20 Darton Street
Concord, MA 01742

May 18, 1990

Mr. John P. Sheppard
Director - Public Access Board
100 Nashua Street, Room 915
Boston, MA 02114

RE: Control of Surface Water Run-Off at White Pond Access Road

Dear Mr. Sheppard:

Enclosed please find a copy of the plan developed to control surface water runoff on the Public Access Road serving White Pond. As you may remember, the purpose of this improvement is to decrease the flow of nutrients directly into the Pond and thereby help to preserve the existing water quality for as long as possible. I would appreciate any feedback you can provide me in terms of improvement or suggestions for its implementation, etc. Basically we realize that the community will need to be primarily responsible for the work indicated in this attached plan. The question remains however, what authorization, permits, etc. need to be obtained before work can commence? How do you suggest we proceed in this endeavor?

I would appreciate hearing from you at your earliest convenience concerning your comments on this drawing, either by mail or calling me at (508) 369-5680.

Very truly yours,

David W. Bearg

WHITE POND ADVISORY COMMITTEE

PRESS RELEASE

July 17, 1990

The White Pond Advisory Committee is finalizing plans for a Runoff Control Project to help preserve and protect water quality in White Pond. This plan of action is based on the recommended measures of the consultant, Dr. William Walker, who has performed three years of studies on the pond. Dr. Walker was hired by the Concord Board of Health, at the urging of the Advisory Committee, after algal blooms appeared in 1986. As pointed out in his reports, surface runoff contributes nutrients, turbidity, and organic materials which can stimulate algal growth, reduce transparency, and increase rate of oxygen depletion from the pond bottom waters. The major source of surface runoff to the pond is the Public Access, or County Road as is frequently called. Although an application has been made to the Commonwealth for White Pond to have improvements performed under the State Clean Lakes Program, any actions under this program would have to wait until the financial health of the Commonwealth improves greatly. Rather than merely wait, while excess nutrients, sediments and organic materials continue to flow into the pond, the White Pond Advisory Committee is attempting to accomplish this project by primarily direct community involvement; reaching out to whoever knows and loves White Pond. The runoff control project itself, will consist of asphalt berms across and along side the access road, at two locations, which will collect the rainwater and divert to catch basins. These basins will permit heavy sediments to settle out for annual removal, while the water will flow out into drywells and then through the soil on its way down to ground water. The drywells will consist of trenches, approximately 8 feet across and 20 feet long, filled with stone and lined with special fabrics on all sides. The action of the drywell and the percolation through the soil will greatly reduce the contribution to the pond of nutrients and fine sediments. The permits for this project are being obtained, and commitments for the donation of materials are being finalized, but the opportunity still exists for more people to share in the credit for getting this worthwhile project accomplished. Anyone who has an appreciation for the qualities of White Pond and an understanding of the need to preserve environmental values is therefore requested to contribute to this effort by sending a check to the Friends of White Pond, c/o 27 Seymour Street, Concord and designate it for the White Pond Runoff Control Project. Now that we have the benefit of these water quality studies on White Pond, the time has come to begin implementing the recommended measures to protect the pond's water quality.

TOWN OF CONCORD

DEPARTMENT OF COMMUNITY SERVICES

MEMORANDUM

TO: Town Manager

FROM: Dan Monahan

DATE: March 14, 1991

SUBJECT: White Pond Projects

In response to our telephone conversation earlier this week concerning the meeting that David Bearg had set up to discuss the drainage project he is pursuing on the county-owned access road to White Pond. As I recall, Al Lima was ill and unable to join us. David Bearg and Gail Jewell were present to meet with you. From what I can gather, David is making progress and has nearly obtained all the necessary funds and/or materials to do the work. The NRC authorized the project under the Wetlands Protection Act. The project is designed to intercept the surface water runoff from the paved access road, pass it through a sump to remove sediment and then discharge it into a drywell.

I have been in very close touch with the White Pond Advisory Committee and Friends of White Pond concerning the stabilization of the bank erosion at the Conservation Land. Alan Aronie (Gail Jewell's husband) has agreed to be the White Pond contact on this project. As you know our concept is to use sandbags which will be much less expensive and much more labor intensive than the original engineered concept using timbers and cement forms estimated at $70,000. It is my expectation that the job will take several years to accomplish and there will be some continued maintenance involved. The Natural Resources Commission has requested that the work schedule be spread out to allow for proper settling so it is not possible to complete the work in time to establish the vegetation during the current planting season. Our potential sources of labor include the Conservation crew, White Pond neighbors, NECC work crew, the Minuteman Votech students, volunteers and others. Some support from the Town crews will be necessary to haul the materials, but I assume they will not be available to be involved to any great extent because of other commitments. I have been in contact with Alan Aronie about setting up our first work project which will likely occur on a weekend in early April.

It is important to acknowledge that because of the nature of the materials involved the project can and should be done in stages. Our goal is to establish a natural vegetation that will blend into the existing slope. Since this is a stand of hemlock trees the project will take many years to achieve the desired results. It is my expectation to keep in close contact with the White Pond neighborhood and have the work proceed in an appropriate, timely manner.

cc: Al Lima
Alan Aronie

March 15, 1991

PROJECT DESCRIPTION

The proposed improvements to the Public Access Roadway serving White Pond is described in this document and the attached drawing. This project is divided into three components: the Basic System plus Options A and B. Therefore, responsive bids should have three prices detailed the cost to complete: (1) the Basic System; (2) the Basic System plus Option A; and, (3) the Basic System plus Options A and B.

Description of the Basic System: This system will collect surface runoff at an existing depression on the north side of the roadway, just uphill from the lower parking area. This location coincides with the existing flow pattern of water coming down the hill. Water will be collected at this location by a non-leaching catchbasin with two (2) 24" by 24" grates. The collection of the water at this location will be facilitated by the installation of a berm of machined bituminous concrete across the roadway. The catchbasin shall be piped to a drywell located on the southside of the roadway. The actual placement of this structure will be determined in the field to minimize disruption to the existing vegetation. This dry well shall consist of a total of 4 precast galleys. These galley shall be surrounded on all four sides by a two (2) foot width of stone fill, consisting of 1.5 to 3.0 inch diameter washed gravel. The excavated trench for the precast galleys and stone shall be lined on the sides, bottom and top with a permeable geotextile, Amoco 4703 soil filtration / drainage fabric, or equivalent. The end galley structures shall include manways for access, the top of the covers for which shall be located at one (1) foot below finished grade. A map shall be furnished by the contractor which indicates the location of these access covers. Also included as part of this basic system, the contractor will be responsible for providing and installing a lockable and removable stanchion, approximately 14' uphill from the end of the paved surface of the roadway and centered in the roadway.

Option A: This option is for a second drywell, catch basin and berm system. This second system differs from the main system in that it is smaller and is located closer to the pond. This system will collect surface runoff on the north side of the roadway, downhill from the lower parking area. The dry well for this system shall consist of a total of 2 precast galleys. The other requirements shall be the same as for the Basic System.

Option B: This option is for a leaching catch basin located further up the hill than the other systems. The specific location will be determined on site in order to maximize collection from the existing channelization of surface waters. This structure shall be of standard configuration, constructed of either precast components or CMU barrel blocks, surrounded by two (2) feet of washed stone.

The bids and any questions should be directed to the Project Coordinator, David W. Bearg at 20 Darton Street, Concord, MA 01742, 369-5680.

SUMMARY OF CONTRIBUTIONS TO THE RUNOFF CONTROL PROJECT
WHITE POND ASSOCIATES, INC. MEMBERS 5/17/1991

A	David & Sara Abend 36 Brooks Street, Concord	$10.00
B	Morton Baker 100 Keyes Road, No. 224, Concord	$25.00
	Steven & Leslie Bates 519 Hayward Mill Road, Concord	$10.00
	Ellen & Thomas Bean	$15.00
	Jane H. Beckwith 17 Hayes Avenue, Lexington	$15.00
	Deborah & Richard Beinecke 61 Lang Street, Concord, 371-3168	$50.00
	Karen Belinsky & Leslie Charm 39 Holden Lane, Concord	$25.00
	Jennifer & John Bemis 21 Liberty Street, Concord, 369-2433	$50.00
	Regina & Richard Billman 29 Hawthorne Village, Concord, 369-5625	$25.00
	Mark & Enid Boasberg	$15.00
	William & Barbara Boger 357 Nashawtuc Road, Concord	$50.00
	Donato & Elsie Bracco 348 Hayward Mill Road, Concord, 369-8347	$20.00
	Janet & David Burke 204 Harrington Avenue, Concord	$25.00
	Jane & John Butler	$25.00
C	David & Susan Clark 329 Heath's Bridge Road	$20.00
	Kenneth Cohen	$25.00
	Catherine & Timothy Collins 37 Crabtree Road, Concord 371-1095	$30.00
	Mary C. Cope 99 Martin Road, Concord	$25.00
	Robert & Mary Cowen 298 Holdenwood Road, Concord	$50.00
D	Irmingard Doane 242 Lexington Road	$25.00
F	J. Hadley Taylor Fisk 95 Old Bridge Road, Concord, 369-5009	$20.00
	Richard Frank & Hope Erwin 63 Buckminster Road, Brookline	$25.00
	Harvey Federman 1357 Old Marlboro Road, Concord	$25.00
G	Sylvia & Lawrence Greene 121 Holden Wood Road, Concord	$25.00
	Patrick & Priscilla Guiney 30 Sunnyside Lane, Concord, 369-0667	$25.00
H	H.O. & Elizabeth Haughton 18 Whittemore Street, Concord	$25.00
	Charles & Beverly Heinle 29 Lexington Road, Concord, 369-4858	$30.00
	Paul & Eleanor Horwitz 32 Riverside Avenue, Concord, 369-4935	$50.00
	C.W. & A.B. Hoyt 31 Indian Spring Road, Concord, 369-1377	$20.00
K	Marian Koehler Korbet	$25.00

