- Stormwater Management Stormfilter:

These facilities are self-contained systems that filter grit, contaminated sediments, metals, hydrocarbons and floating contaminants from surface runoff entering sewer lines. They are installed underground with a minimal amount of surface disturbance. The unit requires approximately a 2-½ foot difference in elevation between the inflow and outflow pipes in order to operate and aerate its filtering media. We have considered the use of these systems generally within street right-of-way areas where the change in elevations can be achieved by existing conditions along the roads. The system offers all pollutant removal through staging of different filter medias within the unit. Changing of the filter media is normally required annually.

ERNST, ERNST & LISSENDEN
CONSULTING ENGINEERS, PLANNERS & SURVEYORS

DATE:

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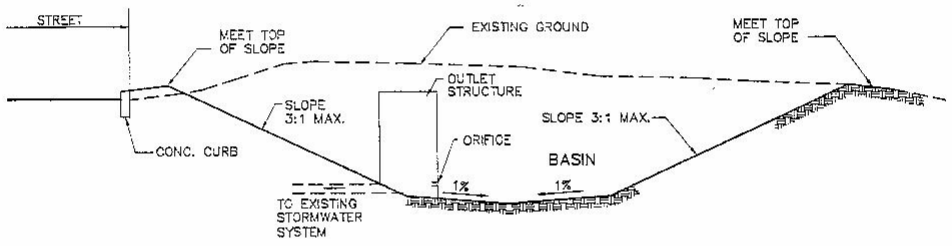
616.040A



STORMWATER RECHARGE BASIN

N.T.S.

51-060

STORMWATER AND WATER QUALITY MANAGEMENT PLAN

RECOMMENDATIONS OF TECHNIQUES TO TREAT STORMWATER RUNOFF
TO MINIMIZE NON-POINT SOURCE POLLUTION
FROM
PINE BEACH DISCHARGE POINTS
TRIBUTARY TO THE
TOMS RIVER

Borough of Pine Beach
Ocean County, New Jersey

December 23, 2002

Prepared by:

John J. Mallon, P.E., P.P.
NJ License No. 21895

ERNST, ERNST AND LISSENDEN
CONSULTING ENGINEERS, PLANNERS AND SURVEYORS
52 Hyers Street, P.O. Box 391 Toms River, New Jersey 08754
Telephone: (732) 349-2215 www.eelengr.com Fax (732) 349-4127

Index For Stormwater and Water Quality Management Plan

Introduction

This document was prepared with the aid of a grant from the New Jersey Department of Environmental Protection, Environmental Services Program.

Stormwater and Water Quality is an everyday problem. Non point source pollution, sometimes called "people pollution", is a problem we face in everyday activities but are simply not aware of it. But steps can be taken to address the sources of non point source pollution, which affect the water we drink and the recreation areas we use.

The Borough of Pine Beach has already taken positive steps to attenuate the problem and reduce the sources of this pollution. Under previous grants, action by the Governing Body and studies, the Borough has:

- Enacted a Pooper Scooper law;
- Continued with catch basin/inlet cleaning;
- Educated young and old alike about pollution sources;
- Entered the schools to educate and allow young people to test the waters that they swim and fish in;
- Installed, in cooperation with scouting pooper scooper, pick up and drop stations;
- Is in the process of coordinating with Soil Conservation Service on sediment control for individual house construction;
- Is coordinating with the County on street sweeping;
- Urged the public to discontinue feeding ducks, geese, gulls and other water animals;
- Through it's Environmental Commission, instituted programs and policies that will improve both surface and ground water quality.

This report considers and recommends some of the best management practices for improving water quality. It does not intend to be all-inclusive and has not considered costs as being the controlling factor in its recommendations. It does not contend to be the ultimate solution but will help clean up the Toms River for recreational use along with providing some groundwater recharge. The recharge systems recommended contain stormwater runoff from roads and development.

The runoff would be preliminarily treated via the best management practices described herein and would remove the heavy materials, considered the "first flush" or "water quality storm" that would address silt, road oils, fertilizers, pesticides, litter, pet and animal waste, car washing detergents, soil erosion, household hazardous products, etc. These materials silt, clog and pollute our storm drains and waterways. These solutions will not solve the pollution problem but will help alleviate part of the problems.

When considering the recommendations of this report, the availability of land was a limiting factor. It is not to suggest that the Borough should condemn land or take away property owner's rights to utilize and implement these best management practices. As vacant property develops different methods will need to be revisited which will achieve water quality to the best "value engineering" evaluation as has been recommended in other areas of the Borough where land is unavailable.

Project Purpose

To establish and devise the best management practices to minimize non-point source pollution of stormwater from Pine Beach discharge points into the Toms River. Non-point source pollution is described as seasonal rains, which carry oils, greases, solids, nutrients, heavy metals and organic compounds into the Toms River from the Borough's storm drainage facilities.

Items of study in this report include the following:

- A description of the Borough's outfall structures along the waters of the Toms River.
- A description of vacant privately owned and Borough owned properties that are available for treatment areas. This also includes Borough street right-of-way areas best suited for treatment areas.
- A description of the various methods that can be utilized to achieve filtering and stormwater recharge.
- Recommendations of the types of systems to be used on a site-specific basis.
- Mapping of existing outfall structures along the Toms River.
- Mapping of possible treatment areas.
- Mapping of site-specific treatment areas with the best method to achieve the goals of the project.

Recommendation of Ordinance Adoption

Other than Borough owned lots (which are currently developed for various uses), a few undeveloped privately owned lots (some which are substandard by Ordinance) and street right-of-ways (that are encumbered by underground utilities) the Borough can be considered as mostly built-out. This presents a problem when considering locations best suited for Stormwater Management practices of this magnitude. Therefore we recommend that the Borough Council adopt changes to the Land Use Ordinance that require future commercial, multi-family or other similar uses to provide an on-site Water Quality Management Plan similar to the recommendations of this report. The Borough may also wish to adopt an Ordinance requiring any future developer to contribute to a fund set aside for Water Quality Management purposes to procure additional lands and facilities as needed.

Description and Locations of Borough's Outfall Structures Into Toms River

The following is a list of existing outfall structures that discharge stormwater into the Toms River. These structures are shown and numbered on Exhibit 'A' plan sheets, which consists of four drawings at the end of this report.

- Outfall No. 1:
  Location – Northwest corner of Monument Road and Prospect Avenue
  Pipe Description – 54" diameter corrugated metal pipe

- Outfall No. 2:
  Location – Westerly terminus of Radnor Avenue
  Pipe Description – 15" diameter reinforced concrete pipe

- Outfall No. 3:
  Location – Northwest corner of Motor Road and Riverside Drive
  Pipe Description – 18" diameter steel pipe

- Outfall No. 4:
  Location – Northerly side of Riverside Drive midway between Motor and Avon Roads
  Pipe Description – 15" diameter corrugated metal pipe

- Outfall No. 5:
  Location – Northerly intersection of Riverside Drive and Avon Road
  Pipe Description – 18" diameter corrugated metal pipe

- Outfall No. 6:
  Location – Approximately 75 feet West of the intersection of Riverside Drive and New Jersey Avenue
  Pipe Description – 18" diameter reinforced concrete pipe

- Outfall No. 7:
  Location – Northerly side of Riverside Drive and New Jersey Avenue
  Pipe Description – 30" diameter corrugated metal pipe

- Outfall No. 8:
  Location – Northerly corner of Riverside Drive and Hillside Avenue
  Pipe Description – 18" diameter reinforced concrete pipe

- Outfall No. 9:
  Location – Northerly corner of Riverside Drive and Hillside Avenue
  Pipe Description – 12" diameter corrugated metal pipe

- Outfall No. 10:
  Location – Approximately 75 feet West of the intersection of Riverside Drive and Midland Avenue
  Pipe Description – 12" diameter corrugated metal pipe

- Outfall No. 11:
  Location – Northerly side of the intersection of Riverside Drive and Midland Avenue
  Pipe Description – 15" diameter reinforced concrete pipe

- Outfall No. 12:
  Location – Northerly corner of Riverside Drive and Henley Avenue
  Pipe Description – 36" diameter corrugated metal pipe

- Outfall No. 13:
  Location – Approximately 75 feet West of the intersection of Riverside Drive and Cedar Avenue
  Pipe Description – 18" diameter reinforced concrete pipe

- Outfall No. 14:
  Location – Northerly corner of Riverside Drive and Station Avenue
  Pipe Description – 36" diameter reinforced concrete pipe

Areas Available For Stormwater Treatment Facilities

- Properties within the Borough that are presently vacant and privately owned. These properties are shown on Exhibit 'A' plan sheets at the end of this report.
  - Block 12, Lot 9: Easterly side of Cedar Avenue, 25 feet North of Huntington Avenue
  - Block 17, Lots 36 & 38. Northerly side of Linden Avenue, 125 feet West of Cedar Avenue
  - Block 26, Lot 37: Southerly side of Huntington Avenue, 125 feet West of Henley Avenue
  - Block 56, Lots 22 & 24: Northerly side of Pennsylvania Avenue, 250 feet East of Avon Road
  - Block 70, Lots 1 & 2: Southeasterly corner of Merion Avenue and Motor Road
  - Block 70, Lots 9 & 10: Northeasterly corner of Monmouth Avenue and Motor Road
  - Block 78, Lots 49 & 50: Southwesterly corner of Washington Avenue and Motor Road
  - Block 98, Lot 7: Southerly side of Buhler Avenue, 40 feet East of Monument Road
- Borough owned properties and Street right-of-way areas that are presently available for treatment areas. These areas are shown on Exhibit 'A' plan sheets at the end of this report.
  - Northerly side of intersection of Prospect Avenue and Monument Road. Treatment for Outfall No. 1.
  - Southerly side of Radnor Avenue at its Westerly terminus. Treatment for Outfall No. 2.
  - Motor Road, 100 feet South of Riverside Drive. Treatment for Outfall No. 3.
  - Southerly side of Riverside Drive, between Motor and Avon Roads. Treatment for Outfall No. 4.
  - Avon Road, Approximately 200 feet South of Riverside Drive. Treatment for Outfall No. 5.
  - Northerly side of intersection of Riverside Drive and New Jersey Avenue. Treatment for Outfall No. 6
  - Block 111, Lot 2 (Borough owned property) Northerly side of intersection of New Jersey Avenue and Riverside Drive. Treatment for Outfalls No. 6 and No. 7.

- Block 111, Lot 2 (Borough owned property) Northerly side of intersection of Hillside Avenue and Riverside Drive. Treatment for Outfalls No. 8 and No. 9.

- Block 111, Lot 2 (Borough owned property) North of intersection of Midland Avenue and Riverside Drive. Treatment for outfalls No. 10 and No. 11.

- Northerly side of intersection of Riverside Drive and Henley Avenue. Treatment for Outfall No. 12.

- Northerly side of Riverside Drive, approximately 100 feet West of Cedar Avenue. Catch basin No. 13-01. Treatment for Outfall No. 13.

- Block 111, Lot 2 (Borough owned property) North of intersection of Station Avenue and Riverside Drive. Treatment for Outfall No. 14.

All of the above areas chosen for treatment must be further investigated for existing underground utilities, existing utility poles, trees, etc. These treatment areas are subject to field inspections and further design considerations.

Best Management Practices

Types of Structures and Methods Considered to Minimize Non-Point Source Pollution and Provide for Ground Water Recharge

- Above Ground Stormwater Recharge Basins:

  These facilities along with providing an overflow structure designed with an orifice at the proper elevation, offer storage and area for recharging the ground water table. They are easier to maintain compared to other methods of groundwater recharge, such as underground piping systems. This facility will be utilized on properties that are presently vacant and in conjunction with a self contained filtering system similar to that as manufactured by "Vortechnics" (which will be described later in this report).

- Underground Stormwater Recharge Piping Systems:

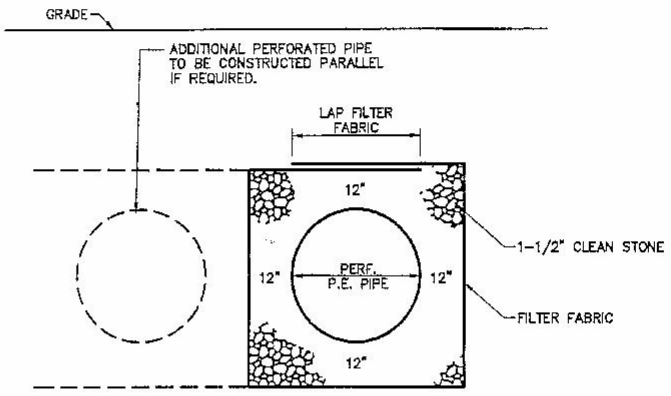
  These facilities offer a means of recharging the ground water table after a storm event. They are costly to install, harder to maintain than an above ground recharge basin and could be subject to conflicts with existing underground utilities. They have been considered in this study as an alternate method of providing ground water recharge other than basins. If site-specific conditions warrant their use they will be considered.

- Catch Basin Traps:

  Traps installed on existing catch basin outlet pipes offer a means of preventing floating debris from entering and clogging sewer lines. When installed with seals they also offer a baffling effect on floating oils that would normally enter the outlet pipes. Maintenance of these facilities is generally minimal under normal conditions. We have considered the use of catch basin traps at specific locations where other uses of filtration devices are impractical.

- Vortechnics Stormwater Treatment System:

  These facilities are self-contained systems that filter grit, contaminated sediments, metal, hydrocarbons and floating contaminants from surface runoff entering sewer lines. They are installed underground with a minimal amount of surface disturbance. The unit itself has the ability of having the same inflow and outflow elevations, which is critical in retrofitting existing systems that are not capable of changes in elevations. The system has a baffled/grit chamber, which allows suspended sediments, floatables and oils to collect in an area that is easily accessible for maintenance of the unit. Where possible these systems are proposed with above ground stormwater recharge basins that permit groundwater recharge after filtering.



RECHARGE PIPING
PERFORATED PIPE IN STONE TRENCH

ERNST, ERNST & LISSENDEN
CONSULTING ENGINEERS, PLANNERS & SURVEYORS

FILE No.
601.010A

Catch Basin Traps

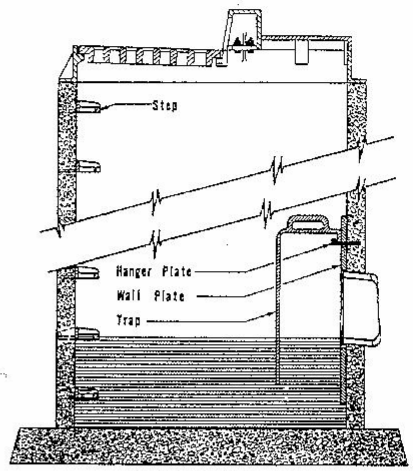
Campbell Foundry Company manufactures three types of Catch Basin Traps:

1. Standard Type
   a. Cast Iron for pipe sizes to 24"
   b. Galvanized Fabricated Steel for pipe sizes 24" and over.
2. Vapor Tight Type
3. Enclosed Type

The Standard Catch Basin Trap consists of two component parts - the hood and the hanger plate. A wall plate can be added to the assembly when specified, however the trap will function equally as well without the wall plate. The Standard Catch Basin Trap is installed to prevent floating debris from entering and clogging the sewer line. The Trap also creates an effective water seal from sewer gases.

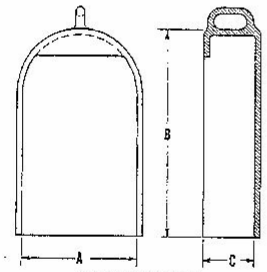
The Vapor Tight Trap is gastight and principally specified at airports. By design this trap prevents any infiltration of gases or vapors into the drainage system. Traps are equipped with a sealed cover for inspection or cleanout.

The Enclosed Catch Basin Trap mounts directly into the outlet pipe and when properly caulked can be made gastight. This type trap is also supplied with a cover for inspection or cleanout.



TYPICAL CATCH BASIN

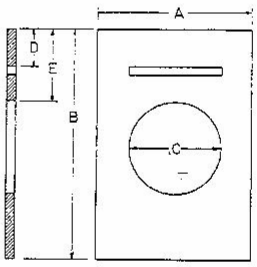
STANDARD CATCH BASIN TRAP



CAST IRON HOOD


CAST IRON HANGER PLATE

NOTE: Cast Iron Hanger Plate furnished with hood.



