

**T0:** Trasolini Chetner Construction Development      **FILE NO.:** 15-6467  
**ATTENTION:** Rob Chetner      **DATE:** January 8, 2016  
**FROM:** Joseph (Inseok) Oh, P.Eng.      **CC:**  
**SUBJECT:** Stormwater Management Plan  
**LOCATION:** 1425 Gordon Avenue, West Vancouver, BC

**MESSAGE/INSTRUCTIONS:**

As requested, Braun Geotechnical Ltd. (BGL) has prepared a stormwater management plan for the above referenced site.

It is understood that the District of West Vancouver requires a stormwater management system designed to manage surficial stormwater runoff from the subject property. The design criteria are that the post-development peak flow should be restricted to the pre-development peak flow levels for the 10-year design storm event. Rainfall records used for the analysis and design were based on design storm rainfall intensities provided by the Great Vancouver Sewerage and Drainage District for the area – Short Duration Rainfall IDF data for West Vancouver Municipal Hall (VW14).

Table 1 below provides a summary of pre and post development catchment areas types, the equivalent calculated surficial runoff coefficient for the site and peak flows.

Table 1 – Development Stormwater Flow Comparison

	Pre-Construction Catchment Area				Post-Construction Catchment Area		
	Area		Surface Coefficient		Area		Surface Coefficient
	ft <sup>2</sup>	m <sup>2</sup>			ft <sup>2</sup>	m <sup>2</sup>	
Lot	11555.0	1073.5	0.530	Lot	11555.0	1073.5	0.676
House	2383.3	221.4	0.900	Vinson House	2706.5	251.4	0.900
Garage	663.6	61.7	0.900	Laneway Cottage	1399.5	130.0	0.900
Concrete	721.3	67.0	0.900	Garden Cottage	1460.2	135.7	0.900
Pavers	421.0	39.1	0.900	Accessory Buildings	935.7	86.9	0.900
Stone Walkway	359.4	33.4	0.700	Stone Walkway	1120.5	104.1	0.700
Vegetated	7006.4	650.9	0.300	Vegetated	3932.6	365.4	0.300
Pre-development Peak Flows: $Q = CIA$ $= 0.530 \times 4.332 \text{ mm/hrs} \times 1073.5 \text{ m}^2 \times 24 \text{ hrs}$ $= 59.15 \text{ m}^3/24 \text{ hrs} (0.68 \text{ l/sec})$				Post-development Peak Flows: $Q = CIA$ $= 0.676 \times 4.332 \text{ mm/hrs} \times 1073.5 \text{ m}^2 \times 24 \text{ hrs}$ $= 75.49 \text{ m}^3/24 \text{ hrs} (0.87 \text{ l/sec})$			
Time of Concentration (Pre / Post) = 24 hrs => West Van IDF Curve 10 yr Intensity = 4.332 mm/hr							

The site is serviced by an existing ditch located along the south property line. A hydraulic analysis using the rational method showed that for 10-year design storm, the pre-development peak flow is  $59.15 \text{ m}^3/24 \text{ hrs}$  and the post-development peak flow will be  $75.49 \text{ m}^3/24 \text{ hrs}$ . Since the post-development peak flow is greater than the pre-development peak flow, stormwater detention will be required to meet the required flow attenuation. The target discharge to the ditch is kept at  $59.15 \text{ m}^3/24 \text{ hrs}$ . The storage volume is conservatively proposed to be  $16.5 \text{ m}^3$  without considering infiltration. Any infiltration shall provide as additional factor of safety to storage volume and allows for flexibility with pit subgrade requirements at the time of construction especially considering potential for shallow bedrock. Note that existing site access constraints (south rock wall and north structures) preclude advancement of machine test pits or drill holes at the proposed pit locations.

The proposed detention facility design includes Infiltration/Detention System located at the southwest area of the property. A flow control manhole is proposed at the downstream of the Infiltration/Detention System with release rate equal to pre-development peak flows ( $59.15 \text{ m}^3/24 \text{ hrs}$ ).

The perimeter drains for Garden Cottage located at the southeast portion of the site should be connected to the pump sump and the ditch in such a manner that prevents stormwater from entering the perimeter drains in the event of a backup, power outage, etc. The pump system including alarm and backup power should be designed by a qualified professional mechanical engineer. BGL should be provided the opportunity to review pump design prior to construction.

