STANDARD DESIGN PROCEDURES
SINGLE STAGE ROCK SUMP DETENTION FACILITIES

Classifications

Stormwater Management Design Criteria for individual residential lot development has been divided into the following classifications:

Class I	Small Development Areas creating an impervious surface area of less than 400 square feet
Class II	Small Development Areas creating an impervious surface area of greater than 400 square feet but less than 3,000 square feet
Class III	Large Development Areas creating an impervious surface area in excess of 3,000 square feet

General Design Criteria

The use of a single stage rock sump is one of several alternatives that may be appropriate for small project area developments. Site parameters which must be considered when determining the suitability of a sump for stormwater control include the following:

Soil Type
Site Topography - Slope, Basement Elevation, etc
Discharge Location
Offsite stormwater conveyance systems
Offsite detention systems

Where it is determined that a single stage rock sump is appropriate, the following procedure is designed to provide a fast, simple method to determine the rock sump volume and orifice size required to provide adequate stormwater control for small projects. In order to develop a practical solution for this type of design problem, several qualifying assumptions are necessary to set limits for which the procedure is applicable. These limits are intended to incorporate the type of situation most often encountered. In general, all of the following conditions must be satisfied in order for the use of single stage rock sumps to be appropriate:

- Runoff from only impervious areas will enter the rock sump, i.e., RCN = 98. This runoff should be collected and conveyed to the sump in a separate drainage system. If runoff from impervious surfaces is not isolated, this method is not valid and the sump must be individually designed for the entire area that will be tributary to the facility;
- The pre-development area to be altered must have an existing time of concentration (Tc) of 0.1 hour or less; and
- The single stage rock sump must be designed in accordance with the parameters shown on the attached construction details.

Prior to using the following procedure, the designer must verify that all of the above criteria apply to the subject property. Should any of the conditions not apply, the use of the procedure outlined herein is inappropriate and may result in either the over-design or under-design of the rock sump facility.

TOWNSHIP OF O'HARA STANDARD CONSTRUCTION DETAILS SINGLE STAGE ROCK SUMP DETENTION FACILTIES	DATE	8/4/2005
	SCALE	N.T.S.
	PROJECT NUMBER	50014
		SW-001

STANDARD DESIGN PROCEDURES
SINGLE STAGE ROCK SUMP DETENTION FACILITIES

Class I Facility Design Sizing

If the Development will result in an increase in impervious surface of less than 400 square feet, the infiltration sump design can be used (Detail Sheet SW-3) The sump volume required should be based upon 40 cubic feet of stone for each 100 square feet of impervious surface. The construction and installation of the sump shall be in accordance with the standard detail

Class II Facility Design Sizing

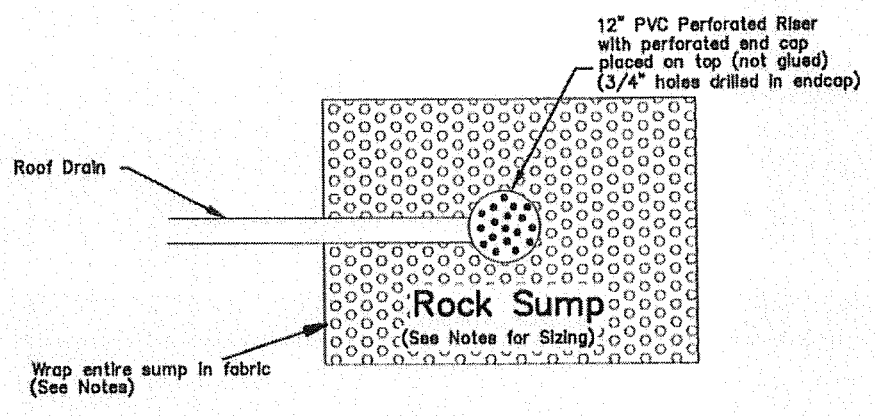
If the Development will result in an increase in impervious surface of greater than 400 square feet but less than 3,000 square feet, the Class II design can be used The rock sump shall be designed in accordance with the standard detail and design parameters shown on Standard Detail SW-4 & SW-5. The following procedure should be followed for the sump design:

1. Determine the area of the impervious surfaces that will be collected and conveyed to the sump. No runoff from pervious surface is permitted.
2. By using the Design Parameters for on-lot sumps, Detail sheet SW-5, determine the required volume of the sump.
3. Determine the sump dimensions to meet the required volume based upon the site topography and surface features.
4. By using the Design Parameters for on-lot sumps, Detail sheet SW-5, determine the size of the release orifice This is based upon the required volume and depth of sump.
5. Complete the design of the sump in accordance with the parameters shown on the construction detail sheet SW-4

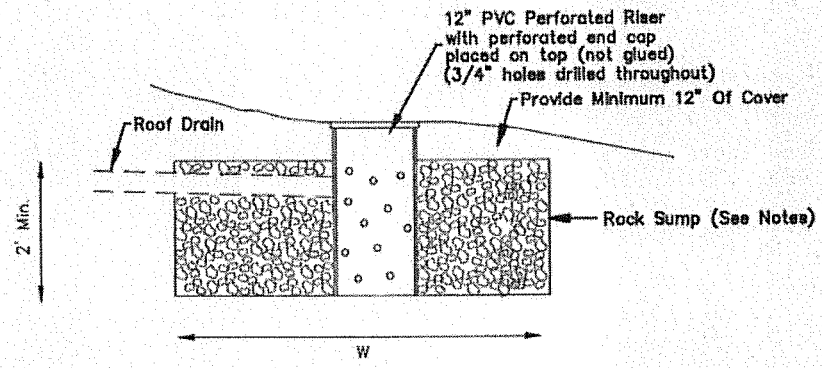
Class III Facility Design Sizing

If the Development will result in an increase in impervious surface in excess of 3,000 square feet or if the area tributary to the facility includes pervious surfaces, the sump must be individually designed for the entire area tributary to the facility. This design must be submitted to the Township along with a report documenting the pre- and post-development site runoff for review and approval

TOWNSHIP OF O'HARA STANDARD CONSTRUCTION DETAILS SINGLE STAGE ROCK SUMP DETENTION FACILTIES	DATE	8/4/2005
	SCALE	N.T.S.
	PROJECT NUMBER	50014
		SW-002



PLAN VIEW



SECTION

Notes:

1. The Rock Sump shall be designed as follows:
   40 c.f. of Rock per 100 s.f. of impervious area
2. Rock Sump shall be constructed of AASHTO #57 Limestone or 2B Gravel.
3. Wrap sump on all sides with PennDOT Class 2, Type B Non-woven Geotextile Material.
4. Dimensions and ratios shall vary as per design volume required.
5. Dry sumps in fill areas not permitted.
6. Cleanouts shall be located just before any horizontal bends.
7. When feasible, the Rock Sump should be located such that the top elevation of the riser pipe is below the basement floor elevation.

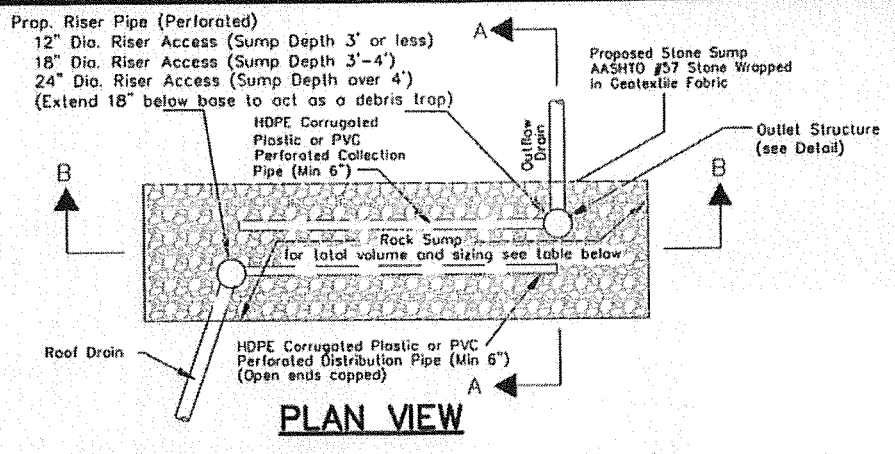
THIS DETAIL MAY BE UTILIZED FOR TOTAL IMPERVIOUS AREAS < 400 S.F.