CAST IRON WALL PLATE

PATTERN NUMBER	DIMENSIONS IN INCHES A	B	C	PIPE SIZE
2560	9½	16	4½	6
2561	11½	20½	5½	8
2562	13¾	23½	6¼	10
2563	15¾	26	7¼	12
2564	18	27	9	15
2565	20½	27	10	18
2566	23½	30	11¼	21
2568A	30	35¾	15	24

PATTERN NUMBER		DIMENSIONS IN INCHES A	B	C	D	E	PIPE SIZE
2560	210	13	22	8	3½	9½	6
2561	210	13	22	10	3½	8½	8
2562	210	16	29	12½	3½	7¼	10
2595	210	22	33	15	6	9	12
2595	211	23	35	19¾	5½	9¾	15
2565	210	25¾	36¼	21	5	8½	18
2566	210	30¾	42¼	24	6	10	21
2568A	210	35	48	27	6	10½	24

NOTE: Wall Plates are not included in trap assembly and must be specified if required.

Stormwater Treatment System

What are your site's stormwater treatment criteria? If the list includes high performance, minimal land consumption, and easy maintenance access, your options have just been significantly narrowed. The Vortechs Stormwater Treatment System, a major advancement in oil and grit separator technology, efficiently removes grit, contaminated sediments, metals, hydrocarbons and floating contaminants from surface runoff.

The Vortechs System's innovative design combines swirl-concentrator and flow-control technologies to eliminate turbulence within the system. These features ensure effective capture of sediment and oils, and prevent resuspension of trapped pollutants – even at flow rates of up to 25 cfs.

- Large capacity system provides an 80% net annual TSS removal rate
- Installs below grade, minimizing land use
- Custom-built of precast concrete near the job site
- Low pump-out volume and one-point access reduce maintenance costs
- Unique design prevents oils and other floatables from escaping the system during cleanout

"We have worked with Vortechnics on at least a dozen stormwater management plans for some of our largest corporate clients. Their efficient turnaround on our requests for technical support and CADD drawings has expedited the permitting process for our clients. We turn to Vortechnics when we need innovative stormwater solutions."

– Lawrence Marsiglio, P.E.
Senior Civil Engineer,
Barakos-Landino, Inc.

Vortechs Systems may be used in a wide range of water-quality improvement applications, including:

Wetlands/Waterfront Protection

Retail Development

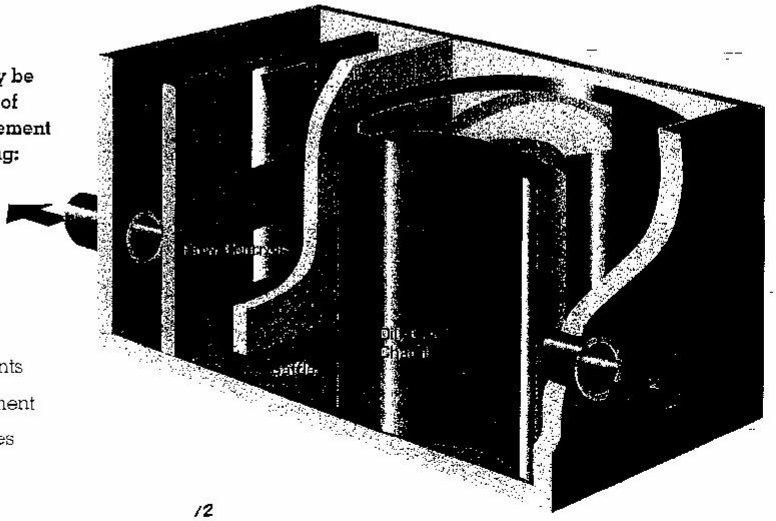
Industrial Sites

Municipal Improvements

Commercial Development

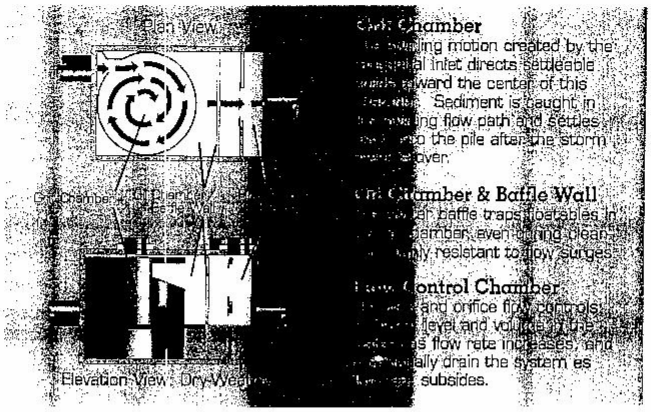
Transportation Facilities

Existing Site Retrofits



Vortechs System

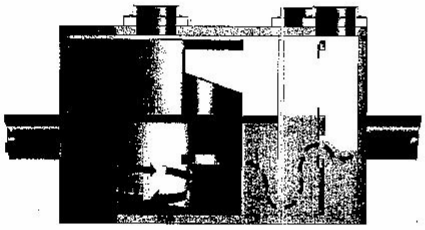
Operation



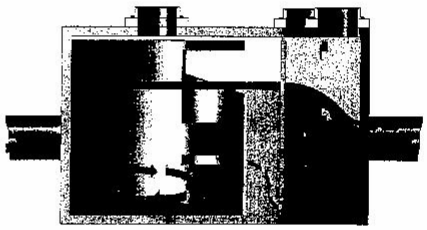
Inlet Chamber
The swirling motion created by the tangential inlet directs settleable solids toward the center of this chamber. Sediment is caught in the swirling flow path and settles into the pile after the storm is over.

Inlet Chamber & Baffle Wall
The high baffle traps floatables in the chamber, even during clean-out, and is highly resistant to flow surges.

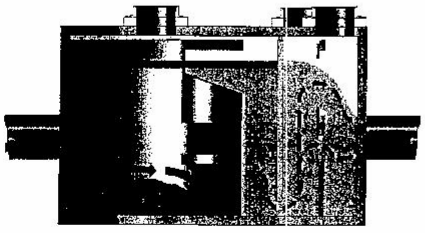
Flow Control Chamber
Vortechs and orifice flow controls regulate level and volume as the flow rate increases, and gradually drain the system as the storm subsides.



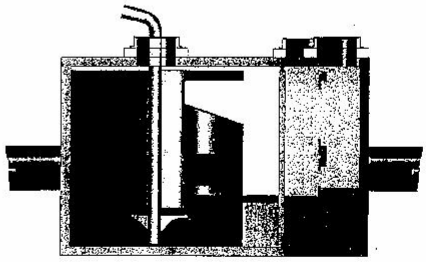
1) Initial Wet Weather Phase
During a two-month storm event the water level begins to rise above the top of the inlet pipe. This influent control feature reduces turbulence and avoids resuspension of pollutants.



2) Transition Phase
As the inflow rate increases above the controlled outflow rate, the tank fills and the floating contaminant layer accumulated from past storms rises. Swirling action increases at this stage, while sediment pile remains stable.



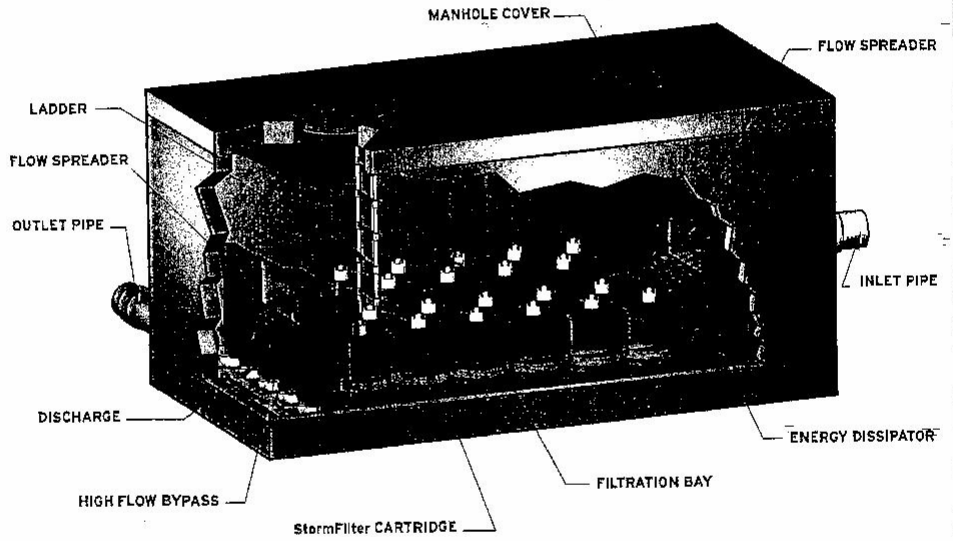
3) Full Capacity Phase
When the high-flow outlet approaches full discharge, storm drains are flowing at peak capacity. The Vortechs System is designed to match your design storm flow and provide treatment throughout the range of storm events without bypassing. To accommodate very high flow rates, Vortechnics can assist designers with configuring a peak-flow bypass.



4) Storm Subsidence Phase/Cleaning
Treated runoff is decanted at a controlled rate, restoring the water level to a low dry-weather volume and revealing a conical pile of sediment. The low water level facilitates inspection and cleaning, and significantly reduces maintenance costs. The system's central baffle prevents transfer of floatables to the outlet during cleaning or during the next storm.

THE STORMWATER MANAGEMENT StormFilter®

StormFilter



STORMWATER MANAGEMENT INC.

12021-B NE Airport Way, Portland, OR 97220 // 800.548.4667 800.561.1271 stormwaterinc.com

THE STORMWATER MANAGEMENT StormFilter®

The StormFilter is the leading stormwater treatment technology. It is a passive siphon-actuated, flow-through, stormwater filtration system consisting of a concrete vault that houses rechargeable, media-filled filter cartridges. The StormFilter works by passing stormwater through these media-filled cartridges, which trap particulates and adsorb pollutants such as dissolved metals, nutrients, and hydrocarbons.

The StormFilter is offered in four different configurations: cast-in-place, precast, linear, and catch basin. The precast, linear and catch basin models use pre-manufactured vaults to ease the design and installation process. The cast-in-place units are customized for larger flows and may be either uncovered or covered underground units.

APPLICATIONS

The StormFilter excels in a wide variety of applications and is being used to treat stormwater runoff in a wide variety of sites throughout the United States. For jurisdictional authorities, the system offers high levels of pollutant removal and improved water quality. For developers, the StormFilter is cost-effective, easy to install, and uses no additional land (entirely underground). For engineers, full design support, provided by Stormwater Management at no extra cost, is invaluable. These benefits, coupled with unsurpassed versatility, make the StormFilter the best long-term solution for stormwater treatment.

TYPICAL DEVELOPMENT APPLICATIONS:

- Parking lots
- Commercial and industrial sites
- High-density and single-family housing
- Maintenance, transportation and port facilities

TYPICAL ROADWAY APPLICATIONS:

- Arterial roads
- Freeways
- Bridge decks
- Light rail and transit facilities

For specialized applications, laboratory evaluation of the water is normally required to establish the operational parameters. Stormwater Management can perform these studies through its outstanding Research and Development department.

DESIGN CRITERIA

The StormFilter is approved as a Best Management Practice (BMP) with many agencies throughout the United States. Regulatory requirements for designing BMPs vary from state to state, and may be based on a water quality flow rate determined from a design storm, a water quality volume, or removal efficiency for a target pollutant. Stormwater Management will help you work with your local governing agency to ensure that your StormFilter system meets their requirements.

SYSTEM SIZING AND HYDRAULIC DROP

System sizing is determined by analyzing data from either a volume-based or flow-based design, depending on which criterion is required by the relevant jurisdiction. Using the required criterion, Stormwater Management engineers will work with you to determine the optimum number of cartridges and system vault size. The StormFilter typically requires 2.3 feet of head differential between the inlet and the outlet. For a size evaluation and cost estimation, complete the project information sheet contained in this package, and fax it to Stormwater Management.

PRETREATMENT AND BYPASSING

Stormwater Management evaluates the need for pretreatment devices for each site. The StormFilter typically does not require pretreatment, but if pretreatment is needed the following devices may be used: the StormGate Separator™, StormScreen™, sedimentation vaults, manholes, oil/water separators, detention/sedimentation tanks or ponds. Stormwater Management can provide recommendations on the need for and size of these facilities. Depending on individual site characteristics, some systems should be equipped with a StormGate™ high-flow bypass. The StormGate is used when the peak storm event generates a flow that exceeds the overflow capacity or design capacity of the StormFilter.

CONSTRUCTION AND INSTALLATION

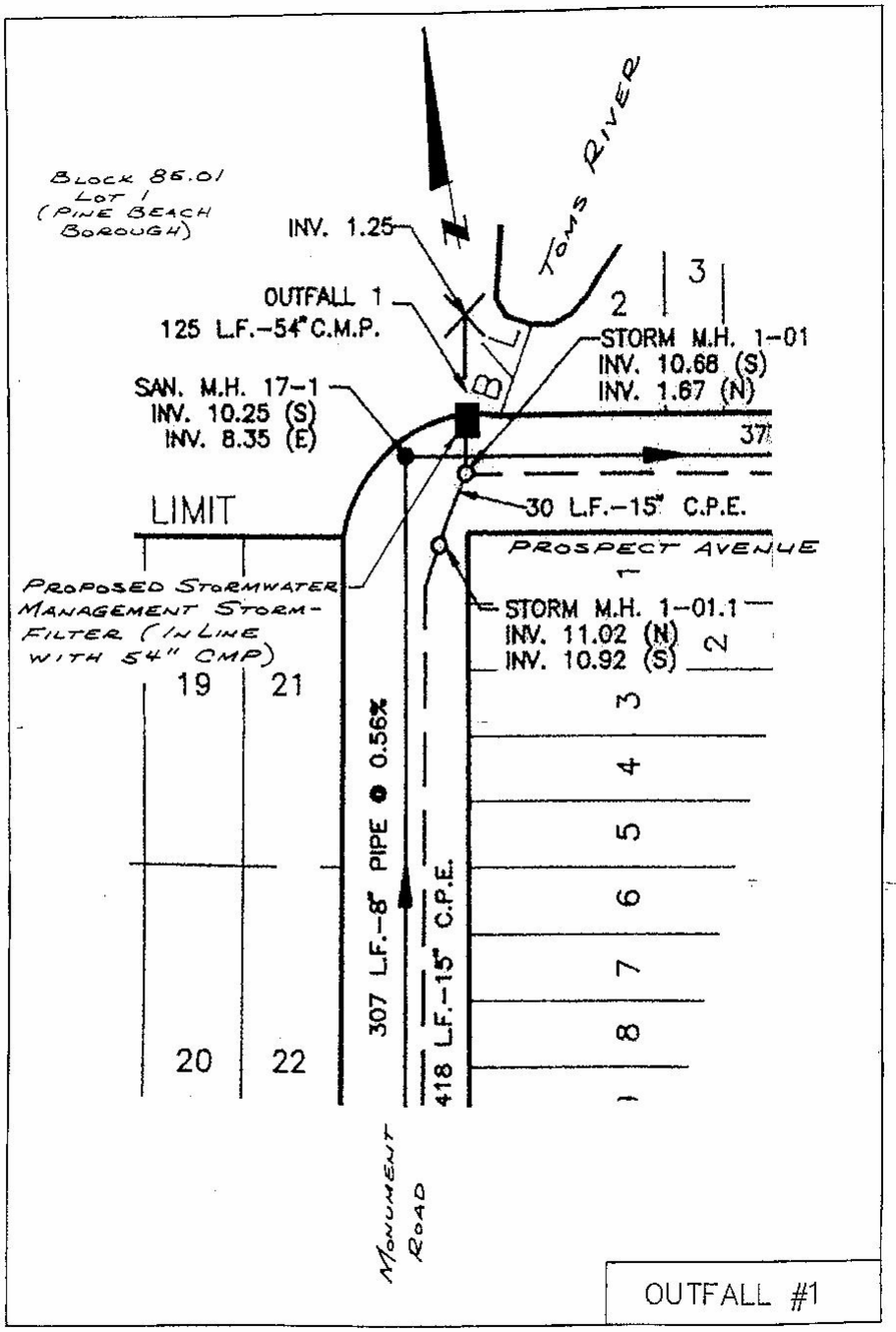
Stormwater Management provides precast StormFilters to the end user as a complete system. The StormFilter is typically delivered to the project site in two separate shipments. The precast vault is first delivered to the site by the local precaster. Once the project is near completion, the site is paved, landscaping is complete, and the storm drains are clean, filter cartridges are delivered for installation in the vault. The filter cartridges can be installed by the on-site contractor or Stormwater Management.

