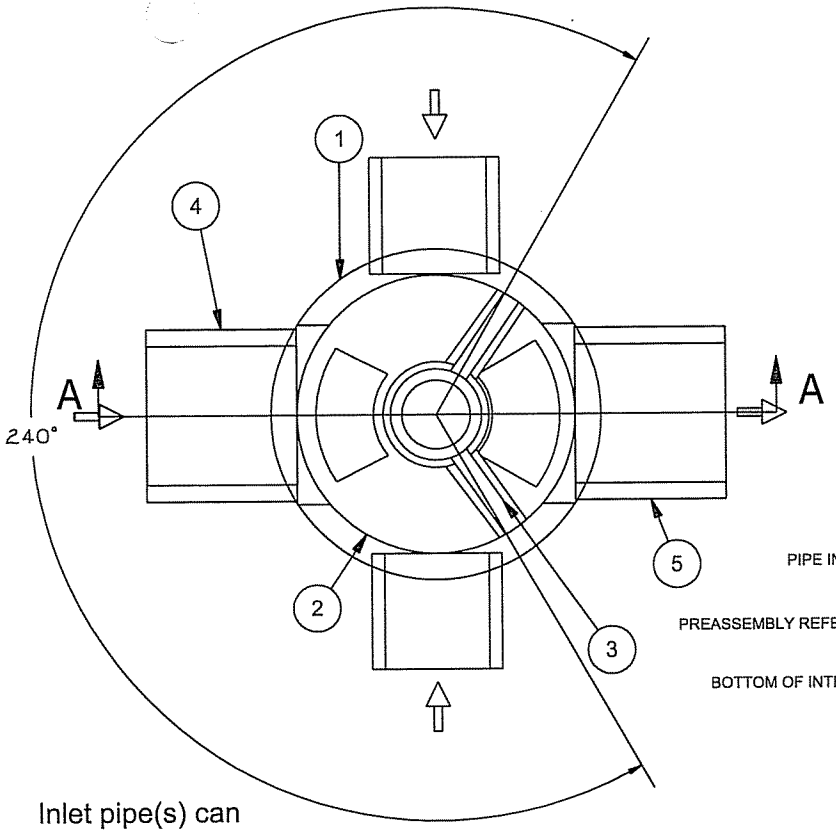
Fig 3. Maintenance is done with a vactor truck

Table 1. First Defense® High Capacity Design Criteria.

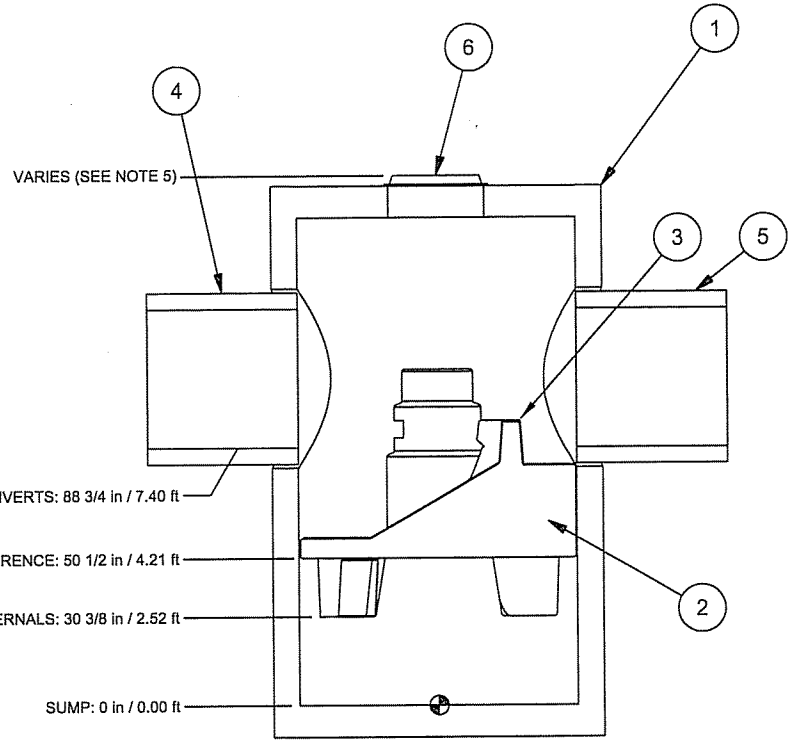
First Defense® High Capacity Model Number	Diameter	Typical TSS Treatment Flow Rates		Peak Online Flow Rate	Maximum Pipe Diameter[1]	Oil Storage Capacity	Typical Sediment Storage Capacity[2]	Minimum Distance from Outlet Invert to Top of Rim[3]	Standard Distance from Outlet Invert to Sump Floor
		NJDEP Certified	110µm						
	(ft / m)	(cfs / L/s)	(cfs / L/s)	(cfs / L/s)	(in / mm)	(gal / L)	(yd^3 / m^3)	(ft / m)	(ft / m)
FD-3HC	3 / 0.9	0.84 / 23.7	1.06 / 30.0	15 / 424	18 / 457	125 / 473	0.4 / 0.3	2.0 - 3.5 / 0.6 - 1.0	3.71 / 1.13
FD-4HC	4 / 1.2	1.50 / 42.4	1.88 / 53.2	18 / 510	24 / 600	191 / 723	0.7 / 0.5	2.3 - 3.9 / 0.7 - 1.2	4.97 / 1.5
FD-5HC	5 / 1.5	2.35 / 66.2	2.94 / 83.2	20 / 566	24 / 600	300 / 1135	1.1 / .84	2.5 - 4.5 / 0.7 - 1.3	5.19 / 1.5
FD-6HC	6 / 1.8	3.38 / 95.7	4.23 / 119.8	32 / 906	30 / 750	496 / 1,878	1.6 / 1.2	3.0 - 5.1 / 0.9 - 1.6	5.97 / 1.8
FD-8HC	8 / 2.4	6.00 / 169.9	7.52 / 212.9	50 / 1,415	48 / 1219	1120 / 4239	2.8 / 2.1	3.0 - 6.0 / 0.9 -1.8	7.40 / 2.2

[1]ct Hydro International when larger pipe sizes are required.
[2]Contact Hydro International when custom sediment storage capacity is required.
[3]Minimum distance for models depends on pipe diameter.

Hydro International, 94 Hutchins Drive, Portland, ME 04102
Tel: (207) 756-6200 Fax: (207) 756-6212
Email: stormwaterinquiry@hydro-int.com Web: www.hydro-int.com



Inlet pipe(s) can enter anywhere within 240° arc.



SECTION A-A

Notes

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.
2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.
3. CONTRACTOR TO CONFIRMRIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

REV	BY	DATE	DESCRIPTION
-	JLL3	3/16/16	FIRST RELEASE

REVISION HISTORY

Date	Scale
3/16/2016	3/6"=1'

Drawn	Checked	Approved
JLL3		

Title

8-FT DIAMETER
FIRST DEFENSE® HC

GENERAL ARANGEMENT

GENERAL NOTES:
1. General Arrangement drawings only. Contact Hydro International for site specific fabrication drawings.
2. The diameter of the inlet & outlet pipes may be no more than 48".
3. Multiple inlet pipes possible (refer to project plans).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plans).
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

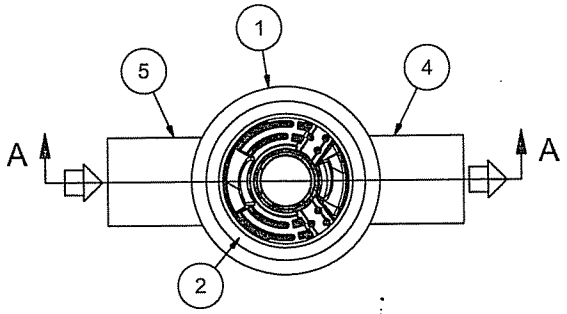
PRODUCT SPECIFICATIONS:
A. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
B. The treatment system shall fit within the limits of excavation (area and depth) as shown in the project plans and will not exceed the dimensions for the design flow rates specified herein.
C. The treatment system shall convey the Peak On-line Flow Rates of up to 30 cfs without causing upstream surcharge conditions. Full-scale independent laboratory scour testing shall demonstrate effluent control of less than or equal to 5 mg/L for all flows up to 200% of MTFR-106.
D. The treatment system shall be capable of capturing and retaining fine silt and sand size particles. Analysis of captured sediment from full-scale field installations shall demonstrate particle sizes predominately in the 20-micron range

Parts List		
ITEM	SIZE (in)	DESCRIPTION
1	96	I.D. PRECAST MANHOLE
2		LEDGER SUPPORT
3		SEPARATION MODULE
4	48	MAXIMUM INLET PIPE (BY OTHERS)
5	48	MAXIMUM OUTLET PIPE (BY OTHERS)
6	30	FRAME AND COVER (OR GRATE) (ROUND)

Hydro International

Stormwater Solutions
94 Hutchins Drive
Portland, Maine 04102
Tel: (207) 756-6200
Fax: (207) 756-6212
stormwaterinquiry@hydro-int.com

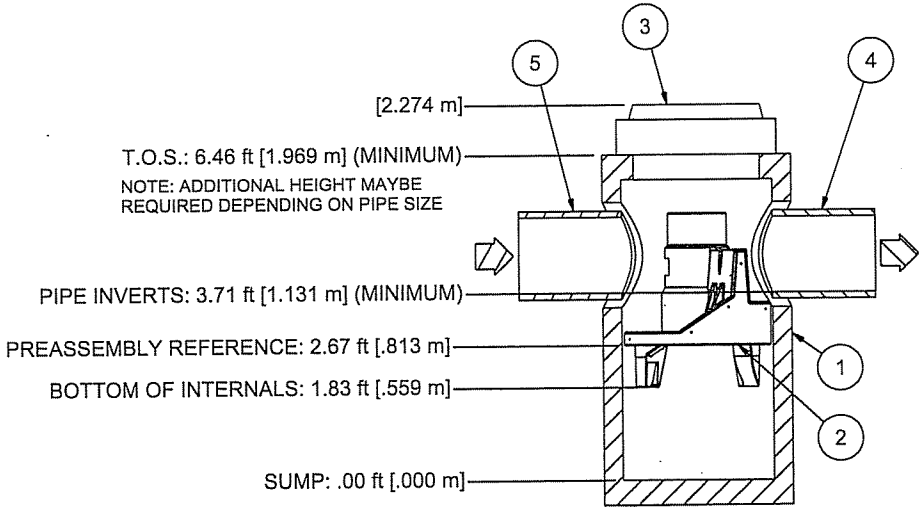
CAD Ref: F8HC-MAX
Project No. xx-xxxx
Drawing No. F8HCS1 Rev.



PLAN VIEW

HYDRO FRAME AND COVER (INCLUDED)

GRADE RINGS BY OTHERS AS REQUIRED



SECTION A-A

PRODUCT SPECIFICATION:

1. Peak Hydraulic Flow: 15.0 cfs (424 l/s)
2. Min Sediment Storage Capacity: 0.4 cu. yd. (0.3 cu. m.)
3. Oil Storage Capacity: 125 gal. (473 liters)
4. Maximum Inlet/Outlet Pipe Diameters: 18 in. (450 mm)
5. The treatment system shall use an induced vortex to separate pollutants from stormwater runoff.
6. For more product information including regulatory acceptances, please visit https://hydro-int.com/en/products/first-defense

GENERAL NOTES:

1. General Arrangement drawings only. Contact Hydro International for site specific drawings.
2. The diameter of the inlet and outlet pipes may be no more than 18".
3. Multiple inlet pipes possible (refer to project plan).
4. Inlet/outlet pipe angle can vary to align with drainage network (refer to project plan.s)
5. Peak flow rate and minimum height limited by available cover and pipe diameter.
6. Larger sediment storage capacity may be provided with a deeper sump depth.

PARTS LIST				
ITEM	QTY	SIZE (in)	SIZE (mm)	DESCRIPTION
1	1	36	900	I.D. PRECAST MANHOLE
2	1			INTERNAL COMPONENTS (PRE-INSTALLED)
3	1	30	750	FRAME AND COVER (ROUND)
4	1	18 (MAX)	450 (MAX)	OUTLET PIPE (BY OTHERS)
5	1	18 (MAX)	450 (MAX)	INLET PIPE (BY OTHERS)

PROJECTION

IF IN DOUBT ASK

COMMENTS:

1. MANHOLE WALL AND SLAB THICKNESSES ARE NOT TO SCALE.

2. CONTACT HYDRO INTERNATIONAL FOR A BOTTOM OF STRUCTURE ELEVATION PRIOR TO SETTING FIRST DEFENSE MANHOLE.

3. CONTRACTOR TO CONFIRM RIM, PIPE INVERTS, PIPE DIA. AND PIPE ORIENTATION PRIOR TO RELEASE OF UNIT TO FABRICATION.

DATE:	SCALE:
10/7/2019	1:30

DRAWN BY:	CHECKED BY:	APPROVED BY
ER	MRJ	

Title
3-ft DIAMETER

FIRST DEFENSE HIGH CAPACITY

GENERAL ARRANGEMENT

Hydro International

hydro-int.com

HYDRO INTERNATIONAL

DO NOT SCALE DRAWING
STEEL FABRICATION TOLERANCES
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

LINEAR	ANGULAR
000 - 012in = ±0.04in	000 - 120in = ±1°
012 - 024in = ±0.06in	120 - 240in = ±0.5°
024 - 048in = ±0.08in	240in >>>> = ±0.25°
048 - 120in = ±0.12in	
120in >>>> = ±0.20in	

WEIGHT:	MATERIAL:
N/A	

STOCK NUMBER:

DRAWING NO.:
FDHC GA-3

SHEET SIZE:	SHEET:	Rev:
B	1 OF 1	-

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Nonpoint Pollution Control
Division of Water Quality
401-02B
Post Office Box 420
Trenton, New Jersey 08625-0420
609-633-7021 Fax: 609-777-0432
http://www.state.nj.us/dep/dwq/bnpc_home.htm

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 9, 2017

Mr. Dave Scott
Technical Product Manager
Hydro International
94 Hutchins Drive
Portland, ME 04102

Re: MTD Lab Certification
First Defense® HC (FDHC) Stormwater Treatment Device by Hydro International
On-line Installation

TSS Removal Rate 50%

Dear Mr. Scott:

This revised certification letter supersedes the Department's prior certification dated April 4, 2016. This revision was completed to reflect the updated Manufactured Treatment Device (MTD) scaling methodology as agreed upon by the manufacturers' working group on September 19, 2016. In part, the updated scaling for hydrodynamic MTDs is based on the depth of the reference (tested) MTD from the top of the false floor utilized during removal efficiency testing, not from the physical bottom of the unit. Based on the above decision, Table A-2 of the NJCAT Technology Verification report located at http://www.njcat.org/uploads/newDocs/FDHCVerificationReportFinal.pdf has been revised, and Table 1 noted below has been updated as well.

The Stormwater Management rules under N.J.A.C. 7:8-5.5(b) and 5.7 (c) allow the use of manufactured treatment devices (MTDs) for compliance with the design and performance standards at N.J.A.C. 7:8-5 if the pollutant removal rates have been verified by the New Jersey Corporation for Advanced Technology (NJCAT) and have been certified by the New Jersey Department of Environmental Protection (NJDEP). Hydro International has requested an MTD Laboratory Certification for the First Defense® HC Stormwater Treatment Device.

The project falls under the "Procedure for Obtaining Verification of a Stormwater Manufactured Treatment Device from New Jersey Corporation for Advance Technology" dated January 25, 2013. The applicable protocol is the "New Jersey Laboratory Testing Protocol to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device" dated January 25, 2013.

NJCAT verification documents submitted to the NJDEP indicate that the requirements of the protocol have been met or exceeded. The NJCAT letter also included a recommended certification TSS removal rate and the required maintenance plan. The NJCAT Verification Report dated February 2016 (Revised

January 2017) with the Verification Appendix for this device is published online at http://www.njcat.org/verification-process/technology-verification-database.html.

The NJDEP certifies the use of the First Defense® HC Stormwater Treatment Device by Hydro International at a TSS removal rate of 50% when designed, operated and maintained in accordance with the information provided in the Verification Appendix and the following conditions:

1. The maximum treatment flow rate (MTFR) for the manufactured treatment device (MTD) is calculated using the New Jersey Water Quality Design Storm (1.25 inches in 2 hrs) in N.J.A.C. 7:8-5.5.

2. The First Defense® HC Stormwater Treatment Device shall be installed using the same configuration reviewed by NJCAT and shall be sized in accordance with the criteria specified in in item 6 below.

3. This First Defense® HC Stormwater Treatment Device cannot be used in series with another MTD or a media filter (such as a sand filter), to achieve an enhance removal rate for total suspended solids (TSS) removal under N.J.A.C. 7:8-5.5.

4. Additional design criteria for MTDs can be found in Chapter 9.6 of the New Jersey Stormwater Best Management Practices (NJ Stormwater BMP) Manual which can be found on-line at www.njstormwater.org.

5. The maintenance plan for a site using this device shall incorporate, at a minimum, the maintenance requirements for the First Defense® HC Stormwater Treatment Device, which is attached to this document. However, it is recommended to review the maintenance manual at http://a2795.actonsoftware.com/acton/attachment/2795/f-0132/1/-/-/-/-/Hydro-International-First-Defense-Treatment-System.pdf for any changes to the maintenance requirements.

6. Sizing Requirements:

   The example below demonstrates the sizing procedure for the First Defense® HC Stormwater Treatment Device:

   Example: A 0.25-acre impervious site is to be treated to 50% TSS removal using a First Defense® HC Stormwater Treatment Device. The impervious site runoff (Q) based on the New Jersey Water Quality Design Storm was determined to be 0.79 cfs.

   Maximum Treatment Flow Rate (MTFR) Evaluation:

   The site runoff (Q) was based on the following:
   time of concentration = 10 minutes
   i=3.2 in/hr (page 5-8, Fig. 5-3 of the NJ Stormwater BMP Manual)
   c=0.99 (curve number for impervious)
   Q=ciA=0.99x3.2x0.25=0.79 cfs

   Given the site runoff is 0.79 cfs and based on Table 1 below, the First Defense® HC Model 3-ft with a MTFR of 0.85 cfs would be the smallest model approved that could be used for this site that could remove 50% of the TSS from the impervious area without exceeding the MTFR.

The sizing table corresponding to the available system models is noted below. Additional specifications regarding each model can be found in the Verification Appendix under Table A-1 and Table A-2.

Table 1 First Defense® HC Models

First Defense® Model	Manhole Diameter (ft)	Maximum Treatment Flowrate, MTFR (cfs)
3-ft	3	0.85
4-ft	4	1.5
5-ft	5	2.35
6-ft	6	3.38
7-ft	7	4.60
8-ft	8	6.00

Be advised a detailed maintenance plan is mandatory for any project with a Stormwater BMP subject to the Stormwater Management Rules, N.J.A.C. 7:8. The plan must include all the items identified in the Stormwater Management Rules, N.J.A.C. 7:8-5.8. Such items include, but are not limited to, the list of inspection and maintenance equipment and tools, specific corrective and preventative maintenance tasks, indication of problems in the system, and training of maintenance personnel. Additional information can be found in Chapter 8: Maintenance and Retrofit of Stormwater Management Measures.

If you have any questions regarding the above information, please contact Mr. Shashi Nayak of my office at (609) 633-7021.