	115 Plainfield Road, Concord	
	Susan Lewinnek	$50.00
	540 Annursnac Hill Road, Concord	
	Erich Lob	$50.00
	86 Farmer's Cliff Road, Concord	
M	Craig MacDonnell & Lisa Whittemore	$50.00
	396 Plainfield Road, Concord, 369-7629	
	Elizabeth & Richard Marshall	$40.00
	143 Holden Wood Road, Concord	
	Robert & Lal Minton	$25.00
	John J. Mooney, M.D.	$50.00
	24 Fernald Drive, Cambridge	
N	Dr. Barbara P. Nash	$25.00
	291 Pope Road, Concord, 369-4336	
	Robert & Therese Nelson	$25.00
	136 Holden Wood Road, Concord	
	Rose Neufeld	$25.00
	266 Main Street	
O	James & Batya Olsen	$25.00
	26 Robin Wood Road, Concord	
	Nina & James Overall	$25.00
	14 Thoreau Court	
P	William & Jacqueline Payne	$20.00
R	Edward & Nicki Richards	$25.00
	1755 Monument Street, Concord	
	Naomi Rosenfeld	$50.00
	389 Garfield Road	
S	Maureen & Norbert Schwartz	$25.00
	51 Longfellow Road, Concord, 369-9002	
	Bozena & Irl Smith	$50.00
	537 Hayward Mill Road, Concord	
	Eric Parkman Smith	$50.00
	35 Academy Lane, Concord, 369-3838	
	James & Joanne Stern	$25.00
	384 Powder Mill Road, Concord	
	W. Deter & Margrit Straub	$25.00
	158 Barton Drive, Sudbury	
	Charles & Margaret Stromeyer	$25.00
	162 Heaths Bridge Road, Concord	
	Charles & Sarah Stuart	$30.00
	36 Wood Street	
T	Robert & Jean Turkington	$10.00
	193 The Valley Road, Concord	
W	Clifford & Toby Walters	$25.00
	32 Hawthorne Village, Concord	
	Fred Wersan & Paula Posnick	$10.00
	61 Southfield Circle, Concord	
	D. Elliott & Sara Wilbur	$50.00
	95 Revolutionary Road	
	Charles & Mary Sue Willie	$25.00
	41 Hillcrest Road, Concord, 369-2363	
	Dieter & Dorothy Willner	$25.00
	24 Brown, Concord	
	Elizabeth Wilson	$50.00
	422 Elm Street	
	Mary Lee & Michael Worthy	$20.00
	15 Westvale Drive, Concord, 369-5334	
Y	Francis Yans	$25.00
Z	Warren & Nikki Zapol	$50.00
	182 Holden Wood Road, Concord	
	Dale & Steven Zippen	$10.00
	19 Damon Street, Concord 369-9712	

SUMMARY OF FUNDS RAISED FOR THE RUNOFF CONTROL PROJECT

Contributor	Amount	Total
Camp Thoreau	$100.00	$100.00
Thomas LeBlanc & Sons	$100.00	$200.00
Don & Charlotte Allen	$50.00	$250.00
Patrica W. Berger	$30.00	$280.00
Carole & Joseph Cushing, Jr.	$100.00	$380.00
John & Donna Robbins	$10.00	$390.00
Ken Nakayama & Kate Anderson	$25.00	$415.00
interest	$1.24	$416.24
Francis Phillips	$50.00	$466.24
Anne Foley	$50.00	$516.24
Paula Robbins	$25.00	$541.24
James & Norma Monaghan	$50.00	$591.24
Nancy James & Richard Frese	$500.00	$1,091.24
David Cownie	$150.00	$1,241.24
Donald & Joan Turner	$100.00	$1,341.24
interest	$5.38	$1,346.62
interest	$6.09	$1,352.71
Carlo Buonomo & Suzanne Koven	$100.00	$1,452.71
Herb & Jan Kottler	$100.00	$1,552.71
Arra & Susan Avakian	$50.00	$1,602.71
White Pond Garden Club	$1,000.00	$2,602.71
Crawford Adams	$50.00	$2,652.71
AMC / Canoe Committee	$200.00	$2,852.71
interest	$11.68	$2,864.39
interest	$13.38	$2,877.77
Naomi & Michael Rosenfeld	$100.00	$2,977.77
Trout Unlimited	$100.00	$3,077.77
MEMBERS, WHITE POND ASSOCIATES	$ 1830.00	4,907.77
Expected Contributions		
Ari Kurtz	$50.00	$3,127.77
White Pond Associates, Inc.	$1,000.00	$4,127.77
Friends of White Pond	$500.00	$4,627.77
White Pond Assoc. Members	$930.00	$5,557.77
Promised		
Public Access Board, State	$1,000.00	$6,557.77

As of, 4/ 4/1991

TOWN OF CONCORD

DEPARTMENT OF PLANNING AND LAND MANAGEMENT

M E M O R A N D U M

TO: Town Manager

FROM: Dan Monahan

DATE: March 26, 1991

SUBJECT: Meeting re: White Pond Runnoff Control Project

It seemed a good idea to drop you a memo and copy both David and Gail to confirm the meeting I have set up at your office on Thursday, March 28th at 3:00 P.M.

There certainly is a lot going on at the White Pond area which have some real environmental benefits. It is impressive to think that they all are being implemented or supported by the neighborhood. The proposed run off control project is an excellent example of such an effort. David Bearg has the project well organized but he is coming down to "crunch time" with some decisions that need to be made about the procurement of materials and installation responsibilities. There also is the long range maintenance question as to who will clean the drainage system on a routine basis.

I was pleased to learn yesterday that Hal likes the design of the drainage system and he does have some options to assist with the project. It seems to me that it is very appropriate for the Town to support this effort which has received considerable neighborhood funding and effort. Furthermore, the project will not only help to preserve White Pond but it will also help to defer the time when public funding for cleaning the pond and/or installing public sewage disposal will be required.

cc: David Bearg, 20 Darton Street
Gail Jewell, 27 Seymour Street

From the desk of David W. Bearg, P.E., C.I.H.:
20 Darton Street, Concord, Massachusetts 01742
508 369-5680 (Voice) & 508 369-0097 (Facsimile)

VIA FAX

PAGES = 1

July 18, 1995

Mr. Michael Arnold
Director of Public Works
Town of Concord
Concord, MA 01742

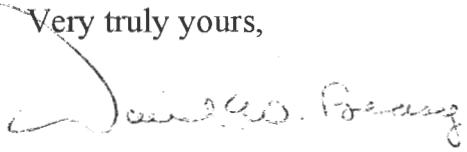
RE: Request for clean-out of catch basin on access road to White Pond

I am requesting that the non-leaching catch basins on the access road to White Pond be cleaned out as soon as possible. I was the Chairman of the White Pond Advisory Committee at the time of the installation of this Run-off Control Project at White Pond, and I have recently observed that the upper, non-leaching catch basin has filled with sediment and therefore any additional sediment is being carried over in the leaching portion of this system, which consists of a fabric-lined galley and gravel leaching system. By permitting sediments to carry over to the leaching portion of this system, I fear that the useful life of this system will be severely shortened.

As a bit of background, the consultant hired by the Board of Health to review the causes of algal blooms in the pond identified the uncontrolled run-off of nutrients and sediment down the paved road as the major preventable source of excess nutrients in the pond. The accumulation of nutrients in the pond is the major contributing factor to algal blooms and water quality deterioration. Based on this information, a Run-off Control Project was undertaken to address this issue. After plans were developed and approved, and private funds raised for materials, the Concord Water Department installed two non-leaching catch basins and associated galley leaching systems on this road.

To continue the commitment to protect the water quality in White Pond, I would hope that these catch basin can be cleaned out in the very near future. In addition, I would also request that this cleaning automatically occur on an annual basis. It would also seem prudent to include the road as part of the street cleaning efforts on Plainfield Road, so as to minimize the potential for nutrients and sediments to accumulate in the first place. If you have any questions or desire additional information, please do not hesitate to contact me.

Very truly yours,



David W. Bearg

David W. Bearg
20 Darton Street
Concord, Massachusetts 01742

Voice: 508 369-5680
Fax: 508 369-0097

December 17, 1996

White Pond Advisory Committee:
Craig MacDonnell, Daniel Holmes, Helen Hopkins, Rick Hahn, and Sara Newton

I am contacting you to add some information pertaining to a problem in the White Pond Community. This is an issue that needs a liaison between the people of this community and the Town of Concord, so there is a role for you to play in its resolution. The issue is the periodic flooding of the northern portion of the intersection at Dover and Darton Streets. This situation, that occurs after a significant rain, is not only a major inconvenience, but if this water were to freeze it would represent a public safety hazard.

It appears that this problem was first created when the Town repaved Dover Street and failed to provide adequate drainage for the runoff collecting at the low point in the road near the intersection with Darton Street. Now, either due to the frequency of recent rainfall or due to the improvements to Darton Street (the replacement of cracked and deteriorating road surface with a new layer of asphalt), this problem of inadequate drainage causes the surface water to back up from the intersection to the front of 60 Dover Street. This is occurring despite improvements in drainage that were performed in conjunction with the improvements to Darton Street that included the cleaning of a catch basin, the lowering of the catch basin cover to improve its capture of surface waters, and the sloping of the road surface away from 60 Dover Street.