TOWNSHIP OF O'HARA

STANDARD CONSTRUCTION DETAILS

ROCK SUMP DETAIL - CLASS I

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-003



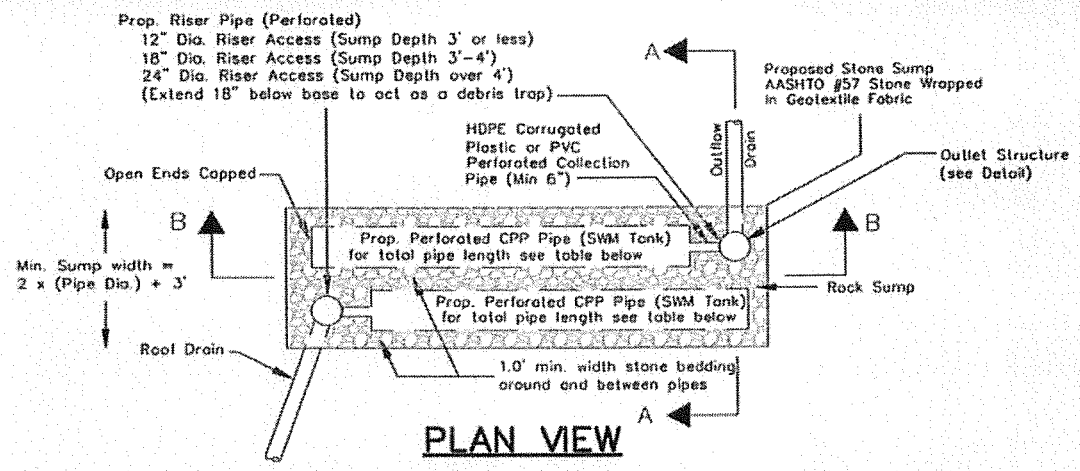
PLAN VIEW

TOWNSHIP OF HAMPTON
STANDARD SIZES FOR
RESIDENTIAL ROCK SUMP

IMPERVIOUS AREA	REQUIRED SUMP VOLUME	Depth (feet)	Width (feet)	Length (feet)
400	170	2	2	43
		3	3	19
		4	4	11
600	255	2	3	43
		3	4	21
		4	5	13
800	340	2	3	57
		3	4	28
		4	5	17
1000	425	2	4	53
		3	5	28
		4	6	18
1200	510	3	4	43
		4	5	26
		5	6	17
1400	595	3	4	50
		4	5	30
		5	6	20
1600	680	3	4	57
		4	5	34
		5	6	23
1800	765	3	4	64
		4	5	38
		5	6	26
2000	850	3	5	57
		4	6	35
		5	7	24
2200	935	3	5	62
		4	6	39
		5	7	27
2400	1020	3	5	68
		4	6	43
		5	7	29
2600	1105	3	6	61
		4	7	39
		5	8	28
2800	1190	3	6	66
		4	7	43
		5	8	30
3000	1275	3	6	71
		4	7	46
		5	8	32