Sincerely,

James J. Murphy, Chief
Bureau of Nonpoint Pollution Control

Attachment: Maintenance Plan

C: Chron File
Richard Magee, NJCAT
Vince Mazzei, NJDEP - DLUR
Ravi Patraju, NJDEP - BES
Gabriel Mahon, NJDEP - BNPC
Shashi Nayak, NJDEP - BNPC

Hec-1 Analyses:

1.) Existing Conditions Hec-1 Model
2.) Developed Conditions Hec-1 Model

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*          VERSION 4.0.1U               *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  09/17/19  TIME  15:41:00   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748              *
*                                       *
*****************************************
```

OAK TREE DEVELOPMENT #SY-1385: EXISTING CONDITIONS HEC-1 ANALYSIS

```
X     X  XXXXXXX   XXXXX           X
X     X  X         X     X        XX
X     X  X         X              X
XXXXXXX  XXXX      X        XXXXX  X
X     X  X         X              X
X     X  X         X     X        X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1      ID                    ~~~~~~~~~~~~input file:EX-R.ih1~~~~~~~~~~~~
   2      ID
   3      ID       HYDROLOGY FOR: OAK TREE(SY #1385)
   4      ID                      TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK
   5      ID                      DATE: 9-17-19
   6      ID
   7      ID       ANALYSIS PREPARED BY: SPARACO & YOUNGBLOOD, PLLC
   8      ID
   9      ID  ANALYSIS PARAMETERS:
  10      ID  EXISTING CONDITIONS RUN
  11      ID  STORM RECURRENCE INTERVALS = 1, 2, 5, 10, 25 & 100 YEAR
  12      ID  HYDROGRAPH METHOD:           SCS
  13      ID  RAINFALL DISTRIBUTION:       SCS TYPE III
  14      ID
  15      ID  24 HOUR RAINFALL DATA:
  16      ID  1 YEAR: 2.8 INCHES
  17      ID  2 YEAR: 3.5 INCHES
  18      ID  5 YEAR: 4.5 INCHES
  19      ID  10 YEAR: 5.1 INCHES
  20      ID  25 YEAR: 6.0 INCHES
  21      ID  100 YEAR: 9.0 INCHES
  22      ID
  23      ID
          *DIAGRAM
  24      IT      6       0       0     300
  25      IO      3       0
  26      JR    PREC     2.8     3.5     4.5     5.1       6       9

  27      KK  SITE-1NORTHWESTERLY SITE RUNOFF TOWARD PT.1
  28      KM
  29      KM  ************************************************************************
  30      KM  * DRAINAGE AREA = 4.14 AC = 0.0065 SQ. MI.      CN=78                 *
  31      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
  32      KM  ************************************************************************
  33      KM
  34      BA  0.0065
  35      PB       1
  36      IN       6
  37      PC       0   0.001   0.002   0.003   0.004   0.005   0.006   0.007   0.008   0.009
  38      PC   0.010   0.011   0.012   0.013   0.014   0.015   0.016   0.017   0.018   0.019
  39      PC   0.020   0.021   0.022   0.023   0.024   0.026   0.027   0.028   0.029   0.030
  40      PC  0.0305   0.031   0.032   0.034   0.035   0.036   0.037   0.038   0.040   0.041
  41      PC   0.042   0.043   0.045   0.046   0.047   0.049   0.050   0.051   0.053   0.054
  42      PC   0.055   0.057   0.058   0.060   0.061   0.063   0.064   0.066   0.067   0.069
  43      PC   0.070   0.072   0.074   0.075   0.077   0.079   0.080   0.082   0.084   0.085
  44      PC   0.087   0.089   0.091   0.093   0.095   0.097   0.100   0.103   0.106   0.109
  45      PC   0.112   0.115   0.118   0.121   0.124   0.127   0.130   0.134   0.137   0.140
  46      PC   0.144   0.148   0.151   0.155   0.159   0.163   0.167   0.171   0.176   0.180
  47      PC   0.185   0.189   0.194   0.199   0.205   0.210   0.216   0.222   0.228   0.235
  48      PC   0.242   0.250   0.258   0.266   0.276   0.287   0.298   0.312   0.328   0.363
  49      PC   0.416   0.500   0.584   0.638   0.673   0.689   0.702   0.714   0.725   0.734
  50      PC   0.743   0.751   0.758   0.766   0.772   0.779   0.785   0.790   0.796   0.801
  51      PC   0.806   0.811   0.816   0.821   0.825   0.829   0.834   0.838   0.842   0.845
  52      PC   0.849   0.853   0.857   0.860   0.864   0.867   0.870   0.874   0.877   0.880
  53      PC   0.886   0.889   0.892   0.895   0.898   0.900   0.903   0.906   0.908   0.910
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  54      PC   0.911   0.913   0.915   0.917   0.919   0.920   0.922   0.924   0.925   0.927
  55      PC   0.929   0.930   0.932   0.933   0.935   0.936   0.938   0.939   0.941   0.942
  56      PC   0.944   0.945   0.946   0.948   0.949   0.951   0.952   0.953   0.955   0.956
  57      PC   0.957   0.958   0.960   0.961   0.962   0.963   0.965   0.966   0.967   0.968
  58      PC   0.969   0.971   0.972   0.973   0.974   0.975   0.976   0.977   0.978   0.979
  59      PC   0.981   0.982   0.983   0.984   0.985   0.986   0.987   0.988   0.989   0.990
  60      PC   0.991   0.992   0.993   0.994   0.995   0.996   0.997   0.998   0.999   1.000
  61      LS      1      78
  62      UD    0.1

  63      KK  SITE-2SOUTHWESTERLY SITE RUNOFF TOWARD PT.1
  64      KM
  65      KM  ************************************************************************
  66      KM  * DRAINAGE AREA = 0.31 AC = 0.0005 SQ. MI.      CN=84                  *
  67      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
  68      KM  ************************************************************************
  69      KM
  70      BA  0.0005
  71      LS      1      84
  72      UD   0.05

  73      KK  SITE-3SOUTHEASTERLY SITE RUNOFF TOWARD PT.3
  74      KM
  75      KM  ************************************************************************
  76      KM  * DRAINAGE AREA = 3.56 AC = 0.0056 SQ. MI.      CN=78                  *
  77      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
  78      KM  ************************************************************************
  79      KM
  80      BA  0.0056
  81      LS      1      78
  82      UD    0.1

  83      KK  SITE-4CENTRAL/EASTERLY SITE RUNOFF TOWARD PT.4
  84      KM
  85      KM  ************************************************************************
  86      KM  * DRAINAGE AREA = 0.91 AC = 0.0014 SQ. MI.      CN=71                  *
  87      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
  88      KM  ************************************************************************
  89      KM
  90      BA  0.0014
  91      LS      1      71
  92      UD    0.1

  93      KK   OFF-1OFFSITE SOUTHEASTERLY RUNOFF TOWARD PT.3
  94      KM
  95      KM  ************************************************************************
  96      KM  * DRAINAGE AREA = 7.85 AC = 0.0123 SQ. MI.      CN=93                  *
  97      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
  98      KM  ************************************************************************
  99      KM
 100      BA  0.0123
 101      LS      1      93
 102      UD    0.1
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 103      KK    PT.3ADD SITE-3, SITE-4 AND OFF-1 HYDROGRAPHS
 104      HC       3

 105      KK   LAG-3LAG PT.2 COMBINED HYDROGRAPH TO PT.4
 106      RT       0       0       1

 107      KK  SITE-5NORTHEASTERLY SITE RUNOFF TOWARD PT.4
 108      KM
 109      KM  ************************************************************************
 110      KM  * DRAINAGE AREA = 5.56 AC = 0.0087 SQ. MI.      CN=76                  *
 111      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
 112      KM  ************************************************************************
 113      KM
 114      BA  0.0087
 115      LS      1      76
 116      UD    0.1

 117      KK   OFF-2OFFSITE EASTERLY RUNOFF TOWARD PT.4
 118      KM
 119      KM  ************************************************************************
 120      KM  * DRAINAGE AREA = 3.32 AC = 0.0052 SQ. MI.      CN=78                  *
 121      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
 122      KM  ************************************************************************
 123      KM
 124      BA  0.0052
 125      LS      1      78
 126      UD    0.1

 127      KK    PT.4ADD LAG-2, SITE-5 AND OFF-2 HYDROGRAPHS
 128      HC       3
 129      ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW
  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   27      SITE-1
                .
                .
   63           .      SITE-2
                .            .
                .            .
   73           .            .      SITE-3
                .            .           .
                .            .           .
   83           .            .           .      SITE-4
                .            .           .           .
                .            .           .           .
   93           .            .           .           .       OFF-1
                .            .           .           .           .
                .            .           .           .           .
  103           .            .         PT.3.....................
                .            .           V
                .            .           V
  105           .            .        LAG-3
                .            .           .
                .            .           .
  107           .            .           .      SITE-5
                .            .           .           .
                .            .           .           .
  117           .            .           .           .       OFF-2
                .            .           .           .           .
                .            .           .           .           .
  127           .            .         PT.4.....................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              MAY   1991               *
*           VERSION 4.0.1U              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  09/17/19  TIME  15:41:00   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*        DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748              *
*                                       *
*****************************************
```

```
                              ------------input file:EX-R.ih1-------------

                         HYDROLOGY FOR: OAK TREE(SY #1385)
                                        TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK
                                        DATE: 9-17-19

                         ANALYSIS PREPARED BY: SPARACO & YOUNGBLOOD, PLLC

                    ANALYSIS PARAMETERS:
                    EXISTING CONDITIONS RUN
                    STORM RECURRENCE INTERVALS = 1, 2, 5, 10, 25 & 100 YEAR
                    HYDROGRAPH METHOD:           SCS
                    RAINFALL DISTRIBUTION:       SCS TYPE III

                    24 HOUR RAINFALL DATA:
                    1 YEAR: 2.8 INCHES
                    2 YEAR: 3.5 INCHES
                    5 YEAR: 4.5 INCHES
                    10 YEAR: 5.1 INCHES
                    25 YEAR: 6.0 INCHES
                    100 YEAR: 9.0 INCHES


  25 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                       NMIN           6  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0554  ENDING TIME
                      ICENT          19  CENTURY MARK

                   COMPUTATION INTERVAL     0.10 HOURS
                       TOTAL TIME BASE    29.90 HOURS

               ENGLISH UNITS
                    DRAINAGE AREA          SQUARE MILES
                    PRECIPITATION DEPTH    INCHES
                    LENGTH, ELEVATION      FEET
                    FLOW                   CUBIC FEET PER SECOND
```

```
              STORAGE VOLUME       ACRE-FEET
              SURFACE AREA         ACRES
              TEMPERATURE          DEGREES FAHRENHEIT

      JP        MULTI-PLAN OPTION
                     NPLAN           1  NUMBER OF PLANS

      JR        MULTI-RATIO OPTION
                    RATIOS OF PRECIPITATION
                   2.80      3.50      4.50      5.10      6.00      9.00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
   27 KK   *   SITE-1   *    NORTHWESTERLY SITE RUNOFF TOWARD PT.1
           *            *
           **************

                         ***********************************************************************
                         * DRAINAGE AREA = 4.14 AC = 0.0065 SQ. MI.       CN=78                  *
                         * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100     *
                         ***********************************************************************


   36 IN        TIME DATA FOR INPUT TIME SERIES
                     JXMIN           6  TIME INTERVAL IN MINUTES
                    JXDATE      1    0  STARTING DATE
                    JXTIME           0  STARTING TIME

              SUBBASIN RUNOFF DATA

   34 BA        SUBBASIN CHARACTERISTICS
                     TAREA        0.01  SUBBASIN AREA

                PRECIPITATION DATA

   35 PB             STORM        1.00  BASIN TOTAL PRECIPITATION

   37 PI          INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                    0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

   61 LS        SCS LOSS RATE
                     STRTL        1.00  INITIAL ABSTRACTION
                    CRVNBR       78.00  CURVE NUMBER
                     RTIMP        0.00  PERCENT IMPERVIOUS AREA

   62 UD        SCS DIMENSIONLESS UNITGRAPH
                      TLAG        0.10  LAG

                                                            ***

                                                         UNIT HYDROGRAPH
                                                      7 END-OF-PERIOD ORDINATES
               16.        17.        6.         2.         1.         0.         0.

     TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =     0.00

    PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       29.90-HR
 +    (CFS)       (HR)
                            (CFS)
 +       0.       0.10                 0.           0.           0.           0.
                          (INCHES)   0.000        0.000        0.000        0.000
                           (AC-FT)     0.           0.           0.           0.

                            CUMULATIVE AREA =     0.01 SQ MI
```

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.10, TOTAL EXCESS = 0.70

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 2.	12.30	0.	0.	0.	0.
		(INCHES) 0.574	0.701	0.701	0.701
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.33, TOTAL EXCESS = 1.17

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 4.	12.30	1.	0.	0.	0.
		(INCHES) 0.982	1.175	1.175	1.175
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.56, TOTAL EXCESS = 1.94

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 7.	12.30	1.	0.	0.	0.
		(INCHES) 1.630	1.938	1.938	1.938
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 2.67, TOTAL EXCESS = 2.43

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 9.	12.30	1.	0.	0.	0.
		(INCHES) 2.040	2.429	2.429	2.429
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 6.00

TOTAL RAINFALL = 6.00, TOTAL LOSS = 2.80, TOTAL EXCESS = 3.20

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 12.	12.20	2.	1.	0.	0.
		(INCHES) 2.678	3.197	3.197	3.197
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-1
FOR PLAN 1, RATIO = 9.00

```
  TOTAL RAINFALL =     9.00, TOTAL LOSS =     3.09, TOTAL EXCESS =     5.91

 PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR       29.90-HR
+   (CFS)        (HR)
                           (CFS)
+       22.      12.20                   3.           1.           1.            1.
                         (INCHES)      4.869        5.915        5.915         5.915
                          (AC-FT)        2.           2.           2.            2.

                         CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  63 KK     *   SITE-2   *     SOUTHWESTERLY SITE RUNOFF TOWARD PT.1
            *            *
            **************

                          ***********************************************************************
                          * DRAINAGE AREA = 0.31 AC = 0.0005 SQ. MI.       CN=84                *
                          * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
                          ***********************************************************************

               SUBBASIN RUNOFF DATA

  70 BA          SUBBASIN CHARACTERISTICS
                       TAREA         0.00  SUBBASIN AREA

                 PRECIPITATION DATA

  35 PB                STORM         1.00  BASIN TOTAL PRECIPITATION

  37 PI            INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                     0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  71 LS          SCS LOSS RATE
                      STRTL          1.00  INITIAL ABSTRACTION
                     CRVNBR         84.00  CURVE NUMBER
                      RTIMP          0.00  PERCENT IMPERVIOUS AREA

  72 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG          0.05  LAG

                                                               ***

                                                       UNIT HYDROGRAPH
                                                   5 END-OF-PERIOD ORDINATES
                 2.         1.         0.         0.         0.

  TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =     0.00

 PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR       29.90-HR
+   (CFS)        (HR)
                           (CFS)
+        0.       0.10                   0.           0.           0.            0.
                         (INCHES)      0.000        0.000        0.000         0.000
                          (AC-FT)        0.           0.           0.            0.

                         CUMULATIVE AREA =     0.00 SQ MI

     ***            ***            ***            ***            ***

                          HYDROGRAPH AT STATION    SITE-2
```

FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.93, TOTAL EXCESS = 0.87

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.20	0.	0.	0.	0.
		(INCHES) 0.724	0.875	0.875	0.875
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.08, TOTAL EXCESS = 1.42

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.20	0.	0.	0.	0.
		(INCHES) 1.200	1.419	1.419	1.419
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.23, TOTAL EXCESS = 2.27

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1.	12.20	0.	0.	0.	0.
		(INCHES) 1.924	2.267	2.267	2.267
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 2.30, TOTAL EXCESS = 2.80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1.	12.20	0.	0.	0.	0.
		(INCHES) 2.370	2.799	2.799	2.799
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2
FOR PLAN 1, RATIO = 6.00

TOTAL RAINFALL = 6.00, TOTAL LOSS = 2.38, TOTAL EXCESS = 3.62

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 1.	12.20	0.	0.	0.	0.
		(INCHES) 3.054	3.621	3.621	3.621
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2
FOR PLAN 1, RATIO = 9.00

TOTAL RAINFALL = 9.00, TOTAL LOSS = 2.54, TOTAL EXCESS = 6.46

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

```
                                        6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       2.     12.20                     0.          0.          0.          0.
                         (INCHES)      5.322       6.462       6.462       6.462
                          (AC-FT)         0.          0.          0.          0.

                       CUMULATIVE AREA =     0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
   73 KK   *   SITE-3   *     SOUTHEASTERLY SITE RUNOFF TOWARD PT.3
           *            *
           **************

                    ************************************************************************
                    * DRAINAGE AREA = 3.56 AC = 0.0056 SQ. MI.      CN=78                  *
                    * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100    *
                    ************************************************************************


              SUBBASIN RUNOFF DATA

   80 BA        SUBBASIN CHARACTERISTICS
                   TAREA        0.01  SUBBASIN AREA

                PRECIPITATION DATA

   35 PB           STORM        1.00  BASIN TOTAL PRECIPITATION

   37 PI         INCREMENTAL PRECIPITATION PATTERN
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.01     0.00     0.01     0.00     0.01     0.01     0.01     0.01     0.01
                  0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.03     0.05
                  0.08     0.08     0.05     0.03     0.02     0.01     0.01     0.01     0.01     0.01
                  0.01     0.01     0.01     0.01     0.01     0.01     0.00     0.01     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.01
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                  0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

   81 LS        SCS LOSS RATE
                   STRTL        1.00  INITIAL ABSTRACTION
                  CRVNBR       78.00  CURVE NUMBER
                   RTIMP        0.00  PERCENT IMPERVIOUS AREA

   82 UD        SCS DIMENSIONLESS UNITGRAPH
                    TLAG        0.10  LAG

                                                ***

                                        UNIT HYDROGRAPH
                                    7 END-OF-PERIOD ORDINATES
             14.       15.       5.        2.        1.        0.        0.

      TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

    PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       0.      0.10                     0.          0.          0.          0.
                         (INCHES)      0.000       0.000       0.000       0.000
                          (AC-FT)         0.          0.          0.          0.

                       CUMULATIVE AREA =     0.01 SQ MI


        ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION   SITE-3
                          FOR PLAN 1, RATIO = 2.80

      TOTAL RAINFALL =    2.80, TOTAL LOSS =    2.10, TOTAL EXCESS =    0.70
```

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2.	12.30		0.	0.	0.	0.
		(INCHES)	0.574	0.701	0.701	0.701
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.33, TOTAL EXCESS = 1.17

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4.	12.30		1.	0.	0.	0.
		(INCHES)	0.982	1.175	1.175	1.175
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.56, TOTAL EXCESS = 1.94

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 6.	12.30		1.	0.	0.	0.
		(INCHES)	1.630	1.938	1.938	1.938
		(AC-FT)	0.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 2.67, TOTAL EXCESS = 2.43

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 8.	12.30		1.	0.	0.	0.
		(INCHES)	2.040	2.429	2.429	2.429
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 6.00

TOTAL RAINFALL = 6.00, TOTAL LOSS = 2.80, TOTAL EXCESS = 3.20

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 10.	12.20		2.	0.	0.	0.
		(INCHES)	2.678	3.197	3.197	3.197
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 9.00

TOTAL RAINFALL = 9.00, TOTAL LOSS = 3.09, TOTAL EXCESS = 5.91

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				

```
+      19.      12.20                      3.           1.          1.           1.
                          (INCHES)     4.869        5.915       5.915        5.915
                           (AC-FT)        1.           2.          2.           2.

                           CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   83 KK      *   SITE-4   *      CENTRAL/EASTERLY SITE RUNOFF TOWARD PT.4
              *            *
              **************

                         ***********************************************************************
                         * DRAINAGE AREA = 0.91 AC = 0.0014 SQ. MI.        CN=71               *
                         * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
                         ***********************************************************************

                SUBBASIN RUNOFF DATA

   90 BA         SUBBASIN CHARACTERISTICS
                       TAREA          0.00  SUBBASIN AREA

                 PRECIPITATION DATA

   35 PB               STORM          1.00  BASIN TOTAL PRECIPITATION

   37 PI           INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                     0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                     0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

   91 LS         SCS LOSS RATE
                       STRTL          1.00  INITIAL ABSTRACTION
                      CRVNBR         71.00  CURVE NUMBER
                       RTIMP          0.00  PERCENT IMPERVIOUS AREA

   92 UD         SCS DIMENSIONLESS UNITGRAPH
                        TLAG          0.10  LAG

                                                      ***

                                                  UNIT HYDROGRAPH
                                              7 END-OF-PERIOD ORDINATES
                 3.          4.          1.          0.          0.          0.          0.

     TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =     0.00

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR      29.90-HR
+    (CFS)       (HR)
                            (CFS)
+       0.       0.10                      0.           0.          0.           0.
                          (INCHES)     0.000        0.000       0.000        0.000
                           (AC-FT)        0.           0.          0.           0.

                           CUMULATIVE AREA =     0.00 SQ MI


       ***            ***            ***            ***            ***

                            HYDROGRAPH AT STATION   SITE-4
                              FOR PLAN 1, RATIO = 2.80

     TOTAL RAINFALL =     2.80, TOTAL LOSS =     2.25, TOTAL EXCESS =     0.55

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR        72-HR      29.90-HR
```

```
+   (CFS)        (HR)
                   (CFS)
+       0.      12.30                0.          0.          0.          0.
                (INCHES)         0.446       0.551       0.551       0.551
                (AC-FT)            0.          0.          0.          0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 3.50

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.55, TOTAL EXCESS =    0.95

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+       1.      12.30                0.          0.          0.          0.
                (INCHES)         0.786       0.949       0.949       0.949
                (AC-FT)            0.          0.          0.          0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 4.50

    TOTAL RAINFALL =    4.50, TOTAL LOSS =    2.88, TOTAL EXCESS =    1.62

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+       1.      12.30                0.          0.          0.          0.
                (INCHES)         1.346       1.615       1.615       1.615
                (AC-FT)            0.          0.          0.          0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    3.05, TOTAL EXCESS =    2.05

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+       2.      12.30                0.          0.          0.          0.
                (INCHES)         1.712       2.054       2.054       2.054
                (AC-FT)            0.          0.          0.          0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    3.25, TOTAL EXCESS =    2.75

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+       2.      12.30                0.          0.          0.          0.
                (INCHES)         2.288       2.752       2.752       2.752
                (AC-FT)            0.          0.          0.          0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.70, TOTAL EXCESS =    5.30

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+       4.      12.20                1.          0.          0.          0.
                (INCHES)         4.354       5.296       5.296       5.296
                (AC-FT)            0.          0.          0.          0.
```

```
                    CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 93 KK    *    OFF-1   *     OFFSITE SOUTHEASTERLY RUNOFF TOWARD PT.3
          *            *
          **************

                      **********************************************************************
                      * DRAINAGE AREA = 7.85 AC = 0.0123 SQ. MI.      CN=93                  *
                      * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100    *
                      **********************************************************************


               SUBBASIN RUNOFF DATA

100 BA          SUBBASIN CHARACTERISTICS
                      TAREA         0.01  SUBBASIN AREA

                PRECIPITATION DATA

 35 PB                STORM         1.00  BASIN TOTAL PRECIPITATION

 37 PI            INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                    0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                    0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

101 LS          SCS LOSS RATE
                     STRTL          1.00  INITIAL ABSTRACTION
                     CRVNBR        93.00  CURVE NUMBER
                     RTIMP          0.00  PERCENT IMPERVIOUS AREA

102 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG          0.10  LAG

                                                     ***

                                                UNIT HYDROGRAPH
                                            7 END-OF-PERIOD ORDINATES
               30.       33.       11.        4.        1.        0.        0.

     TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     29.90-HR
 +   (CFS)       (HR)
                           (CFS)
 +       0.      0.10                   0.          0.          0.           0.
                         (INCHES)    0.000       0.000       0.000        0.000
                          (AC-FT)       0.          0.          0.           0.

                       CUMULATIVE AREA =    0.01 SQ MI


       ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    OFF-1
                          FOR PLAN 1, RATIO = 2.80

     TOTAL RAINFALL =    2.80, TOTAL LOSS =    1.53, TOTAL EXCESS =    1.27

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     29.90-HR
 +   (CFS)       (HR)
                           (CFS)
 +      10.     12.30                   1.          0.          0.           0.
```

```
                    (INCHES)     1.078        1.269        1.269        1.269
                    (AC-FT)        1.           1.           1.           1.

                    CUMULATIVE AREA =    0.01 SQ MI


     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    OFF-1
                      FOR PLAN 1, RATIO = 3.50

    TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.58, TOTAL EXCESS =    1.92

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                      (CFS)
+      15.     12.30                    2.           1.           1.           1.
                    (INCHES)     1.659        1.921        1.921        1.921
                    (AC-FT)        1.           1.           1.           1.

                    CUMULATIVE AREA =    0.01 SQ MI


     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    OFF-1
                      FOR PLAN 1, RATIO = 4.50

    TOTAL RAINFALL =    4.50, TOTAL LOSS =    1.62, TOTAL EXCESS =    2.88

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                      (CFS)
+      23.     12.20                    3.           1.           1.           1.
                    (INCHES)     2.484        2.881        2.881        2.881
                    (AC-FT)        2.           2.           2.           2.

                    CUMULATIVE AREA =    0.01 SQ MI


     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    OFF-1
                      FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    1.64, TOTAL EXCESS =    3.46

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                      (CFS)
+      27.     12.20                    4.           1.           1.           1.
                    (INCHES)     2.976        3.464        3.464        3.464
                    (AC-FT)        2.           2.           2.           2.

                    CUMULATIVE AREA =    0.01 SQ MI


     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    OFF-1
                      FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    1.65, TOTAL EXCESS =    4.35

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                      (CFS)
+      33.     12.20                    5.           1.           1.           1.
                    (INCHES)     3.691        4.346        4.346        4.346
                    (AC-FT)        2.           3.           3.           3.

                    CUMULATIVE AREA =    0.01 SQ MI


     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION    OFF-1
                      FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    1.69, TOTAL EXCESS =    7.31

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                      (CFS)
+      52.     12.20                    8.           2.           2.           2.
                    (INCHES)     5.979        7.312        7.312        7.312
                    (AC-FT)        4.           5.           5.           5.

                    CUMULATIVE AREA =    0.01 SQ MI
```

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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 103 KK       *     PT.3   *     ADD SITE-3, SITE-4 AND OFF-1 HYDROGRAPHS
              *            *
              **************

 104 HC           HYDROGRAPH COMBINATION
                        ICOMP          3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                      ***

       ***             ***             ***             ***             ***

                                   HYDROGRAPH AT STATION     PT.3
                                     FOR PLAN 1, RATIO = 2.80

 PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      12.     12.30                        2.           1.           0.            0.
                            (INCHES)     0.885        1.052        1.052         1.052
                             (AC-FT)        1.           1.           1.            1.

                            CUMULATIVE AREA =     0.02 SQ MI

       ***             ***             ***             ***             ***

                                   HYDROGRAPH AT STATION     PT.3
                                     FOR PLAN 1, RATIO = 3.50

 PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      19.     12.30                        3.           1.           1.            1.
                            (INCHES)     1.399        1.634        1.634         1.634
                             (AC-FT)        1.           2.           2.            2.

                            CUMULATIVE AREA =     0.02 SQ MI

       ***             ***             ***             ***             ***

                                   HYDROGRAPH AT STATION     PT.3
                                     FOR PLAN 1, RATIO = 4.50

 PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      30.     12.20                        4.           1.           1.            1.
                            (INCHES)     2.151        2.515        2.515         2.515
                             (AC-FT)        2.           3.           3.            3.

                            CUMULATIVE AREA =     0.02 SQ MI

       ***             ***             ***             ***             ***

                                   HYDROGRAPH AT STATION     PT.3
                                     FOR PLAN 1, RATIO = 5.10

 PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      36.     12.20                        5.           2.           1.            1.
                            (INCHES)     2.610        3.061        3.061         3.061
                             (AC-FT)        3.           3.           3.            3.

                            CUMULATIVE AREA =     0.02 SQ MI

       ***             ***             ***             ***             ***

                                   HYDROGRAPH AT STATION     PT.3
                                     FOR PLAN 1, RATIO = 6.00

 PEAK FLOW      TIME                                  MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      46.     12.20                        7.           2.           2.            2.
                            (INCHES)     3.292        3.897        3.897         3.897
                             (AC-FT)        3.           4.           4.            4.

                            CUMULATIVE AREA =     0.02 SQ MI
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      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     PT.3
                          FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      76.     12.20                   11.          4.           3.           3.
                       (INCHES)      5.531        6.760        6.760        6.760
                        (AC-FT)        6.           7.           7.           7.

                        CUMULATIVE AREA =    0.02 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *             *
  105 KK    *     LAG-3   *     LAG PT.2 COMBINED HYDROGRAPH TO PT.4
            *             *
            **************

               HYDROGRAPH ROUTING DATA

  106 RT         TATUM OR STRADDLE-STAGGER ROUTING
                      NSTPS            0   NUMBER OF TATUM STEPS
                      NSTDL            0   NUMBER OF ORDINATES TO BE AVERAGED
                      LAG              1   NUMBER OF INTERVALS TO LAG HYDROGRAPH

                                                                  ***

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    LAG-3
                          FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      12.     12.40                    2.          1.           0.           0.
                       (INCHES)      0.885        1.052        1.052        1.052
                        (AC-FT)        1.           1.           1.           1.

                        CUMULATIVE AREA =    0.02 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    LAG-3
                          FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      19.     12.40                    3.          1.           1.           1.
                       (INCHES)      1.399        1.634        1.634        1.634
                        (AC-FT)        1.           2.           2.           2.

                        CUMULATIVE AREA =    0.02 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    LAG-3
                          FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      30.     12.30                    4.          1.           1.           1.
                       (INCHES)      2.151        2.515        2.515        2.515
                        (AC-FT)        2.           3.           3.           3.

                        CUMULATIVE AREA =    0.02 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    LAG-3
                          FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
```

```
+      36.     12.30                   5.          2.          1.           1.
                       (INCHES)     2.610       3.061       3.061        3.061
                        (AC-FT)        3.          3.          3.           3.

                         CUMULATIVE AREA =    0.02 SQ MI


       ***           ***         ***          ***          ***

                          HYDROGRAPH AT STATION    LAG-3
                            FOR PLAN 1, RATIO = 6.00

  PEAK FLOW    TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+      46.     12.30                   7.          2.          2.           2.
                       (INCHES)     3.292       3.897       3.897        3.897
                        (AC-FT)        3.          4.          4.           4.

                         CUMULATIVE AREA =    0.02 SQ MI


       ***           ***         ***          ***          ***

                          HYDROGRAPH AT STATION    LAG-3
                            FOR PLAN 1, RATIO = 9.00

  PEAK FLOW    TIME                         MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+      76.     12.30                  11.          4.          3.           3.
                       (INCHES)     5.531       6.760       6.760        6.760
                        (AC-FT)        6.          7.          7.           7.

                         CUMULATIVE AREA =    0.02 SQ MI



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
  107 KK      *   SITE-5   *     NORTHEASTERLY SITE RUNOFF TOWARD PT.4
              *            *
              **************

                          ***********************************************************************
                          * DRAINAGE AREA = 5.56 AC = 0.0087 SQ. MI.      CN=76                 *
                          * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
                          ***********************************************************************


                SUBBASIN RUNOFF DATA

  114 BA          SUBBASIN CHARACTERISTICS
                        TAREA         0.01  SUBBASIN AREA

                  PRECIPITATION DATA

   35 PB                STORM         1.00  BASIN TOTAL PRECIPITATION

   37 PI            INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                      0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  115 LS          SCS LOSS RATE
                        STRTL         1.00  INITIAL ABSTRACTION
                       CRVNBR        76.00  CURVE NUMBER
                        RTIMP         0.00  PERCENT IMPERVIOUS AREA
```

```
116 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG        0.10  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                            7 END-OF-PERIOD ORDINATES
              21.        23.        8.        3.        1.        0.        0.

   TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

 PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+       0.     0.10                 0.         0.         0.          0.
                       (INCHES)  0.000      0.000      0.000       0.000
                        (AC-FT)     0.         0.         0.          0.

                       CUMULATIVE AREA =    0.01 SQ MI


      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION   SITE-5
                           FOR PLAN 1, RATIO = 2.80

   TOTAL RAINFALL =    2.80, TOTAL LOSS =    2.15, TOTAL EXCESS =    0.65

 PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+       3.    12.30                 0.         0.         0.          0.
                       (INCHES)  0.533      0.654      0.654       0.654
                        (AC-FT)     0.         0.         0.          0.

                       CUMULATIVE AREA =    0.01 SQ MI


      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION   SITE-5
                           FOR PLAN 1, RATIO = 3.50

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.40, TOTAL EXCESS =    1.10

 PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+       5.    12.30                 1.         0.         0.          0.
                       (INCHES)  0.921      1.105      1.105       1.105
                        (AC-FT)     0.         1.         1.          1.

                       CUMULATIVE AREA =    0.01 SQ MI


      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION   SITE-5
                           FOR PLAN 1, RATIO = 4.50

   TOTAL RAINFALL =    4.50, TOTAL LOSS =    2.66, TOTAL EXCESS =    1.84

 PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+       9.    12.30                 1.         0.         0.          0.
                       (INCHES)  1.543      1.840      1.840       1.840
                        (AC-FT)     1.         1.         1.          1.

                       CUMULATIVE AREA =    0.01 SQ MI


      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION   SITE-5
                           FOR PLAN 1, RATIO = 5.10

   TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.78, TOTAL EXCESS =    2.32

 PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                  6-HR      24-HR      72-HR     29.90-HR
+   (CFS)      (HR)
                          (CFS)
+      12.    12.30                 2.         1.         0.          0.
                       (INCHES)  1.941      2.316      2.316       2.316
                        (AC-FT)     1.         1.         1.          1.

                       CUMULATIVE AREA =    0.01 SQ MI
```

```
      ***              ***              ***              ***              ***

                          HYDROGRAPH AT STATION    SITE-5
                            FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    2.94, TOTAL EXCESS =    3.06

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR       29.90-HR
+   (CFS)       (HR)
                           (CFS)
+      15.      12.20                    2.           1.           1.            1.
                         (INCHES)     2.562        3.065        3.065         3.065
                          (AC-FT)        1.           1.           1.            1.

                         CUMULATIVE AREA =     0.01 SQ MI


      ***              ***              ***              ***              ***

                          HYDROGRAPH AT STATION    SITE-5
                            FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.26, TOTAL EXCESS =    5.74

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR       29.90-HR
+   (CFS)       (HR)
                           (CFS)
+      29.      12.20                    4.           1.           1.            1.
                         (INCHES)     4.721        5.736        5.736         5.736
                          (AC-FT)        2.           3.           3.            3.

                         CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  117 KK    *    OFF-2   *     OFFSITE EASTERLY RUNOFF TOWARD PT.4
            *            *
            **************

                         **********************************************************************
                         * DRAINAGE AREA = 3.32 AC = 0.0052 SQ. MI.       CN=78               *
                         * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
                         **********************************************************************


               SUBBASIN RUNOFF DATA

  124 BA         SUBBASIN CHARACTERISTICS
                       TAREA         0.01  SUBBASIN AREA

                 PRECIPITATION DATA

   35 PB               STORM         1.00  BASIN TOTAL PRECIPITATION

   37 PI           INCREMENTAL PRECIPITATION PATTERN
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                      0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                      0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  125 LS         SCS LOSS RATE
                      STRTL          1.00  INITIAL ABSTRACTION
                     CRVNBR         78.00  CURVE NUMBER
                      RTIMP          0.00  PERCENT IMPERVIOUS AREA

  126 UD         SCS DIMENSIONLESS UNITGRAPH
                       TLAG          0.10  LAG
```

***

UNIT HYDROGRAPH
7 END-OF-PERIOD ORDINATES

13.	14.	5.	2.	1.	0.	0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-2
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.10, TOTAL EXCESS = 0.70

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2.	12.30		0.	0.	0.	0.
		(INCHES)	0.574	0.701	0.701	0.701
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-2
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.33, TOTAL EXCESS = 1.17

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3.	12.30		1.	0.	0.	0.
		(INCHES)	0.982	1.175	1.175	1.175
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-2
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.56, TOTAL EXCESS = 1.94

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 6.	12.30		1.	0.	0.	0.
		(INCHES)	1.630	1.938	1.938	1.938
		(AC-FT)	0.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-2
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 2.67, TOTAL EXCESS = 2.43

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 7.	12.30		1.	0.	0.	0.
		(INCHES)	2.040	2.429	2.429	2.429
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-2

```
                           FOR PLAN 1, RATIO = 6.00

          TOTAL RAINFALL =     6.00, TOTAL LOSS =     2.80, TOTAL EXCESS =     3.20

       PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                              6-HR         24-HR        72-HR       29.90-HR
   +    (CFS)        (HR)
                                    (CFS)
   +       10.      12.20                        1.            0.           0.            0.
                                  (INCHES)     2.678         3.197        3.197         3.197
                                   (AC-FT)        1.            1.           1.            1.

                                  CUMULATIVE AREA =     0.01 SQ MI


        ***             ***             ***             ***             ***

                                HYDROGRAPH AT STATION     OFF-2
                                  FOR PLAN 1, RATIO = 9.00

          TOTAL RAINFALL =     9.00, TOTAL LOSS =     3.09, TOTAL EXCESS =     5.91

       PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                              6-HR         24-HR        72-HR       29.90-HR
   +    (CFS)        (HR)
                                    (CFS)
   +       18.      12.20                        3.            1.           1.            1.
                                  (INCHES)     4.869         5.915        5.915         5.915
                                   (AC-FT)        1.            2.           2.            2.

                                  CUMULATIVE AREA =     0.01 SQ MI


   *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

                ***************
                *             *
    127 KK      *     PT.4    *     ADD LAG-2, SITE-5 AND OFF-2 HYDROGRAPHS
                *             *
                ***************

    128 HC          HYDROGRAPH COMBINATION
                          ICOMP            3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                      ***

        ***             ***             ***             ***             ***

                                HYDROGRAPH AT STATION      PT.4
                                  FOR PLAN 1, RATIO = 2.80

       PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                              6-HR         24-HR        72-HR       29.90-HR
   +    (CFS)        (HR)
                                    (CFS)
   +       16.      12.40                        3.            1.           1.            1.
                                  (INCHES)     0.744         0.893        0.893         0.893
                                   (AC-FT)        1.            2.           2.            2.

                                  CUMULATIVE AREA =     0.03 SQ MI


        ***             ***             ***             ***             ***

                                HYDROGRAPH AT STATION      PT.4
                                  FOR PLAN 1, RATIO = 3.50

       PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                              6-HR         24-HR        72-HR       29.90-HR
   +    (CFS)        (HR)
                                    (CFS)
   +       28.      12.30                        4.            1.           1.            1.
                                  (INCHES)     1.208         1.424        1.424         1.424
                                   (AC-FT)        2.            3.           3.            3.

                                  CUMULATIVE AREA =     0.03 SQ MI


        ***             ***             ***             ***             ***

                                HYDROGRAPH AT STATION      PT.4
                                  FOR PLAN 1, RATIO = 4.50

       PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                              6-HR         24-HR        72-HR       29.90-HR
   +    (CFS)        (HR)
                                    (CFS)
   +       45.      12.30                        7.            2.           2.            2.
                                  (INCHES)     1.910         2.248        2.248         2.248
                                   (AC-FT)        3.            4.           4.            4.

                                  CUMULATIVE AREA =     0.03 SQ MI
```

*** *** *** *** ***

HYDROGRAPH AT STATION PT.4
FOR PLAN 1, RATIO = 5.10

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 55.	12.30	8.	2.	2.	2.
		(INCHES) 2.344	2.767	2.767	2.767
		(AC-FT) 4.	5.	5.	5.

CUMULATIVE AREA = 0.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION PT.4
FOR PLAN 1, RATIO = 6.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 71.	12.30	11.	3.	3.	3.
		(INCHES) 3.004	3.569	3.569	3.569
		(AC-FT) 5.	6.	6.	6.

CUMULATIVE AREA = 0.03 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION PT.4
FOR PLAN 1, RATIO = 9.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 121.	12.30	19.	6.	5.	5.
		(INCHES) 5.213	6.359	6.359	6.359
		(AC-FT) 9.	11.	11.	11.