What seems to be needed first is an engineering assessment of both the quantities of water flowing to this intersection, both from Dover Street and Darton Street and a determination of the storm capacity of the catch basin there. It would seem that since the capacity of this catch basin is not adequate for the volumes it is seeing, that there needs to be an increase in the capacity of this system.

In addition, since the Town of Concord owns land that has frontage on the portion of Darton Street that recently had been improved, and yet has not contributed towards these improvements, it would seem appropriate that it could contribute to this effort in the form of an improvement to the drainage at this intersection. Also, since it appears that this problem was first created when the Town repaved Dover Street and did not provide adequate provisions for drainage at the low point at the intersection with Darton Street, perhaps now would be a good time for this problem to finally be corrected.

Letter to White Pond Advisory Committee
December 17, 1996

It would seem that a correction would involve the adding of additional initial volume to the existing catch basin. This could be achieved by the addition of an adjacent structure with an overflow pipe from the existing catch basin. It would be prudent, of course, to first perform some engineering calculations as to the area of the roadway being drained, and the requirement for additional volume to accept this amount of water.

Please follow-up with the Highway Superintendent, David Turocy, who was already contacted on December 2, 1996, and any other Town officials that you feel are necessary to solve this problem. Thank you for your help in this matter.

Very truly yours,

David W. Bearg

cc: Paula Vanar and Robert McMurtry, 66 Dover Street
Diane and Joseph Lucas, 60 Dover Street
Susan Koven and Carlo Buonomo, 80 Dover Street
Barbara and David Greene, 11 Shore Drive

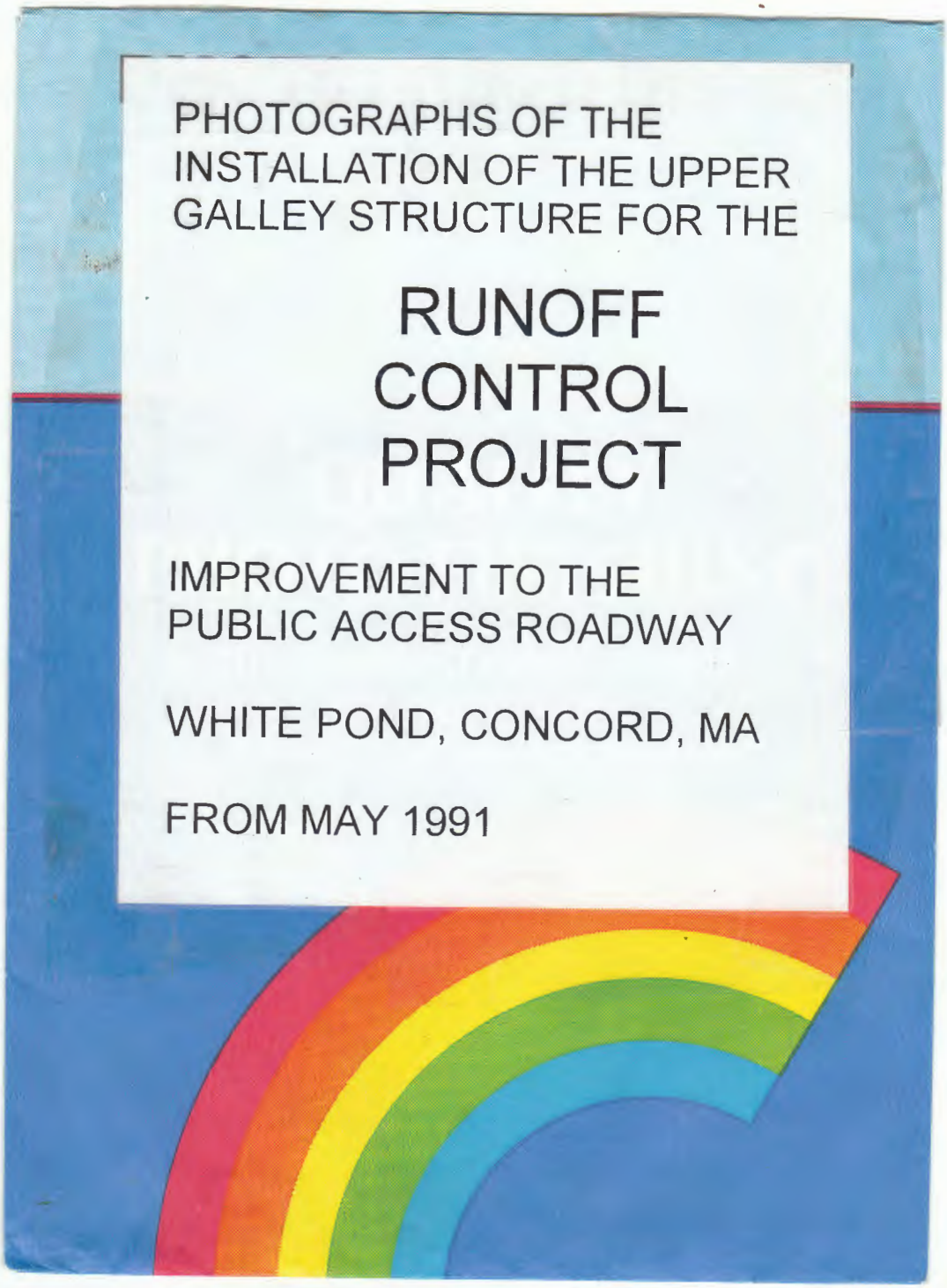
PHOTOGRAPHS OF THE
INSTALLATION OF THE UPPER
GALLEY STRUCTURE FOR THE

RUNOFF CONTROL PROJECT

IMPROVEMENT TO THE
PUBLIC ACCESS ROADWAY

WHITE POND, CONCORD, MA

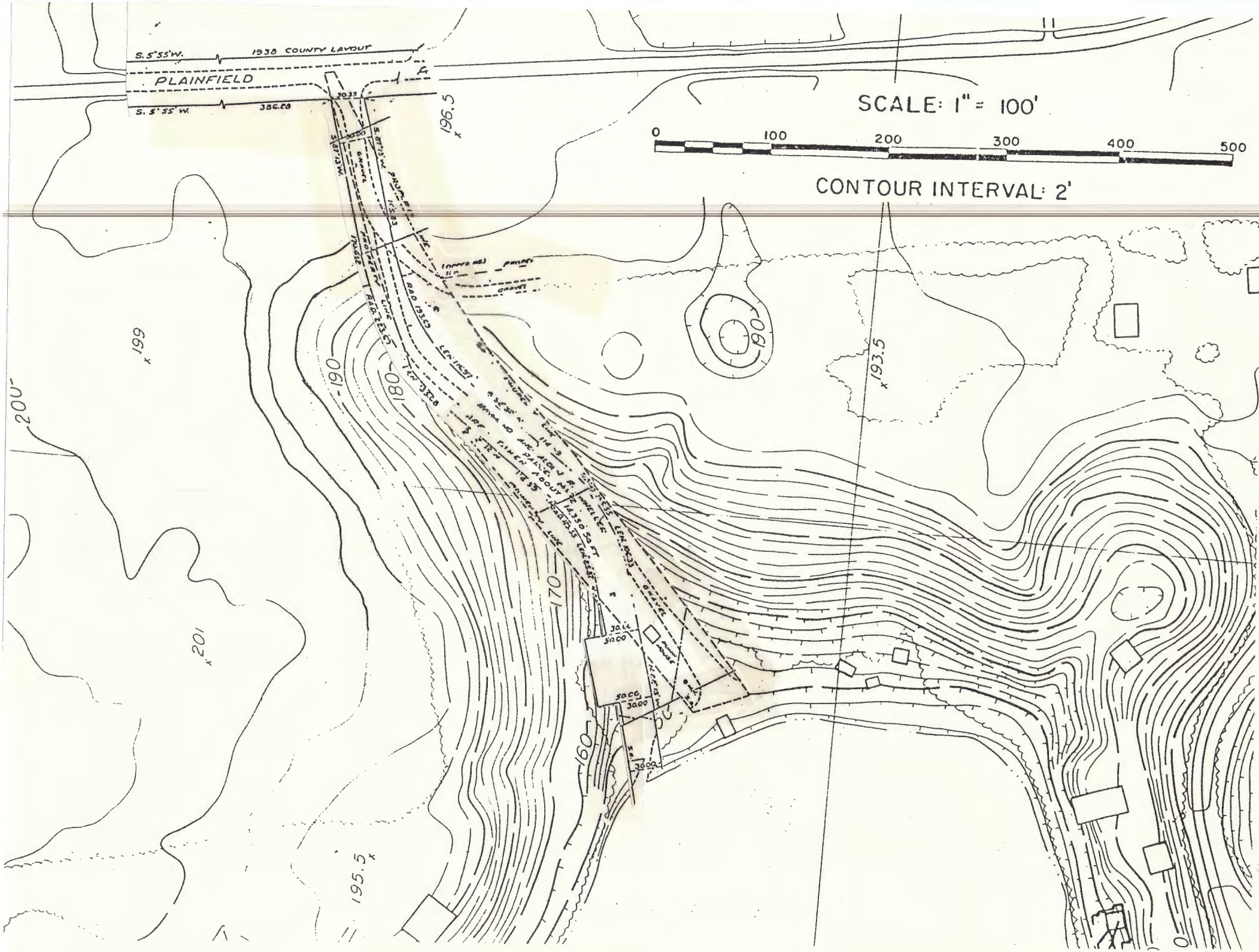
FROM MAY 1991



CALCULATIONS FOR RUNOFF CONTROL PROJECT
WHITE POND, CONCORD, MASS.