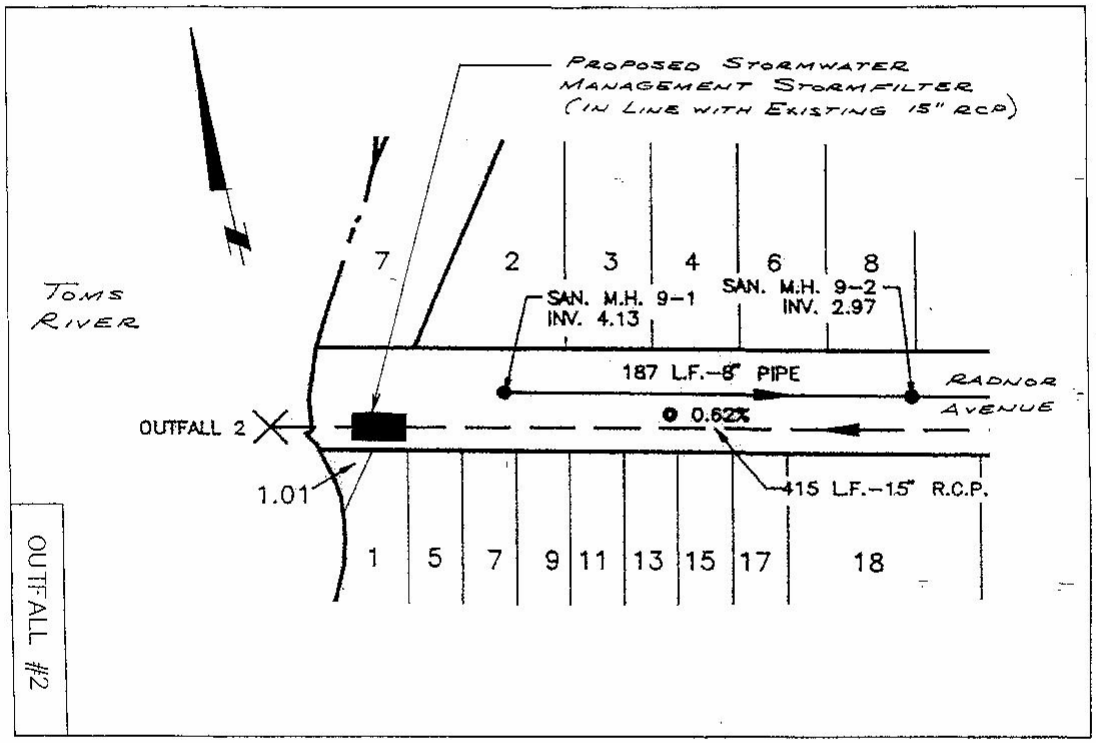
Site Specific Best Management Practices

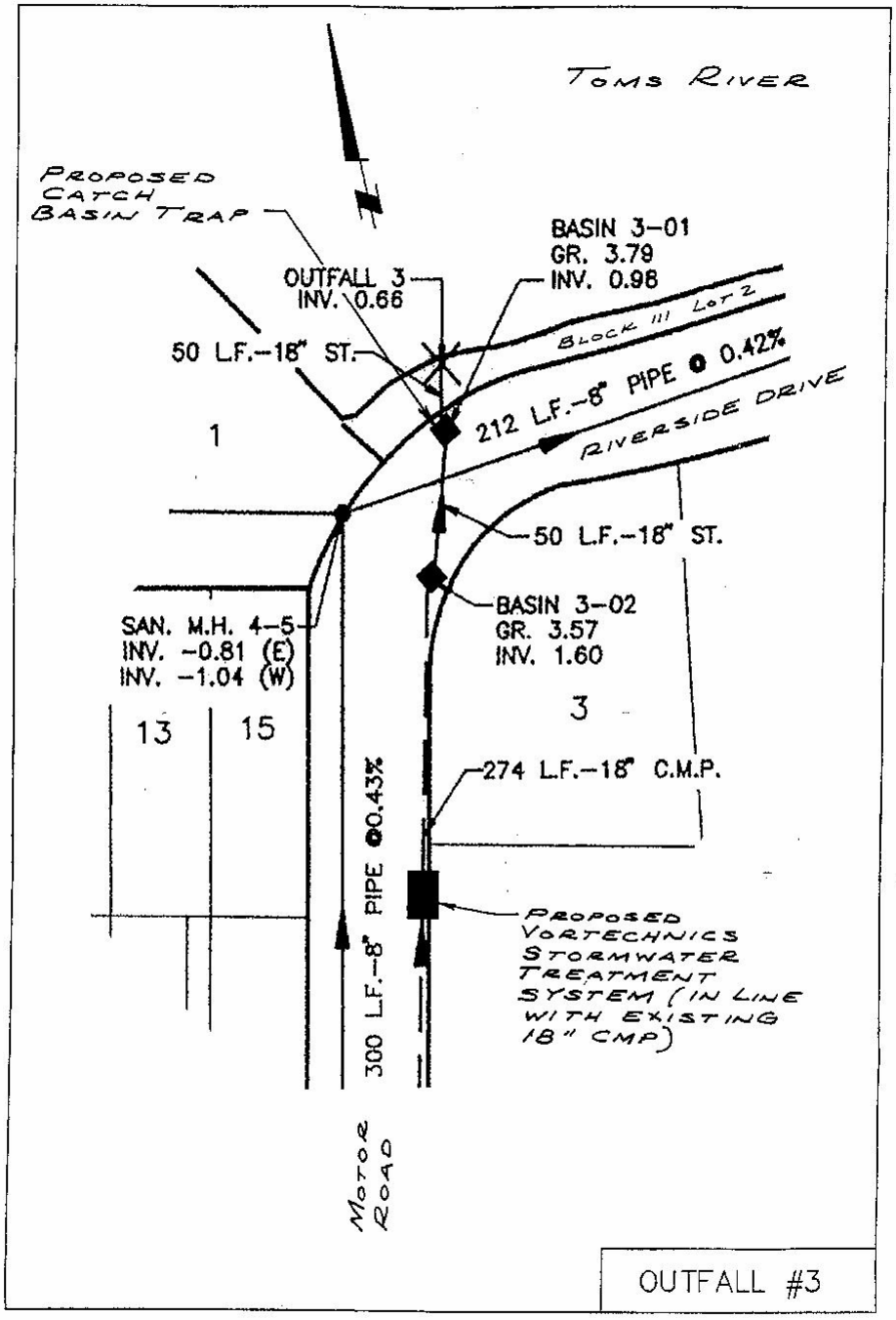
All of the Best Management Practices of filtering and groundwater recharge have been considered at each site shown on the following table. Each location has site specific design parameters such as existing underground utilities, sanitary sewer, potable water mains, gas mains, cable, height of seasonal high water table, area restraints, etc. that will warrant further investigations to perform a proper design for each outfall pipe along the Toms River as well as individual lots and street right-of way areas. Conceptual diagrams of the different systems are included on the pages following the chart.

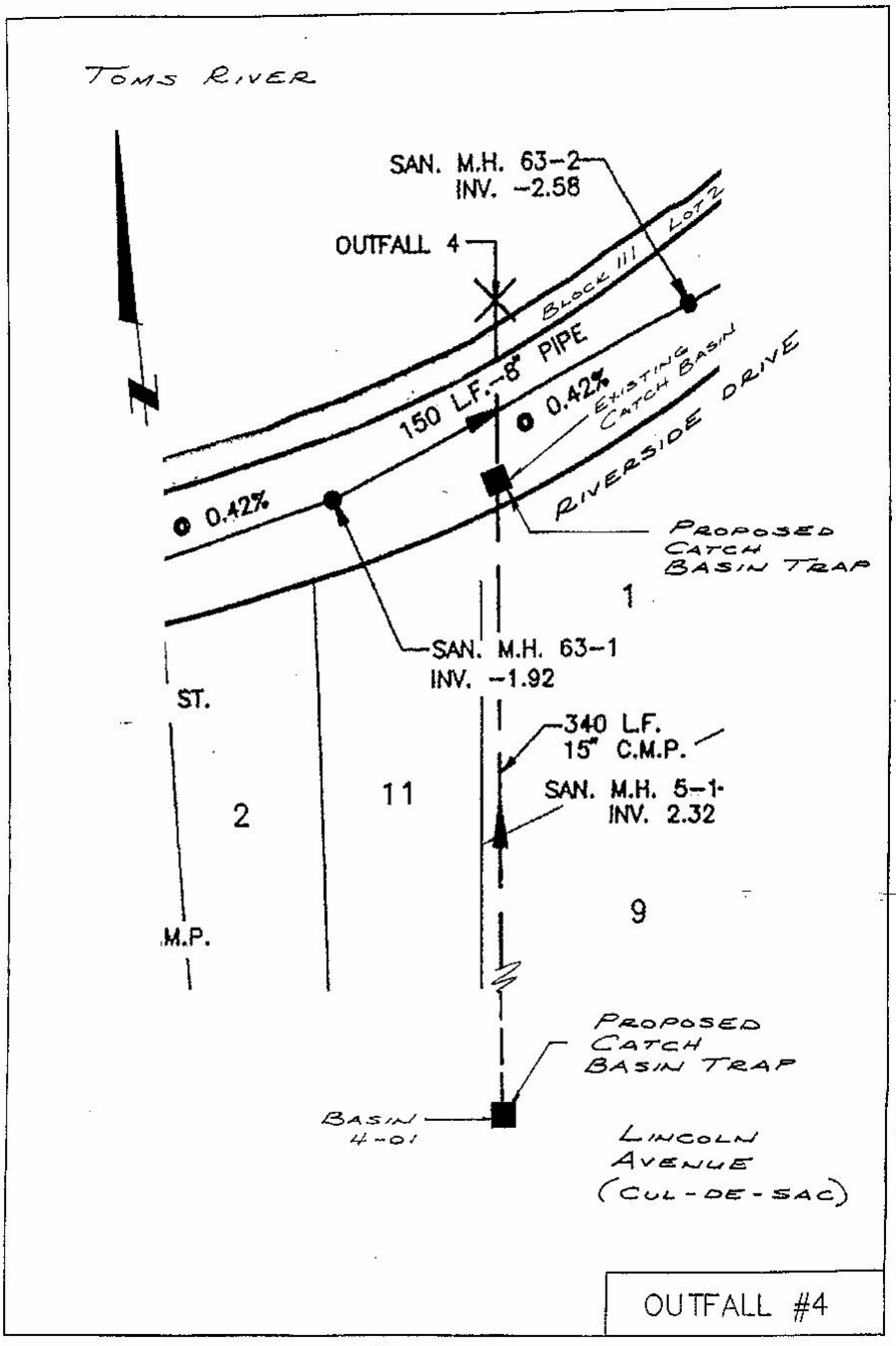
OUTFALL NO. OR LOCATION	TYPE OF BEST MANAGEMENT PRACTICE				
	*ABOVE GROUND STORMWATER RECHARGE BASIN	UNDERGROUND STORMWATER RECHARGE PIPING SYSTEM	CATCH BASIN TRAPS	VORTECHNICS STORMWATER TREATMENT SYSTEM	STORMWATER MANAGEMENT STORM FILTER
OUTFALL NO. 1					X
OUTFALL NO. 2					X
OUTFALL NO. 3			X	X	
OUTFALL NO. 4			X		
OUTFALL NO. 5			X	X	
OUTFALL NO. 6				X	
OUTFALL NO. 7					X
OUTFALL NO. 8					X
OUTFALL NO. 9					X
OUTFALL NO. 10			X		
OUTFALL NO. 11			X		X
OUTFALL NO. 12					X
OUTFALL NO. 13					X
OUTFALL NO. 14				X	
BLK 12, LOT 9	X			X	
BLK 17, LOTS 36& 39	X			X	
BLK 25, LOT 37	X			X	
BLK 58, LOTS 22 & 24	SUBJECT TO ADDITIONAL EXISTING FIELD SURVEY INFORMATION BEING OBTAINED				
BLK 70, LOTS 1 & 2	X			X	
BLK 70, LOTS 9 & 10	X			X	
BLK 78, LOTS 49 & 50	X			X	
BLK 98, LOT 7	X				

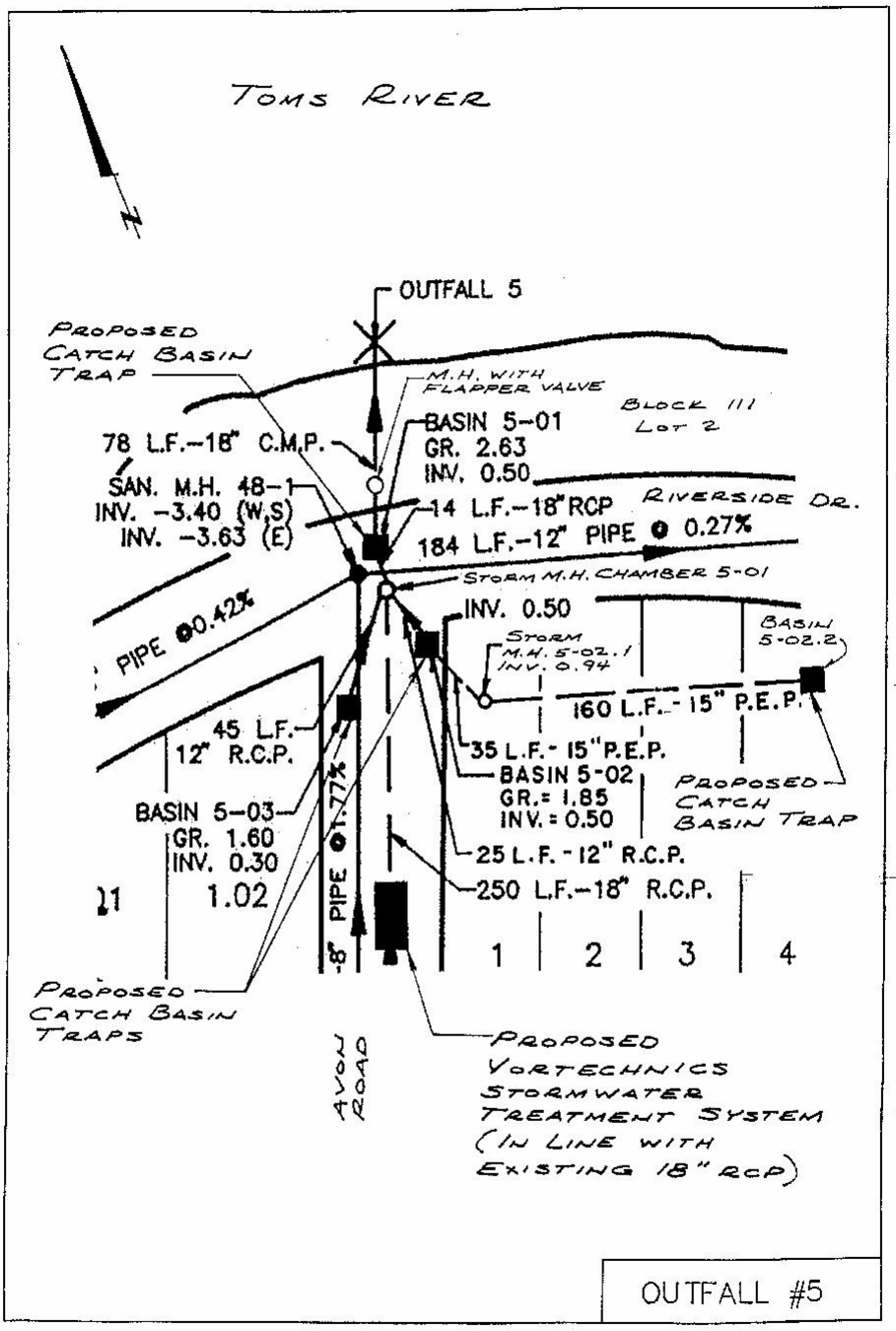
*Above ground stormwater recharge basins can be replaced with underground recharge piping systems and covered over for aesthetic purposes.