CUMULATIVE AREA = 0.03 SQ MI

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
VOLUME IN ACRE-FEET, TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION					
OPERATION	STATION	AREA	PLAN		RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
					2.80	3.50	4.50	5.10	6.00	9.00
HYDROGRAPH AT										
+	SITE-1	0.007	1	FLOW	2.28	4.27	7.30	9.18	12.14	22.48
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.24	0.41	0.67	0.84	1.11	2.05
HYDROGRAPH AT										
+	SITE-2	0.001	1	FLOW	0.25	0.47	0.78	0.96	1.23	2.11
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.02	0.04	0.06	0.07	0.10	0.17
HYDROGRAPH AT										
+	SITE-3	0.006	1	FLOW	1.97	3.68	6.29	7.90	10.45	19.37
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.21	0.35	0.58	0.73	0.95	1.77
HYDROGRAPH AT										
+	SITE-4	0.001	1	FLOW	0.37	0.71	1.27	1.63	2.19	4.27
				TIME	12.30	12.30	12.30	12.30	12.30	12.20
				VOLUME	0.04	0.07	0.12	0.15	0.21	0.40
HYDROGRAPH AT										
+	OFF-1	0.012	1	FLOW	9.62	15.04	22.65	26.90	32.99	52.19
				TIME	12.30	12.30	12.20	12.20	12.20	12.20
				VOLUME	0.83	1.26	1.89	2.27	2.85	4.80
3 COMBINED AT										
+	PT.3	0.019	1	FLOW	11.95	19.43	29.95	36.30	45.62	75.83
				TIME	12.30	12.30	12.20	12.20	12.20	12.20
				VOLUME	1.08	1.68	2.59	3.15	4.01	6.96
ROUTED TO										
+	LAG-3	0.019	1	FLOW	11.95	19.43	29.95	36.30	45.62	75.83
				TIME	12.40	12.40	12.30	12.30	12.30	12.30
				VOLUME	1.08	1.68	2.59	3.15	4.01	6.96

HYDROGRAPH AT										
+	SITE-5	0.009	1	FLOW	2.80	5.30	9.19	11.63	15.41	29.07
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.30	0.51	0.85	1.07	1.42	2.66
HYDROGRAPH AT										
+	OFF-2	0.005	1	FLOW	1.82	3.41	5.84	7.34	9.71	17.98
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.19	0.33	0.54	0.67	0.89	1.64
3 COMBINED AT										
+	PT.4	0.033	1	FLOW	16.12	27.58	44.98	55.27	70.59	121.08
				TIME	12.40	12.30	12.30	12.30	12.30	12.30
				VOLUME	1.58	2.52	3.98	4.90	6.32	11.26

*** NORMAL END OF HEC-1 ***

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*             MAY   1991                *
*           VERSION 4.0.1U              *
*     Lahey F77L-EM/32 version 5.01     *
*       Dodson & Associates, Inc.       *
*  RUN DATE  04/21/21  TIME  14:48:47   *
*****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 551-1748              *
*                                       *
*****************************************
```

OAK TREE DEVELOPMENT #SY-1385: DEVELOPED CONDITIONS HEC-1 ANALYSIS

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX           XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

   1          ID                    ------------input file:DEV-R9.ih1-------------
   2          ID
   3          ID       HYDROLOGY FOR: OAK TREE(SY #1385)
   4          ID                      TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK
   5          ID                      DATE: 4-19-21
   6          ID
   7          ID       ANALYSIS PREPARED BY: SPARACO & YOUNGBLOOD, PLLC
   8          ID
   9          ID  ANALYSIS PARAMETERS:
  10          ID  DEVELOPED CONDITIONS RUN
  11          ID  STORM RECURRENCE INTERVALS = 1, 2, 5, 10, 25 & 100 YEAR
  12          ID  HYDROGRAPH METHOD:          SCS
  13          ID  RAINFALL DISTRIBUTION:      SCS TYPE III
  14          ID                              -
  15          ID  24 HOUR RAINFALL DATA:
  16          ID  1 YEAR: 2.8 INCHES
  17          ID  2 YEAR: 3.5 INCHES
  18          ID  5 YEAR: 4.5 INCHES
  19          ID  10 YEAR: 5.1 INCHES
  20          ID  25 YEAR: 6.0 INCHES
  21          ID  100 YEAR: 9.0 INCHES
  22          ID
  23          ID
              *DIAGRAM
  24          IT       6       0       0     300
  25          IO       3       0
  26          JR    PREC     2.8     3.5     4.5     5.1       6       9

  27          KK  SITE1ANORTHWESTERLY SITE DEV. ROAD AND PARK. LOT RUNOFF TOWARD PT.1
  28          KM
  29          KM  ************************************************************************
  30          KM  * DRAINAGE AREA = 0.44 AC = 0.0007 SQ. MI.      CN=94                *
  31          KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
  32          KM  ************************************************************************
  33          KM
  34          BA  0.0007
  35          PB       1
  36          IN       6
  37          PC       0   0.001   0.002   0.003   0.004   0.005   0.006   0.007   0.008   0.009
  38          PC   0.010   0.011   0.012   0.013   0.014   0.015   0.016   0.017   0.018   0.019
  39          PC   0.020   0.021   0.022   0.023   0.024   0.026   0.027   0.028   0.029   0.030
  40          PC  0.0305   0.031   0.032   0.034   0.035   0.036   0.037   0.038   0.040   0.041
  41          PC   0.042   0.043   0.045   0.046   0.047   0.049   0.050   0.051   0.053   0.054
  42          PC   0.055   0.057   0.058   0.060   0.061   0.063   0.064   0.066   0.067   0.069
  43          PC   0.070   0.072   0.074   0.075   0.077   0.079   0.080   0.082   0.084   0.085
  44          PC   0.087   0.089   0.091   0.093   0.095   0.097   0.100   0.103   0.106   0.109
  45          PC   0.112   0.115   0.118   0.121   0.124   0.127   0.130   0.134   0.137   0.140
  46          PC   0.144   0.148   0.151   0.155   0.159   0.163   0.167   0.171   0.176   0.180
  47          PC   0.185   0.189   0.194   0.199   0.205   0.210   0.216   0.222   0.228   0.235
  48          PC   0.242   0.250   0.258   0.266   0.276   0.287   0.298   0.312   0.328   0.363
  49          PC   0.416   0.500   0.584   0.638   0.673   0.689   0.702   0.714   0.725   0.734
  50          PC   0.743   0.751   0.758   0.766   0.772   0.779   0.785   0.790   0.796   0.801
  51          PC   0.806   0.811   0.816   0.821   0.825   0.829   0.834   0.838   0.842   0.845
  52          PC   0.849   0.853   0.857   0.860   0.864   0.867   0.870   0.874   0.877   0.880
  53          PC   0.886   0.889   0.892   0.895   0.898   0.900   0.903   0.906   0.908   0.910
```

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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

  54      PC   0.911   0.913   0.915   0.917   0.919   0.920   0.922   0.924   0.925   0.927
  55      PC   0.929   0.930   0.932   0.933   0.935   0.936   0.938   0.939   0.941   0.942
  56      PC   0.944   0.945   0.946   0.948   0.949   0.951   0.952   0.953   0.955   0.956
  57      PC   0.957   0.958   0.960   0.961   0.962   0.963   0.965   0.966   0.967   0.968
  58      PC   0.969   0.971   0.972   0.973   0.974   0.975   0.976   0.977   0.978   0.979
  59      PC   0.981   0.982   0.983   0.984   0.985   0.986   0.987   0.988   0.989   0.990
  60      PC   0.991   0.992   0.993   0.994   0.995   0.996   0.997   0.998   0.999   1.000
  61      LS       1      94
  62      UD    0.05

  63      KK  SITE1BNORTHWESTERLY SITE DEV. ROAD RUNOFF 1 TO SWALE AND TOWARD PT.1
  64      KM
  65      KM  ************************************************************************
  66      KM  * DRAINAGE AREA = 0.56 AC = 0.0009 SQ. MI.      CN=80                 *
  67      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
  68      KM  ************************************************************************
  69      KM
  70      BA  0.0009
  71      LS       1      80
  72      UD    0.05

  73      KK  SITE1CNORTHWESTERLY SITE DEV. ROAD RUNOFF 2 TO SWALE AND TOWARD PT.1
  74      KM
  75      KM  ************************************************************************
  76      KM  * DRAINAGE AREA = 0.07 AC = 0.0001 SQ. MI.      CN=98                 *
  77      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
  78      KM  ************************************************************************
  79      KM
  80      BA  0.0001
  81      LS       1      98
  82      UD    0.05

  83      KK  SITE-1NORTHWESTERLY SITE TRAIL RUNOFF TOWARD PT.1
  84      KM
  85      KM  ************************************************************************
  86      KM  * DRAINAGE AREA = 0.82 AC = 0.0013 SQ. MI.      CN=78                 *
  87      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
  88      KM  ************************************************************************
  89      KM
  90      BA  0.0013
  91      LS       1      78
  92      UD    0.05

  93      KK    PT.1ADD SITE1A, SITE1B, SITE1C AND SITE-1 HYDROGRAPHS
  94      HC       4

  95      KK  SITE-2SOUTHWESTERLY SITE RUNOFF TOWARD PT.1
  96      KM
  97      KM  ************************************************************************
  98      KM  * DRAINAGE AREA = 0.18 AC = 0.0003 SQ. MI.      CN=86                 *
  99      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
 100      KM  ************************************************************************
 101      KM
 102      BA  0.0003
 103      LS       1      86
```



```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

 104      UD    0.05

 105      KK  SITE3ASOUTHEASTERLY DEVELOPED SITE RUNOFF TOWARD PT.3
 106      KM
 107      KM  ************************************************************************
 108      KM  * DRAINAGE AREA = 2.32 AC = 0.0036 SQ. MI.      CN=93                 *
 109      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
 110      KM  ************************************************************************
 111      KM
 112      BA  0.0036
 113      LS       1      93
 114      UD    0.05

 115      KK  SITE-4SOUTHEASTERLY SITE RUNOFF (DETENTION AREA) TOWARD PT.3
 116      KM
 117      KM  ************************************************************************
 118      KM  * DRAINAGE AREA = 1.90 AC = 0.0030 SQ. MI.      CN=75                 *
 119      KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
 120      KM  ************************************************************************
 121      KM
 122      BA   0.003
 123      LS       1      75
 124      UD     0.1

 125      KK  SITE5ANORTHEASTERLY DEVELOPED SITE RUNOFF TOWARD PT.5
 126      KM
 127      KM  ************************************************************************
 128      KM  * DRAINAGE AREA = 4.26 AC = 0.0067 SQ. MI.      CN=95                 *
 129      KM  * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
 130      KM  ************************************************************************
 131      KM
 132      BA  0.0067
```

```
          LS       1      95
          UD    0.05

          KK   SUB5AAPPLY 14 MIN. PERCOLATION
          DT  PERC5A             0.47
          DI    6.88   10.43   14.68   17.04   20.47   31.52
          DQ    6.41    9.96   14.13   16.57      20   31.05

          KK  ROUT5AROUTING IN UNDERGROUND STORAGE SYSTEM FOR SITE-5A
          KM
          KM  OUTLET STRUCTURE DATA: 140 STORMTECH MC-4500 UNITS
          KM  ********************************************************************
          KM  *  WEIR LENGTH = 6.28' WEIR OVERFLOW AT EL.: 366.9                   *
          KM  *  18-INCH DIAMETER ORIFICE AT EL.: 363.75                           *
          KM  ********************************************************************
          KM
          RS       1    ELEV     359
          SV       0   0.037  0.1449  0.2484   0.345  0.4304  0.4932  0.5426  0.5426
          SE     359  359.75  360.75  361.75  362.75  363.75  364.75  365.75   368.5
          SL   364.5   1.767     0.6     0.5
          SS   366.9    6.28     3.0     1.5
          ST     368       5     3.0     1.5
1                                    HEC-1 INPUT                                    PAGE  4

        LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK    PT.AADD SITE-3A, SITE-4 AND SITE5A HYDROGRAPHS
          HC       3

          KK    SUBAAPPLY 28 MIN. PERCOLATION
          DT   PERCA             0.37
          DI    3.91    6.68   13.61   23.06   35.84    57.6
          DQ    3.54    6.31   13.24   22.69   35.47   57.23

          KK   ROUTAROUTING IN ABOVE GROUND STORAGE SYSTEM FOR COMB-3
          KM
          KM  OUTLET STRUCTURE DATA:
          KM  ********************************************************************
          KM  *  WEIR LENGTH = 1.0' WEIR OVERFLOW AT EL.: 353.3                    *
          KM  *  3.50-INCH DIAMETER CPv ORIFICE AT EL. 351.5                       *
          KM  ********************************************************************
          KM
          RS       1    ELEV     350
          SV       0  0.0864  0.1878  0.4544    0.79  1.3767  1.5367  1.5367
          SE     350   350.5   351.5     353     355     357  358.25     358
          SQ       0    0.08    0.42    0.71    8.47   15.51   23.88   31.39   37.94    48.3
          SE   351.9   351.8   353.3   353.5     355     356     357     358   358.2   358.6

          KK  SITE-3SOUTHEASTERLY UNIMPROVED SITE RUNOFF TOWARD PT.3
          KM
          KM  ************************************************************************
          KM  * DRAINAGE AREA = 0.16 AC = 0.0003 SQ. MI.      CN=70                 *
          KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
          KM  ************************************************************************
          KM
          BA  0.0003
          LS       1      70
          UD     0.1

          KK    PT.BADD ROUTE3 AND SITE-3 HYDROGRAPHS
          HC       2

          KK   OFF-1OFFSITE SOUTHEASTERLY RUNOFF TOWARD PT.3
          KM
          KM  ************************************************************************
          KM  * DRAINAGE AREA = 7.85 AC = 0.0123 SQ. MI.      CN=93                 *
          KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
          KM  ************************************************************************
          KM
          BA  0.0123
          LS       1      93
          UD     0.1

          KK    PT.3ADD PT.B AND OFF-1 HYDROGRAPHS
          HC       2
1                                    HEC-1 INPUT                                    PAGE  5

        LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK   LAG-3LAG PT.2 COMBINED HYDROGRAPH TO PT.4
          RT       0       0       1

          KK  SITE-5NORTHEASTERLY UNDEVELOPED SITE RUNOFF TOWARD PT.4
          KM
          KM  ************************************************************************
          KM  * DRAINAGE AREA = 3.77 AC = 0.0059 SQ. MI.      CN=73                 *
          KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
          KM  ************************************************************************
          KM
          BA  0.0059
          LS       1      73
          UD     0.1
```

```
208          KK   OFF-2OFFSITE EASTERLY RUNOFF TOWARD PT.4
209          KM
210          KM  ************************************************************************
211          KM  * DRAINAGE AREA = 3.32 AC = 0.0052 SQ. MI.       CN=78                 *
212          KM  * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
213          KM  ************************************************************************
214          KM
215          BA  0.0052
216          LS       1      78
217          UD     0.1

218          KK    PT.4ADD LAG-3, SITE-5 AND OFF-2 HYDROGRAPHS
219          HC       3
220          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    27      SITE1A
                .
                .
    63          .      SITE1B
                .          .
                .          .
    73          .          .      SITE1C
                .          .          .
                .          .          .
    83          .          .          .      SITE-1
                .          .          .          .
                .          .          .          .
    93        PT.1.....................................
                .
                .
    95          .      SITE-2
                .          .
                .          .
   105          .          .      SITE3A
                .          .          .
                .          .          .
   115          .          .          .      SITE-4
                .          .          .          .
                .          .          .          .
   125          .          .          .          .      SITE5A
                .          .          .          .          .
                .          .          .          .          .
   136          .          .          .          .          .--------> PERC5A
   135          .          .          .          .       SUB5A
                .          .          .          .          V
                .          .          .          .          V
   139          .          .          .          .      ROUT5A
                .          .          .          .          .
                .          .          .          .          .
   153          .          .        PT.A.........................
                .          .          .
                .          .          .
   156          .          .          .--------->   PERCA
   155          .          .        SUBA
                .          .          V
                .          .          V
   159          .          .       ROUTA
                .          .          .
                .          .          .
   172          .          .          .      SITE-3
                .          .          .          .
                .          .          .          .
   182          .          .        PT.B.............
                .          .          .
                .          .          .
   184          .          .          .       OFF-1
                .          .          .          .
                .          .          .          .
   194          .          .        PT.3.............
                .          .          V
                .          .          V
   196          .          .       LAG-3
                .          .          .
                .          .          .
   198          .          .          .      SITE-5
                .          .          .          .
                .          .          .          .
   208          .          .          .          .       OFF-2
                .          .          .          .          .
                .          .          .          .          .
   218          .          .        PT.4.........................

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************                  ****************************************
 *                                      *                  *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                  *    U.S. ARMY CORPS OF ENGINEERS      *
 *              MAY   1991              *                  *    HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.0.1U             *                  *          609 SECOND STREET           *
 *     Lahey F77L-EM/32 version 5.01    *                  *       DAVIS, CALIFORNIA 95616        *
```

```
                        ------------input file:DEV-R9.ih1-------------

                 HYDROLOGY FOR: OAK TREE(SY #1385)
                                TOWN OF HAVERSTRAW, ROCKLAND COUNTY, NEW YORK
                                DATE: 4-19-21

                 ANALYSIS PREPARED BY: SPARACO & YOUNGBLOOD, PLLC

              ANALYSIS PARAMETERS:
              DEVELOPED CONDITIONS RUN
              STORM RECURRENCE INTERVALS = 1, 2, 5, 10, 25 & 100 YEAR
              HYDROGRAPH METHOD:          SCS
              RAINFALL DISTRIBUTION:      SCS TYPE III

              24 HOUR RAINFALL DATA:
              1 YEAR: 2.8 INCHES
              2 YEAR: 3.5 INCHES
              5 YEAR: 4.5 INCHES
              10 YEAR: 5.1 INCHES
              25 YEAR: 6.0 INCHES
              100 YEAR: 9.0 INCHES


 25 IO         OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT         HYDROGRAPH TIME DATA
                      NMIN          6  MINUTES IN COMPUTATION INTERVAL
                     IDATE     1    0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     2    0  ENDING DATE
                    NDTIME       0554  ENDING TIME
                    ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL    0.10 HOURS
                     TOTAL TIME BASE   29.90 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

    JP         MULTI-PLAN OPTION
                     NPLAN          1  NUMBER OF PLANS

    JR         MULTI-RATIO OPTION
                   RATIOS OF PRECIPITATION
                 2.80      3.50      4.50      5.10      6.00      9.00


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 27 KK    *   SITE1A   *    NORTHWESTERLY SITE DEV. ROAD AND PARK. LOT RUNOFF TOWARD PT.1
          *            *
          **************

              ***********************************************************************
              * DRAINAGE AREA = 0.44 AC = 0.0007 SQ. MI.      CN=94                 *
              * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
              ***********************************************************************


 36 IN         TIME DATA FOR INPUT TIME SERIES
                     JXMIN          6  TIME INTERVAL IN MINUTES
                    JXDATE     1    0  STARTING DATE
                    JXTIME          0  STARTING TIME

            SUBBASIN RUNOFF DATA

 34 BA         SUBBASIN CHARACTERISTICS
                     TAREA       0.00  SUBBASIN AREA

               PRECIPITATION DATA

 35 PB               STORM       1.00  BASIN TOTAL PRECIPITATION
```

37 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

61 LS SCS LOSS RATE

STRTL 1.00 INITIAL ABSTRACTION
CRVNBR 94.00 CURVE NUMBER
RTIMP 0.00 PERCENT IMPERVIOUS AREA

62 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 0.05 LAG

***

UNIT HYDROGRAPH
5 END-OF-PERIOD ORDINATES

3. 1. 0. 0. 0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1A
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.47, TOTAL EXCESS = 1.33

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1.	12.20		0.	0.	0.	0.
		(INCHES)	1.136	1.329	1.329	1.329
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1A
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 1.51, TOTAL EXCESS = 1.99

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1.	12.20		0.	0.	0.	0.
		(INCHES)	1.727	1.992	1.992	1.992
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1A
FOR PLAN 1, RATIO = 4.50