2/ 6/91

Item Description	Units	Main System	Bottom System	Both Systems
Length of Road	ft	545	80	625
Average Road Width	ft	18	40	
Road Area	ft^2	9,810	3,200	13,010
	acres	.2252	.0735	.2987
Number of Galleys	units	4	2	6
Gross Volume	ft^3	256	128	384
Net Volume (.7)	ft^3	179	90	269
Length of Hole	ft	20	12	
Width of Hole	ft	8	6	
Depth of Hole	ft	6	5	
Volume of Hole	ft^3	960	360	1,320
	yd^3	35.6	13.3	48.9
Perimeter Stone	ft^3	704	232	
Perimeter Void (.4)	ft^3	282	93	
TOTAL VOID SPACE	FT^3	461	182	643
	ACRE-FT	.0106	.0042	.0148
DRAINED SURFACE	ACRES	.2252	.0735	.2987
CAPACITY	INCHES	.5637	.6840	


S. 5°55'W.
1938 COUNTY LAYOUT
PLAINFIELD
S. 5°55'W.
386.28
SCALE: 1" = 100'
0
100
200
300
400
500
CONTOUR INTERVAL: 2'
196.5
199
200
201
195.5
193.5
190
180
170
160
90
0

OND ASSOCIATES INC.

WOODED AREA

'ND AND
.. WHEELER
RCEL NO.
ABOUT 320 SQ. FT

OPERTY LINE

165.83

(TIPPED NG.)

S.F.

PROPER

GRAVEL

RAD 193.69 LEN 116.97

PROPERTY LINE

170.412 RAD. 223.60 LEN 135.08

ID ASSSOCIATES INC.
ARCEL NO. 1
EN ABOUT 1700 SQ FT.

sachusetts
WILDLIFE
FORCEMENT

PROPERTY LINE

S 52° 32' W 114.59

RAYMOND AND ALDEN R. WHEELER
AREA TAKEN ABOUT 14,350 SQ. FT

S 52° 32' W

PROPERTY LINE

S.B.

RAD. 125.55 LEN. 106.33

GRAVEL

WOODED AREA

4" C.I. WATER PIPE

WHITE POND ASSOCIATES INC.
PARCEL NO. 2
AREA TAKEN ABOUT 5170 SQ. FT.

WOODED AREA

PLAN OF
A RIGHT OF WA
TO

BEACH

S.B.

4" C.I. WATER PIPE

BEACH LINE

PUMP HOUSE

O.M.

S.B.

RAD. 125.55 LEN. 85.82

N. 88° 13' W. 50.00

30.00

N. 1° 47' E. 20.00

N. 88° 13' W. 60.00

S. 1° 47' W. 20.00

50.00

30.00

N. 88° 13' W.

T. CONN. 179.0

S.B.

30.00

100.0 ±

SHORE

#455

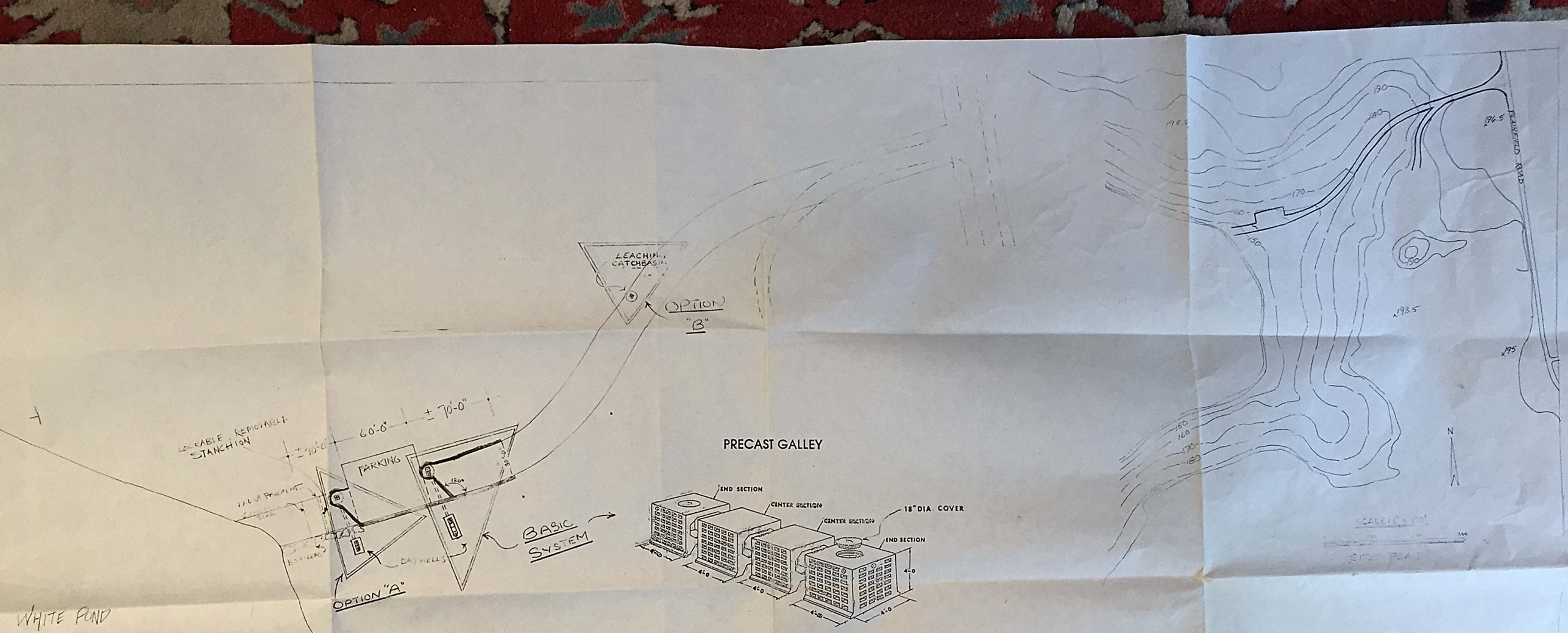
#456

#457

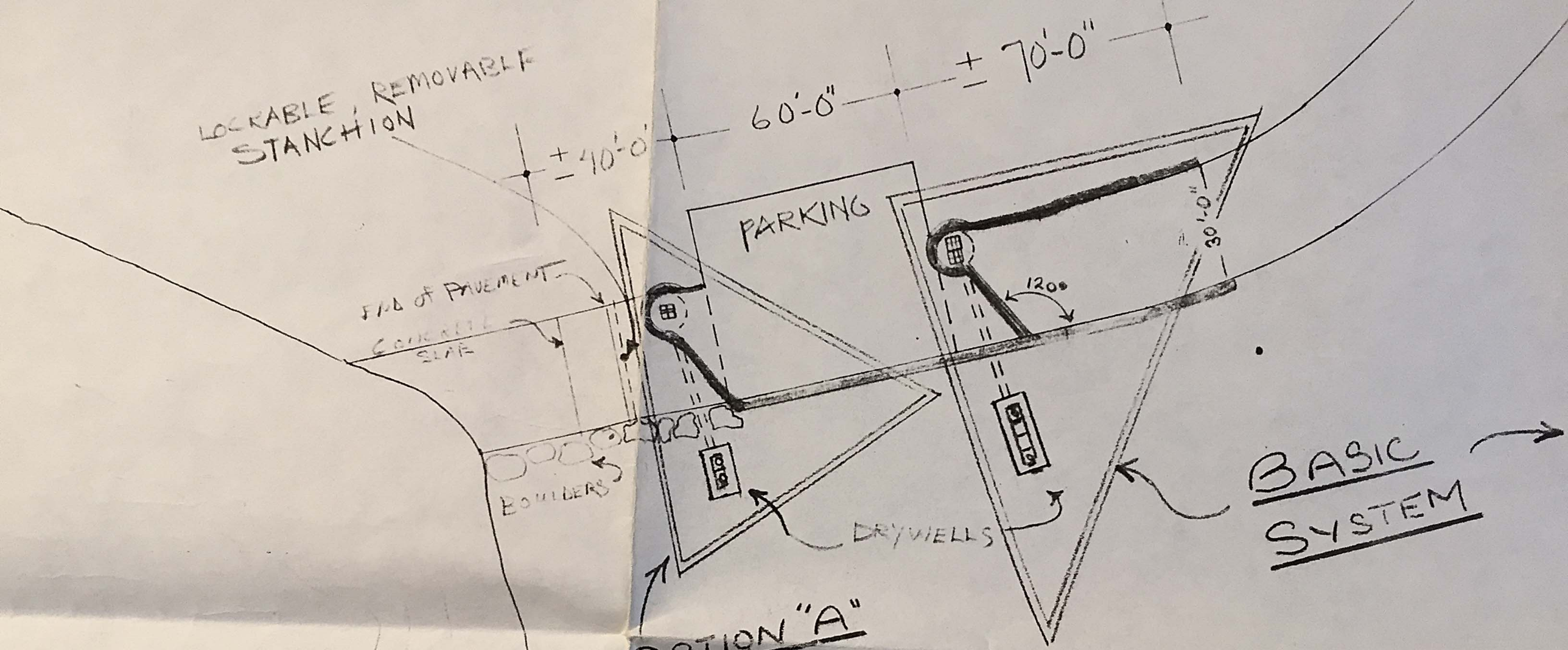
PROPERTY LINE

WHITE POND
ASSOCIATES INC.
PARCEL NO. 3
INDEFINITE AREA TAKEN

WOODED



RUNOFF CONTROL PROJECT
PUBLIC ACCESS ROADWAY
WHITE POND, CONCORD, MA.
SCALE AS NOTED



SITE DETAIL

SCALE 1" = 40'-0"

± 70'-0"