BLOCK 86.01
LOT 1
(PINE BEACH BOROUGH)
INV. 1.25
TOMS RIVER
OUTFALL 1
125 L.F.-54" C.M.P.
STORM M.H. 1-01
INV. 10.68 (S)
INV. 1.67 (N)
SAN. M.H. 17-1
INV. 10.25 (S)
INV. 8.35 (E)
30 L.F.-15" C.P.E.
LIMIT
PROSPECT AVENUE
PROPOSED STORMWATER MANAGEMENT STORM-FILTER (IN LINE WITH 54" CMP)
STORM M.H. 1-01.1
INV. 11.02 (N)
INV. 10.92 (S)
307 L.F.-8" PIPE @ 0.56%
418 L.F.-15" C.P.E.
MONUMENT ROAD
OUTFALL #1

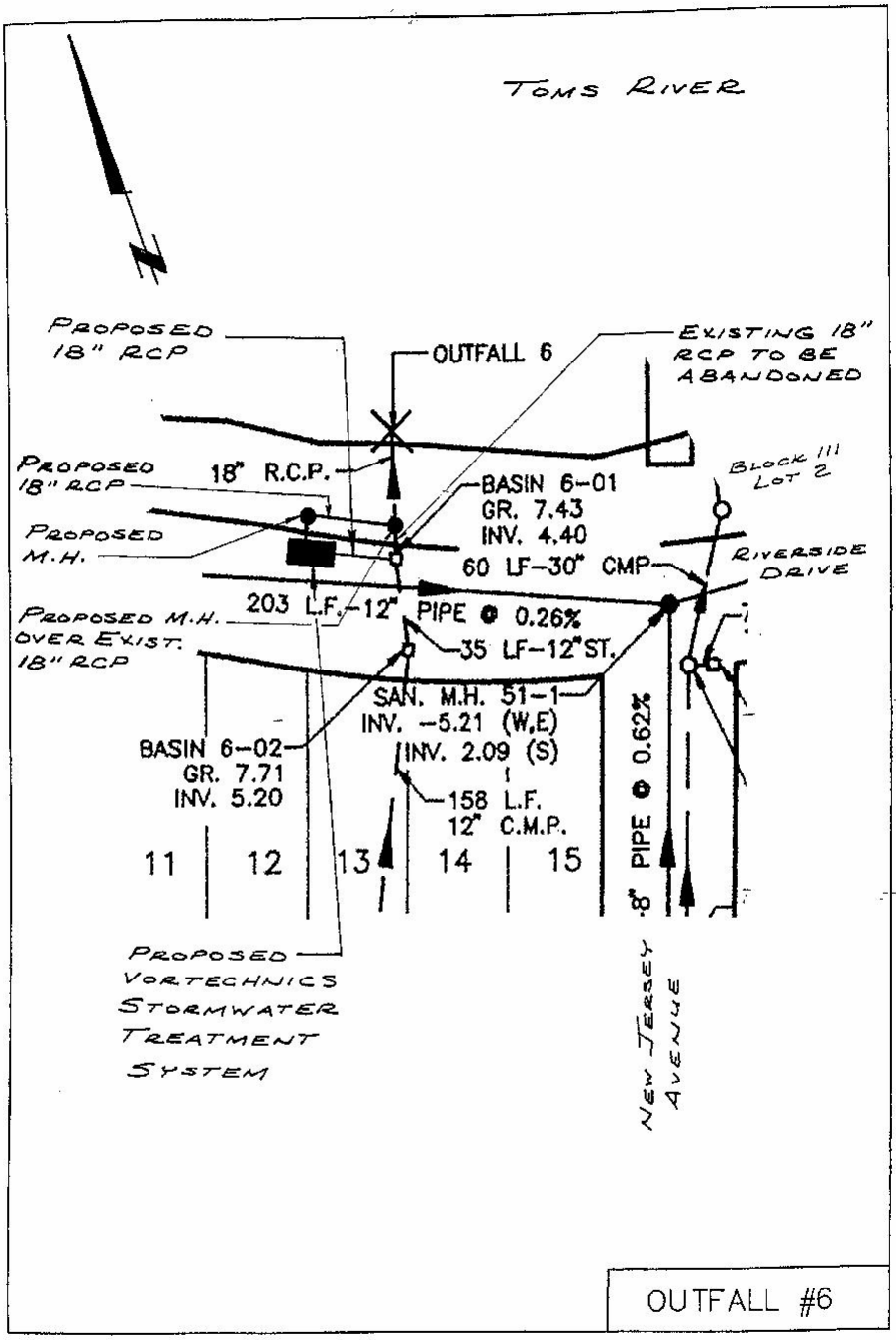

PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH EXISTING 15" RCP)
TOMS RIVER
7
2
3
4
6
8
SAN. M.H. 9-1
INV. 4.13
SAN. M.H. 9-2
INV. 2.97
187 L.F.-8" PIPE
RADNOR AVENUE
OUTFALL 2
0.62%
1.01
415 L.F.-15" R.C.P.
1
5
7
9
11
13
15
17
18
OUTFALL #2

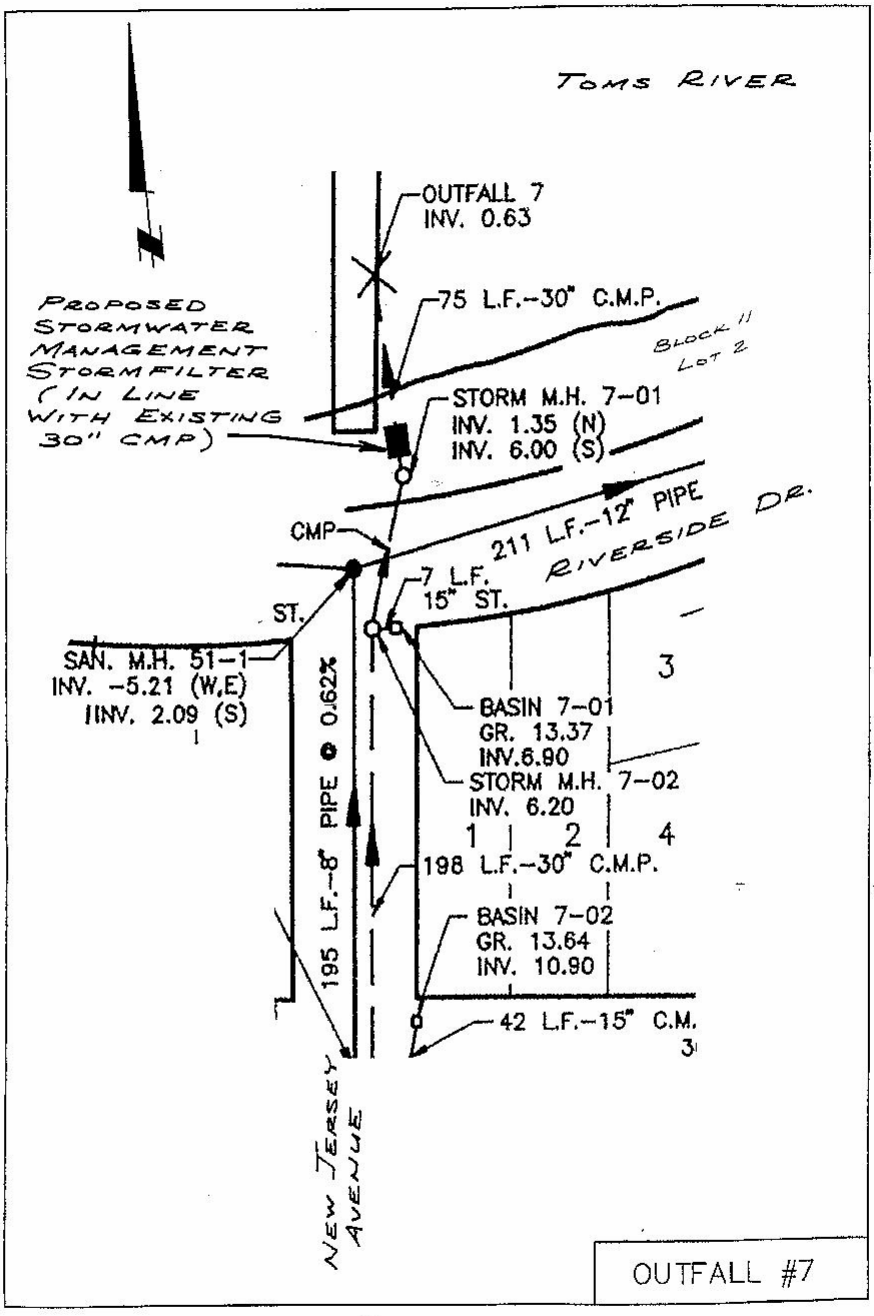

TOMS RIVER
PROPOSED CATCH BASIN TRAP
OUTFALL 3
INV. 0.66
BASIN 3-01
GR. 3.79
INV. 0.98
BLOCK 111 LOT 2
50 L.F.-18" ST.
212 L.F.-8" PIPE @ 0.42%
RIVERSIDE DRIVE
1
50 L.F.-18" ST.
BASIN 3-02
GR. 3.57
INV. 1.60
SAN. M.H. 4-5
INV. -0.81 (E)
INV. -1.04 (W)
3
13
15
274 L.F.-18" C.M.P.
300 L.F.-8" PIPE @0.43%
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM (IN LINE WITH EXISTING 18" CMP)
MOTOR ROAD
OUTFALL #3

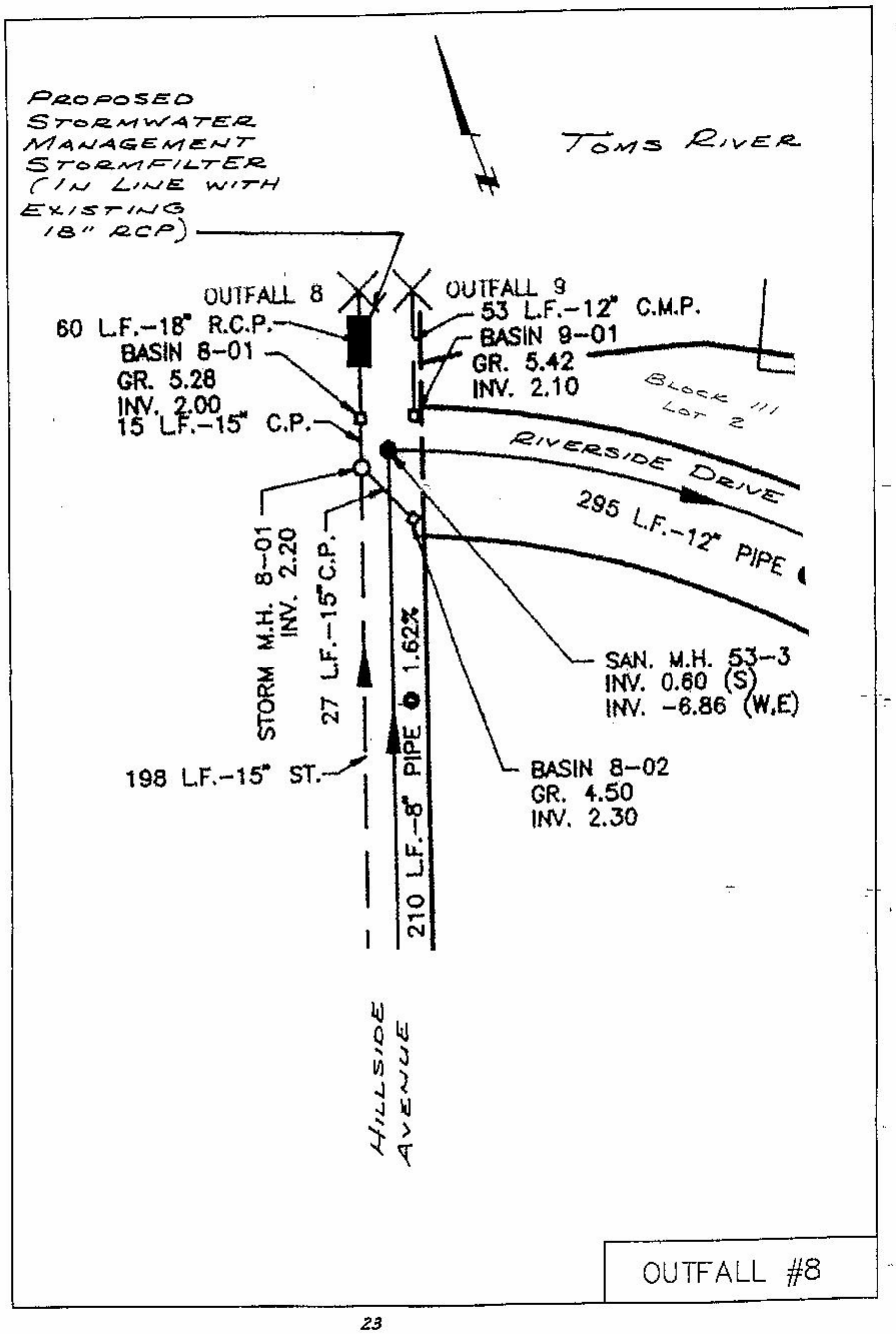

TOMS RIVER
SAN. M.H. 63-2
INV. -2.58
OUTFALL 4
BLOCK 111
LOT 2
150 L.F.-8" PIPE
0.42%
EXISTING CATCH BASIN
RIVERSIDE DRIVE
0.42%
PROPOSED CATCH BASIN TRAP
1
SAN. M.H. 63-1
INV. -1.92
ST.
340 L.F.
15" C.M.P.
11
SAN. M.H. 5-1-
INV. 2.32
2
9
M.P.
PROPOSED CATCH BASIN TRAP
BASIN 4-01
LINCOLN AVENUE
(CUL-DE-SAC)
OUTFALL #4

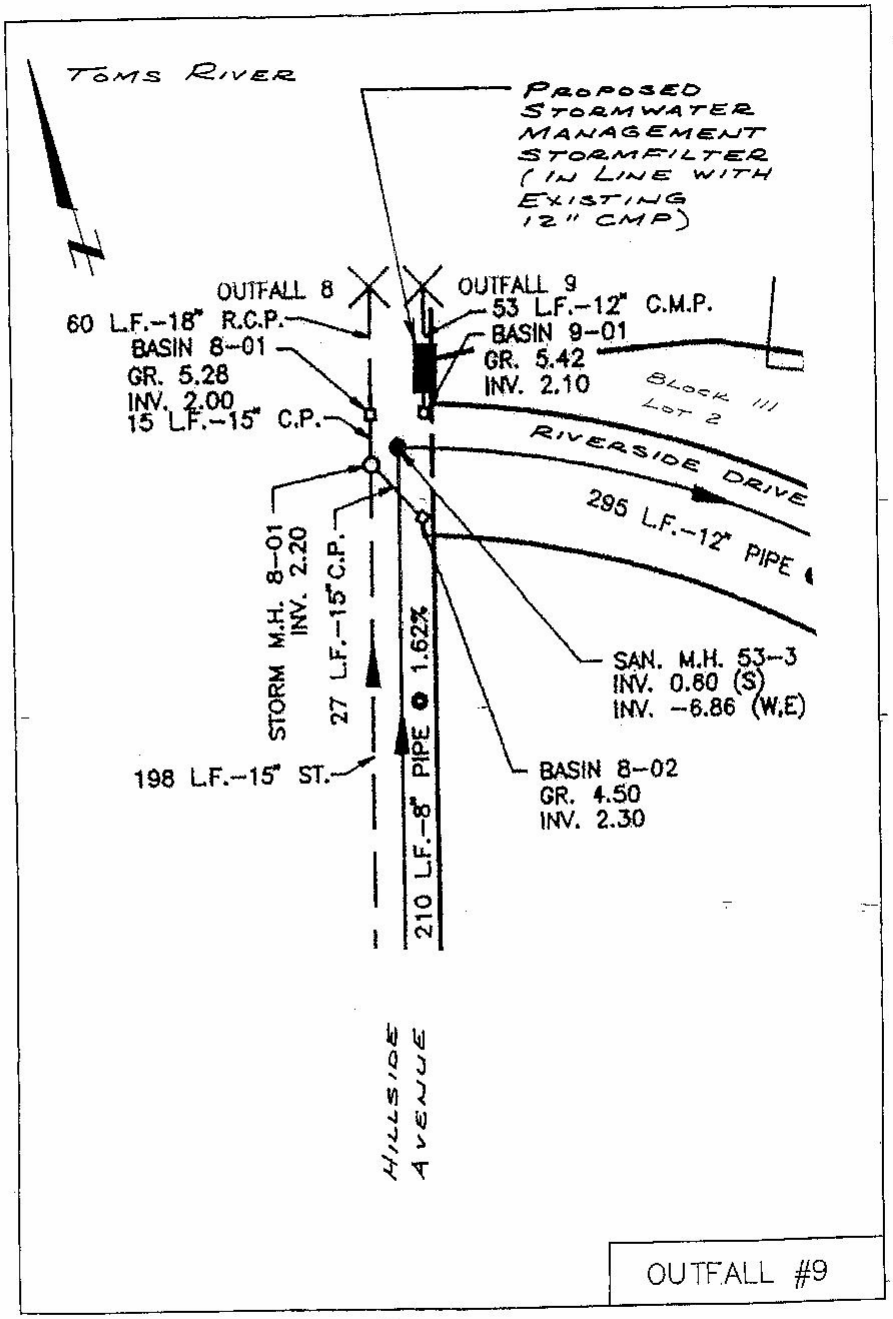

TOMS RIVER
N
OUTFALL 5
PROPOSED CATCH BASIN TRAP
M.H. WITH FLAPPER VALVE
BLOCK 111 LOT 2
BASIN 5-01
GR. 2.63
INV. 0.50
78 L.F.-18" C.M.P.
SAN. M.H. 48-1
INV. -3.40 (W,S)
INV. -3.63 (E)
14 L.F.-18" RCP
RIVERSIDE DR.
184 L.F.-12" PIPE @ 0.27%
STORM M.H. CHAMBER 5-01
INV. 0.50
PIPE @0.42%
STORM M.H. 5-02.1
INV. 0.94
BASIN 5-02.2
160 L.F.-15" P.E.P.
45 L.F.-12" R.C.P.
35 L.F.-15" P.E.P.
BASIN 5-02
GR.= 1.85
INV. = 0.50
PROPOSED CATCH BASIN TRAP
BASIN 5-03
GR. 1.60
INV. 0.30
8" PIPE @1.77%
25 L.F.-12" R.C.P.
250 L.F.-18" R.C.P.
11
1.02
1
2
3
4
PROPOSED CATCH BASIN TRAPS
AVON ROAD
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM (IN LINE WITH EXISTING 18" RCP)