TOWNSHIP OF O'HARA
STANDARD CONSTRUCTION DETAILS
ROCK SUMP DETAIL - CLASS II

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-004

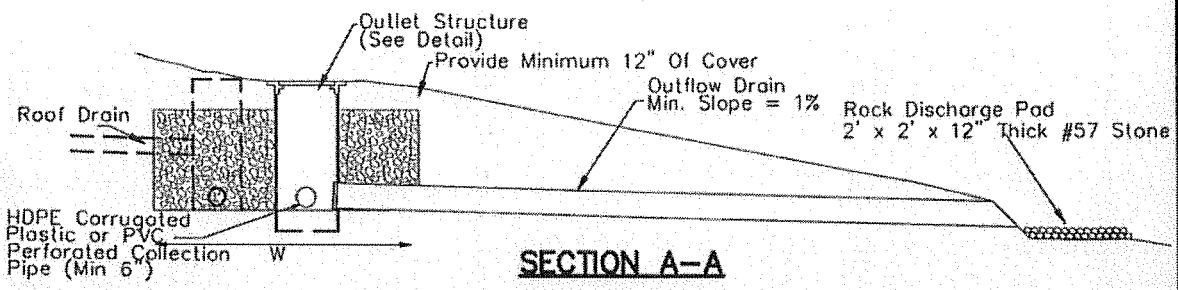


TOWNSHIP OF HAMPTON
STANDARDS SIZE SPREADSHEET
IF PIPE IS TO BE USED FOR RESIDENTIAL STORMWATER MANAGEMENT

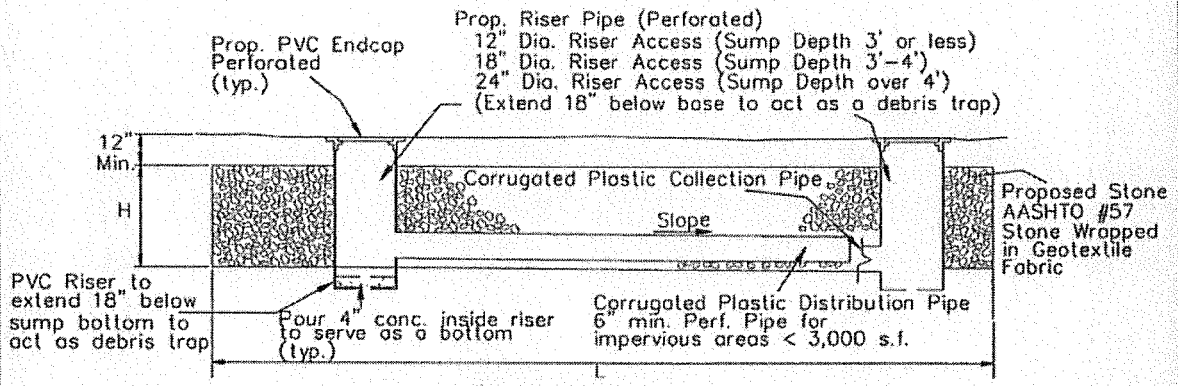
IMPERVIOUS AREA	REQUIRED NET VOLUME	APPROXIMATE PIPE SIZE AND LENGTH REQUIRED							
		2' Depth Sump		3' Depth Sump		4' Depth Sump		5' Depth Sump	
		Pipe Size (inches)	Pipe Length (feet)	Pipe Size (inches)	Pipe Length (feet)	Pipe Size (inches)	Pipe Length (feet)	Pipe Size (inches)	Pipe Length (feet)
400	68	18	38	24	22	30	14	36	10
600	102	18	58	24	32	30	20	36	14
800	136	18	76	24	42	30	28	36	18
1000	170	18	96	24	54	30	34	36	24
1200	204	18	110	24	64	30	42	36	28
1400	238	18	130	24	76	30	48	36	34
1600	272	18	150	24	86	30	54	36	38
1800	306	18	170	24	98	30	62	36	42
2000	340	18	190	24	108	30	66	36	48
2200	374	18	210	24	118	30	70	36	52
2400	408	18	230	24	130	30	80	36	56
2600	442	18	250	24	140	30	90	36	62
2800	472	18	267	24	150	30	96	36	66
3000	510	18	289	24	160	30	104	36	72

TOWNSHIP OF O'HARA
STANDARD CONSTRUCTION DETAILS
ROCK SUMP DETAIL - CLASS II

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-005



SECTION A–A



SECTION B–B

Notes:

1. Design Parameters for stone sump or pipe shall be based upon the table of values shown on sheets SW-004 and SW-005.
2. Rock Sump shall be constructed of AASHTO #57 Limestone or 2B Gravel.
3. Wrap sump on all sides with PennDOT Type B Non-woven Geotextile Material.
4. Dimensions and ratios of L (Length), W (Width) and H (Height) shall vary as per design volume required.
5. Minimum ratio L to W is 3:1; (ie. L = 3W).
6. Dry sumps in fill areas not permitted.
7. Dimensions L (Length) shall be oriented to be parallel to the grade contour alignment.
8. No 90° elbows permitted on cleanout installations.
9. Cleanouts shall be located just before any horizontal bends.