```
     TOTAL RAINFALL =    4.50, TOTAL LOSS =    1.54, TOTAL EXCESS =    2.96

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      29.90-HR
+    (CFS)         (HR)
                    (CFS)
+        1.      12.20                0.           0.           0.           0.
                (INCHES)          2.559        2.960        2.960        2.960
                 (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION   SITE1A
                    FOR PLAN 1, RATIO = 5.10

     TOTAL RAINFALL =    5.10, TOTAL LOSS =    1.55, TOTAL EXCESS =    3.55

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      29.90-HR
+    (CFS)         (HR)
                    (CFS)
+        2.      12.20                0.           0.           0.           0.
                (INCHES)          3.054        3.548        3.548        3.548
                 (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION   SITE1A
                    FOR PLAN 1, RATIO = 6.00

     TOTAL RAINFALL =    6.00, TOTAL LOSS =    1.57, TOTAL EXCESS =    4.43

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      29.90-HR
+    (CFS)         (HR)
                    (CFS)
+        2.      12.20                0.           0.           0.           0.
                (INCHES)          3.768        4.434        4.434        4.434
                 (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION   SITE1A
                    FOR PLAN 1, RATIO = 9.00

     TOTAL RAINFALL =    9.00, TOTAL LOSS =    1.59, TOTAL EXCESS =    7.41

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      29.90-HR
+    (CFS)         (HR)
                    (CFS)
+        3.      12.20                0.           0.           0.           0.
                (INCHES)          6.047        7.409        7.409        7.409
                 (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  63 KK     *   SITE1B   *     NORTHWESTERLY SITE DEV. ROAD RUNOFF 1 TO SWALE AND TOWARD PT.1
            *            *
            **************

                      ************************************************************************
                      * DRAINAGE AREA = 0.56 AC = 0.0009 SQ. MI.      CN=80                  *
                      * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050     *
                      ************************************************************************

               SUBBASIN RUNOFF DATA

  70 BA          SUBBASIN CHARACTERISTICS
                      TAREA         0.00  SUBBASIN AREA

               PRECIPITATION DATA

  35 PB               STORM         1.00  BASIN TOTAL PRECIPITATION

  37 PI           INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

```
71 LS          SCS LOSS RATE
                  STRTL        1.00  INITIAL ABSTRACTION
                 CRVNBR       80.00  CURVE NUMBER
                  RTIMP        0.00  PERCENT IMPERVIOUS AREA

72 UD          SCS DIMENSIONLESS UNITGRAPH
                   TLAG        0.05  LAG
```

***

UNIT HYDROGRAPH
5 END-OF-PERIOD ORDINATES

4.	1.	0.	0.	0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	29.90-HR
+	(CFS)	(HR)					
			(CFS)				
+	0.	0.10		0.	0.	0.	0.
			(INCHES)	0.000	0.000	0.000	0.000
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1B
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.05, TOTAL EXCESS = 0.75

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	29.90-HR
+	(CFS)	(HR)					
			(CFS)				
+	0.	12.20		0.	0.	0.	0.
			(INCHES)	0.619	0.753	0.753	0.753
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1B
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.25, TOTAL EXCESS = 1.25

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	29.90-HR
+	(CFS)	(HR)					
			(CFS)				
+	1.	12.20		0.	0.	0.	0.
			(INCHES)	1.050	1.250	1.250	1.250
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1B
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.46, TOTAL EXCESS = 2.04

PEAK FLOW   TIME   MAXIMUM AVERAGE FLOW

```
                                        6-HR        24-HR        72-HR      29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       1.     12.20                     0.           0.           0.           0.
                (INCHES)      1.723       2.042        2.042        2.042
                (AC-FT)         0.          0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE1B
                    FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.55, TOTAL EXCESS =    2.55

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       2.     12.20                     0.           0.           0.           0.
                (INCHES)      2.144       2.547        2.547        2.547
                (AC-FT)         0.          0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE1B
                    FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    2.67, TOTAL EXCESS =    3.33

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       2.     12.20                     0.           0.           0.           0.
                (INCHES)      2.800       3.333        3.333        3.333
                (AC-FT)         0.          0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION   SITE1B
                    FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    2.90, TOTAL EXCESS =    6.10

  PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       4.     12.20                     0.           0.           0.           0.
                (INCHES)      5.019       6.095        6.095        6.095
                (AC-FT)         0.          0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 73 KK    *    SITE1C  *     NORTHWESTERLY SITE DEV. ROAD RUNOFF 2 TO SWALE AND TOWARD PT.1
          *            *
          **************

                ************************************************************************
                * DRAINAGE AREA = 0.07 AC = 0.0001 SQ. MI.       CN=98                 *
                * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050     *
                ************************************************************************


            SUBBASIN RUNOFF DATA

 80 BA        SUBBASIN CHARACTERISTICS
                 TAREA        0.00  SUBBASIN AREA

            PRECIPITATION DATA

 35 PB           STORM        1.00  BASIN TOTAL PRECIPITATION

 37 PI         INCREMENTAL PRECIPITATION PATTERN
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                 0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

```
 81 LS          SCS LOSS RATE
                  STRTL        1.00  INITIAL ABSTRACTION
                  CRVNBR      98.00  CURVE NUMBER
                  RTIMP        0.00  PERCENT IMPERVIOUS AREA

 82 UD          SCS DIMENSIONLESS UNITGRAPH
                  TLAG         0.05  LAG
```

***

UNIT HYDROGRAPH
5 END-OF-PERIOD ORDINATES

0.	0.	0.	0.	0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1C
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.18, TOTAL EXCESS = 1.62

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	12.20		0.	0.	0.	0.
		(INCHES)	1.410	1.617	1.617	1.617
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1C
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 1.19, TOTAL EXCESS = 2.31

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	12.20		0.	0.	0.	0.
		(INCHES)	2.032	2.311	2.311	2.311
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE1C
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 1.19, TOTAL EXCESS = 3.31

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				

```
+       0.     12.20                    0.          0.          0.          0.
                          (INCHES)     2.890       3.307       3.307       3.307
                          (AC-FT)        0.          0.          0.          0.

                          CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION   SITE1C
                              FOR PLAN 1, RATIO = 5.10

     TOTAL RAINFALL =    5.10, TOTAL LOSS =    1.19, TOTAL EXCESS =    3.91

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       0.     12.20                    0.          0.          0.          0.
                          (INCHES)     3.378       3.906       3.906       3.906
                          (AC-FT)        0.          0.          0.          0.

                          CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION   SITE1C
                              FOR PLAN 1, RATIO = 6.00

     TOTAL RAINFALL =    6.00, TOTAL LOSS =    1.20, TOTAL EXCESS =    4.80

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       0.     12.20                    0.          0.          0.          0.
                          (INCHES)     4.084       4.804       4.804       4.804
                          (AC-FT)        0.          0.          0.          0.

                          CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION   SITE1C
                              FOR PLAN 1, RATIO = 9.00

     TOTAL RAINFALL =    9.00, TOTAL LOSS =    1.20, TOTAL EXCESS =    7.80

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       0.     12.20                    0.          0.          0.          0.
                          (INCHES)     6.283       7.801       7.801       7.801
                          (AC-FT)        0.          0.          0.          0.

                          CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  83 KK     *    SITE-1  *     NORTHWESTERLY SITE TRAIL RUNOFF TOWARD PT.1
            *            *
            **************

                          ************************************************************************
                          * DRAINAGE AREA = 0.82 AC = 0.0013 SQ. MI.      CN=78                  *
                          * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050     *
                          ************************************************************************


               SUBBASIN RUNOFF DATA

  90 BA          SUBBASIN CHARACTERISTICS
                      TAREA        0.00  SUBBASIN AREA

               PRECIPITATION DATA

  35 PB               STORM        1.00  BASIN TOTAL PRECIPITATION

  37 PI           INCREMENTAL PRECIPITATION PATTERN
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                    0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

```
91 LS         SCS LOSS RATE
                  STRTL        1.00  INITIAL ABSTRACTION
                  CRVNBR      78.00  CURVE NUMBER
                  RTIMP        0.00  PERCENT IMPERVIOUS AREA

92 UD         SCS DIMENSIONLESS UNITGRAPH
                  TLAG         0.05  LAG

                                                ***

                                          UNIT HYDROGRAPH
                                      5 END-OF-PERIOD ORDINATES
               6.        2.        0.        0.        0.

   TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                            (CFS)
+      0.       0.10                      0.          0.          0.          0.
                          (INCHES)    0.000       0.000       0.000       0.000
                           (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =    0.00 SQ MI


     ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION   SITE-1
                               FOR PLAN 1, RATIO = 2.80

   TOTAL RAINFALL =    2.80, TOTAL LOSS =    2.10, TOTAL EXCESS =    0.70

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                            (CFS)
+      0.      12.20                      0.          0.          0.          0.
                          (INCHES)    0.574       0.701       0.701       0.701
                           (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =    0.00 SQ MI


     ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION   SITE-1
                               FOR PLAN 1, RATIO = 3.50

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    2.33, TOTAL EXCESS =    1.17

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                            (CFS)
+      1.      12.20                      0.          0.          0.          0.
                          (INCHES)    0.983       1.175       1.175       1.175
                           (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =    0.00 SQ MI


     ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION   SITE-1
                               FOR PLAN 1, RATIO = 4.50

   TOTAL RAINFALL =    4.50, TOTAL LOSS =    2.56, TOTAL EXCESS =    1.94

  PEAK FLOW     TIME                            MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                            (CFS)
+      2.      12.20                      0.          0.          0.          0.
                          (INCHES)    1.631       1.938       1.938       1.938
                           (AC-FT)       0.          0.          0.          0.
```

```
                     CUMULATIVE AREA =    0.00 SQ MI

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION   SITE-1
                        FOR PLAN 1, RATIO = 5.10

   TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.67, TOTAL EXCESS =    2.43

  PEAK FLOW    TIME                     MAXIMUM AVERAGE FLOW
                                6-HR       24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                        (CFS)
+      2.     12.20                0.          0.          0.           0.
                      (INCHES)  2.040       2.429       2.429        2.429
                       (AC-FT)     0.          0.          0.           0.

                     CUMULATIVE AREA =    0.00 SQ MI

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION   SITE-1
                        FOR PLAN 1, RATIO = 6.00

   TOTAL RAINFALL =    6.00, TOTAL LOSS =    2.80, TOTAL EXCESS =    3.20

  PEAK FLOW    TIME                     MAXIMUM AVERAGE FLOW
                                6-HR       24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                        (CFS)
+      3.     12.20                0.          0.          0.           0.
                      (INCHES)  2.679       3.197       3.197        3.197
                       (AC-FT)     0.          0.          0.           0.

                     CUMULATIVE AREA =    0.00 SQ MI

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION   SITE-1
                        FOR PLAN 1, RATIO = 9.00

   TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.09, TOTAL EXCESS =    5.91

  PEAK FLOW    TIME                     MAXIMUM AVERAGE FLOW
                                6-HR       24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                        (CFS)
+      5.     12.20                1.          0.          0.           0.
                      (INCHES)  4.870       5.915       5.915        5.915
                       (AC-FT)     0.          0.          0.           0.

                     CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
  93 KK      *    PT.1    *     ADD SITE1A, SITE1B, SITE1C AND SITE-1 HYDROGRAPHS
             *            *
             **************

  94 HC          HYDROGRAPH COMBINATION
                       ICOMP           4  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                ***

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION     PT.1
                        FOR PLAN 1, RATIO = 2.80

  PEAK FLOW    TIME                     MAXIMUM AVERAGE FLOW
                                6-HR       24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                        (CFS)
+      2.     12.20                0.          0.          0.           0.
                      (INCHES)  0.746       0.894       0.894        0.894
                       (AC-FT)     0.          0.          0.           0.

                     CUMULATIVE AREA =    0.00 SQ MI

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION     PT.1
                        FOR PLAN 1, RATIO = 3.50
```

```
  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+       3.     12.20                         0.          0.          0.            0.
                             (INCHES)     1.211       1.426       1.426         1.426
                              (AC-FT)        0.          0.          0.            0.

                            CUMULATIVE AREA =    0.00 SQ MI


       ***             ***          ***           ***           ***

                              HYDROGRAPH AT STATION     PT.1
                                FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+       5.     12.20                         1.          0.          0.            0.
                             (INCHES)     1.913       2.253       2.253         2.253
                              (AC-FT)        0.          0.          0.            0.

                            CUMULATIVE AREA =    0.00 SQ MI


       ***             ***          ***           ***           ***

                              HYDROGRAPH AT STATION     PT.1
                                FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+       6.     12.20                         1.          0.          0.            0.
                             (INCHES)     2.348       2.775       2.775         2.775
                              (AC-FT)        0.          0.          0.            0.

                            CUMULATIVE AREA =    0.00 SQ MI


       ***             ***          ***           ***           ***

                              HYDROGRAPH AT STATION     PT.1
                                FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+       7.     12.20                         1.          0.          0.            0.
                             (INCHES)     3.011       3.580       3.580         3.580
                              (AC-FT)        0.          1.          1.            1.

                            CUMULATIVE AREA =    0.00 SQ MI


       ***             ***          ***           ***           ***

                              HYDROGRAPH AT STATION     PT.1
                                FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR      29.90-HR
+   (CFS)       (HR)
                               (CFS)
+      12.     12.20                         2.          1.          0.            0.
                             (INCHES)     5.228       6.380       6.380         6.380
                              (AC-FT)        1.          1.          1.            1.

                            CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   95 KK      *   SITE-2   *     SOUTHWESTERLY SITE RUNOFF TOWARD PT.1
              *            *
              **************

                                **********************************************************************
                                * DRAINAGE AREA = 0.18 AC = 0.0003 SQ. MI.      CN=86                 *
                                * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050    *
                                **********************************************************************

                 SUBBASIN RUNOFF DATA

  102 BA           SUBBASIN CHARACTERISTICS
```

TAREA 0.00 SUBBASIN AREA

PRECIPITATION DATA

35 PB STORM 1.00 BASIN TOTAL PRECIPITATION

37 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

103 LS SCS LOSS RATE

STRTL 1.00 INITIAL ABSTRACTION

CRVNBR 86.00 CURVE NUMBER

RTIMP 0.00 PERCENT IMPERVIOUS AREA

104 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 0.05 LAG

***

UNIT HYDROGRAPH

5 END-OF-PERIOD ORDINATES

1.	0.	0.	0.	0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2

FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.85, TOTAL EXCESS = 0.95

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	12.20		0.	0.	0.	0.
		(INCHES)	0.787	0.945	0.945	0.945
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-2

FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 1.99, TOTAL EXCESS = 1.51

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	12.20		0.	0.	0.	0.
		(INCHES)	1.285	1.514	1.514	1.514
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

```
      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE-2
                          FOR PLAN 1, RATIO = 4.50

    TOTAL RAINFALL =    4.50, TOTAL LOSS =    2.11, TOTAL EXCESS =    2.39

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       0.     12.20                0.           0.           0.           0.
                        (INCHES)    2.034        2.389        2.389        2.389
                        (AC-FT)      0.           0.           0.           0.

                        CUMULATIVE AREA =    0.00 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE-2
                          FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.17, TOTAL EXCESS =    2.93

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       1.     12.20                0.           0.           0.           0.
                        (INCHES)    2.493        2.935        2.935        2.935
                        (AC-FT)      0.           0.           0.           0.

                        CUMULATIVE AREA =    0.00 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE-2
                          FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    2.23, TOTAL EXCESS =    3.77

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       1.     12.20                0.           0.           0.           0.
                        (INCHES)    3.188        3.772        3.772        3.772
                        (AC-FT)      0.           0.           0.           0.

                        CUMULATIVE AREA =    0.00 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE-2
                          FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    2.35, TOTAL EXCESS =    6.65

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       1.     12.20                0.           0.           0.           0.
                        (INCHES)    5.472        6.647        6.647        6.647
                        (AC-FT)      0.           0.           0.           0.

                        CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
105 KK      *    SITE3A  *     SOUTHEASTERLY DEVELOPED SITE RUNOFF TOWARD PT.3
            *            *
            **************

                        ************************************************************************
                        * DRAINAGE AREA = 2.32 AC = 0.0036 SQ. MI.      CN=93                  *
                        * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050     *
                        ************************************************************************


              SUBBASIN RUNOFF DATA

112 BA          SUBBASIN CHARACTERISTICS
                      TAREA        0.00  SUBBASIN AREA

                PRECIPITATION DATA
```

```
 35 PB           STORM        1.00  BASIN TOTAL PRECIPITATION

 37 PI       INCREMENTAL PRECIPITATION PATTERN
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.01    0.00    0.01    0.00    0.01    0.01    0.01    0.01    0.01
               0.01    0.01    0.01    0.01    0.01    0.01    0.01    0.02    0.03    0.05
               0.08    0.08    0.05    0.03    0.02    0.01    0.01    0.01    0.01    0.01
               0.01    0.01    0.01    0.01    0.01    0.01    0.00    0.01    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.01
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
               0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00

113 LS      SCS LOSS RATE
              STRTL        1.00  INITIAL ABSTRACTION
             CRVNBR       93.00  CURVE NUMBER
              RTIMP        0.00  PERCENT IMPERVIOUS AREA

114 UD      SCS DIMENSIONLESS UNITGRAPH
               TLAG        0.05  LAG

                                        ***

                                          UNIT HYDROGRAPH
                                        5 END-OF-PERIOD ORDINATES
          17.       5.       1.       0.       0.

   TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      0.       0.10                    0.          0.          0.           0.
                        (INCHES)    0.000       0.000       0.000        0.000
                         (AC-FT)       0.          0.          0.           0.

                          CUMULATIVE AREA =    0.00 SQ MI


      ***          ***          ***          ***          ***

                           HYDROGRAPH AT STATION   SITE3A
                             FOR PLAN 1, RATIO = 2.80

   TOTAL RAINFALL =    2.80, TOTAL LOSS =    1.53, TOTAL EXCESS =    1.27

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      3.      12.20                    0.          0.          0.           0.
                        (INCHES)    1.080       1.269       1.269        1.269
                         (AC-FT)       0.          0.          0.           0.

                          CUMULATIVE AREA =    0.00 SQ MI


      ***          ***          ***          ***          ***

                           HYDROGRAPH AT STATION   SITE3A
                             FOR PLAN 1, RATIO = 3.50

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.58, TOTAL EXCESS =    1.92

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      5.      12.20                    1.          0.          0.           0.
                        (INCHES)    1.661       1.921       1.921        1.921
                         (AC-FT)       0.          0.          0.           0.

                          CUMULATIVE AREA =    0.00 SQ MI


      ***          ***          ***          ***          ***

                           HYDROGRAPH AT STATION   SITE3A
```

```
                          FOR PLAN 1, RATIO = 4.50

     TOTAL RAINFALL =    4.50, TOTAL LOSS =    1.62, TOTAL EXCESS =    2.88

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       7.     12.20                1.           0.           0.           0.
                  (INCHES)      2.485        2.881        2.881        2.881
                  (AC-FT)          0.           1.           1.           1.

                  CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE3A
                          FOR PLAN 1, RATIO = 5.10

     TOTAL RAINFALL =    5.10, TOTAL LOSS =    1.64, TOTAL EXCESS =    3.46

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+       9.     12.20                1.           0.           0.           0.
                  (INCHES)      2.977        3.464        3.464        3.464
                  (AC-FT)          1.           1.           1.           1.

                  CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE3A
                          FOR PLAN 1, RATIO = 6.00

     TOTAL RAINFALL =    6.00, TOTAL LOSS =    1.65, TOTAL EXCESS =    4.35

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+      11.     12.20                1.           0.           0.           0.
                  (INCHES)      3.691        4.346        4.346        4.346
                  (AC-FT)          1.           1.           1.           1.

                  CUMULATIVE AREA =    0.00 SQ MI


       ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION   SITE3A
                          FOR PLAN 1, RATIO = 9.00

     TOTAL RAINFALL =    9.00, TOTAL LOSS =    1.69, TOTAL EXCESS =    7.31

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)        (HR)
                    (CFS)
+      17.     12.20                2.           1.           1.           1.
                  (INCHES)      5.980        7.312        7.312        7.312
                  (AC-FT)          1.           1.           1.           1.

                  CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 115 KK     *    SITE-4  *     SOUTHEASTERLY SITE RUNOFF (DETENTION AREA) TOWARD PT.3
            *            *
            **************

                     ************************************************************************
                     * DRAINAGE AREA = 1.90 AC = 0.0030 SQ. MI.      CN=75                  *
                     * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100    *
                     ************************************************************************


               SUBBASIN RUNOFF DATA

 122 BA          SUBBASIN CHARACTERISTICS
                       TAREA        0.00  SUBBASIN AREA

               PRECIPITATION DATA

  35 PB                STORM        1.00  BASIN TOTAL PRECIPITATION
```