30'-0"

120°

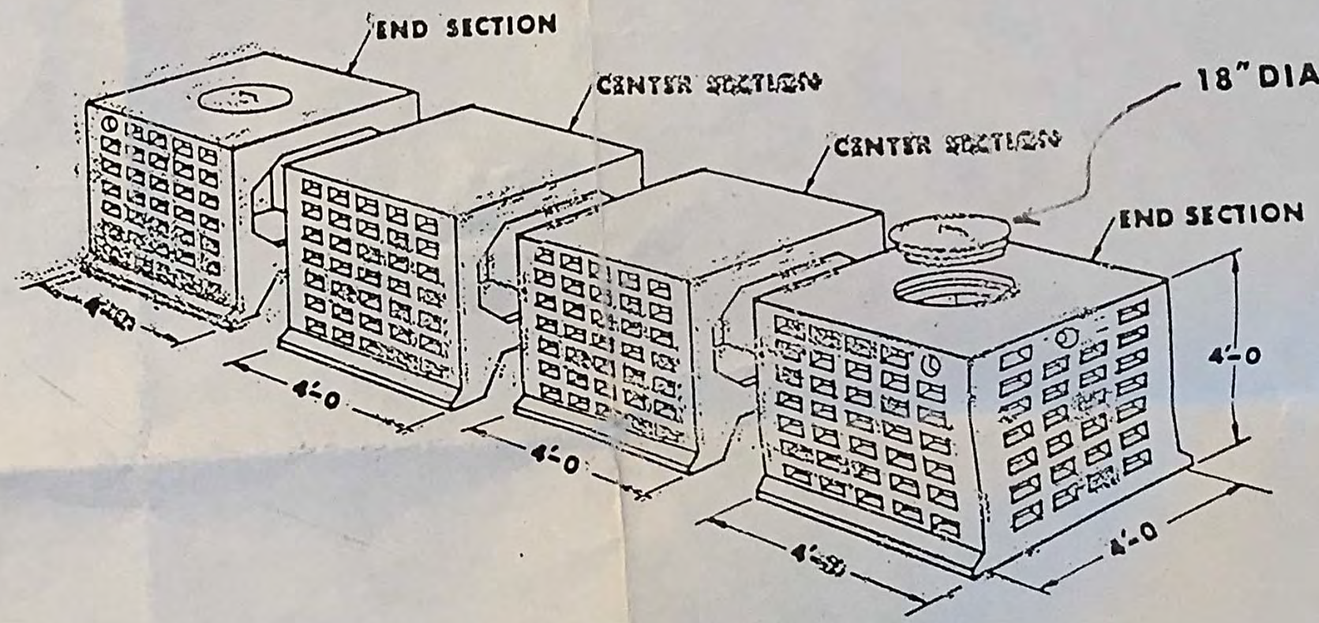
WELLS

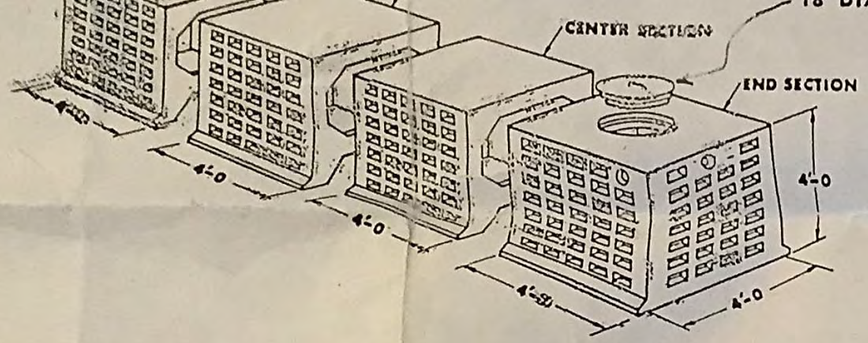
BASIC SYSTEM

TE DETAIL

LE 1" = 40'-0"

PRECAST GALLEY

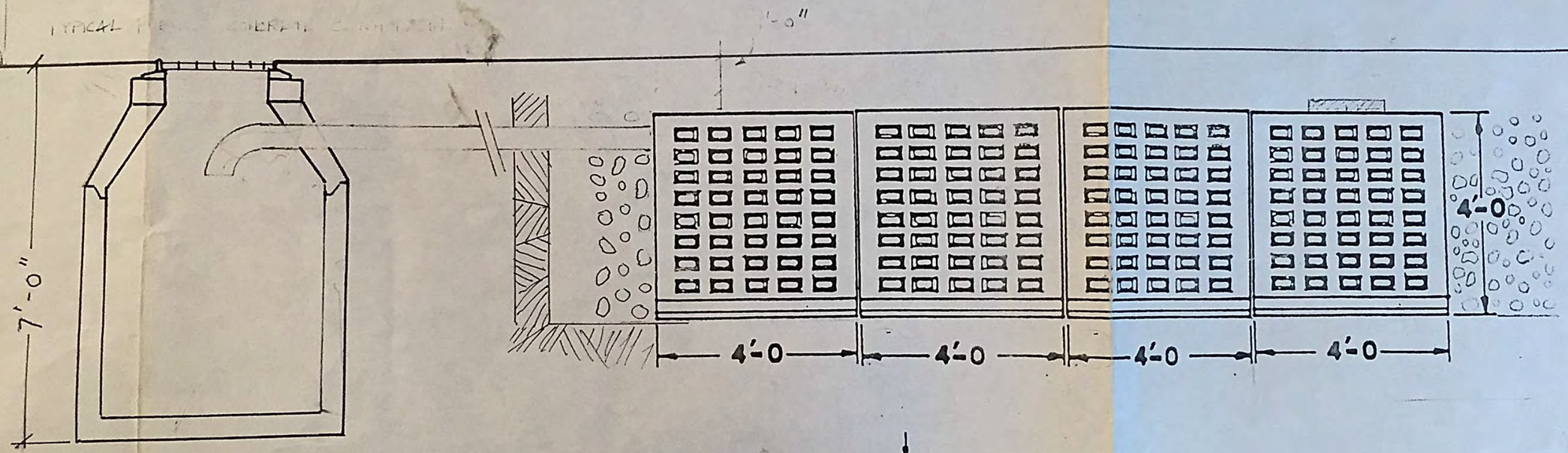




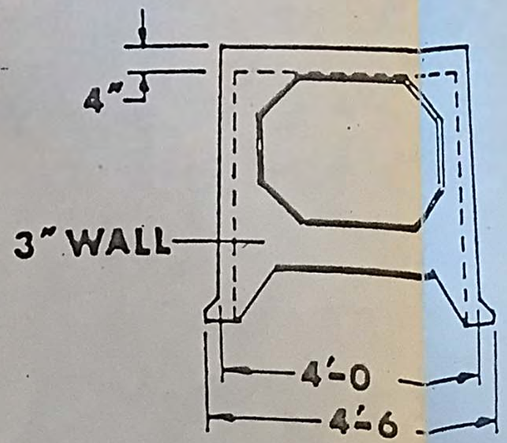
SCALE: 1" = 100'

100 200 300

SITE PLAN



DETAIL OF CATCH BASIN AND PRECAST GALLEY



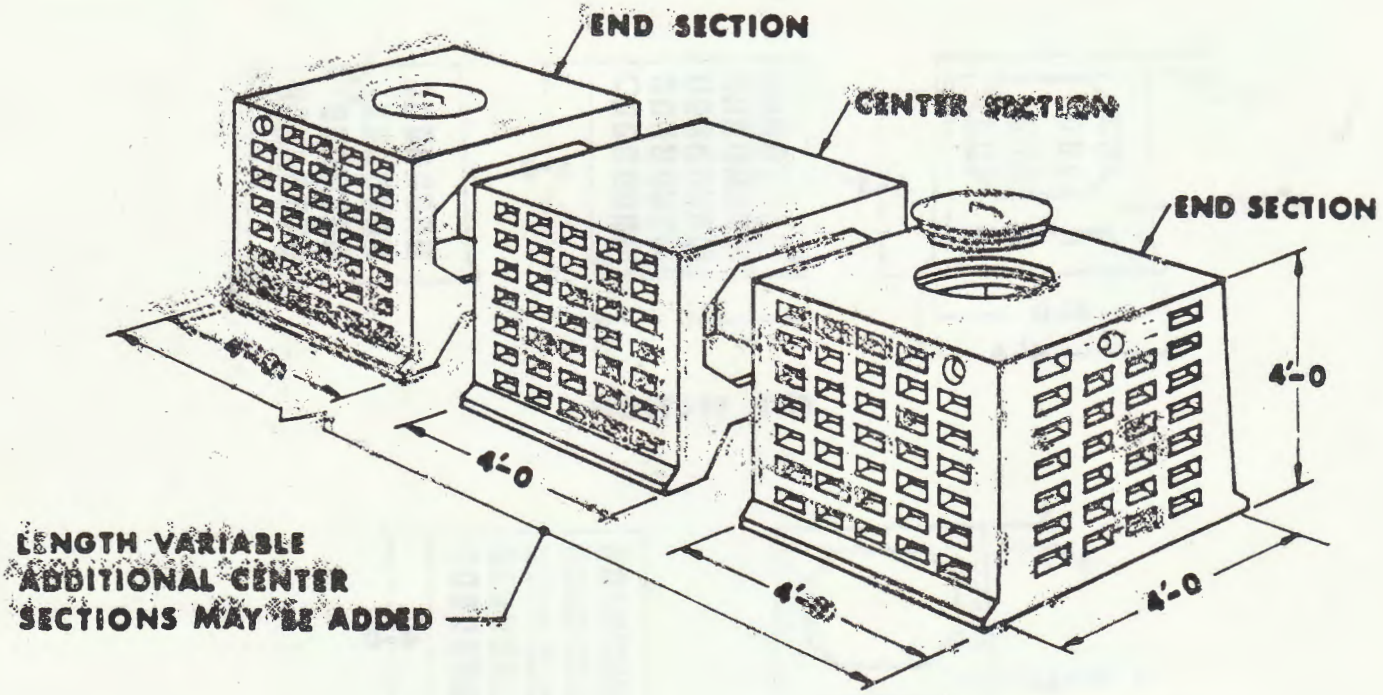
RUNOFF CONTROL PROJECT
PUBLIC ACCESS ROADWAY
WHITE POND, CONCORD, MA.