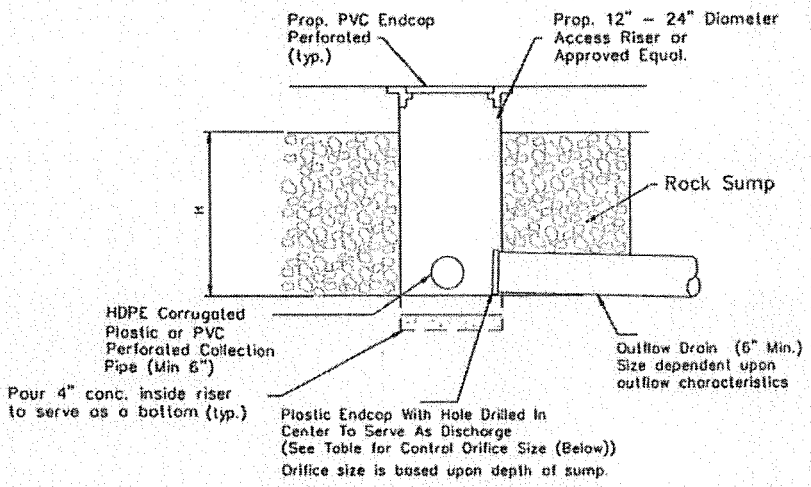
10... When feasible, the Rock Sump should be located such that the outflow elevation is below the basement floor elevation.

TOWNSHIP OF O'HARA

STANDARD CONSTRUCTION DETAILS

ROCK SUMP DETAIL - CLASS II

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-006



OUTLET STRUCTURE

DESIGN PARAMETERS
RESIDENTIAL ON-LOT SUMP

(TOTAL IMPERVIOUS AREA < 3,000 S.F.)

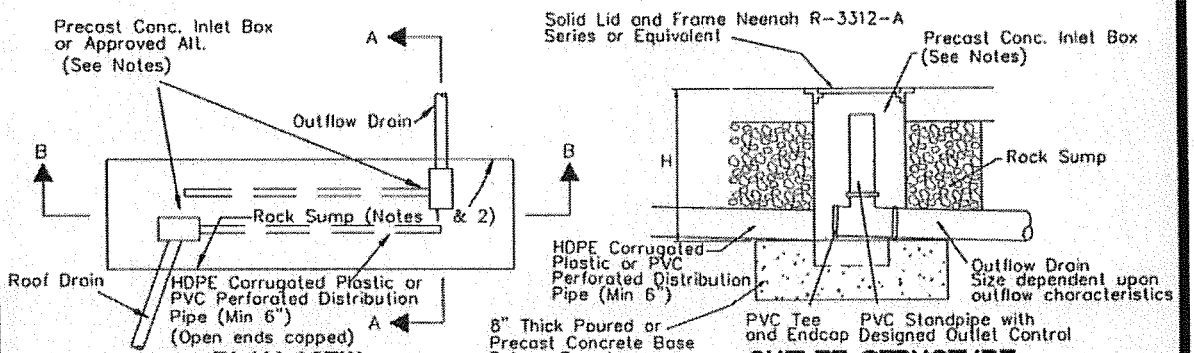
IMPERVIOUS AREA (SQ. FT.)	DEPTH OF SUMP (FT.)				
	1	2	3	4	5
	DIAMETER OF OUTLET ORIFICE (IN)				
400	11/16	9/16	1/2	1/2	1/2
600	13/16	11/16	5/8	9/16	9/16
800	15/16	13/16	11/16	5/8	5/8
1000	1-1/16	7/8	13/16	3/4	11/16
1200	1-3/16	1-0	7/8	13/16	3/4
1400	1-1/4	1-1/16	15/16	7/8	13/16
1600	1-3/8	1-1/8	1-0	15/16	7/8
1800	1-7/16	1-3/16	1-1/16	1-0	15/16
2000	1-1/2	1-1/4	1-1/8	1-1/16	1-0
2200	1-9/16	1-5/16	1-3/16	1-1/8	1-1/16
2400	1-5/8	1-3/8	1-1/4	1-3/16	1-1/8
2600	1-11/16	1-7/16	1-5/16	1-1/4	1-1/8
2800	1-3/4	1-1/2	1-3/8	1-1/4	1-3/16
3000	1-13/16	1-9/16	1-3/8	1-5/16	1-1/4