Grass / landscaped areas should be underlain by a minimum 0.3m thick layer of permeable topsoil and walkway areas should be sloped to direct flow towards permeable landscaped areas.

Details of the proposed stormwater management system are provided on the enclosed Braun Geotechnical Drawings 15-6467-SWM-1 to -7.

We trust this meets your present requirements.

Encl – Braun Geotechnical Dwg 15-6467-SWM-1 to 7

**Braun Geotechnical Ltd.**

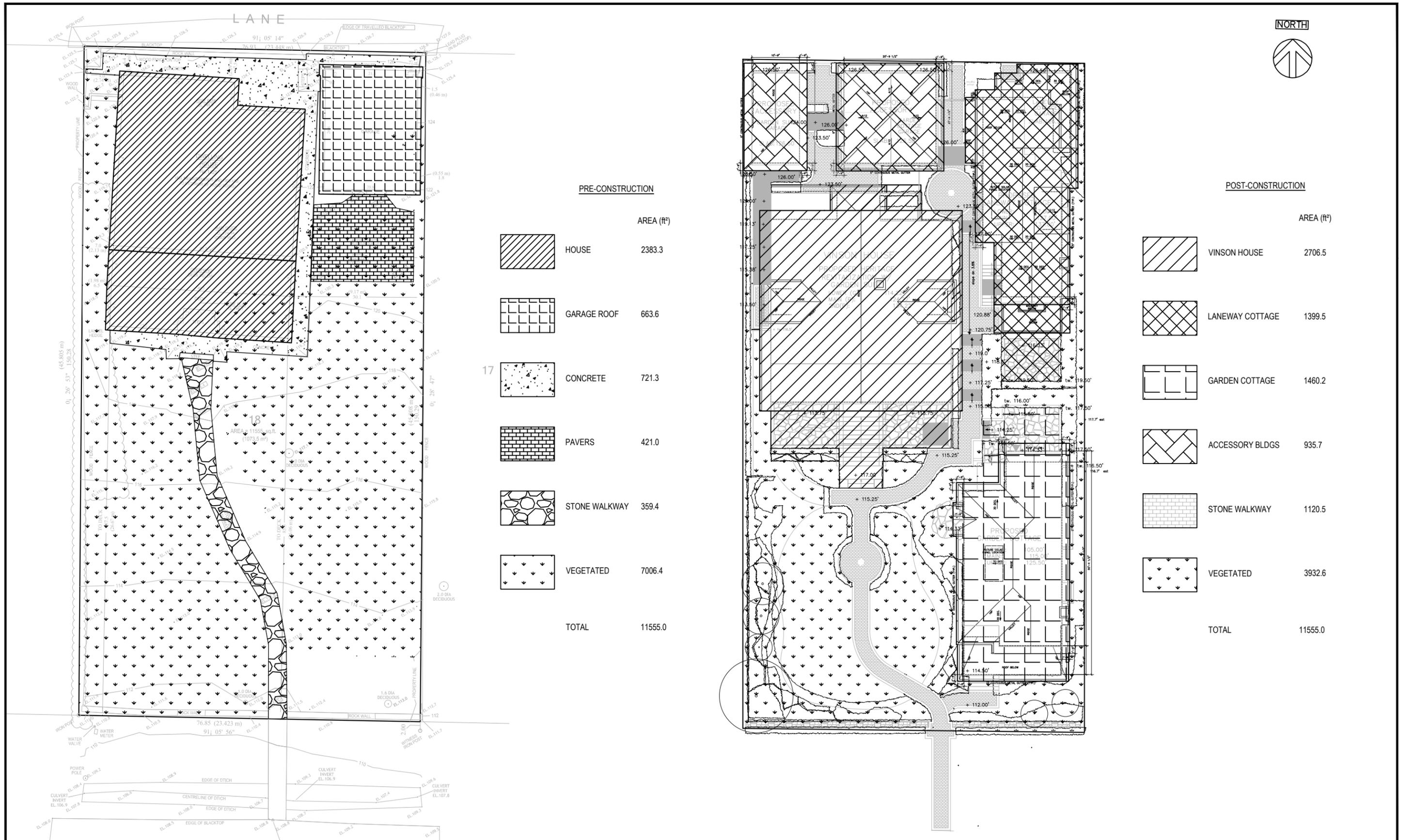
**Reviewed by**

**DRAFT**

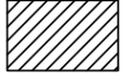
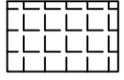
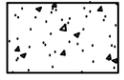
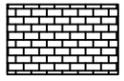
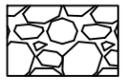
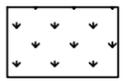
**DRAFT**