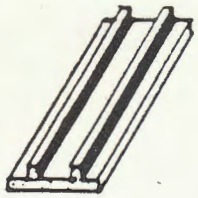
SCALE AS NOTED

REVISED: MARCH 15, 1991

David Bearg
369 5680

PRECAST GALLEY





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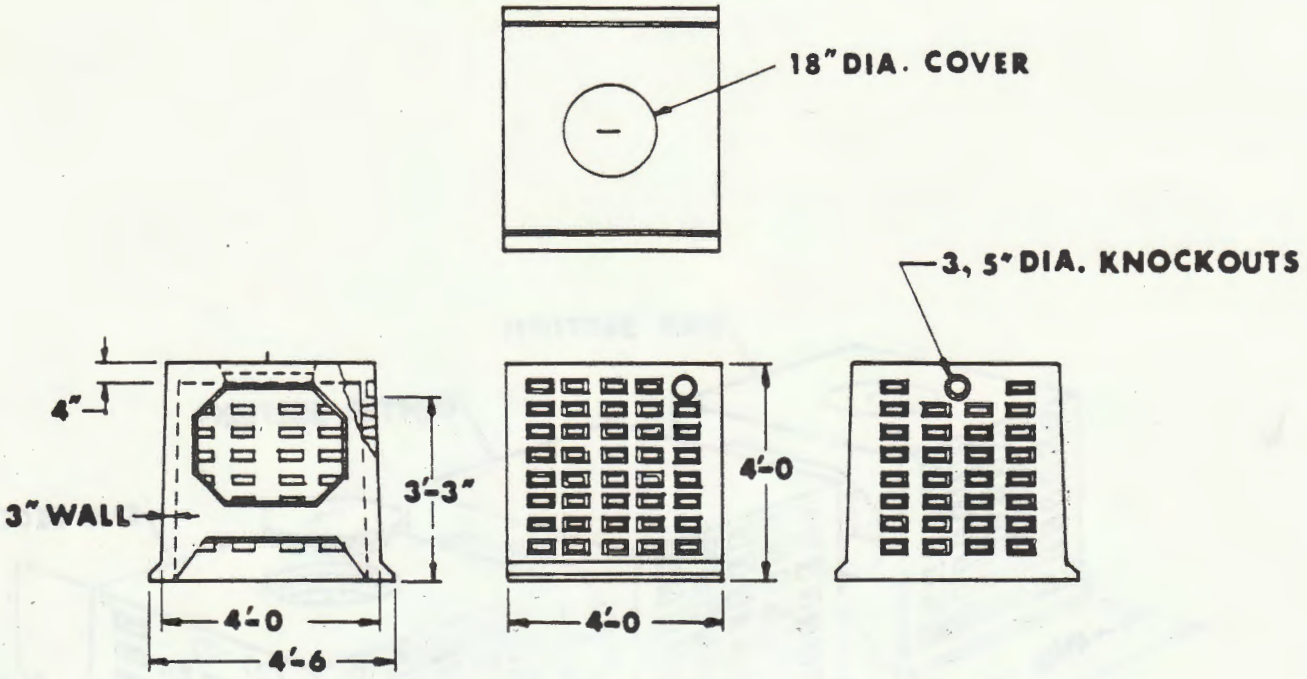

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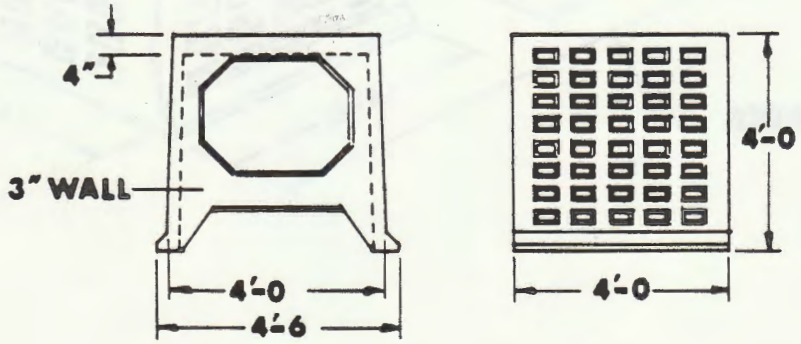
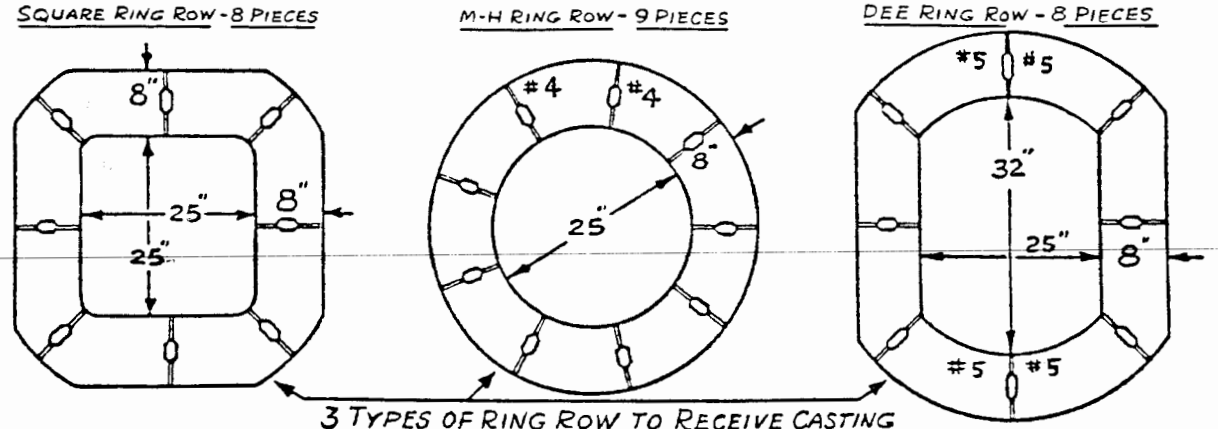
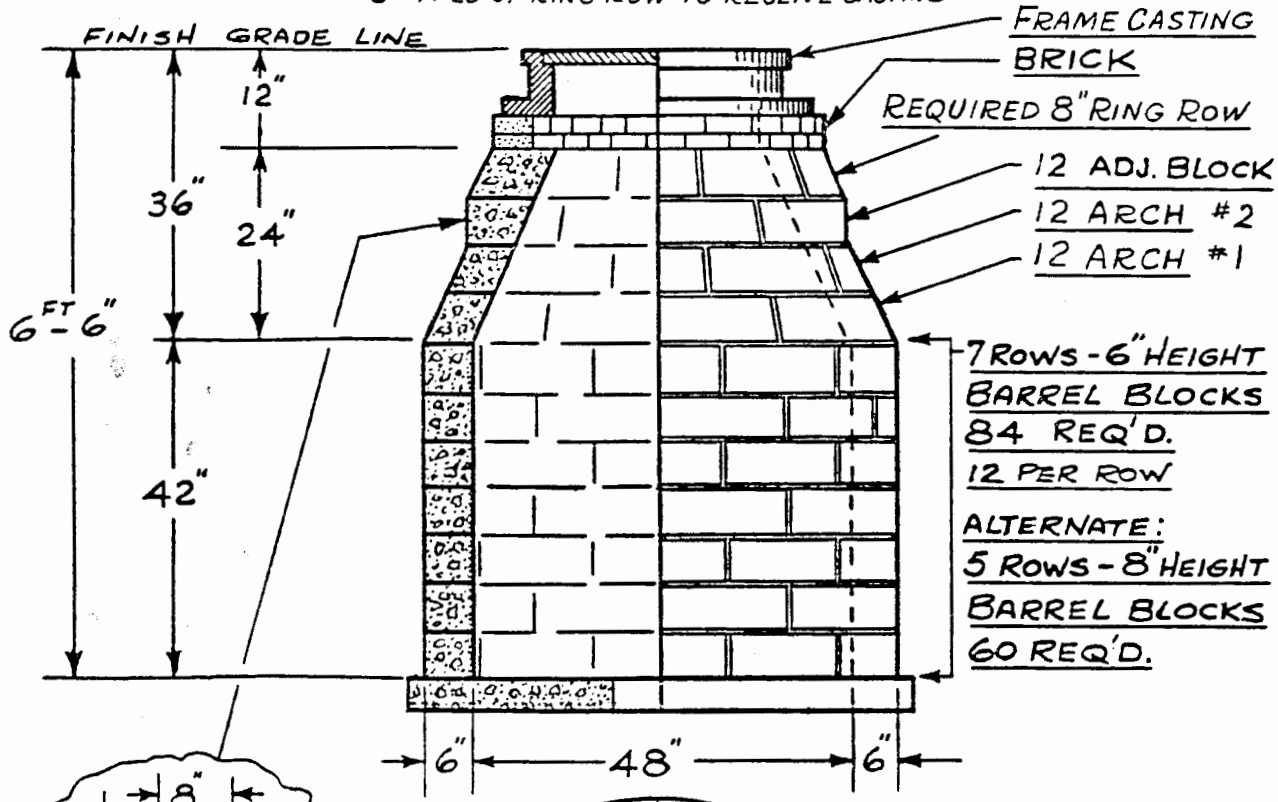