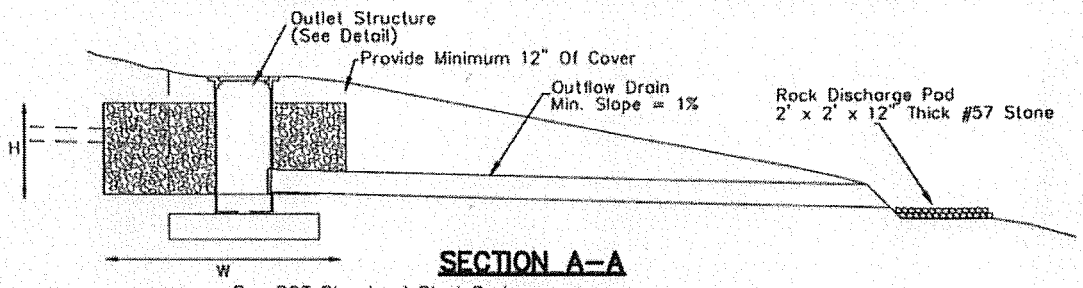
TOWNSHIP OF O'HARA

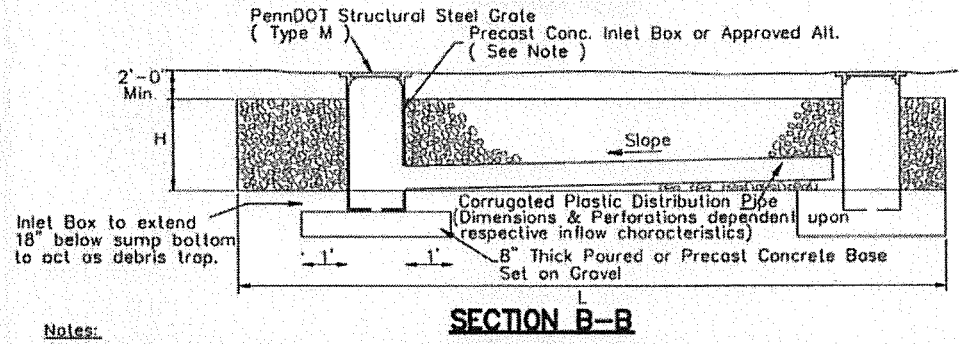
STANDARD CONSTRUCTION DETAILS

ROCK SUMP DETAIL - CLASS II

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-007







Notes:

1. Rock Sump must be individually designed for the tributary area. The Design and Report must be submitted for review and approval by the Township.
2. Rock Sump shall be constructed of AASHTO #57 Limestone or 2B Gravel.
3. Wrap sump on all sides with PennDOT Type B Non-woven Geotextile Material.
4. Dimensions and ratios of L (Length), W (Width) and H (Height) shall vary as per design volume required.
5. Minimum ratio L to W is 3:1; (ie. L = 3W).
6. Dry sumps in fill areas not permitted.
7. Dimensions L (Length) shall be oriented to be parallel to the grade contour alignment.
8. No 90° elbows permitted on cleanout installations.
9. Cleanouts shall be located just before any horizontal bends.
10. All pipe and fittings shall be ASTM D2729.
11. Typical void ratio for sizing the sump is 40% unless otherwise approved.
12. When feasible, the Rock Sump should be located such that the outflow elevation is below the basement floor elevation.

Approved Alternate Structures

Precast Concrete Inlet Box Specifications:

If the total depth of the sump < 4 feet:
2' x 2' Precast Conc. Inlet Box
24" Diameter Conc. Pipe

If the total depth of the sump > 4 feet:
2' x 4' Precast Conc. Inlet Box
36" Diameter Conc. Pipe

Lid and Grate Specifications: (for conc. pipe)
Open Grate – Neenah R-2510 Series or equal
Solid Lid – Neenah R-1691 Series or equal