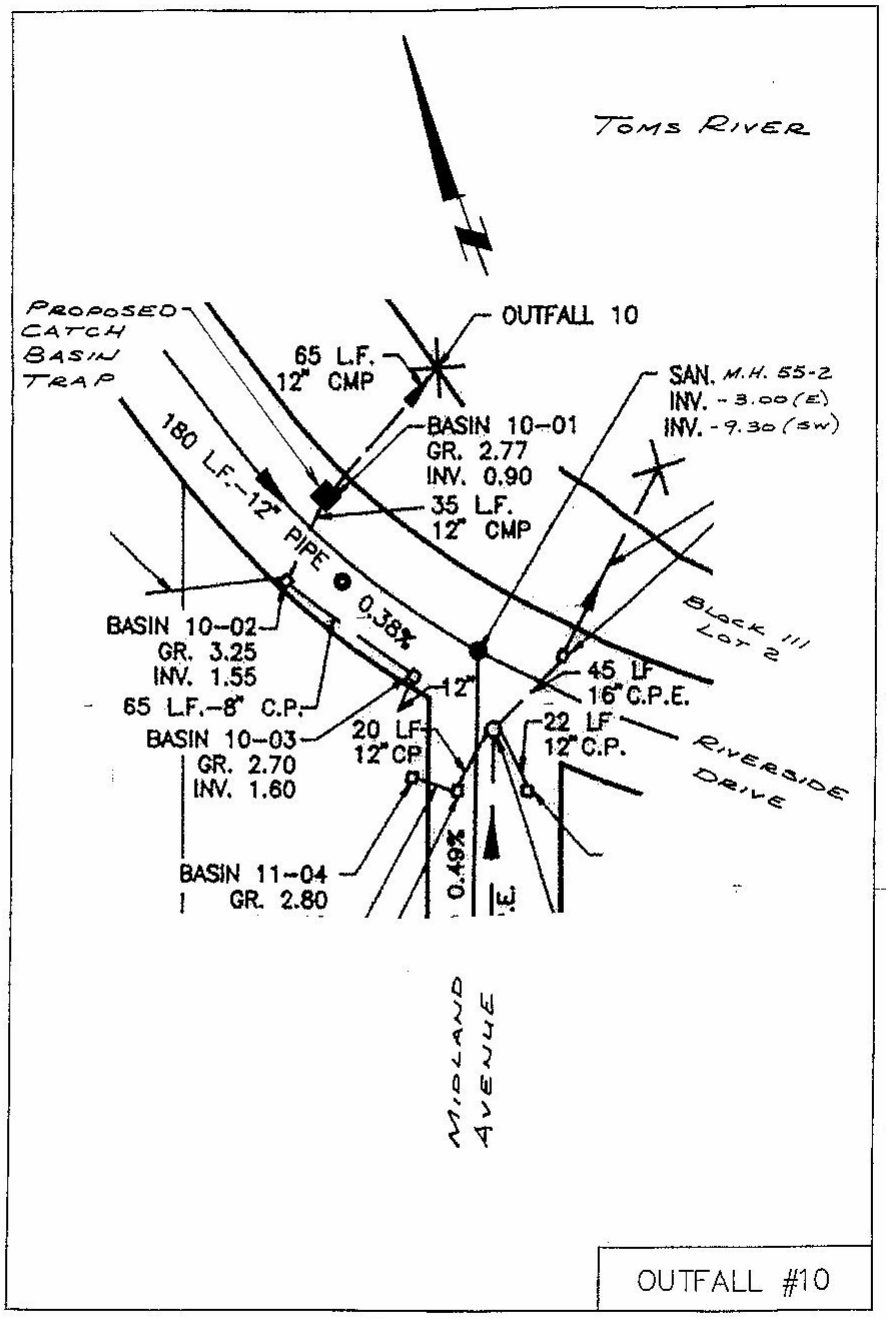
OUTFALL #5

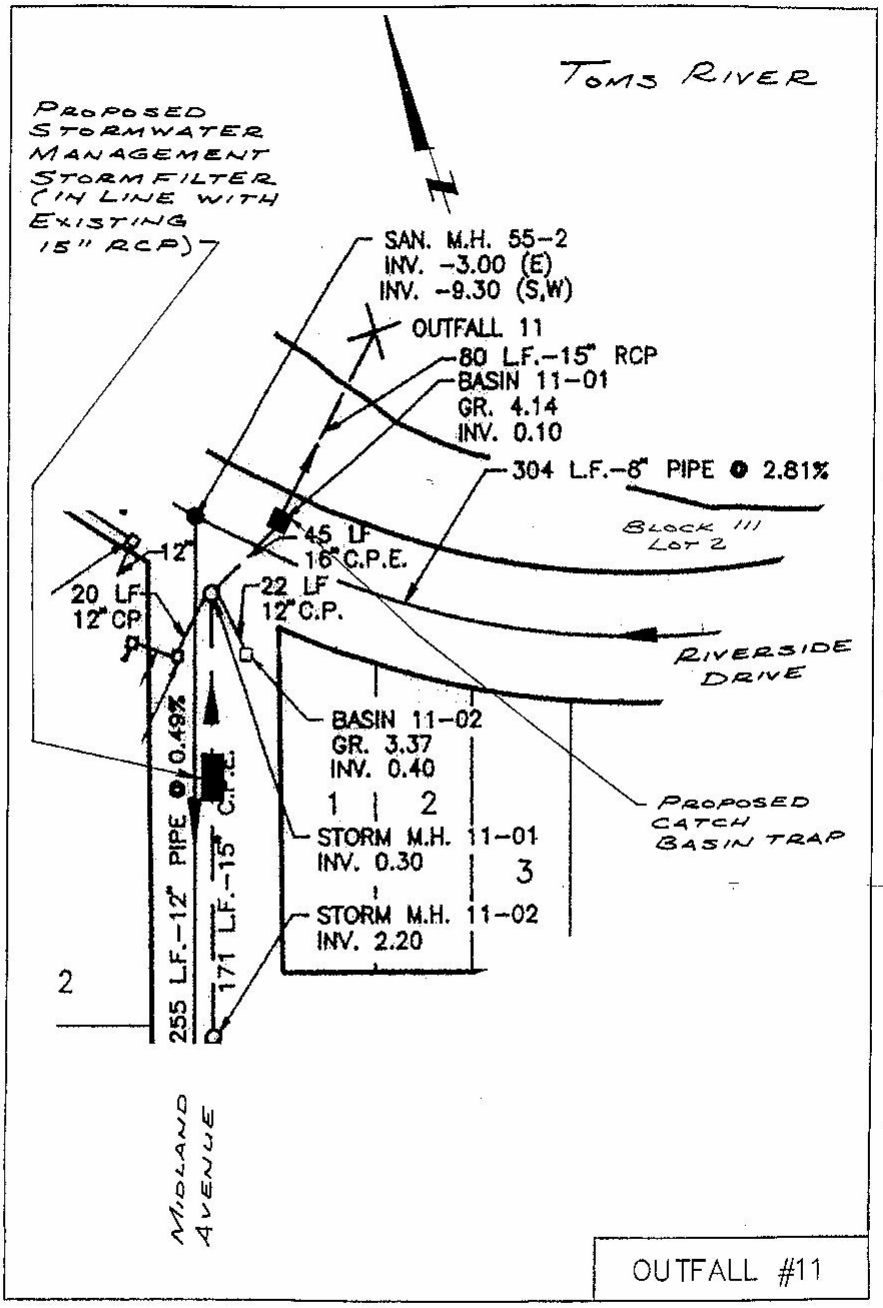

TOMS RIVER
PROPOSED 18" RCP
OUTFALL 6
EXISTING 18" RCP TO BE ABANDONED
PROPOSED 18" RCP
18" R.C.P.
BASIN 6-01
GR. 7.43
INV. 4.40
BLOCK 111 LOT 2
PROPOSED M.H.
60 LF-30" CMP
RIVERSIDE DRIVE
203 L.F.-12" PIPE @ 0.26%
PROPOSED M.H. OVER EXIST. 18" RCP
35 LF-12"ST.
SAN. M.H. 51-1
INV. -5.21 (W,E)
INV. 2.09 (S)
BASIN 6-02
GR. 7.71
INV. 5.20
158 L.F. 12" C.M.P.
11
12
13
14
15
8" PIPE @ 0.62%
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM
NEW JERSEY AVENUE
OUTFALL #6

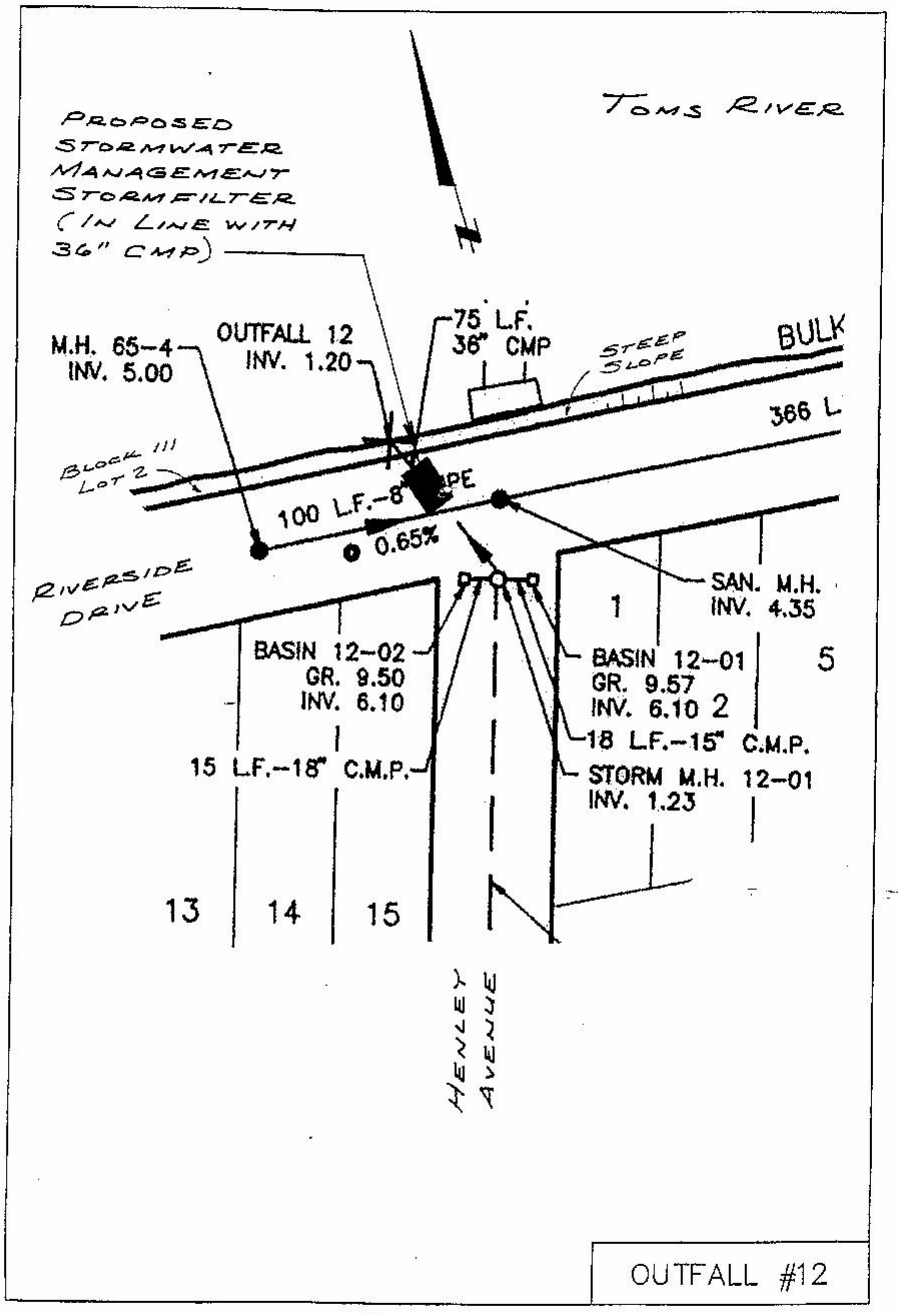

TOMS RIVER
OUTFALL 7
INV. 0.63
75 L.F.-30" C.M.P.
BLOCK 11
LOT 2
PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH EXISTING 30" CMP)
STORM M.H. 7-01
INV. 1.35 (N)
INV. 6.00 (S)
211 L.F.-12" PIPE
RIVERSIDE DR.
CMP
7 L.F. 15" ST.
ST.
SAN. M.H. 51-1
INV. -5.21 (W,E)
INV. 2.09 (S)
195 L.F.-8" PIPE @ 0.62%
BASIN 7-01
GR. 13.37
INV.6.90
STORM M.H. 7-02
INV. 6.20
198 L.F.-30" C.M.P.
BASIN 7-02
GR. 13.64
INV. 10.90
42 L.F.-15" C.M.
NEW JERSEY AVENUE
OUTFALL #7