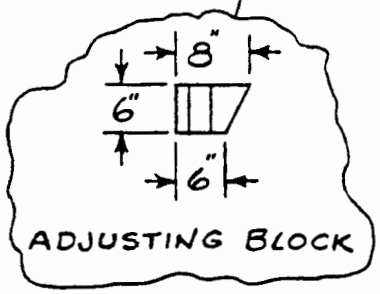
CENTER SECTION

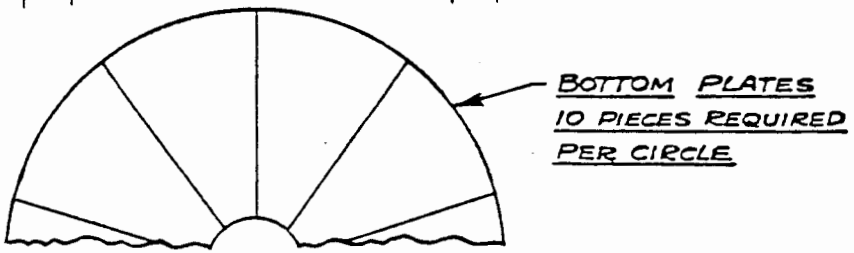
CATCH BASIN AND MANHOLE INSTRUCTIONS



3 TYPES OF RING ROW TO RECEIVE CASTING







6" WALL STRUCTURE WITH 8" TOP

by using adjusting block in place of 3# arch block.

Meets State and Federal Specifications

QUOTATION OF UNITS AS PER PRINT

	Plant	Del.	Total
84 6x6 Barrel Blocks @	.89	.98	
60 6x8 Barrel Blocks @			
12 #1 Arch @	.95	1.04	
12 #2 Arch @	.95	1.04	
12 Adjusting Block @	.95	1.04	
Dee or Square Ring Row	16.21	17.46	
Manhole Ring Row	16.21	17.46	
1 Set #3 Plates	18.14	19.39	
2 Sets 3" Plates			
1 Set 4" Plates	19.23	20.48	
Complete C.B. 1 Set 4" Plates	144.40	157.70	
Complete C.B. 2 Sets Plates			
Complete M.H. 1 Set 4" Plates	144.40	157.70	

Ring Rows and Plates are quoted as complete sets. Multiply number of Barrel and Arch Blocks by unit prices to establish your cost.

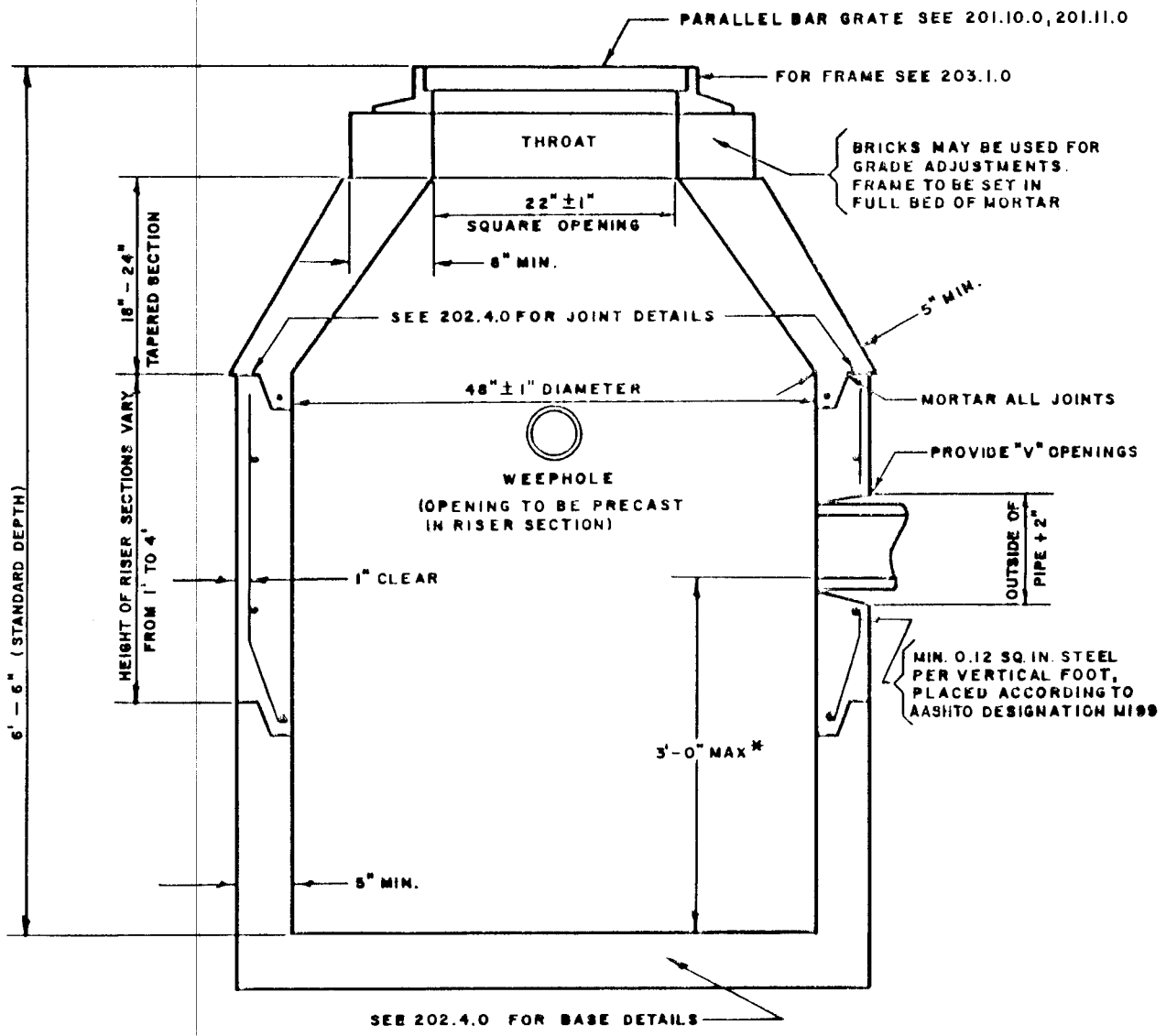
For additional depth add 24 6x6 Barrel Blocks per vertical foot.

Southeastern Construction Inc.

Avon, Mass.

Plant: JUniper 6-2202 Office: JUniper 6-2203

PRECAST CONCRETE DROP INLET
TYPE-D **



NOTES:

1. DETAILS NOT INDICATED ABOVE ARE TO BE SIMILAR TO THOSE SHOWN ON 203.3.0
2. FOR DESCRIPTIONS, MATERIALS AND CONSTRUCTION METHOD, SEE LATEST SPECIFICATIONS
*. MINIMUM DEPTH OF SUMP TO BE 2'
** THIS DROP INLET IS NOT TO BE USED AT ANY LOCATION WHERE IT MAY PRESENT A HAZARD TO VEHICLES THAT RUN OFF THE ROAD. FOR FLUSH TYPE SEE 203.6.0

CONSTRUCTION FABRICS

AMOCO 4545/4551 DRAINAGE FABRICS

- 4545-For highway underdrain applications.
- 4551-Heavy Duty drainage fabric.

Amoco polypropylene fabrics are highly permeable nonwoven fabrics designed specifically for use as a soil filtering media for subsurface drainage systems such as French Drains and Blanket Drains.

Good subsurface drainage is critical in maintaining stable soil conditions necessary in highways and streets, parking lots, airport runways, building foundations, embankments, or virtually any earthen structure susceptible to saturation from water buildup.

Properly designed subsurface drainage systems protected by Amoco Soil Filtration Fabrics ensure higher quality drains that can be constructed at much lower costs. Drains that last longer!

Installation of Amoco 4545/4551 is simple and straight-forward. Effective drainage protection is ensured as long as the drainage stone is completely encapsulated by Amoco Soil Filtration Fabrics.

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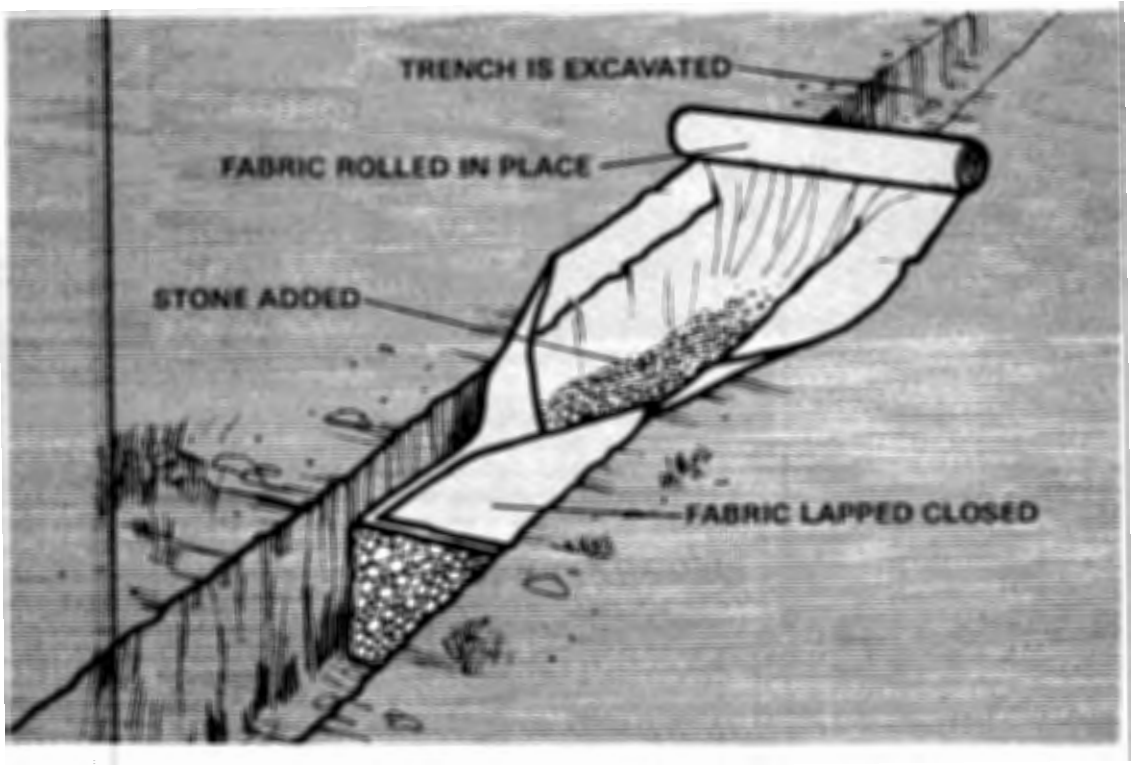