37 PI INCREMENTAL PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

123 LS SCS LOSS RATE

STRTL	1.00	INITIAL ABSTRACTION
CRVNBR	75.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

124 UD SCS DIMENSIONLESS UNITGRAPH

TLAG	0.10	LAG

***

UNIT HYDROGRAPH
7 END-OF-PERIOD ORDINATES

7.	8.	3.	1.	0.	0.	0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-4
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.17, TOTAL EXCESS = 0.63

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1.	12.30		0.	0.	0.	0.
		(INCHES)	0.514	0.631	0.631	0.631
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-4
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.43, TOTAL EXCESS = 1.07

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2.	12.30		0.	0.	0.	0.
		(INCHES)	0.892	1.071	1.071	1.071
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-4
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.71, TOTAL EXCESS = 1.79

```
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+       3.     12.30                0.           0.           0.           0.
                (INCHES)         1.502        1.793        1.793        1.793
                (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***            ***            ***            ***            ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.84, TOTAL EXCESS =    2.26

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+       4.     12.30                1.           0.           0.           0.
                (INCHES)         1.893        2.261        2.261        2.261
                (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***            ***            ***            ***            ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    3.00, TOTAL EXCESS =    3.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+       5.     12.20                1.           0.           0.           0.
                (INCHES)         2.505        3.000        3.000        3.000
                (AC-FT)             0.           0.           0.           0.

                CUMULATIVE AREA =    0.00 SQ MI


      ***            ***            ***            ***            ***

                  HYDROGRAPH AT STATION   SITE-4
                    FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.35, TOTAL EXCESS =    5.65

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      10.     12.20                1.           0.           0.           0.
                (INCHES)         4.647        5.647        5.647        5.647
                (AC-FT)             1.           1.           1.           1.

                CUMULATIVE AREA =    0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 125 KK   *    SITE5A  *     NORTHEASTERLY DEVELOPED SITE RUNOFF TOWARD PT.5
          *            *
          **************

                ************************************************************************
                * DRAINAGE AREA = 4.26 AC = 0.0067 SQ. MI.      CN=95                  *
                * TIME OF CONCENTRATION = 5 MIN = 0.083 HR x 0.6 (SCS LAG) = 0.050     *
                ************************************************************************


            SUBBASIN RUNOFF DATA

 132 BA       SUBBASIN CHARACTERISTICS
                 TAREA        0.01  SUBBASIN AREA

            PRECIPITATION DATA

  35 PB           STORM        1.00  BASIN TOTAL PRECIPITATION

  37 PI         INCREMENTAL PRECIPITATION PATTERN
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                  0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

```
133 LS          SCS LOSS RATE
                      STRTL         1.00  INITIAL ABSTRACTION
                     CRVNBR        95.00  CURVE NUMBER
                      RTIMP         0.00  PERCENT IMPERVIOUS AREA

134 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG         0.05  LAG

                                                                ***

                                                          UNIT HYDROGRAPH
                                                      5 END-OF-PERIOD ORDINATES
                 32.         9.         2.         0.         0.

   TOTAL RAINFALL =    1.00, TOTAL LOSS =    1.00, TOTAL EXCESS =    0.00

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       0.      0.10                       0.          0.           0.            0.
                        (INCHES)       0.000       0.000        0.000         0.000
                         (AC-FT)          0.          0.           0.            0.

                          CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***              ***              ***

                           HYDROGRAPH AT STATION   SITE5A
                             FOR PLAN 1, RATIO = 2.80

   TOTAL RAINFALL =    2.80, TOTAL LOSS =    1.41, TOTAL EXCESS =    1.39

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       7.     12.20                       1.          0.           0.            0.
                        (INCHES)       1.196       1.393        1.393         1.393
                         (AC-FT)          0.          0.           0.            0.

                          CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***              ***              ***

                           HYDROGRAPH AT STATION   SITE5A
                             FOR PLAN 1, RATIO = 3.50

   TOTAL RAINFALL =    3.50, TOTAL LOSS =    1.43, TOTAL EXCESS =    2.07

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      10.     12.20                       1.          0.           0.            0.
                        (INCHES)       1.796       2.065        2.065         2.065
                         (AC-FT)          1.          1.           1.            1.

                          CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***              ***              ***

                           HYDROGRAPH AT STATION   SITE5A
                             FOR PLAN 1, RATIO = 4.50

   TOTAL RAINFALL =    4.50, TOTAL LOSS =    1.46, TOTAL EXCESS =    3.04

PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                       6-HR        24-HR        72-HR      29.90-HR
```

```
+   (CFS)       (HR)
                            (CFS)
+       15.     12.20                   2.          1.          0.           0.
                          (INCHES)    2.638       3.042       3.042        3.042
                           (AC-FT)      1.          1.          1.           1.

                          CUMULATIVE AREA =     0.01 SQ MI


       ***            ***           ***            ***            ***

                           HYDROGRAPH AT STATION    SITE5A
                             FOR PLAN 1, RATIO = 5.10

      TOTAL RAINFALL =     5.10, TOTAL LOSS =     1.47, TOTAL EXCESS =     3.63

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR       29.90-HR
+   (CFS)       (HR)
                            (CFS)
+       17.     12.20                   2.          1.          1.           1.
                          (INCHES)    3.133       3.634       3.634        3.634
                           (AC-FT)      1.          1.          1.           1.

                          CUMULATIVE AREA =     0.01 SQ MI


       ***            ***           ***            ***            ***

                           HYDROGRAPH AT STATION    SITE5A
                             FOR PLAN 1, RATIO = 6.00

      TOTAL RAINFALL =     6.00, TOTAL LOSS =     1.48, TOTAL EXCESS =     4.52

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR       29.90-HR
+   (CFS)       (HR)
                            (CFS)
+       20.     12.20                   3.          1.          1.           1.
                          (INCHES)    3.847       4.524       4.524        4.524
                           (AC-FT)      1.          2.          2.           2.

                          CUMULATIVE AREA =     0.01 SQ MI


       ***            ***           ***            ***            ***

                           HYDROGRAPH AT STATION    SITE5A
                             FOR PLAN 1, RATIO = 9.00

      TOTAL RAINFALL =     9.00, TOTAL LOSS =     1.49, TOTAL EXCESS =     7.51

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR       29.90-HR
+   (CFS)       (HR)
                            (CFS)
+       32.     12.20                   4.          1.          1.           1.
                          (INCHES)    6.110       7.506       7.506        7.506
                           (AC-FT)      2.          3.          3.           3.

                          CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   135 KK     *    SUB5A   *     APPLY 14 MIN. PERCOLATION
              *            *
              **************

      DT          DIVERSION
                        ISTAD          PERC5A  DIVERSION HYDROGRAPH IDENTIFICATION

      DI             INFLOW            6.88      10.43      14.68      17.04      20.47      31.52

      DQ         DIVERTED FLOW         6.41       9.96      14.13      16.57      20.00      31.05
                                                                        ***

       ***            ***           ***            ***            ***

                           DIVERSION HYDROGRAPH    PERC5A
                             FOR PLAN 1, RATIO = 2.80

   PEAK FLOW     TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR       72-HR       29.90-HR
+   (CFS)       (HR)
                            (CFS)
+        0.     12.00                   0.          0.          0.           0.
                          (INCHES)    0.533       0.730       0.730        0.730
                           (AC-FT)      0.          0.          0.           0.
```

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SUB5A
FOR PLAN 1, RATIO = 2.80

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 6.	12.20	0.	0.	0.	0.
		(INCHES) 0.663	0.663	0.663	0.663
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

DIVERSION HYDROGRAPH PERC5A
FOR PLAN 1, RATIO = 3.50

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	11.80	0.	0.	0.	0.
		(INCHES) 0.597	0.866	0.866	0.866
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SUB5A
FOR PLAN 1, RATIO = 3.50

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 10.	12.20	1.	0.	0.	0.
		(INCHES) 1.199	1.199	1.199	1.199
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

DIVERSION HYDROGRAPH PERC5A
FOR PLAN 1, RATIO = 4.50

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	11.20	0.	0.	0.	0.
		(INCHES) 0.643	1.048	1.048	1.048
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SUB5A
FOR PLAN 1, RATIO = 4.50

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 14.	12.20	1.	0.	0.	0.
		(INCHES) 1.995	1.995	1.995	1.995
		(AC-FT) 1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

DIVERSION HYDROGRAPH PERC5A
FOR PLAN 1, RATIO = 5.10

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	10.80	0.	0.	0.	0.
		(INCHES) 0.652	1.152	1.152	1.152

```
                         (AC-FT)        0.          0.          0.           0.

                         CUMULATIVE AREA =    0.01 SQ MI


      ***           ***           ***           ***           ***

                          HYDROGRAPH AT STATION    SUB5A
                            FOR PLAN 1, RATIO = 5.10

   PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      29.90-HR
 +   (CFS)      (HR)
                          (CFS)
 +       17.    12.20                   2.          0.          0.          0.
                         (INCHES)     2.481       2.481       2.481       2.481
                          (AC-FT)        1.          1.          1.          1.

                         CUMULATIVE AREA =    0.01 SQ MI


      ***           ***           ***           ***           ***

                          DIVERSION HYDROGRAPH   PERC5A
                            FOR PLAN 1, RATIO = 6.00

   PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      29.90-HR
 +   (CFS)      (HR)
                          (CFS)
 +        0.    10.30                   0.          0.          0.          0.
                         (INCHES)     0.652       1.298       1.298       1.298
                          (AC-FT)        0.          0.          0.          0.

                         CUMULATIVE AREA =    0.01 SQ MI


      ***           ***           ***           ***           ***

                          HYDROGRAPH AT STATION    SUB5A
                            FOR PLAN 1, RATIO = 6.00

   PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      29.90-HR
 +   (CFS)      (HR)
                          (CFS)
 +       20.    12.20                   2.          1.          0.          0.
                         (INCHES)     3.195       3.226       3.226       3.226
                          (AC-FT)        1.          1.          1.          1.

                         CUMULATIVE AREA =    0.01 SQ MI


      ***           ***           ***           ***           ***

                          DIVERSION HYDROGRAPH   PERC5A
                            FOR PLAN 1, RATIO = 9.00

   PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      29.90-HR
 +   (CFS)      (HR)
                          (CFS)
 +        0.     8.70                   0.          0.          0.          0.
                         (INCHES)     0.652       1.642       1.642       1.642
                          (AC-FT)        0.          1.          1.          1.

                         CUMULATIVE AREA =    0.01 SQ MI


      ***           ***           ***           ***           ***

                          HYDROGRAPH AT STATION    SUB5A
                            FOR PLAN 1, RATIO = 9.00

   PEAK FLOW    TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      29.90-HR
 +   (CFS)      (HR)
                          (CFS)
 +       31.    12.20                   4.          1.          1.          1.
                         (INCHES)     5.458       5.864       5.864       5.864
                          (AC-FT)        2.          2.          2.          2.

                         CUMULATIVE AREA =    0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   139 KK     *   ROUT5A   *     ROUTING IN UNDERGROUND STORAGE SYSTEM FOR SITE-5A
              *            *
              **************
```

OUTLET STRUCTURE DATA: 140 STORMTECH MC-4500 UNITS

```
**********************************************************************
*  WEIR LENGTH = 6.28' WEIR OVERFLOW AT EL.: 366.9                   *
*  18-INCH DIAMETER ORIFICE AT EL.: 363.75                           *
**********************************************************************
```

HYDROGRAPH ROUTING DATA

```
147 RS          STORAGE ROUTING
                     NSTPS           1  NUMBER OF SUBREACHES
                      ITYP        ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC      359.00  INITIAL CONDITION
                         X        0.00 WORKING R AND D COEFFICIENT

148 SV            STORAGE         0.0       0.0       0.1       0.2       0.3       0.4       0.5       0.5       0.5

149 SE          ELEVATION      359.00    359.75    360.75    361.75    362.75    363.75    364.75    365.75    368.50

150 SL          LOW-LEVEL OUTLET
                     ELEVL      364.50  ELEVATION AT CENTER OF OUTLET
                     CAREA        1.77  CROSS-SECTIONAL AREA
                      COQL        0.60  COEFFICIENT
                      EXPL        0.50  EXPONENT OF HEAD

151 SS          SPILLWAY
                      CREL      366.90  SPILLWAY CREST ELEVATION
                     SPWID        6.28  SPILLWAY WIDTH
                      COQW        3.00  WEIR COEFFICIENT
                      EXPW        1.50  EXPONENT OF HEAD

152 ST          TOP OF DAM
                     TOPEL      368.00  ELEVATION AT TOP OF DAM
                    DAMWID        5.00  DAM WIDTH
                      COQD        3.00  WEIR COEFFICIENT
                      EXPD        1.50  EXPONENT OF HEAD
```

***

COMPUTED OUTFLOW-ELEVATION DATA

(EXCLUDING FLOW OVER DAM)

OUTFLOW	0.00	0.00	7.21	7.71	8.28	8.94	9.72	10.65	11.78	13.17
ELEVATION	359.00	364.50	365.22	365.32	365.45	365.61	365.81	366.07	366.42	366.90
OUTFLOW	13.48	14.15	15.40	17.40	20.34	24.38	29.71	36.49	44.91	55.14
ELEVATION	366.95	367.01	367.10	367.22	367.36	367.54	367.74	367.96	368.22	368.50

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

(INCLUDING FLOW OVER DAM)

STORAGE	0.00	0.04	0.14	0.25	0.34	0.43	0.48	0.49	0.52	0.52
OUTFLOW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.25	7.21	7.71
ELEVATION	359.00	359.75	360.75	361.75	362.75	363.75	364.50	364.75	365.22	365.32
STORAGE	0.53	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
OUTFLOW	8.28	8.94	9.51	9.72	10.65	11.78	13.17	13.48	14.15	15.40
ELEVATION	365.45	365.61	365.75	365.81	366.07	366.42	366.90	366.95	367.01	367.10
STORAGE	0.54	0.54	0.54	0.54	0.54	0.54	0.54			
OUTFLOW	17.40	20.34	24.38	29.71	36.49	46.44	60.44			
ELEVATION	367.22	367.36	367.54	367.74	367.96	368.22	368.50			

*** *** *** *** ***

HYDROGRAPH AT STATION ROUT5A
FOR PLAN 1, RATIO = 2.80

PEAK OUTFLOW IS 0. AT TIME 0.00 HOURS

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)				
0.	16.00	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)				
361.64	16.10	361.64	360.93	360.55	360.55

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUT5A
FOR PLAN 1, RATIO = 3.50

PEAK OUTFLOW IS 0. AT TIME 0.00 HOURS

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)					
0.	16.10		0.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)					
363.73	16.20		363.73	362.43	361.75	361.75

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUT5A
FOR PLAN 1, RATIO = 4.50

PEAK OUTFLOW IS 5. AT TIME 12.50 HOURS

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 5.	12.50		0.	0.	0.	0.
		(INCHES)	0.660	0.660	0.660	0.660
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)					
0.	12.50		0.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)					
364.78	12.50		364.51	363.08	362.27	362.27

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUT5A
FOR PLAN 1, RATIO = 5.10

PEAK OUTFLOW IS 8. AT TIME 12.40 HOURS

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 8.	12.40		1.	0.	0.	0.
		(INCHES)	1.146	1.146	1.146	1.146
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)					
1.	12.40		0.	0.	0.	0.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)					
365.40	12.40		364.54	363.11	362.30	362.30

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUT5A
FOR PLAN 1, RATIO = 6.00

PEAK OUTFLOW IS 19. AT TIME 12.30 HOURS

```
  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      19.     12.30                 1.           0.           0.           0.
                         (INCHES)    1.890        1.890        1.890        1.890
                          (AC-FT)      1.           1.           1.           1.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR     29.90-HR
+  (AC-FT)      (HR)
       1.     12.30                 0.           0.           0.           0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR     29.90-HR
+   (FEET)      (HR)
    367.29     12.30              364.60       363.17       362.35       362.35

                        CUMULATIVE AREA =    0.01 SQ MI


      ***             ***            ***            ***            ***

                          HYDROGRAPH AT STATION   ROUT5A
                            FOR PLAN 1, RATIO = 9.00

 PEAK OUTFLOW IS       33. AT TIME  12.10 HOURS


  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+      33.     12.10                 3.           1.           1.           1.
                         (INCHES)    4.458        4.527        4.527        4.527
                          (AC-FT)      2.           2.           2.           2.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR     29.90-HR
+  (AC-FT)      (HR)
       1.     12.10                 0.           0.           0.           0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR     29.90-HR
+   (FEET)      (HR)
    367.85     12.10              364.78       363.39       362.52       362.52

                        CUMULATIVE AREA =    0.01 SQ MI



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 153 KK    *      PT.A  *     ADD SITE-3A, SITE-4 AND SITE5A HYDROGRAPHS
           *            *
           **************

 154 HC          HYDROGRAPH COMBINATION
                      ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                    ***

      ***             ***            ***            ***            ***

                          HYDROGRAPH AT STATION     PT.A
                            FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       4.     12.20                 1.           0.           0.           0.
                         (INCHES)    0.408        0.486        0.486        0.486
                          (AC-FT)      0.           0.           0.           0.