**Joseph (Inseok) Oh, P.Eng.**

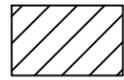
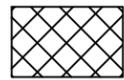
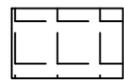
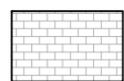
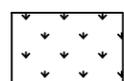
**Stuart Hrysio, P.Eng.**



PRE-CONSTRUCTION

	AREA (ft <sup>2</sup> )
 HOUSE	2383.3
 GARAGE ROOF	663.6
 CONCRETE	721.3
 PAVERS	421.0
 STONE WALKWAY	359.4
 VEGETATED	7006.4
<b>TOTAL</b>	<b>11555.0</b>

POST-CONSTRUCTION

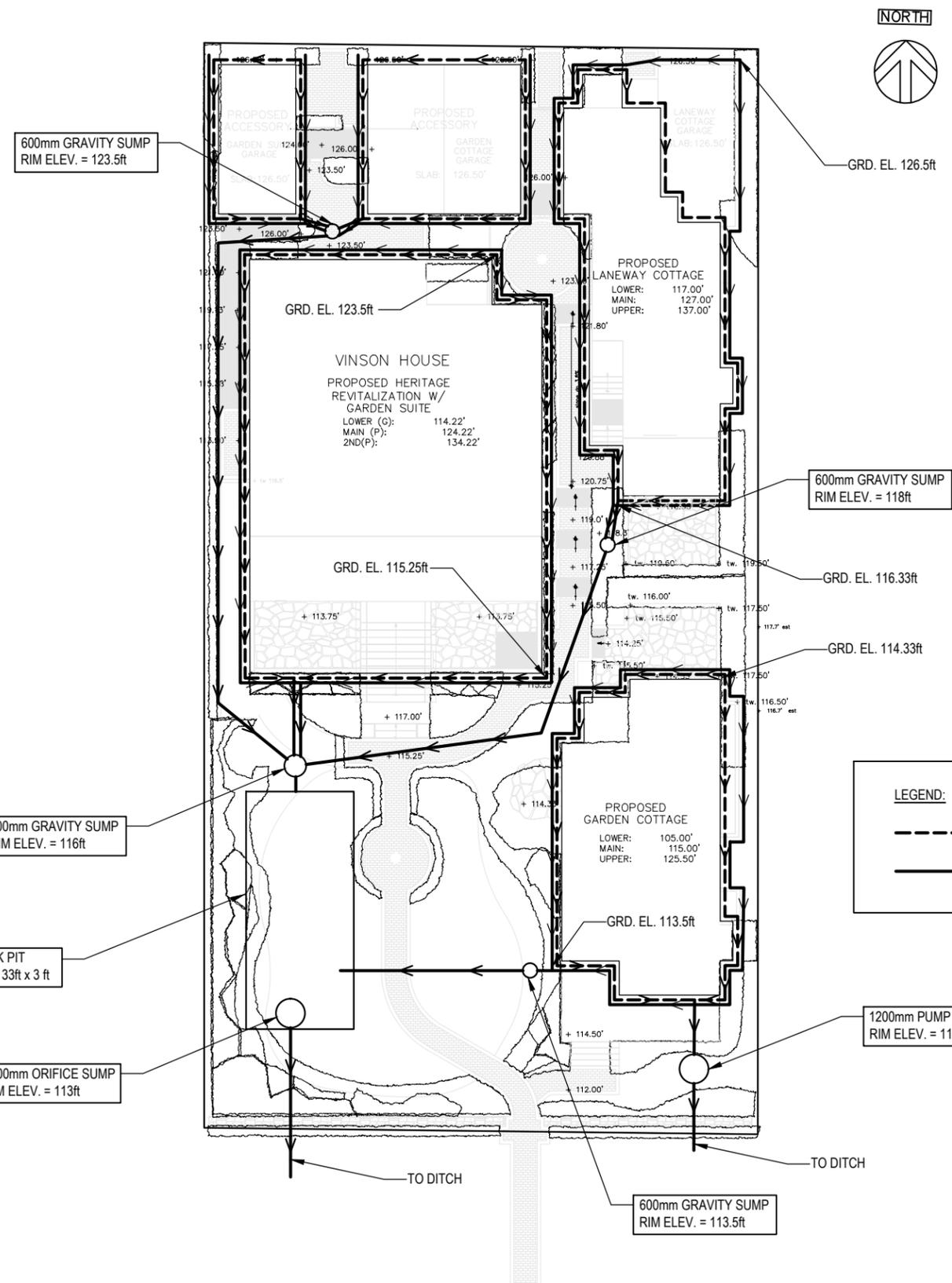
	AREA (ft <sup>2</sup> )
 VINSON HOUSE	2706.5
 LANEWAY COTTAGE	1399.5
 GARDEN COTTAGE	1460.2
 ACCESSORY BLDGS	935.7
 STONE WALKWAY	1120.5
 VEGETATED	3932.6
<b>TOTAL</b>	<b>11555.0</b>