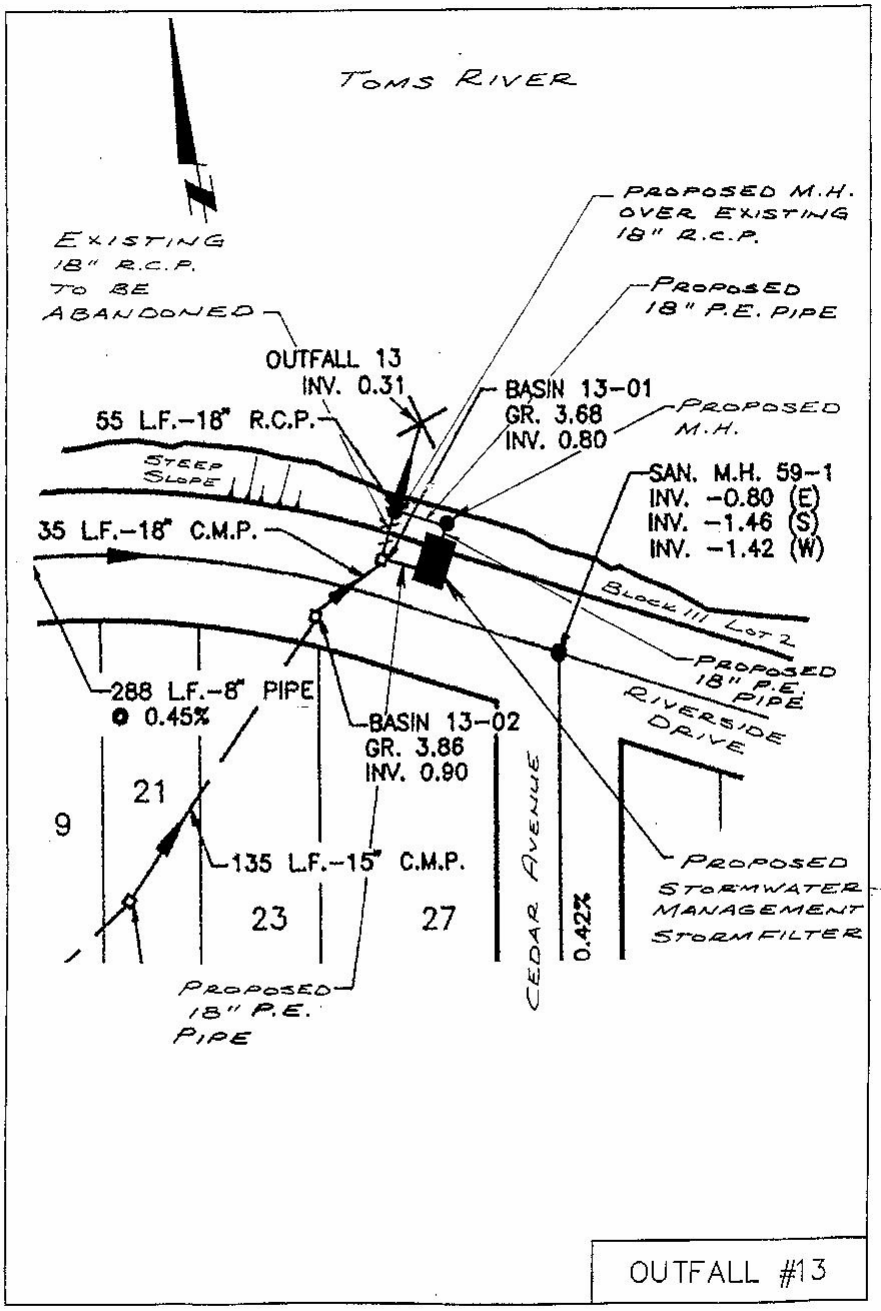

PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH EXISTING 18" RCP)
TOMS RIVER
OUTFALL 8
OUTFALL 9
60 L.F.-18" R.C.P.
BASIN 8-01
GR. 5.28
INV. 2.00
15 L.F.-15" C.P.
53 L.F.-12" C.M.P.
BASIN 9-01
GR. 5.42
INV. 2.10
BLOCK 111
LOT 2
RIVERSIDE DRIVE
295 L.F.-12" PIPE
STORM M.H. 8-01
INV. 2.20
27 L.F.-15" C.P.
SAN. M.H. 53-3
INV. 0.60 (S)
INV. -6.86 (W,E)
198 L.F.-15" ST.
210 L.F.-8" PIPE @ 1.62%
BASIN 8-02
GR. 4.50
INV. 2.30
HILLSIDE AVENUE
OUTFALL #8

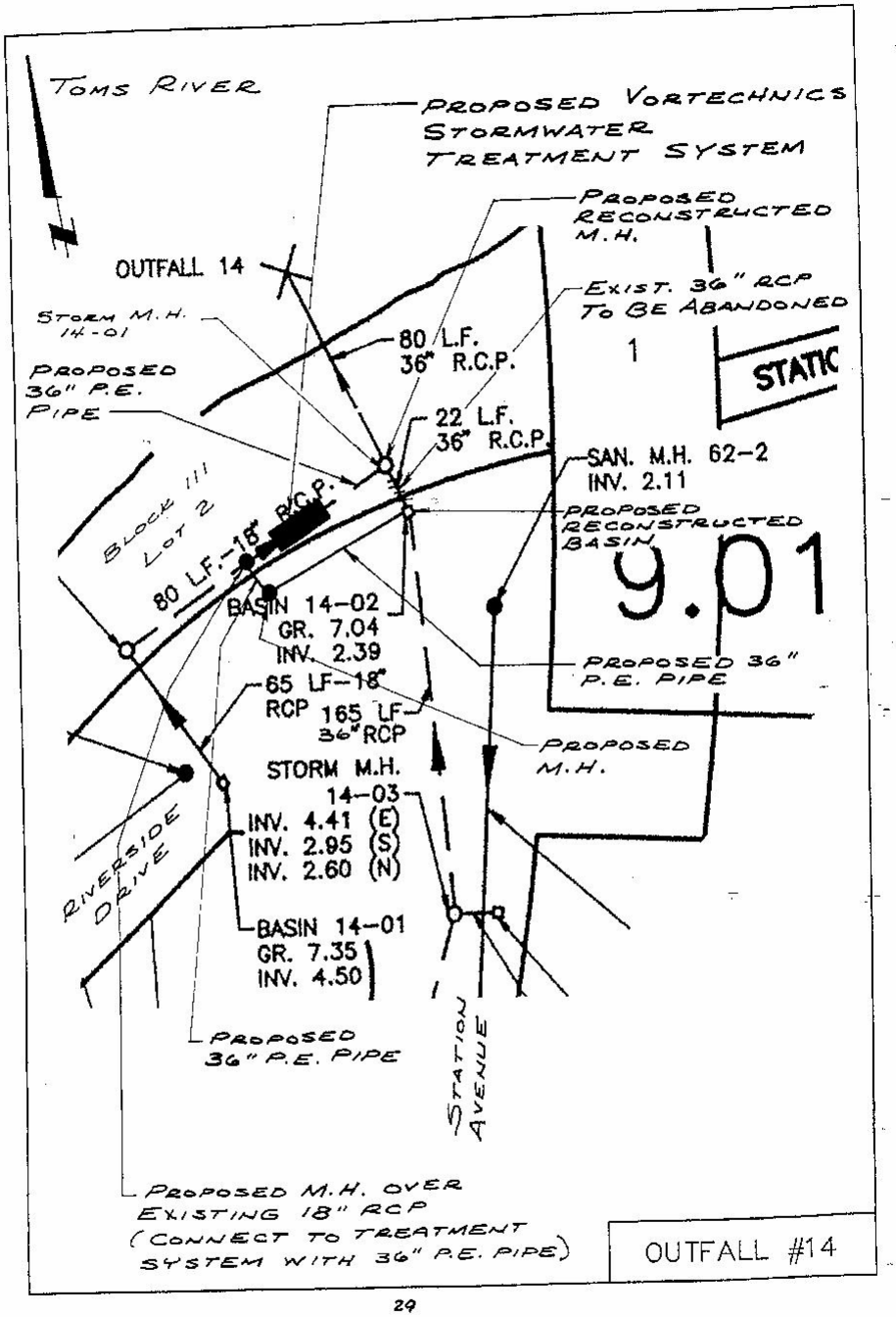

TOMS RIVER
PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH EXISTING 12" CMP)
OUTFALL 8
60 L.F.-18" R.C.P.
BASIN 8-01
GR. 5.28
INV. 2.00
15 L.F.-15" C.P.
OUTFALL 9
53 L.F.-12" C.M.P.
BASIN 9-01
GR. 5.42
INV. 2.10
BLOCK 111
LOT 2
RIVERSIDE DRIVE
295 L.F.-12" PIPE
STORM M.H. 8-01
INV. 2.20
27 L.F.-15" C.P.
210 L.F.-8" PIPE @ 1.62%
SAN. M.H. 53-3
INV. 0.60 (S)
INV. -6.86 (W,E)
198 L.F.-15" ST.
BASIN 8-02
GR. 4.50
INV. 2.30
HILLSIDE AVENUE
OUTFALL #9

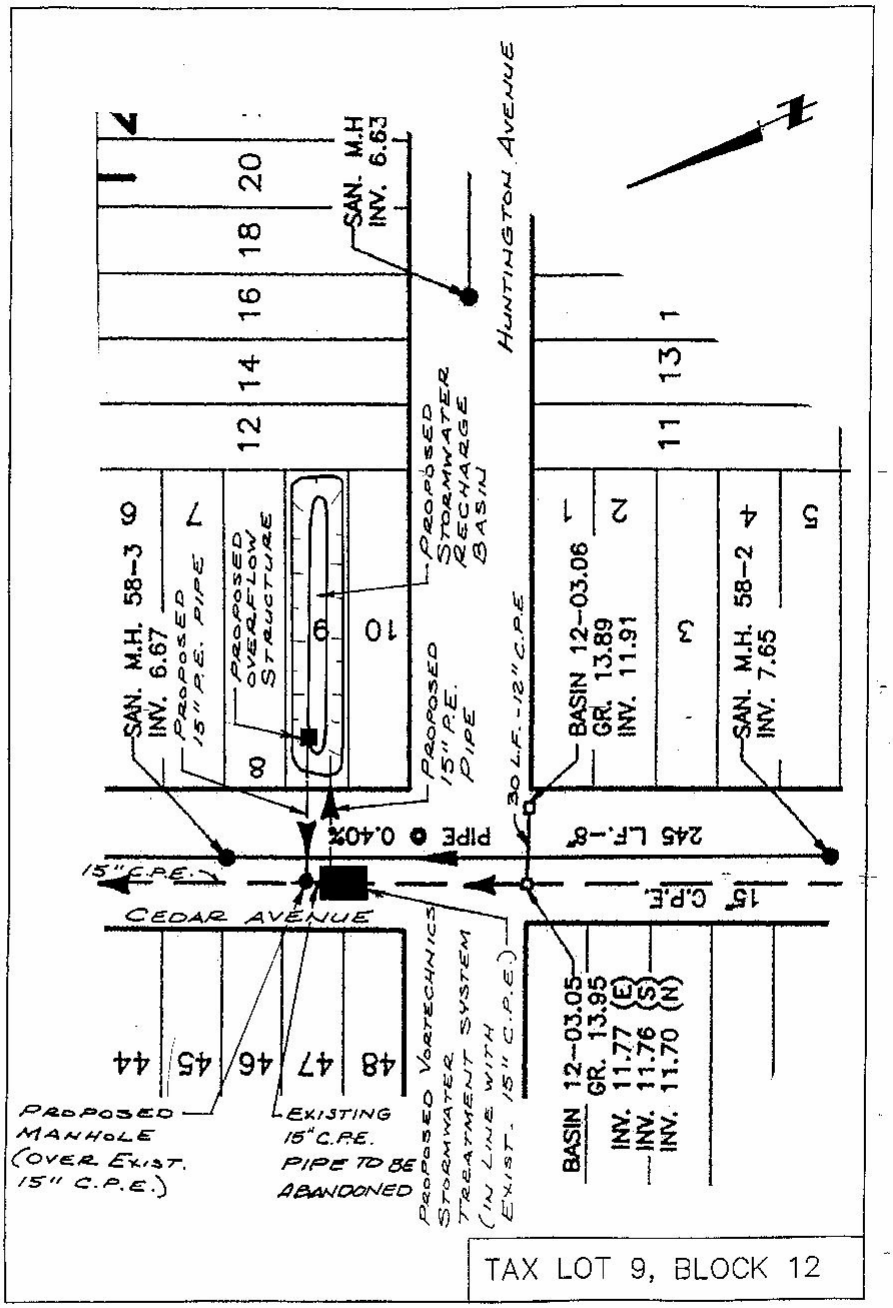

TOMS RIVER
PROPOSED CATCH BASIN TRAP
OUTFALL 10
65 L.F. 12" CMP
BASIN 10-01 GR. 2.77 INV. 0.90
35 L.F. 12" CMP
SAN. M.H. 55-2 INV. - 3.00 (E) INV. - 9.30 (SW)
180 L.F. - 12" PIPE @ 0.38%
BLACK 111 LOT 2
BASIN 10-02 GR. 3.25 INV. 1.55
65 L.F. - 8" C.P.
12"
45 LF 16" C.P.E.
BASIN 10-03 GR. 2.70 INV. 1.60
20 LF 12" CP
22 LF 12" C.P.
RIVERSIDE DRIVE
BASIN 11-04 GR. 2.80
0.49%
MIDLAND AVENUE
OUTFALL #10

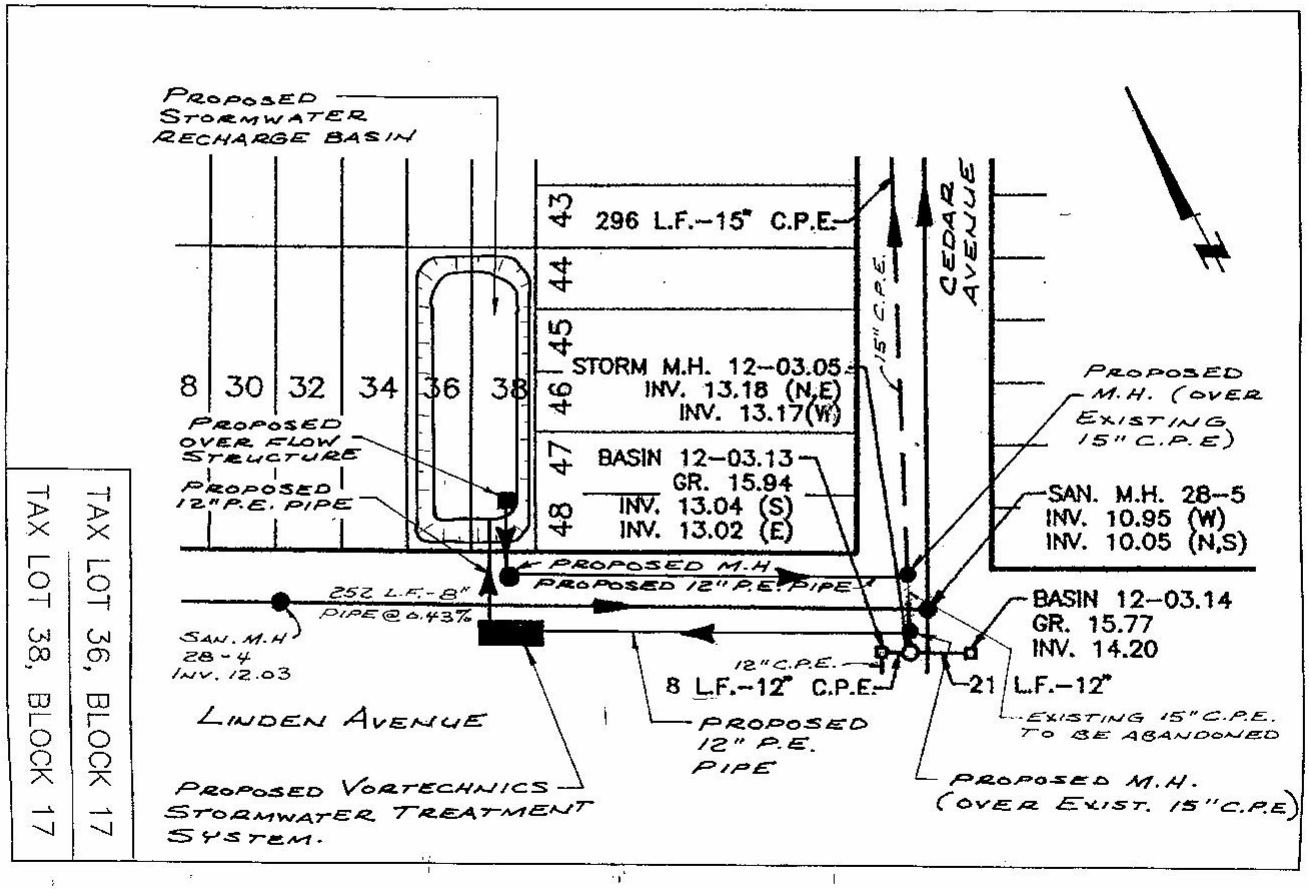

TOMS RIVER
PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH EXISTING 15" RCP)
SAN. M.H. 55-2
INV. -3.00 (E)
INV. -9.30 (S,W)
OUTFALL 11
80 L.F.-15" RCP
BASIN 11-01
GR. 4.14
INV. 0.10
304 L.F.-8" PIPE @ 2.81%
BLOCK 111
LOT 2
45 LF
16" C.P.E.
12"
20 LF
12" CP
22 LF
12" C.P.
RIVERSIDE DRIVE
BASIN 11-02
GR. 3.37
INV. 0.40
PROPOSED CATCH BASIN TRAP
0.49%
255 L.F.-12" PIPE
171 LF.-15" C.P.E.
1
2
STORM M.H. 11-01
INV. 0.30
3
STORM M.H. 11-02
INV. 2.20
2
MIDLAND AVENUE
OUTFALL #11


TOMS RIVER
PROPOSED STORMWATER MANAGEMENT STORMFILTER (IN LINE WITH 36" CMP)
M.H. 65-4
INV. 5.00
OUTFALL 12
INV. 1.20
75 L.F.
36" CMP
STEEP SLOPE
BULK
366 L
BLOCK 111
LOT 2
100 L.F.-8"
0.65%
RIVERSIDE DRIVE
SAN. M.H.
INV. 4.35
1
BASIN 12-02
GR. 9.50
INV. 6.10
BASIN 12-01
GR. 9.57
INV. 6.10
5
2
18 L.F.-15" C.M.P.
15 L.F.-18" C.M.P.
STORM M.H. 12-01
INV. 1.23
13
14
15
HENLEY AVENUE
OUTFALL #12