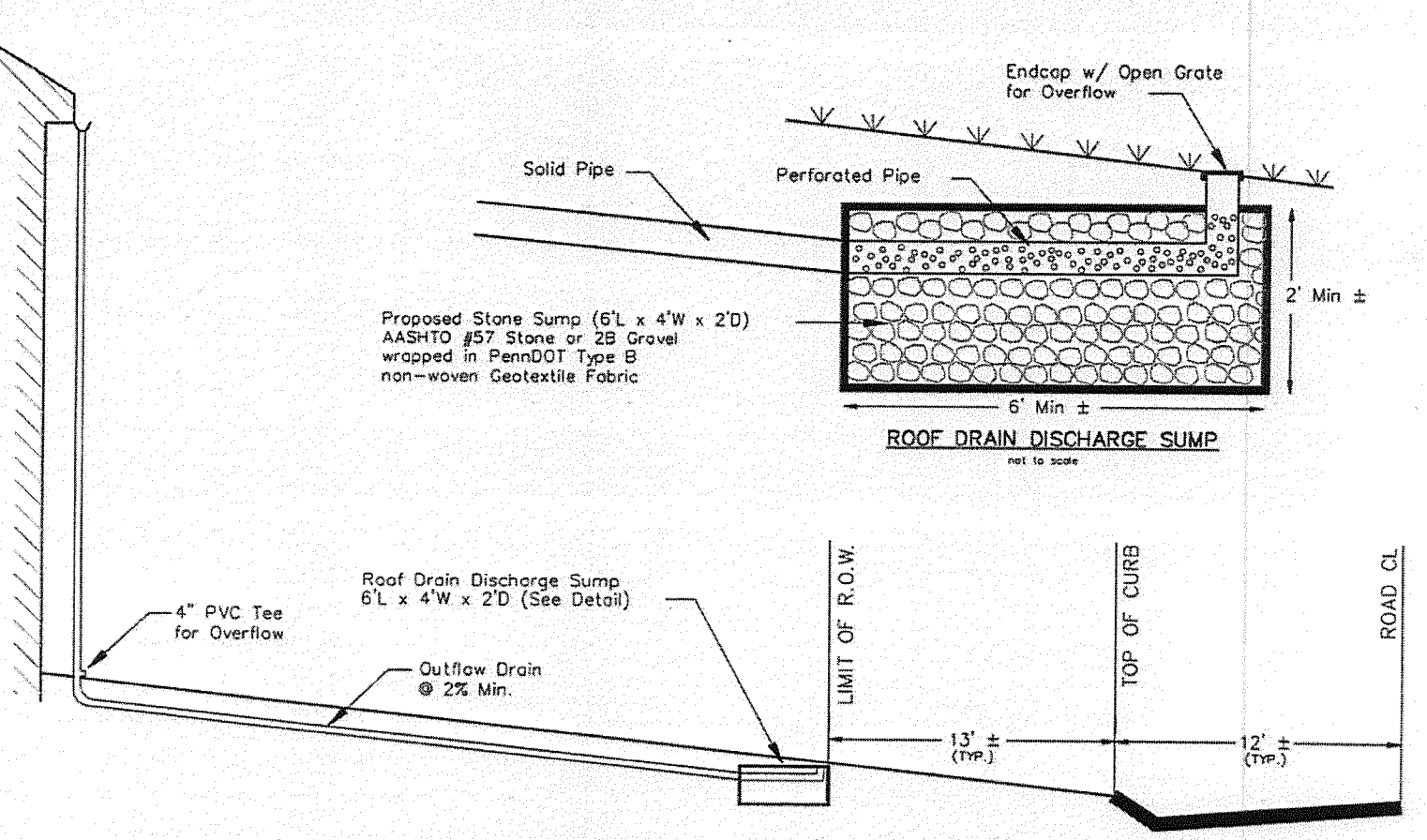
THIS DETAIL MAY BE UTILIZED FOR TOTAL IMPERVIOUS AREAS > 3,000 S.F.

TOWNSHIP OF O'HARA

STANDARD CONSTRUCTION DETAILS

ROCK SUMP DETAIL - CLASS III

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-008



** NO WORK IS PERMITTED WITHIN THE PUBLIC RIGHT-OF-WAY **

TOWNSHIP OF O'HARA

STANDARD CONSTRUCTION DETAILS

TYPICAL RESIDENTIAL ROOF DRAIN DISCHARGE

DATE	8/4/2005
SCALE	N.T.S.
PROJECT NUMBER	50014
	SW-009