Rev.	Description	Date
Rev 0	Issued for Review	Jan. 8, 2016

Client	Trasolini Chetner Construction Development		
Project	Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC		
Project no.	15-6467	Drawn	DD
		Design	JO
		Checked	SH

Title	STORMWATER MANAGEMENT DESIGN PRE & POST-CONSTRUCTION PLAN		
Date	January 8, 2016	Scale	1"=20'
Drawing no.	15-6467-SWM-1		



GRD. EL. 126.5ft

600mm GRAVITY SUMP  
RIM ELEV. = 123.5ft

600mm GRAVITY SUMP  
RIM ELEV. = 118ft

GRD. EL. 115.25ft

GRD. EL. 116.33ft

GRD. EL. 114.33ft

900mm GRAVITY SUMP  
RIM ELEV. = 116ft

ROCK PIT  
15ft x 33ft x 3ft

1200mm ORIFICE SUMP  
RIM ELEV. = 113ft

**LEGEND:**

- 100mm Ø PERFORATED PVC
- 100mm Ø SOLID PVC

1200mm PUMP SUMP  
RIM ELEV. = 112ft

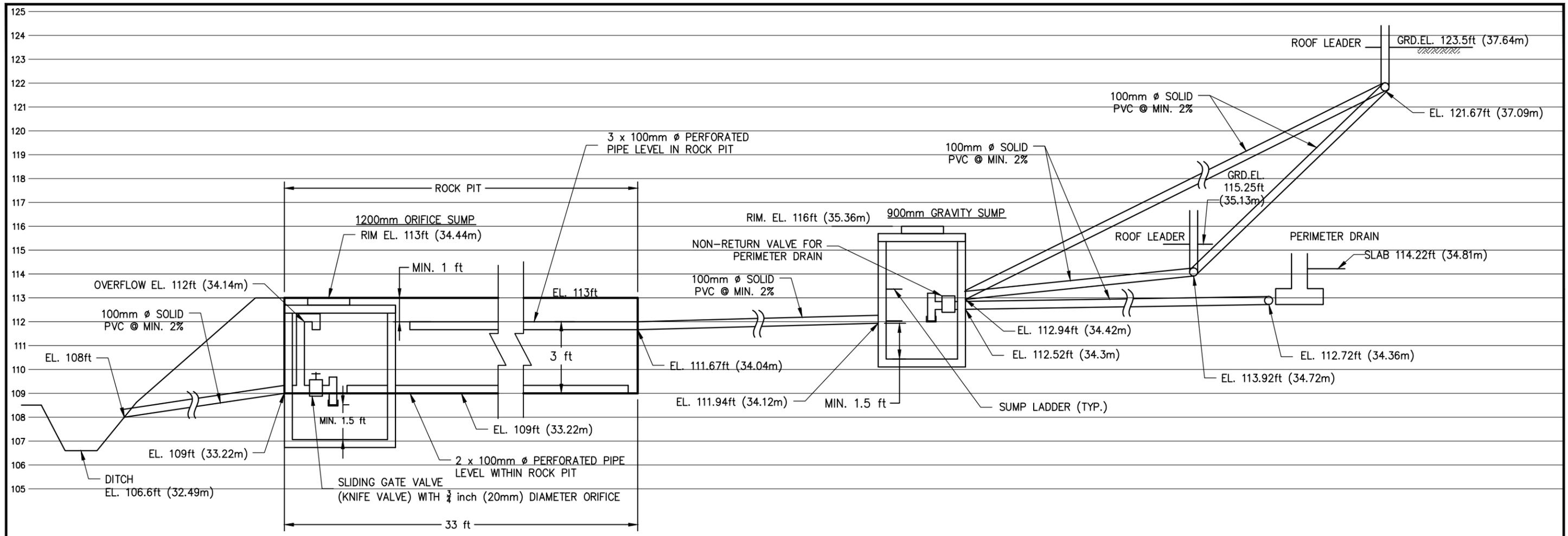
TO DITCH

TO DITCH

600mm GRAVITY SUMP  
RIM ELEV. = 113.5ft



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Rev 0	Issued for Review	Jan. 8, 2016	Trasolini Chetner Construction Development	STORMWATER MANAGEMENT DESIGN PLAN					
			Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC						
			Project no. 15-6467	Drawn DD	Design JO	Checked SH	Date January 8, 2016	Scale 1"=20'	Drawing no. 15-6467-SWM-2