TOMS RIVER
EXISTING 18" R.C.P. TO BE ABANDONED
OUTFALL 13
INV. 0.31
55 L.F.-18" R.C.P.
STEEP SLOPE
35 L.F.-18" C.M.P.
288 L.F.-8" PIPE
@ 0.45%
135 L.F.-15" C.M.P.
PROPOSED 18" P.E. PIPE
BASIN 13-01
GR. 3.68
INV. 0.80
PROPOSED M.H.
PROPOSED M.H. OVER EXISTING 18" R.C.P.
PROPOSED 18" P.E. PIPE
SAN. M.H. 59-1
INV. -0.80 (E)
INV. -1.46 (S)
INV. -1.42 (W)
BLOCK 111 LOT 2
PROPOSED 18" P.E. PIPE
RIVERSIDE DRIVE
BASIN 13-02
GR. 3.86
INV. 0.90
CEDAR AVENUE
0.42%
PROPOSED STORMWATER MANAGEMENT STORMFILTER
9
21
23
27
OUTFALL #13

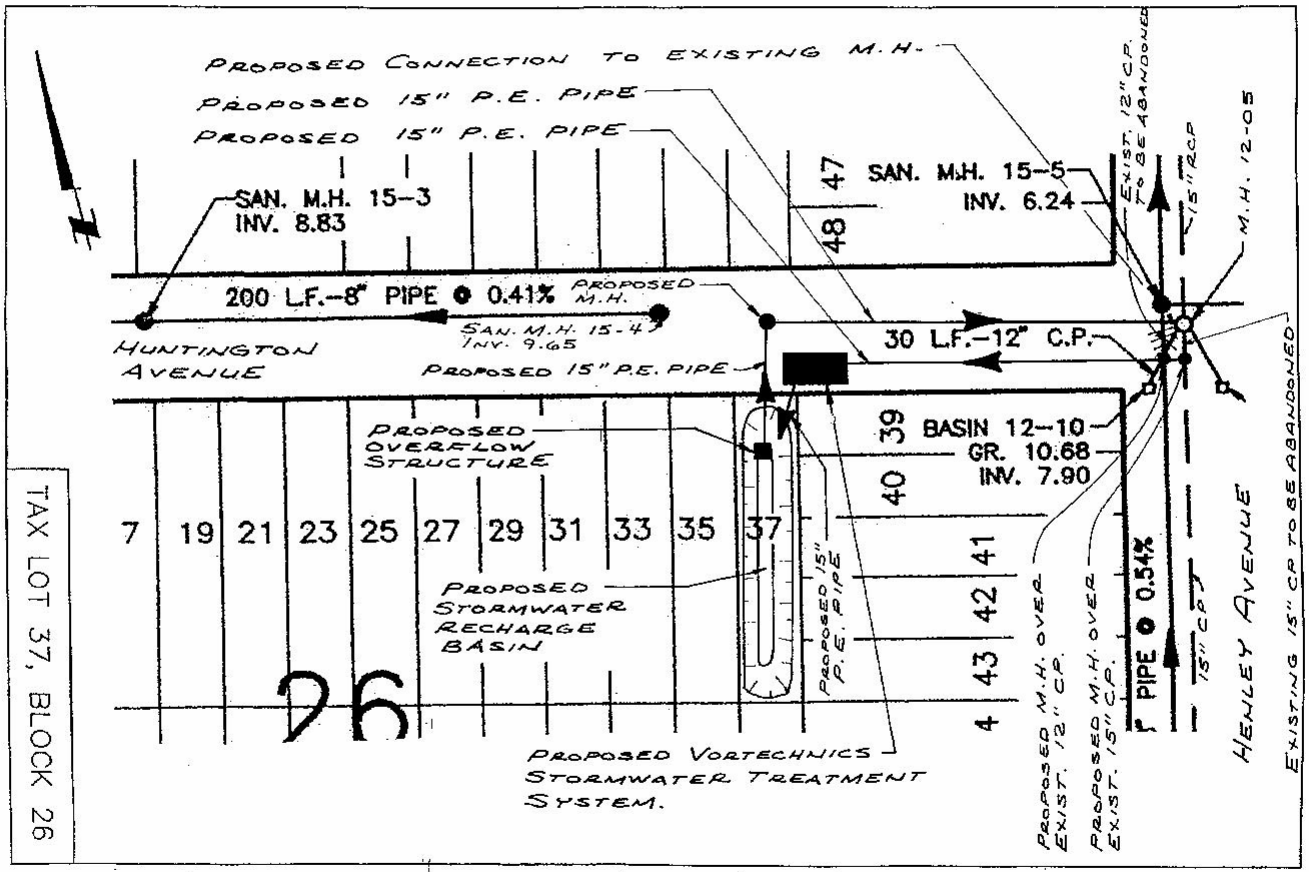

TOMS RIVER
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM
PROPOSED RECONSTRUCTED M.H.
OUTFALL 14
EXIST. 36" RCP TO BE ABANDONED
STORM M.H. 14-01
80 L.F. 36" R.C.P.
PROPOSED 36" P.E. PIPE
22 L.F. 36" R.C.P.
SAN. M.H. 62-2 INV. 2.11
BLOCK 111 LOT 2
80 LF-18" R.C.P.
PROPOSED RECONSTRUCTED BASIN
9.01
BASIN 14-02 GR. 7.04 INV. 2.39
PROPOSED 36" P.E. PIPE
65 LF-18" RCP
165 LF 36" RCP
PROPOSED M.H.
STORM M.H. 14-03
INV. 4.41 (E)
INV. 2.95 (S)
INV. 2.60 (N)
RIVERSIDE DRIVE
BASIN 14-01 GR. 7.35 INV. 4.50
PROPOSED 36" P.E. PIPE
STATION AVENUE
PROPOSED M.H. OVER EXISTING 18" RCP (CONNECT TO TREATMENT SYSTEM WITH 36" P.E. PIPE)
OUTFALL #14

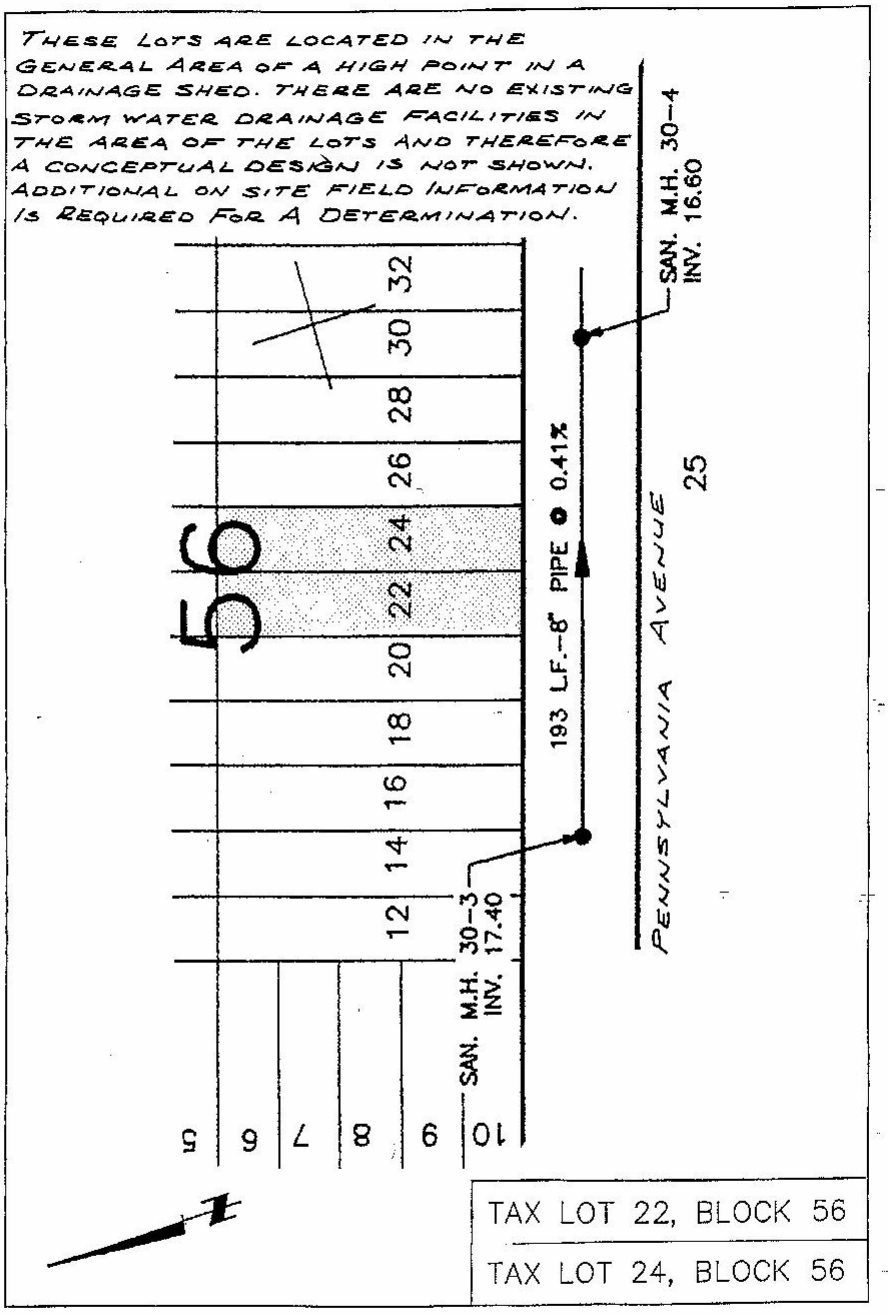

HUNTINGTON AVENUE
CEDAR AVENUE
SAN. M.H INV. 6.63
SAN. M.H. 58-3 INV. 6.67
PROPOSED 15" P.E. PIPE
PROPOSED OVERFLOW STRUCTURE
PROPOSED STORMWATER RECHARGE BASIN
PROPOSED 15" P.E. PIPE
30 L.F. 12" C.P.E.
BASIN 12-03.06 GR. 13.89 INV. 11.91
SAN. M.H. 58-2 INV. 7.65
245 L.F.-8"
PIPE @ 0.40%
15" C.P.E.
15" C.P.E.
BASIN 12-03.05 GR. 13.95 INV. 11.77 (E) INV. 11.76 (S) INV. 11.70 (N)
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM (IN LINE WITH EXIST. 15" C.P.E.)
EXISTING 15" C.P.E. PIPE TO BE ABANDONED
PROPOSED MANHOLE (OVER EXIST. 15" C.P.E.)
TAX LOT 9, BLOCK 12