Chamber Leachfield Systems

An alternative to conventional gravel-filled systems

Randy May

Abstract

Conventional septic system leachfields normally have been constructed utilizing gravel-filled trenches or beds. A number of alternative systems have evolved in various geographic regions. Several research workers have questioned the use of gravel in such systems, confirming concerns expressed by regulators based on field experience. Chamber-type leaching systems offer an effective alternative without the potential drawbacks of other systems.

Construction and design of leachfields for on-site wastewater systems was a matter of trial and error for many years. Despite efforts by Ryon in New York state in the 1920s[1] and work by the U.S. Public Health Service[2], systematic studies of leachfield performance factors were not undertaken until the 1960s.

Since that time a great deal of effort has been made to determine loading rates on various soils, normally utilizing soil columns to determine long-term acceptance rates through mature biological mat growths at a soil interface. Other areas of interest have been methods of distribution and dosing of effluent to achieve optimal results, groundwater quality and hydrogeologic impacts.

Very little effort has been devoted to the fundamental method of constructing leachfield systems utilizing gravel. The use of gravel in leachfields systems appears to have evolved simply because the material was widely available, reasonably low in cost and able to provide adequate support for an earthen excavation. The U.S. Environmental Protection Agency has summarized the reasons to use gravel for support of distribution pipe and the soil cavity, for velocity reduction and provision of storage capacity.[2]

There is no evidence or hypothetical basis to conclude that gravel plays any part in effluent treatment.[3] It also is likely that other structures or mechanisms could be used to perform those functions of gravel as cited by EPA.

Alternatives to gravel trenches have been developed in various parts of this and other countries. These include seepage pits and early versions of chamber-type systems. Seepage pits appear to have evolved from the once common cesspool configuration. While clearly a workable solution in certain soils, their depth to width ratio requires very deep groundwater tables to provide adequate unsaturated flow for renovation. As a corollary, well-drained soils are required since the geometry of the seepage pit concentrates effluent in a narrow hydrogeologic setting.

Chamber systems have evolved in various locations around the world as a shallow, linear form of leaching structure characterized by an open bottom area and a variety of sidewall configurations. These systems have ranged from treated wooden structures in Maine to block or brick systems in portions of Michigan to fiberglass systems in large areas of Australia.

In the early 1970s, pre-cast concrete leaching chambers were developed. These now enjoy widespread use in Maine, New Hampshire, Massachusetts, Connecticut and Rhode Island. EPA has noted the prevalence of this system in the Northeast.[3,4]

At the same time these systems were under development, various regulatory and research workers began to raise questions about conventional construction techniques in leaching systems. In 1974 Daniel and Bouma[5] pointed out the differences between column studies and field systems, concluding that "...the field system has a seepage bed filled with gravel, which reduces the effective infiltrative surface by at least 40%."

In 1975, Bouma pointed out the need for further research to explore th negative impacts of compaction, smearing and mechanical barriers.[6] McGauhey and Krone discussed the fact that stone would exert a substantial discontinuity and exert a masking or shadow effect.[7] Current research at the University of Wisconsin also is investigating the potential impacts of gravel usage.[8]

Siegrist has directly observed and photographed the gravel masking phenomenon utilizing vertical thin sections through mature biomats.[9] He observed the distinct lack of effluent transfer in areas where aggregate was in direct soil contact and concluded: "The infiltrative surface area actually available for wastewater infiltration may have been substantially reduced by this gravel masking phenomenon."

These authorities have recogized what field workers have long observed about potential damaging impacts of gravel. These are: compaction of moist soil by weight and velocity of gravel during installation, creation of a low permeability layer by fines entrained with gravel, physical obstruction of the soil interface and the potential for high BODs and SS loadings in the stone voids at the soil interface.

The utilization of chamber technology obviates the potential drawbacks of gravel as a negative system component. Chamber systems offer ease of construction and inspection, high storage volumes and eliminate the negative impacts of stone. There is substantial evidence that points to the negative impacts of gravel. If these are confirmed, the regulatory implications of this issue will be substantial.

Hoxie and Frick have conducted what appears to be the largest empirical study of system performance on record.[10] With the inception of Maine's revised regulatory program in 1976, a computerized data bank has been kept of more than 27,000 septic systems in every soils group in the state. In one subset of this data, chamber systems are compared to gravel systems, both installed in bed configurations. Chamber systems are installed at 50% of the size of gravel systems.

The most current update of this work by Hoxie et.al. indicates that two gravel systems are installed for each chamber system. The ratio of gravel bed to chamber failure rate is 5-to-1. In this large and ongoing study, Hoxie concludes, "To date, chamber systems appear to have a lower failure rate than conventional bed systems.[11]"

System failure can be attributed to several well understood causes, including soil and site conditions, construction, distribution, effluent quality/quantity and maintenance. In a study such as Hoxie's, these factors should be evenly distributed among the large numbers of gravel and

Randy May was principal sanitary engineer for the Connecticut Department of Environmental Protection, head of that agency's on-site sewage disposal program, and a consultant to Infiltrator Systems, Inc.

Work commissioned by the Water Authority of Western Australia[12] moves closer to scientific confirmation of the negative impacts of gravel. Tests were conducted in column (loading rate) studies, laboratory and pilot plant tests. One objective of the research was to compare gravel-filled systems, which predominate in the United States, with the chambers utilized in western Australia.

The laboratory work involved carefully constructed large steel boxes, segmented to allow measurement of side and bottom wall areas in three configurations, chamber (leachbrick), gravel and gravel on the sidewalls of chamber systems. Soil material was a uniform carefully controlled sand.

Once a mature biological mat growth had occurred, the open bottom of chamber systems had an infiltration rate of 34 mm/day compared to 15 mm/day for gravel. Side wall infiltration rates were eventually similar. The study concludes that the low infiltration rates for gravel-filled systems were due to physical blockage of soil by gravel or by excessive attached growth in the gravel voids.

These results were confirmed in pilot scale testing where gravel-filled systems could not operate at loading rates used for control (chamber) systems. The author concluded by recommending that gravel systems not be utilized in western Australia.

It is also interesting to examine Healy and Laak[13] who compared long-term acceptance rates from soil/column tests with a range of 0.24 gpd/ft^2 to 5.0 gpd/ft^2 to work by Bouma[6] which studied four active, gravel-filled systems resulting in a much narrower long-term acceptance rate range of 0.15 to 1.23 gpd/ft^2.

All of these studies suggest that gravel systems have lower equilibrium infiltration rates than open bottomed systems such as chambers. The mechanism causing the masking phenemenon and the difference in acceptance rates is described by Siegrist[9].

He explains the makeup of the clogging layer for mature systems (with ponding), noting two distinct zones of alteration of the natural soil morphology. The first 1 mm extending into the soil had amorphous organic matter within the soil pores. Extending above the orginal surface was a zone of mineral matter enriched with organic matter. No accumulation of organic matter was observed on top or within the soil directly beneath the stones.

Once the biomat forms, the effluent cannot go through the stones but must pass through the biomat formed in the spaces between the stones. Acceptance rates may become even lower as solid matter is washed into the trench from the septic tank and deposited in the core spaces between the stones, further blocking the effluents's path to the soil.

In addition to this biological and hydraulic limitation, it is evident that gravel emplacement causes physical damage to the soil interface. This has not been quantified, however.

Conclusions

A significant body of data supports the conclusion that a leachfield system that does not cover the soil interface with gravel can outperform the comparable gravel-covered interface by a factor of more than 2-to-1. This factor has been used in several states which allow installation of chamber systems sized at 50-60% of conventional gravel systems. This practice has not resulted in any documented problems and, in one large study, has been supported as superior to conventional practice.

Leaching chambers have been demonstrated as a viable alternative to gravel-filled trenches. They are gaining wide acceptance and offer many advantages to the property owner, designer and regulator. □

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TURBO
CHEVROLET

Fast Forward - December 2014. The routine maintenance needed to sustain the infiltration basin has not been performed in nearly two decades. The upper basin is apparently not functioning and the lower basin functions only in smaller storms. Routine maintenance would involve clearing leaves and other debris from the road and cleaning out the catch basins, which are normal practices elsewhere in the Town. More expensive measures may be needed to restore the facilities if the infiltration chambers are also plugged.


709·PPX