                        CUMULATIVE AREA =    0.01 SQ MI


      ***             ***            ***            ***            ***

                          HYDROGRAPH AT STATION     PT.A
                            FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       7.     12.20                 1.           0.           0.           0.
                         (INCHES)    0.650        0.762        0.762        0.762
                          (AC-FT)      0.           1.           1.           1.
```

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                    CUMULATIVE AREA =    0.01 SQ MI

      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION     PT.A
                      FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                   (CFS)
+      10.     12.20                 2.          1.          0.          0.
                (INCHES)      1.342       1.517       1.517       1.517
                (AC-FT)         1.          1.          1.          1.

                    CUMULATIVE AREA =    0.01 SQ MI

      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION     PT.A
                      FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                   (CFS)
+      16.     12.40                 3.          1.          1.          1.
                (INCHES)      1.808       2.025       2.025       2.025
                (AC-FT)         1.          1.          1.          1.

                    CUMULATIVE AREA =    0.01 SQ MI

      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION     PT.A
                      FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                   (CFS)
+      32.     12.30                 4.          1.          1.          1.
                (INCHES)      2.511       2.805       2.805       2.805
                (AC-FT)         2.          2.          2.          2.

                    CUMULATIVE AREA =    0.01 SQ MI

      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION     PT.A
                      FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                   (CFS)
+      55.     12.10                 7.          2.          2.          2.
                (INCHES)      4.863       5.533       5.533       5.533
                (AC-FT)         3.          4.          4.          4.

                    CUMULATIVE AREA =    0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  155 KK    *      SUBA  *     APPLY 28 MIN. PERCOLATION
            *            *
            **************

      DT          DIVERSION
                       ISTAD       PERCA  DIVERSION HYDROGRAPH IDENTIFICATION

      DI             INFLOW        3.91      6.68      13.61      23.06      35.84      57.60

      DQ      DIVERTED FLOW        3.54      6.31      13.24      22.69      35.47      57.23

                                                                   ***

      ***           ***           ***           ***           ***

                    DIVERSION HYDROGRAPH     PERCA
                      FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR     29.90-HR
```

```
  +   (CFS)        (HR)
                                (CFS)
  +        0.      12.00                      0.           0.           0.            0.
                              (INCHES)     0.209        0.286        0.286         0.286
                               (AC-FT)        0.           0.           0.            0.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 HYDROGRAPH AT STATION      SUBA
                                   FOR PLAN 1, RATIO = 2.80

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                               6-HR         24-HR         72-HR       29.90-HR
  +   (CFS)        (HR)
                                (CFS)
  +        4.      12.20                      0.           0.           0.            0.
                              (INCHES)     0.199        0.199        0.199         0.199
                               (AC-FT)        0.           0.           0.            0.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 DIVERSION HYDROGRAPH     PERCA
                                   FOR PLAN 1, RATIO = 3.50

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                               6-HR         24-HR         72-HR       29.90-HR
  +   (CFS)        (HR)
                                (CFS)
  +        0.      11.90                      0.           0.           0.            0.
                              (INCHES)     0.238        0.350        0.350         0.350
                               (AC-FT)        0.           0.           0.            0.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 HYDROGRAPH AT STATION      SUBA
                                   FOR PLAN 1, RATIO = 3.50

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                               6-HR         24-HR         72-HR       29.90-HR
  +   (CFS)        (HR)
                                (CFS)
  +        6.      12.20                      1.           0.           0.            0.
                              (INCHES)     0.412        0.412        0.412         0.412
                               (AC-FT)        0.           0.           0.            0.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 DIVERSION HYDROGRAPH     PERCA
                                   FOR PLAN 1, RATIO = 4.50

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                               6-HR         24-HR         72-HR       29.90-HR
  +   (CFS)        (HR)
                                (CFS)
  +        0.      11.40                      0.           0.           0.            0.
                              (INCHES)     0.255        0.429        0.429         0.429
                               (AC-FT)        0.           0.           0.            0.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 HYDROGRAPH AT STATION      SUBA
                                   FOR PLAN 1, RATIO = 4.50

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                               6-HR         24-HR         72-HR       29.90-HR
  +   (CFS)        (HR)
                                (CFS)
  +       10.      12.20                      2.           0.           0.            0.
                              (INCHES)     1.087        1.087        1.087         1.087
                               (AC-FT)        1.           1.           1.            1.

                                CUMULATIVE AREA =     0.01 SQ MI


          ***              ***           ***            ***            ***

                                 DIVERSION HYDROGRAPH     PERCA
                                   FOR PLAN 1, RATIO = 5.10

     PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
```

```
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+      0.     11.00                       0.        0.         0.          0.
                          (INCHES)    0.258     0.475      0.475       0.475
                           (AC-FT)        0.        0.         0.          0.

                          CUMULATIVE AREA =     0.01 SQ MI


      ***           ***         ***          ***          ***

                           HYDROGRAPH AT STATION     SUBA
                             FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+     15.     12.40                       2.        1.         0.          0.
                          (INCHES)    1.549     1.550      1.550       1.550
                           (AC-FT)        1.        1.         1.          1.

                          CUMULATIVE AREA =     0.01 SQ MI


      ***           ***         ***          ***          ***

                           DIVERSION HYDROGRAPH    PERCA
                             FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+      0.     10.50                       0.        0.         0.          0.
                          (INCHES)    0.259     0.537      0.537       0.537
                           (AC-FT)        0.        0.         0.          0.

                          CUMULATIVE AREA =     0.01 SQ MI


      ***           ***         ***          ***          ***

                           HYDROGRAPH AT STATION     SUBA
                             FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+     32.     12.30                       3.        1.         1.          1.
                          (INCHES)    2.252     2.268      2.268       2.268
                           (AC-FT)        2.        2.         2.          2.

                          CUMULATIVE AREA =     0.01 SQ MI


      ***           ***         ***          ***          ***

                           DIVERSION HYDROGRAPH    PERCA
                             FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+      0.      9.00                       0.        0.         0.          0.
                          (INCHES)    0.259     0.669      0.669       0.669
                           (AC-FT)        0.        0.         0.          0.

                          CUMULATIVE AREA =     0.01 SQ MI


      ***           ***         ***          ***          ***

                           HYDROGRAPH AT STATION     SUBA
                             FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR      24-HR      72-HR    29.90-HR
+   (CFS)      (HR)
                            (CFS)
+     55.     12.10                       7.        2.         1.          1.
                          (INCHES)    4.604     4.865      4.865       4.865
                           (AC-FT)        3.        3.         3.          3.

                          CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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          **************
          *            *
159 KK    *     ROUTA  *     ROUTING IN ABOVE GROUND STORAGE SYSTEM FOR COMB-3
          *            *
          **************

                    OUTLET STRUCTURE DATA:
                    ***********************************************************************
                    *  WEIR LENGTH = 1.0' WEIR OVERFLOW AT EL.: 353.3                     *
                    *  3.50-INCH DIAMETER CPv ORIFICE AT EL. 351.5                        *
                    ***********************************************************************


               HYDROGRAPH ROUTING DATA

167 RS           STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC     350.00  INITIAL CONDITION
                          X       0.00 WORKING R AND D COEFFICIENT

168 SV             STORAGE        0.0        0.1        0.2        0.5        0.8        1.4        1.5        1.5

169 SE           ELEVATION     350.00     350.50     351.50     353.00     355.00     357.00     358.25     358.00

170 SQ           DISCHARGE         0.         0.         0.         1.         8.        16.        24.        31.        38.        48.

171 SE           ELEVATION     351.90     351.80     353.30     353.50     355.00     356.00     357.00     358.00     358.20     358.60

                                                        ***

                                              COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

             STORAGE       0.00       0.09       0.19       0.26       0.45       0.50       0.54       0.79       1.08       1.38
             OUTFLOW       0.00       0.00       0.00       0.10       0.35       0.42       0.71       8.47      15.51      23.88
           ELEVATION     350.00     350.50     351.50     351.90     353.00     353.30     353.50     355.00     356.00     357.00

             STORAGE       1.50       1.53       1.54       1.54
             OUTFLOW      31.39      37.94      39.23      48.30
           ELEVATION     358.00     358.20     358.25     358.60

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       31. TO       48.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    ROUTA
                            FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       0.      0.10                   0.           0.           0.           0.
                        (INCHES)     0.000        0.000        0.000        0.000
                         (AC-FT)        0.           0.           0.           0.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     29.90-HR
+  (AC-FT)      (HR)
        0.     14.40                    0.           0.           0.           0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     29.90-HR
+   (FEET)      (HR)
    351.04     16.10                351.04       350.75       350.61       350.61

                          CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    ROUTA
                            FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     29.90-HR
+   (CFS)       (HR)
                          (CFS)
+       0.     14.40                   0.           0.           0.           0.
                        (INCHES)     0.070        0.127        0.127        0.127
                         (AC-FT)        0.           0.           0.           0.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     29.90-HR
+  (AC-FT)      (HR)
        0.     14.30                    0.           0.           0.           0.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     29.90-HR
+   (FEET)      (HR)
    351.95     14.70                351.89       351.28       351.03       351.03
```

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUTA
FOR PLAN 1, RATIO = 4.50

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1.	13.60		1.	0.	0.	0.
		(INCHES)	0.449	0.721	0.721	0.721
		(AC-FT)	0.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)				
1.	13.60	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)				
353.61	13.60	353.35	351.98	351.59	351.59

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUTA
FOR PLAN 1, RATIO = 5.10

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4.	12.80		1.	0.	0.	0.
		(INCHES)	0.888	1.178	1.178	1.178
		(AC-FT)	1.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)				
1.	12.80	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)				
354.13	12.80	353.54	352.06	351.65	351.65

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUTA
FOR PLAN 1, RATIO = 6.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9.	12.60		2.	1.	1.	1.
		(INCHES)	1.580	1.890	1.890	1.890
		(AC-FT)	1.	1.	1.	1.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (AC-FT)	(HR)				
1.	12.60	1.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	29.90-HR
+ (FEET)	(HR)				
355.10	12.60	353.76	352.16	351.73	351.73

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION ROUTA
FOR PLAN 1, RATIO = 9.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 27.	12.40		6.	2.	1.	1.
		(INCHES)	4.031	4.448	4.448	4.448
		(AC-FT)	3.	3.	3.	3.

```
 PEAK STORAGE   TIME                              MAXIMUM AVERAGE STORAGE
                                          6-HR       24-HR       72-HR     29.90-HR
+  (AC-FT)      (HR)
        1.     12.40                        1.          0.          0.          0.

  PEAK STAGE    TIME                              MAXIMUM AVERAGE STAGE
                                          6-HR       24-HR       72-HR     29.90-HR
+   (FEET)      (HR)
    357.44     12.40                   354.35      352.51      352.02      352.02

                          CUMULATIVE AREA =     0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

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          *            *
  172 KK  *   SITE-3   *     SOUTHEASTERLY UNIMPROVED SITE RUNOFF TOWARD PT.3
          *            *
          **************

                              **********************************************************************
                              * DRAINAGE AREA = 0.16 AC = 0.0003 SQ. MI.      CN=70                *
                              * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100  *
                              **********************************************************************

             SUBBASIN RUNOFF DATA

  179 BA       SUBBASIN CHARACTERISTICS
                     TAREA        0.00  SUBBASIN AREA

               PRECIPITATION DATA

   35 PB             STORM        1.00  BASIN TOTAL PRECIPITATION

   37 PI         INCREMENTAL PRECIPITATION PATTERN
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.01      0.00      0.01      0.00      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.01      0.02      0.03      0.05
                   0.08      0.08      0.05      0.03      0.02      0.01      0.01      0.01      0.01      0.01
                   0.01      0.01      0.01      0.01      0.01      0.01      0.00      0.01      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.01
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                   0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00

  180 LS       SCS LOSS RATE
                     STRTL        1.00  INITIAL ABSTRACTION
                    CRVNBR       70.00  CURVE NUMBER
                     RTIMP        0.00  PERCENT IMPERVIOUS AREA

  181 UD       SCS DIMENSIONLESS UNITGRAPH
                      TLAG        0.10  LAG

                                                          ***

                                                       UNIT HYDROGRAPH
                                                   7 END-OF-PERIOD ORDINATES
             1.        1.        0.        0.        0.        0.        0.

     TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =     0.00

   PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                           6-HR       24-HR       72-HR     29.90-HR
+    (CFS)       (HR)
                            (CFS)
+        0.      0.10                         0.          0.          0.          0.
                           (INCHES)       0.000       0.000       0.000       0.000
                            (AC-FT)          0.          0.          0.          0.

                           CUMULATIVE AREA =     0.00 SQ MI


      ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION    SITE-3
```

FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.27, TOTAL EXCESS = 0.53

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.30	0.	0.	0.	0.
		(INCHES) 0.431	0.532	0.532	0.532
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.58, TOTAL EXCESS = 0.92

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.30	0.	0.	0.	0.
		(INCHES) 0.762	0.921	0.921	0.921
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.93, TOTAL EXCESS = 1.57

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.30	0.	0.	0.	0.
		(INCHES) 1.310	1.573	1.573	1.573
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 3.10, TOTAL EXCESS = 2.00

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.30	0.	0.	0.	0.
		(INCHES) 1.669	2.005	2.005	2.005
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 6.00

TOTAL RAINFALL = 6.00, TOTAL LOSS = 3.31, TOTAL EXCESS = 2.69

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW			
		6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)				
		(CFS)			
+ 0.	12.30	0.	0.	0.	0.
		(INCHES) 2.236	2.692	2.692	2.692
		(AC-FT) 0.	0.	0.	0.

CUMULATIVE AREA = 0.00 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-3
FOR PLAN 1, RATIO = 9.00

TOTAL RAINFALL = 9.00, TOTAL LOSS = 3.79, TOTAL EXCESS = 5.21

PEAK FLOW	TIME	MAXIMUM AVERAGE FLOW

```
                                        6-HR       24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                              (CFS)
+       1.       12.20                     0.          0.          0.          0.
                           (INCHES)    4.282       5.209       5.209       5.209
                            (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =     0.00 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 182 KK     *     PT.B   *     ADD ROUTE3 AND SITE-3 HYDROGRAPHS
            *            *
            **************

 183 HC          HYDROGRAPH COMBINATION
                      ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                      ***

      ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION     PT.B
                               FOR PLAN 1, RATIO = 2.80

 PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                              (CFS)
+       0.     12.30                       0.          0.          0.          0.
                           (INCHES)    0.010       0.012       0.012       0.012
                            (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =     0.01 SQ MI


      ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION     PT.B
                               FOR PLAN 1, RATIO = 3.50

 PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                              (CFS)
+       0.     12.30                       0.          0.          0.          0.
                           (INCHES)    0.079       0.145       0.145       0.145
                            (AC-FT)       0.          0.          0.          0.

                           CUMULATIVE AREA =     0.01 SQ MI


      ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION     PT.B
                               FOR PLAN 1, RATIO = 4.50

 PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                              (CFS)
+       1.     13.60                       1.          0.          0.          0.
                           (INCHES)    0.456       0.739       0.739       0.739
                            (AC-FT)       0.          1.          1.          1.

                           CUMULATIVE AREA =     0.01 SQ MI


      ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION     PT.B
                               FOR PLAN 1, RATIO = 5.10

 PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                              (CFS)
+       4.     12.80                       1.          0.          0.          0.
                           (INCHES)    0.895       1.196       1.196       1.196
                            (AC-FT)       1.          1.          1.          1.

                           CUMULATIVE AREA =     0.01 SQ MI


      ***            ***            ***            ***            ***

                             HYDROGRAPH AT STATION     PT.B
                               FOR PLAN 1, RATIO = 6.00
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  PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                          6-HR         24-HR        72-HR       29.90-HR
+   (CFS)        (HR)
                           (CFS)
+        9.     12.60                       2.            1.           1.             1.
                         (INCHES)     1.586         1.908        1.908          1.908
                          (AC-FT)        1.            1.           1.             1.

                         CUMULATIVE AREA =     0.01 SQ MI


       ***              ***             ***              ***              ***

                           HYDROGRAPH AT STATION      PT.B
                             FOR PLAN 1, RATIO = 9.00

  PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                          6-HR         24-HR        72-HR       29.90-HR
+   (CFS)        (HR)
                           (CFS)
+       28.     12.40                       6.            2.           1.             1.
                         (INCHES)     4.028         4.464        4.464          4.464
                          (AC-FT)        3.            3.           3.             3.

                         CUMULATIVE AREA =     0.01 SQ MI



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


             **************
             *            *
 184 KK      *    OFF-1   *     OFFSITE SOUTHEASTERLY RUNOFF TOWARD PT.3
             *            *
             **************

                          ***********************************************************************
                          * DRAINAGE AREA = 7.85 AC = 0.0123 SQ. MI.      CN=93                  *
                          * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100    *
                          ***********************************************************************


                SUBBASIN RUNOFF DATA

 191 BA           SUBBASIN CHARACTERISTICS
                        TAREA        0.01  SUBBASIN AREA

                  PRECIPITATION DATA

  35 PB                 STORM        1.00  BASIN TOTAL PRECIPITATION

  37 PI             INCREMENTAL PRECIPITATION PATTERN
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.01     0.00     0.01     0.00     0.01     0.01     0.01     0.01     0.01
                     0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.02     0.03     0.05
                     0.08     0.08     0.05     0.03     0.02     0.01     0.01     0.01     0.01     0.01
                     0.01     0.01     0.01     0.01     0.01     0.01     0.00     0.01     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.01
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00

 192 LS           SCS LOSS RATE
                       STRTL         1.00  INITIAL ABSTRACTION
                      CRVNBR        93.00  CURVE NUMBER
                       RTIMP         0.00  PERCENT IMPERVIOUS AREA

 193 UD           SCS DIMENSIONLESS UNITGRAPH
                        TLAG         0.10  LAG

                                                       ***

                                                   UNIT HYDROGRAPH
                                                 7 END-OF-PERIOD ORDINATES
               30.        33.        11.         4.         1.         0.         0.

     TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =    0.00
```

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-1
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 1.53, TOTAL EXCESS = 1.27

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 10.	12.30		1.	0.	0.	0.
		(INCHES)	1.078	1.269	1.269	1.269
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-1
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 1.58, TOTAL EXCESS = 1.92

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 15.	12.30		2.	1.	1.	1.
		(INCHES)	1.659	1.921	1.921	1.921
		(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-1
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 1.62, TOTAL EXCESS = 2.88

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 23.	12.20		3.	1.	1.	1.
		(INCHES)	2.484	2.881	2.881	2.881
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-1
FOR PLAN 1, RATIO = 5.10

TOTAL RAINFALL = 5.10, TOTAL LOSS = 1.64, TOTAL EXCESS = 3.46

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 27.	12.20		4.	1.	1.	1.
		(INCHES)	2.976	3.464	3.464	3.464
		(AC-FT)	2.	2.	2.	2.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION OFF-1
FOR PLAN 1, RATIO = 6.00

TOTAL RAINFALL = 6.00, TOTAL LOSS = 1.65, TOTAL EXCESS = 4.35

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 33.	12.20		5.	1.	1.	1.

```
                    (INCHES)    3.691       4.346       4.346        4.346
                    (AC-FT)        2.          3.          3.           3.

                    CUMULATIVE AREA =    0.01 SQ MI


      ***            ***           ***           ***            ***

                     HYDROGRAPH AT STATION     OFF-1
                       FOR PLAN 1, RATIO = 9.00

   TOTAL RAINFALL =    9.00, TOTAL LOSS =    1.69, TOTAL EXCESS =    7.31

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                         (CFS)
+      52.     12.20                 8.          2.          2.           2.
                    (INCHES)    5.979       7.312       7.312        7.312
                    (AC-FT)        4.          5.          5.           5.

                    CUMULATIVE AREA =    0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  194 KK    *    PT.3    *     ADD PT.B AND OFF-1 HYDROGRAPHS
            *            *
            **************

  195 HC         HYDROGRAPH COMBINATION
                      ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                            ***

      ***            ***           ***           ***            ***

                     HYDROGRAPH AT STATION      PT.3
                       FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                         (CFS)
+      10.     12.30                 1.          0.          0.           0.
                    (INCHES)    0.517       0.609       0.609        0.609
                    (AC-FT)        1.          1.          1.           1.

                    CUMULATIVE AREA =    0.03 SQ MI


      ***            ***           ***           ***            ***

                     HYDROGRAPH AT STATION      PT.3
                       FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                         (CFS)
+      15.     12.30                 2.          1.          1.           1.
                    (INCHES)    0.828       0.988       0.988        0.988
                    (AC-FT)        1.          1.          1.           1.

                    CUMULATIVE AREA =    0.03 SQ MI


      ***            ***           ***           ***            ***

                     HYDROGRAPH AT STATION      PT.3
                       FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                         (CFS)
+      23.     12.20                 4.          1.          1.           1.
                    (INCHES)    1.401       1.756       1.756        1.756
                    (AC-FT)        2.          2.          2.           2.

                    CUMULATIVE AREA =    0.03 SQ MI


      ***            ***           ***           ***            ***

                     HYDROGRAPH AT STATION      PT.3
                       FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR     29.90-HR
```

```
+   (CFS)       (HR)
                  (CFS)
+      27.     12.20                5.          2.          1.          1.
                (INCHES)      1.857       2.273       2.273       2.273
                 (AC-FT)        3.          3.          3.          3.

                CUMULATIVE AREA =    0.03 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION     PT.3
                    FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      34.     12.20                7.          2.          2.          2.
                (INCHES)      2.551       3.066       3.066       3.066
                 (AC-FT)        4.          4.          4.          4.

                CUMULATIVE AREA =    0.03 SQ MI


      ***           ***           ***           ***           ***

                  HYDROGRAPH AT STATION     PT.3
                    FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      72.     12.30               14.          4.          3.          3.
                (INCHES)      4.869       5.817       5.817       5.817
                 (AC-FT)        7.          8.          8.          8.

                CUMULATIVE AREA =    0.03 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
196 KK    *     LAG-3  *     LAG PT.2 COMBINED HYDROGRAPH TO PT.4
          *            *
          **************

            HYDROGRAPH ROUTING DATA

197 RT        TATUM OR STRADDLE-STAGGER ROUTING
                   NSTPS            0   NUMBER OF TATUM STEPS
                   NSTDL            0   NUMBER OF ORDINATES TO BE AVERAGED
                   LAG              1   NUMBER OF INTERVALS TO LAG HYDROGRAPH

                                                                  ***

      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION    LAG-3
                      FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      10.     12.40                1.          0.          0.          0.
                (INCHES)      0.517       0.609       0.609       0.609
                 (AC-FT)        1.          1.          1.          1.

                CUMULATIVE AREA =    0.03 SQ MI


      ***           ***           ***           ***           ***

                    HYDROGRAPH AT STATION    LAG-3
                      FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                   6-HR        24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      15.     12.40                2.          1.          1.          1.
                (INCHES)      0.828       0.988       0.988       0.988
                 (AC-FT)        1.          1.          1.          1.

                CUMULATIVE AREA =    0.03 SQ MI


      ***           ***           ***           ***           ***
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                         HYDROGRAPH AT STATION    LAG-3
                           FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                             MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                             (CFS)
+       23.     12.30                     4.           1.           1.            1.
                           (INCHES)    1.401        1.756        1.756         1.756
                            (AC-FT)       2.           2.           2.            2.

                          CUMULATIVE AREA =     0.03 SQ MI


       ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    LAG-3
                           FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                             MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                             (CFS)
+       27.     12.30                     5.           2.           1.            1.
                           (INCHES)    1.857        2.272        2.272         2.272
                            (AC-FT)       3.           3.           3.            3.

                          CUMULATIVE AREA =     0.03 SQ MI


       ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    LAG-3
                           FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                             MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                             (CFS)
+       34.     12.30                     7.           2.           2.            2.
                           (INCHES)    2.551        3.065        3.065         3.065
                            (AC-FT)       4.           4.           4.            4.

                          CUMULATIVE AREA =     0.03 SQ MI


       ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    LAG-3
                           FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                             MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      29.90-HR
+   (CFS)       (HR)
                             (CFS)
+       72.     12.40                    14.           4.           3.            3.
                           (INCHES)    4.869        5.816        5.816         5.816
                            (AC-FT)       7.           8.           8.            8.

                          CUMULATIVE AREA =     0.03 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 198 KK       *   SITE-5   *     NORTHEASTERLY UNDEVELOPED SITE RUNOFF TOWARD PT.4
              *            *
              **************

                            ***********************************************************************
                            * DRAINAGE AREA = 3.77 AC = 0.0059 SQ. MI.      CN=73                  *
                            * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100   *
                            ***********************************************************************


                 SUBBASIN RUNOFF DATA

 205 BA            SUBBASIN CHARACTERISTICS
                         TAREA          0.01  SUBBASIN AREA

                   PRECIPITATION DATA

  35 PB                  STORM          1.00  BASIN TOTAL PRECIPITATION

  37 PI              INCREMENTAL PRECIPITATION PATTERN
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                       0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
```