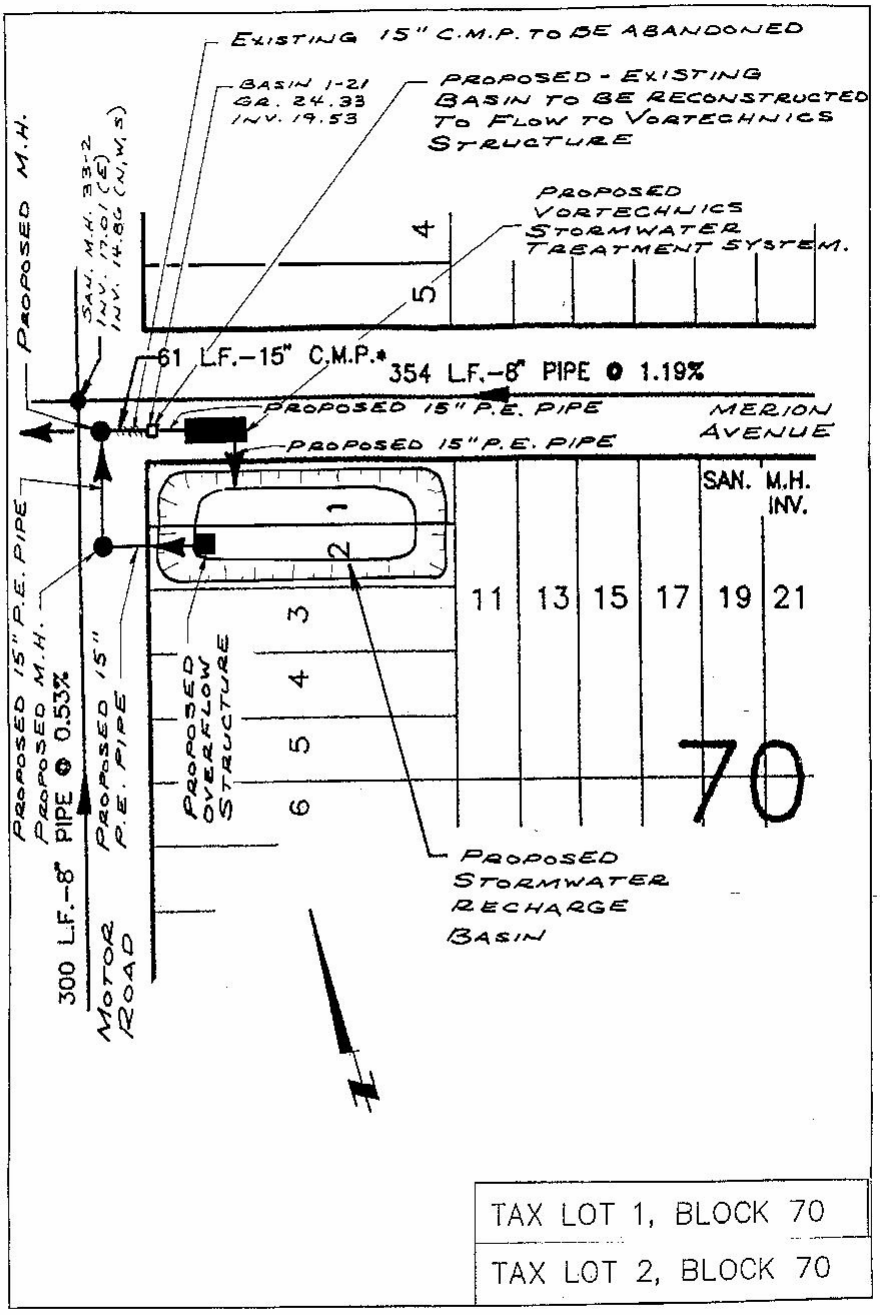


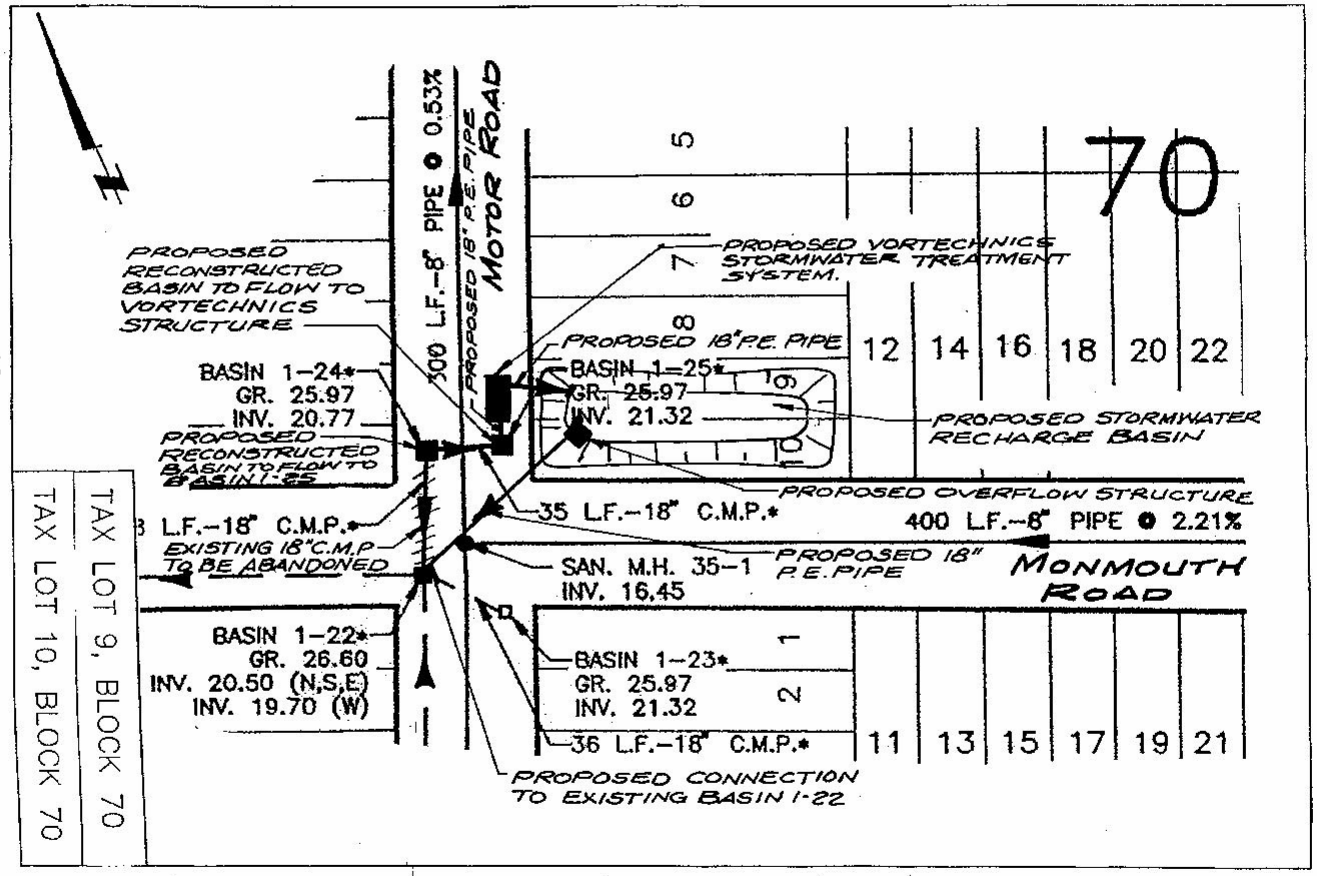
TAX LOT 36, BLOCK 17

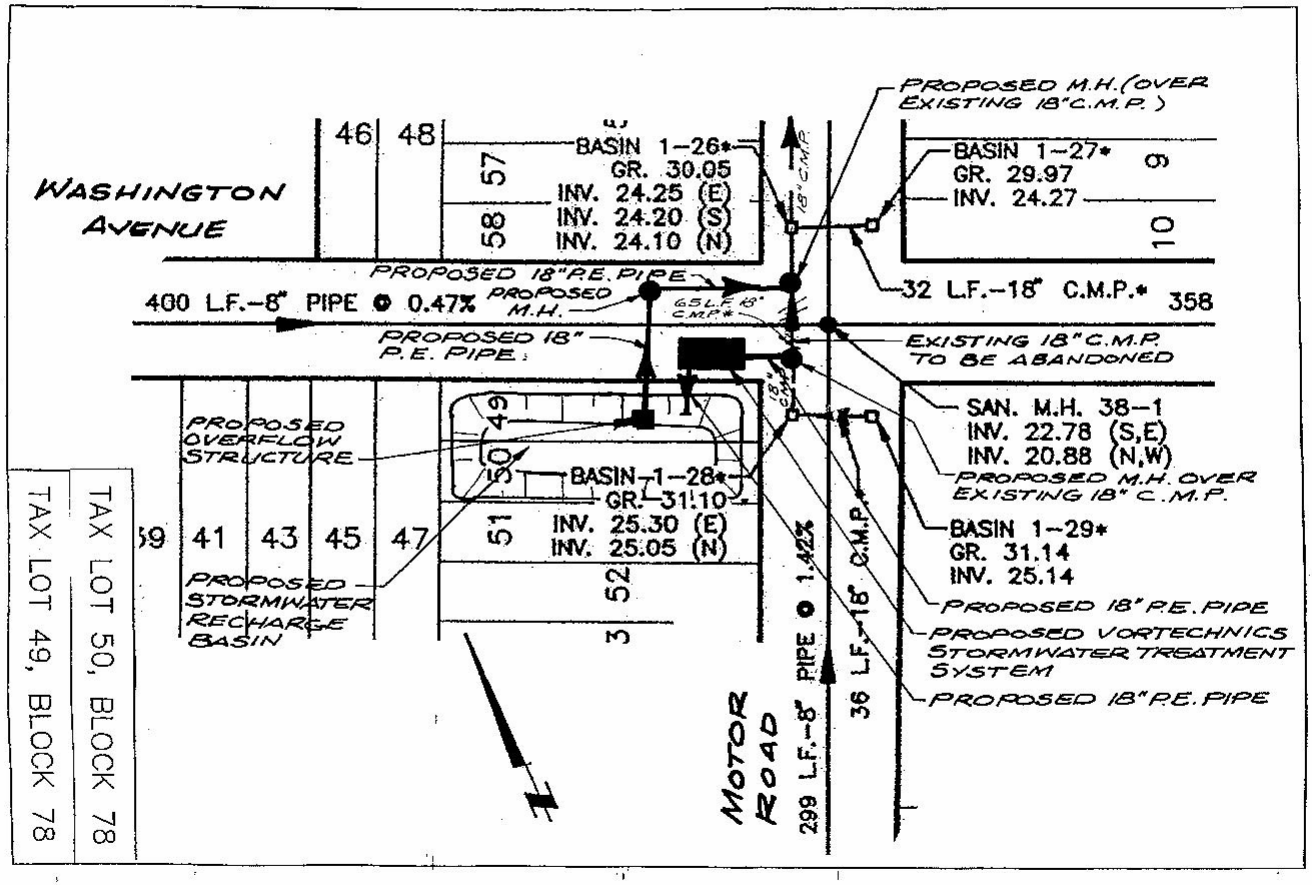
TAX LOT 38, BLOCK 17

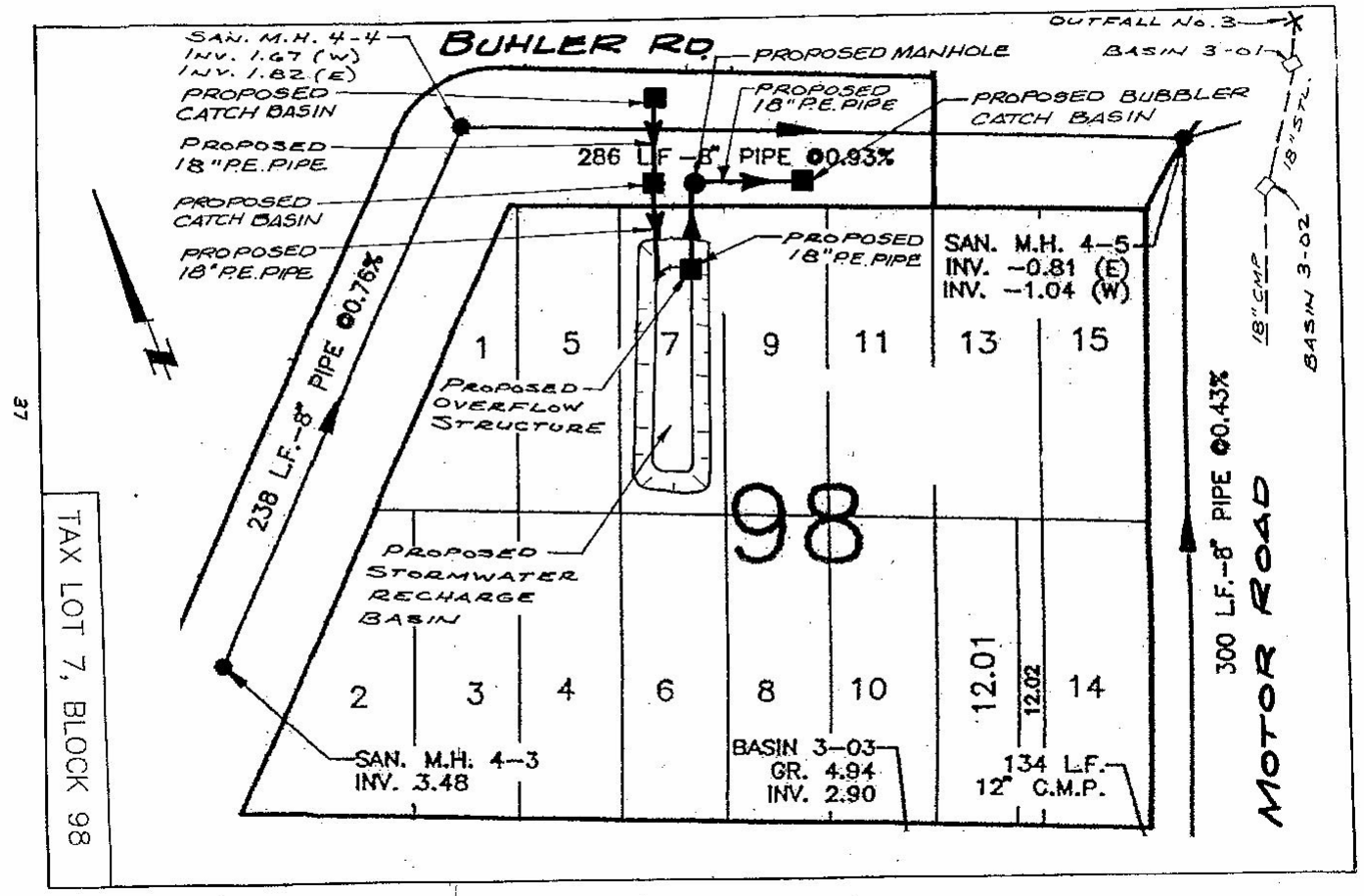

PROPOSED CONNECTION TO EXISTING M.H.
PROPOSED 15" P.E. PIPE
PROPOSED 15" P.E. PIPE
SAN. M.H. 15-3
INV. 8.83
SAN. M.H. 15-5
INV. 6.24
EXIST. 12" C.P. TO BE ABANDONED
15" RCP
M.H. 12-05
200 L.F.-8" PIPE @ 0.41%
PROPOSED M.H.
SAN. M.H. 15-4
INV. 9.65
30 L.F.-12" C.P.
HUNTINGTON AVENUE
PROPOSED 15" P.E. PIPE
PROPOSED OVERFLOW STRUCTURE
BASIN 12-10
GR. 10.68
INV. 7.90
7
19
21
23
25
27
29
31
33
35
37
39
40
41
42
43
4
26
PROPOSED STORMWATER RECHARGE BASIN
PROPOSED 15" P.E. PIPE
PROPOSED M.H. OVER EXIST. 12" C.P.
PROPOSED M.H. OVER EXIST. 15" C.P.
15" PIPE @ 0.54%
15" C.P.
HENLEY AVENUE
EXISTING 15" CP TO BE ABANDONED
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM.
TAX LOT 37, BLOCK 26
32


THESE LOTS ARE LOCATED IN THE GENERAL AREA OF A HIGH POINT IN A DRAINAGE SHED. THERE ARE NO EXISTING STORM WATER DRAINAGE FACILITIES IN THE AREA OF THE LOTS AND THEREFORE A CONCEPTUAL DESIGN IS NOT SHOWN. ADDITIONAL ON SITE FIELD INFORMATION IS REQUIRED FOR A DETERMINATION.
SAN. M.H. 30-4
INV. 16.60
193 LF.-8" PIPE @ 0.41%
SAN. M.H. 30-3
INV. 17.40
PENNSYLVANIA AVENUE
25
56
32
30
28
26
24
22
20
18
16
14
12
10
9
8
7
6
5
TAX LOT 22, BLOCK 56
TAX LOT 24, BLOCK 56


EXISTING 15" C.M.P. TO BE ABANDONED
BASIN 1-21
GR. 24.33
INV. 19.53
PROPOSED - EXISTING BASIN TO BE RECONSTRUCTED TO FLOW TO VORTECHNICS STRUCTURE
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM.
PROPOSED M.H.
SAN. M.H. 33-2
INV. 17.01 (E)
INV. 14.86 (N,W,S)
61 L.F.–15" C.M.P.
354 L.F.–8" PIPE @ 1.19%
PROPOSED 15" P.E. PIPE
PROPOSED 15" P.E. PIPE
MERION AVENUE
SAN. M.H. INV.
11 13 15 17 19 21
PROPOSED 15" P.E. PIPE
PROPOSED M.H.
300 L.F.–8" PIPE @ 0.53%
PROPOSED 15" P.E. PIPE
PROPOSED OVERFLOW STRUCTURE
MOTOR ROAD
PROPOSED STORMWATER RECHARGE BASIN
70
TAX LOT 1, BLOCK 70
TAX LOT 2, BLOCK 70


70
PROPOSED RECONSTRUCTED BASIN TO FLOW TO VORTECHNICS STRUCTURE
BASIN 1-24*
GR. 25.97
INV. 20.77
PROPOSED RECONSTRUCTED BASIN TO FLOW TO BASIN 1-25
3 L.F.-18" C.M.P.*
EXISTING 18"C.M.P TO BE ABANDONED
BASIN 1-22*
GR. 26.60
INV. 20.50 (N,S,E)
INV. 19.70 (W)
300 L.F.-8" PIPE @ 0.53%
PROPOSED 18" P.E. PIPE
MOTOR ROAD
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM.
PROPOSED 18"P.E. PIPE
BASIN 1-25*
GR. 25.97
INV. 21.32
PROPOSED STORMWATER RECHARGE BASIN
PROPOSED OVERFLOW STRUCTURE
35 L.F.-18" C.M.P.*
400 L.F.-8" PIPE @ 2.21%
SAN. M.H. 35-1
INV. 16.45
PROPOSED 18" P.E. PIPE
MONMOUTH ROAD
BASIN 1-23*
GR. 25.97
INV. 21.32
36 L.F.-18" C.M.P.*
PROPOSED CONNECTION TO EXISTING BASIN 1-22
TAX LOT 9, BLOCK 70
TAX LOT 10, BLOCK 70
35
5
6
7
8
9
10
1
2
12
14
16
18
20
22
11
13
15
17
19
21


WASHINGTON AVENUE
46
48
57
58
BASIN 1-26*
GR. 30.05
INV. 24.25 (E)
INV. 24.20 (S)
INV. 24.10 (N)
18" C.M.P.
PROPOSED M.H. (OVER EXISTING 18" C.M.P.)
BASIN 1-27*
GR. 29.97
INV. 24.27
9
10
PROPOSED 18" R.E. PIPE
400 L.F.-8" PIPE @ 0.47%
PROPOSED M.H.
65 L.F. 18" C.M.P.*
32 L.F.-18" C.M.P.*
358
PROPOSED 18" R.E. PIPE
EXISTING 18" C.M.P. TO BE ABANDONED
SAN. M.H. 38-1
INV. 22.78 (S,E)
INV. 20.88 (N,W)
PROPOSED M.H. OVER EXISTING 18" C.M.P.
PROPOSED OVERFLOW STRUCTURE
49
10
BASIN 1-28*
GR. 31.10
INV. 25.30 (E)
INV. 25.05 (N)
51
52
3
59
41
43
45
47
PROPOSED STORMWATER RECHARGE BASIN
BASIN 1-29*
GR. 31.14
INV. 25.14
PROPOSED 18" R.E. PIPE
PROPOSED VORTECHNICS STORMWATER TREATMENT SYSTEM
PROPOSED 18" R.E. PIPE
36 L.F.-18" C.M.P.
299 L.F.-8" PIPE @ 1.42%
MOTOR ROAD
TAX LOT 50, BLOCK 78
TAX LOT 49, BLOCK 78


BUHLER RD.
SAN. M.H. 4-4
INV. 1.67 (W)
INV. 1.82 (E)
PROPOSED CATCH BASIN
PROPOSED 18" P.E. PIPE
PROPOSED CATCH BASIN
PROPOSED 18" P.E. PIPE
PROPOSED MANHOLE
PROPOSED 18" P.E. PIPE
286 L.F. -8" PIPE @0.93%
PROPOSED BUBBLER CATCH BASIN
OUTFALL No. 3
BASIN 3-01
18" STL.
18" CMP
BASIN 3-02
SAN. M.H. 4-5
INV. -0.81 (E)
INV. -1.04 (W)
PROPOSED 18" P.E. PIPE
238 L.F. -8" PIPE @0.76%
PROPOSED OVERFLOW STRUCTURE
PROPOSED STORMWATER RECHARGE BASIN
98
1
5
7
9
11
13
15
2
3
4
6
8
10
12.01
12.02
14
SAN. M.H. 4-3
INV. 3.48
BASIN 3-03
GR. 4.94
INV. 2.90
134 L.F. 12" C.M.P.
300 L.F. -8" PIPE @0.43%
MOTOR ROAD
TAX LOT 7, BLOCK 98