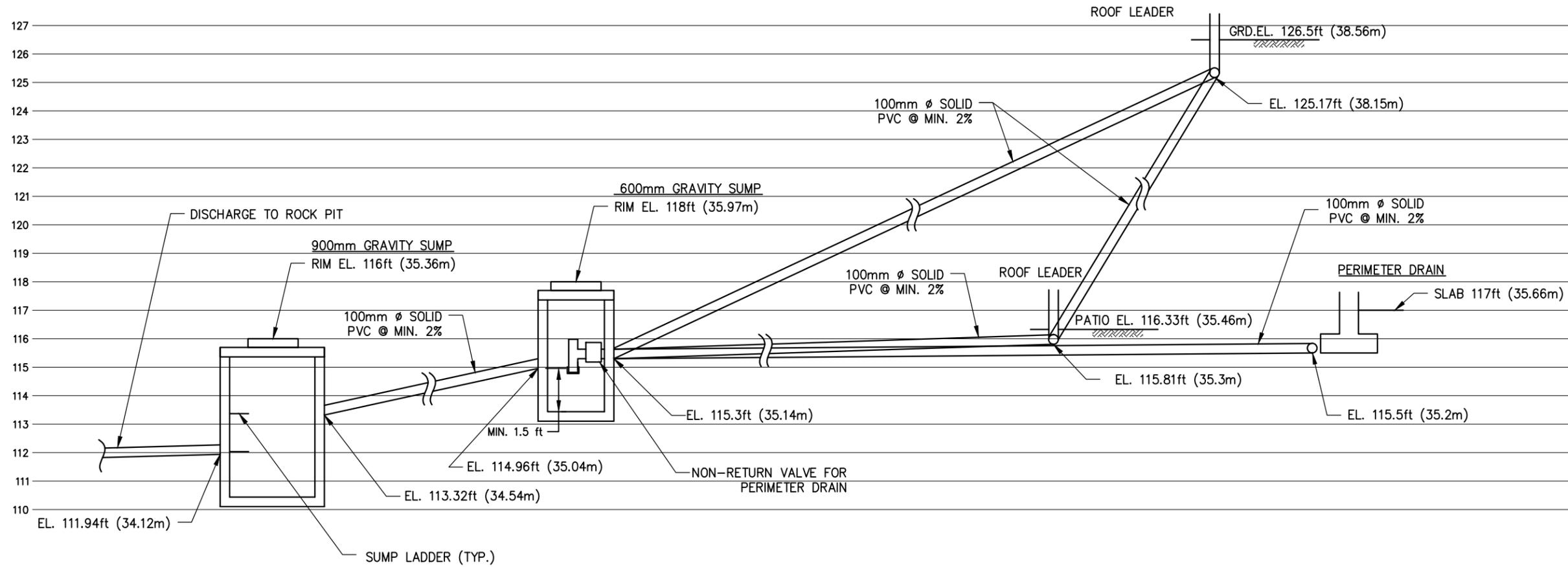


**NOTES:**

1. These drawings are based on Site Plan dated November 2015 by Formwerks Architectural.
2. Contractor to confirm all locations and elevations of existing works prior to start of work, and to advise Engineer of discrepancies and conflicts.
3. Proposed Storm pipes to be SDR 35 to ASTM D3034 & CAN/CSA-B182.2.
4. The Engineer shall be notified at least 24 hrs in advance when pipes and sump are in place and excavation of rock pit is complete, prior to backfill of rock pit and at the time of final lot grading.
5. Contractor is responsible for locating all existing underground utilities and connections prior to construction.
6. Pump System including alarm and backup power to be designed by a qualified Professional Mechanical Engineer.
7. Finished grade around the proposed buildings to be sloped away from the buildings at a minimum slope of 2.0%.
8. Pipes to be installed a minimum of 0.3m below finished grade.