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

206 LS SCS LOSS RATE

STRTL	1.00	INITIAL ABSTRACTION
CRVNBR	73.00	CURVE NUMBER
RTIMP	0.00	PERCENT IMPERVIOUS AREA

207 UD SCS DIMENSIONLESS UNITGRAPH

TLAG 0.10 LAG

***

UNIT HYDROGRAPH
7 END-OF-PERIOD ORDINATES

14. 16. 5. 2. 1. 0. 0.

TOTAL RAINFALL = 1.00, TOTAL LOSS = 1.00, TOTAL EXCESS = 0.00

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	0.10		0.	0.	0.	0.
		(INCHES)	0.000	0.000	0.000	0.000
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-5
FOR PLAN 1, RATIO = 2.80

TOTAL RAINFALL = 2.80, TOTAL LOSS = 2.21, TOTAL EXCESS = 0.59

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2.	12.30		0.	0.	0.	0.
		(INCHES)	0.478	0.589	0.589	0.589
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-5
FOR PLAN 1, RATIO = 3.50

TOTAL RAINFALL = 3.50, TOTAL LOSS = 2.49, TOTAL EXCESS = 1.01

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3.	12.30		1.	0.	0.	0.
		(INCHES)	0.837	1.008	1.008	1.008
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = 0.01 SQ MI

*** *** *** *** ***

HYDROGRAPH AT STATION SITE-5
FOR PLAN 1, RATIO = 4.50

TOTAL RAINFALL = 4.50, TOTAL LOSS = 2.80, TOTAL EXCESS = 1.70

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	29.90-HR
+ (CFS)	(HR)					
		(CFS)				
+ 6.	12.30		1.	0.	0.	0.
		(INCHES)	1.422	1.702	1.702	1.702

```
                     (AC-FT)        0.          1.          1.          1.

                     CUMULATIVE AREA =    0.01 SQ MI


      ***            ***          ***           ***           ***

                      HYDROGRAPH AT STATION   SITE-5
                        FOR PLAN 1, RATIO = 5.10

   TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.94, TOTAL EXCESS =    2.16

 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                 6-HR        24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                      (CFS)
+      7.     12.30                 1.          0.          0.          0.
                    (INCHES)     1.800       2.156       2.156       2.156
                     (AC-FT)        1.          1.          1.          1.

                     CUMULATIVE AREA =    0.01 SQ MI


      ***            ***          ***           ***           ***

                      HYDROGRAPH AT STATION   SITE-5
                        FOR PLAN 1, RATIO = 6.00

   TOTAL RAINFALL =    6.00, TOTAL LOSS =    3.13, TOTAL EXCESS =    2.87

 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                 6-HR        24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                      (CFS)
+     10.     12.30                 2.          0.          0.          0.
                    (INCHES)     2.395       2.874       2.874       2.874
                     (AC-FT)        1.          1.          1.          1.

                     CUMULATIVE AREA =    0.01 SQ MI


      ***            ***          ***           ***           ***

                      HYDROGRAPH AT STATION   SITE-5
                        FOR PLAN 1, RATIO = 9.00

   TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.53, TOTAL EXCESS =    5.47

 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                 6-HR        24-HR       72-HR      29.90-HR
+   (CFS)      (HR)
                      (CFS)
+     19.     12.20                 3.          1.          1.          1.
                    (INCHES)     4.501       5.471       5.471       5.471
                     (AC-FT)        1.          2.          2.          2.

                     CUMULATIVE AREA =    0.01 SQ MI



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 208 KK    *    OFF-2   *     OFFSITE EASTERLY RUNOFF TOWARD PT.4
           *            *
           **************

                       ************************************************************************
                       * DRAINAGE AREA = 3.32 AC = 0.0052 SQ. MI.       CN=78                  *
                       * TIME OF CONCENTRATION = 10 MIN = 0.167 HR x 0.6 (SCS LAG) = 0.100    *
                       ************************************************************************


              SUBBASIN RUNOFF DATA

 215 BA         SUBBASIN CHARACTERISTICS
                      TAREA          0.01  SUBBASIN AREA

                PRECIPITATION DATA

  35 PB               STORM        1.00  BASIN TOTAL PRECIPITATION

  37 PI           INCREMENTAL PRECIPITATION PATTERN
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
                     0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00      0.00
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0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05
0.08	0.08	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

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216 LS          SCS LOSS RATE
                      STRTL        1.00  INITIAL ABSTRACTION
                     CRVNBR       78.00  CURVE NUMBER
                      RTIMP        0.00  PERCENT IMPERVIOUS AREA

217 UD          SCS DIMENSIONLESS UNITGRAPH
                       TLAG        0.10  LAG

                                                 ***

                                           UNIT HYDROGRAPH
                                       7 END-OF-PERIOD ORDINATES
              13.        14.         5.         2.         1.        0.        0.

   TOTAL RAINFALL =     1.00, TOTAL LOSS =     1.00, TOTAL EXCESS =     0.00

PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       29.90-HR
+  (CFS)        (HR)
                           (CFS)
+        0.      0.10                  0.          0.           0.            0.
                        (INCHES)     0.000       0.000        0.000         0.000
                         (AC-FT)       0.          0.           0.            0.

                         CUMULATIVE AREA =     0.01 SQ MI
```

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      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    OFF-2
                            FOR PLAN 1, RATIO = 2.80

   TOTAL RAINFALL =     2.80, TOTAL LOSS =     2.10, TOTAL EXCESS =     0.70

PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       29.90-HR
+  (CFS)        (HR)
                           (CFS)
+        2.     12.30                  0.          0.           0.            0.
                        (INCHES)     0.574       0.701        0.701         0.701
                         (AC-FT)       0.          0.           0.            0.

                         CUMULATIVE AREA =     0.01 SQ MI
```

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      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    OFF-2
                            FOR PLAN 1, RATIO = 3.50

   TOTAL RAINFALL =     3.50, TOTAL LOSS =     2.33, TOTAL EXCESS =     1.17

PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       29.90-HR
+  (CFS)        (HR)
                           (CFS)
+        3.     12.30                  1.          0.           0.            0.
                        (INCHES)     0.982       1.175        1.175         1.175
                         (AC-FT)       0.          0.           0.            0.

                         CUMULATIVE AREA =     0.01 SQ MI
```

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      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    OFF-2
                            FOR PLAN 1, RATIO = 4.50

   TOTAL RAINFALL =     4.50, TOTAL LOSS =     2.56, TOTAL EXCESS =     1.94

PEAK FLOW      TIME                             MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       29.90-HR
+  (CFS)        (HR)
                           (CFS)
+        6.     12.30                  1.          0.           0.            0.
                        (INCHES)     1.630       1.938        1.938         1.938
                         (AC-FT)       0.          1.           1.            1.

                         CUMULATIVE AREA =     0.01 SQ MI
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      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    OFF-2
                          FOR PLAN 1, RATIO = 5.10

    TOTAL RAINFALL =    5.10, TOTAL LOSS =    2.67, TOTAL EXCESS =    2.43

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+       7.     12.30                1.          0.          0.          0.
                (INCHES)     2.040       2.429       2.429       2.429
                (AC-FT)         1.          1.          1.          1.

                CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    OFF-2
                          FOR PLAN 1, RATIO = 6.00

    TOTAL RAINFALL =    6.00, TOTAL LOSS =    2.80, TOTAL EXCESS =    3.20

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      10.     12.20                1.          0.          0.          0.
                (INCHES)     2.678       3.197       3.197       3.197
                (AC-FT)         1.          1.          1.          1.

                CUMULATIVE AREA =    0.01 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    OFF-2
                          FOR PLAN 1, RATIO = 9.00

    TOTAL RAINFALL =    9.00, TOTAL LOSS =    3.09, TOTAL EXCESS =    5.91

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      18.     12.20                3.          1.          1.          1.
                (INCHES)     4.869       5.915       5.915       5.915
                (AC-FT)         1.          2.          2.          2.

                CUMULATIVE AREA =    0.01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
218 KK     *      PT.4  *     ADD LAG-3, SITE-5 AND OFF-2 HYDROGRAPHS
           *            *
           **************

219 HC          HYDROGRAPH COMBINATION
                     ICOMP           3  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                    ***

      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     PT.4
                          FOR PLAN 1, RATIO = 2.80

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     29.90-HR
+   (CFS)       (HR)
                  (CFS)
+      13.     12.40                2.          1.          0.          0.
                (INCHES)     0.519       0.619       0.619       0.619
                (AC-FT)         1.          1.          1.          1.

                CUMULATIVE AREA =    0.04 SQ MI


      ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION     PT.4
                          FOR PLAN 1, RATIO = 3.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     29.90-HR
```

```
+   (CFS)        (HR)
                   (CFS)
+      22.      12.30                3.          1.          1.          1.
                (INCHES)          0.851       1.018       1.018       1.018
                 (AC-FT)             2.          2.          2.          2.

                CUMULATIVE AREA =    0.04 SQ MI


      ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     PT.4
                    FOR PLAN 1, RATIO = 4.50

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+      34.      12.30                6.          2.          1.          1.
                (INCHES)          1.436       1.773       1.773       1.773
                 (AC-FT)             3.          3.          3.          3.

                CUMULATIVE AREA =    0.04 SQ MI


      ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     PT.4
                    FOR PLAN 1, RATIO = 5.10

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+      42.      12.30                7.          2.          2.          2.
                (INCHES)          1.873       2.276       2.276       2.276
                 (AC-FT)             4.          4.          4.          4.

                CUMULATIVE AREA =    0.04 SQ MI


      ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     PT.4
                    FOR PLAN 1, RATIO = 6.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+      53.      12.30               10.          3.          2.          2.
                (INCHES)          2.544       3.053       3.053       3.053
                 (AC-FT)             5.          6.          6.          6.

                CUMULATIVE AREA =    0.04 SQ MI


      ***             ***             ***             ***             ***

                  HYDROGRAPH AT STATION     PT.4
                    FOR PLAN 1, RATIO = 9.00

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR       72-HR     29.90-HR
+   (CFS)        (HR)
                   (CFS)
+     103.      12.30               19.          6.          5.          5.
                (INCHES)          4.810       5.775       5.775       5.775
                 (AC-FT)             9.         11.         11.         11.

                CUMULATIVE AREA =    0.04 SQ MI

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PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
VOLUME IN ACRE-FEET, TIME TO PEAK IN HOURS

					RATIOS APPLIED TO PRECIPITATION					
OPERATION	STATION	AREA	PLAN		RATIO 1 2.80	RATIO 2 3.50	RATIO 3 4.50	RATIO 4 5.10	RATIO 5 6.00	RATIO 6 9.00
HYDROGRAPH AT										
+	SITE1A	0.001	1	FLOW	0.67	1.04	1.49	1.74	2.11	3.27
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.05	0.07	0.11	0.13	0.17	0.28
HYDROGRAPH AT										
+	SITE1B	0.001	1	FLOW	0.37	0.72	1.23	1.54	2.02	3.59
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.04	0.06	0.10	0.12	0.16	0.29
HYDROGRAPH AT										
+	SITE1C	0.000	1	FLOW	0.13	0.18	0.23	0.27	0.32	0.48

				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.01	0.01	0.02	0.02	0.03	0.04
HYDROGRAPH AT										
+	SITE-1	0.001	1	FLOW	0.49	0.95	1.67	2.11	2.78	5.03
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.05	0.08	0.13	0.17	0.22	0.41
4 COMBINED AT										
+	PT.1	0.003	1	FLOW	1.66	2.89	4.62	5.66	7.22	12.36
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.14	0.23	0.36	0.44	0.57	1.02
HYDROGRAPH AT										
+	SITE-2	0.000	1	FLOW	0.17	0.31	0.50	0.61	0.77	1.30
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.02	0.02	0.04	0.05	0.06	0.11
HYDROGRAPH AT										
+	SITE3A	0.004	1	FLOW	3.18	5.09	7.45	8.76	10.66	16.70
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.24	0.37	0.55	0.67	0.83	1.40
HYDROGRAPH AT										
+	SITE-4	0.003	1	FLOW	0.93	1.76	3.07	3.90	5.18	9.85
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.10	0.17	0.29	0.36	0.48	0.90
HYDROGRAPH AT										
+	SITE5A	0.007	1	FLOW	6.88	10.43	14.68	17.04	20.47	31.52
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.50	0.74	1.09	1.30	1.62	2.68
DIVERSION TO										
+	PERC5A	0.007	1	FLOW	0.47	0.47	0.47	0.47	0.47	0.47
				TIME	12.00	11.80	11.20	10.80	10.30	8.70
				VOLUME	0.26	0.31	0.37	0.41	0.46	0.59
HYDROGRAPH AT										
+	SUB5A	0.007	1	FLOW	6.41	9.96	14.21	16.57	20.00	31.05
				TIME	12.20	12.20	12.20	12.20	12.20	12.20
				VOLUME	0.24	0.43	0.71	0.89	1.15	2.10
ROUTED TO										
+	ROUT5A	0.007	1	FLOW	0.00	0.00	4.54	8.07	18.71	32.93
				TIME	0.10	0.10	12.50	12.40	12.30	12.10
				VOLUME	0.00	0.00	0.24	0.41	0.68	1.62
			** PEAK STAGES IN FEET **							
			1	STAGE	361.64	363.73	364.78	365.40	367.29	367.85
				TIME	16.10	16.20	12.50	12.40	12.30	12.10
3 COMBINED AT										
+	PT.A	0.013	1	FLOW	3.91	6.68	10.40	15.77	31.97	55.22
				TIME	12.20	12.20	12.20	12.40	12.30	12.10
				VOLUME	0.34	0.54	1.08	1.44	1.99	3.93
DIVERSION TO										
+	PERCA	0.013	1	FLOW	0.37	0.37	0.37	0.37	0.37	0.37
				TIME	12.00	11.90	11.40	11.00	10.50	9.00
				VOLUME	0.20	0.25	0.30	0.34	0.38	0.47
HYDROGRAPH AT										
+	SUBA	0.013	1	FLOW	3.54	6.31	10.03	15.40	31.60	54.85
				TIME	12.20	12.20	12.20	12.40	12.30	12.10
				VOLUME	0.14	0.29	0.77	1.10	1.61	3.45
ROUTED TO										
+	ROUTA	0.013	1	FLOW	0.00	0.11	1.30	3.97	9.14	27.20
				TIME	0.10	14.40	13.60	12.80	12.60	12.40
				VOLUME	0.00	0.09	0.51	0.84	1.34	3.15
			** PEAK STAGES IN FEET **							
			1	STAGE	351.04	351.95	353.61	354.13	355.10	357.44
				TIME	16.10	14.70	13.60	12.80	12.60	12.40
HYDROGRAPH AT										
+	SITE-3	0.000	1	FLOW	0.08	0.15	0.26	0.34	0.46	0.90
				TIME	12.30	12.30	12.30	12.30	12.30	12.20
				VOLUME	0.01	0.01	0.03	0.03	0.04	0.08
2 COMBINED AT										
+	PT.B	0.014	1	FLOW	0.08	0.15	1.33	4.04	9.30	27.88
				TIME	12.30	12.30	13.60	12.80	12.60	12.40
				VOLUME	0.01	0.10	0.54	0.87	1.38	3.24
HYDROGRAPH AT										
+	OFF-1	0.012	1	FLOW	9.62	15.04	22.65	26.90	32.99	52.19
				TIME	12.30	12.30	12.20	12.20	12.20	12.20
				VOLUME	0.83	1.26	1.89	2.27	2.85	4.80
2 COMBINED AT										
+	PT.3	0.026	1	FLOW	9.69	15.19	22.90	27.30	33.67	71.81
				TIME	12.30	12.30	12.20	12.20	12.20	12.30
				VOLUME	0.84	1.37	2.43	3.14	4.23	8.03

ROUTED TO										
+	LAG-3	0.026	1	FLOW	9.69	15.19	22.90	27.30	33.67	71.81
				TIME	12.40	12.40	12.30	12.30	12.30	12.40
				VOLUME	0.84	1.37	2.43	3.14	4.23	8.03
HYDROGRAPH AT										
+	SITE-5	0.006	1	FLOW	1.67	3.22	5.69	7.26	9.69	18.68
				TIME	12.30	12.30	12.30	12.30	12.30	12.20
				VOLUME	0.19	0.32	0.54	0.68	0.90	1.72
HYDROGRAPH AT										
+	OFF-2	0.005	1	FLOW	1.82	3.41	5.84	7.34	9.71	17.98
				TIME	12.30	12.30	12.30	12.30	12.20	12.20
				VOLUME	0.19	0.33	0.54	0.67	0.89	1.64
3 COMBINED AT										
+	PT.4	0.037	1	FLOW	12.85	21.67	34.43	41.90	52.98	103.38
				TIME	12.40	12.30	12.30	12.30	12.30	12.30
				VOLUME	1.22	2.01	3.50	4.49	6.02	11.40

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION ROUT5A
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	359.00	366.90	368.00
STORAGE	0.	1.	1.
OUTFLOW	0.	13.	38.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
2.80	361.64	0.00	0.	0.	0.00	0.00	0.00
3.50	363.73	0.00	0.	0.	0.00	0.00	0.00
4.50	364.78	0.00	0.	5.	0.00	12.50	0.00
5.10	365.40	0.00	1.	8.	0.00	12.40	0.00
6.00	367.29	0.00	1.	19.	0.00	12.30	0.00
9.00	367.85	0.00	1.	33.	0.00	12.10	0.00

*** NORMAL END OF HEC-1 ***