9. Rock pit should be dimensioned to fit site configuration, ensuring that the minimum required floor area is achieved. The storage volume of the rock pit are based on a void ratio of 40%. Actual dimensions may be revised based on available area, subject to review by Braun Geotechnical.
10. Rock pits require periodic maintenance and some care to minimize inlet debris in order to ensure satisfactory performance over the design life. Rock pit repairs and/or total reconstruction can be minimized by regularly cleaning the sump upstream from the pit, and not discharging silty or otherwise contaminated water into the rock pit.



Rev.	Description	Date	Client	Title					
Rev 0	Issued for Review	Jan. 8, 2016	Trasolini Chetner Construction Development	STORMWATER MANAGEMENT DESIGN Longitudinal Section Schematic - Vinson House					
			Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC						
			Project no. 15-6467	Drawn DD	Design JO	Checked SH	Date January 8, 2016	Scale NTS	Drawing no. 15-6467-3

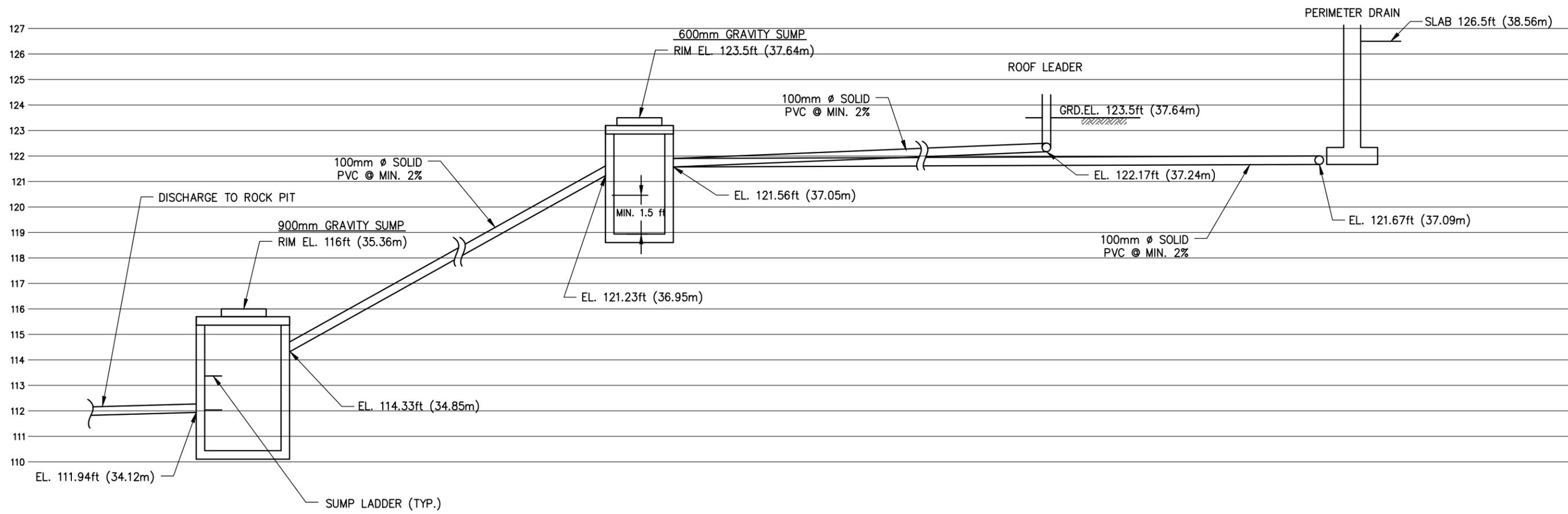


Rev.	Description	Date
Rev 0	Issued for Review	Jan. 8, 2016

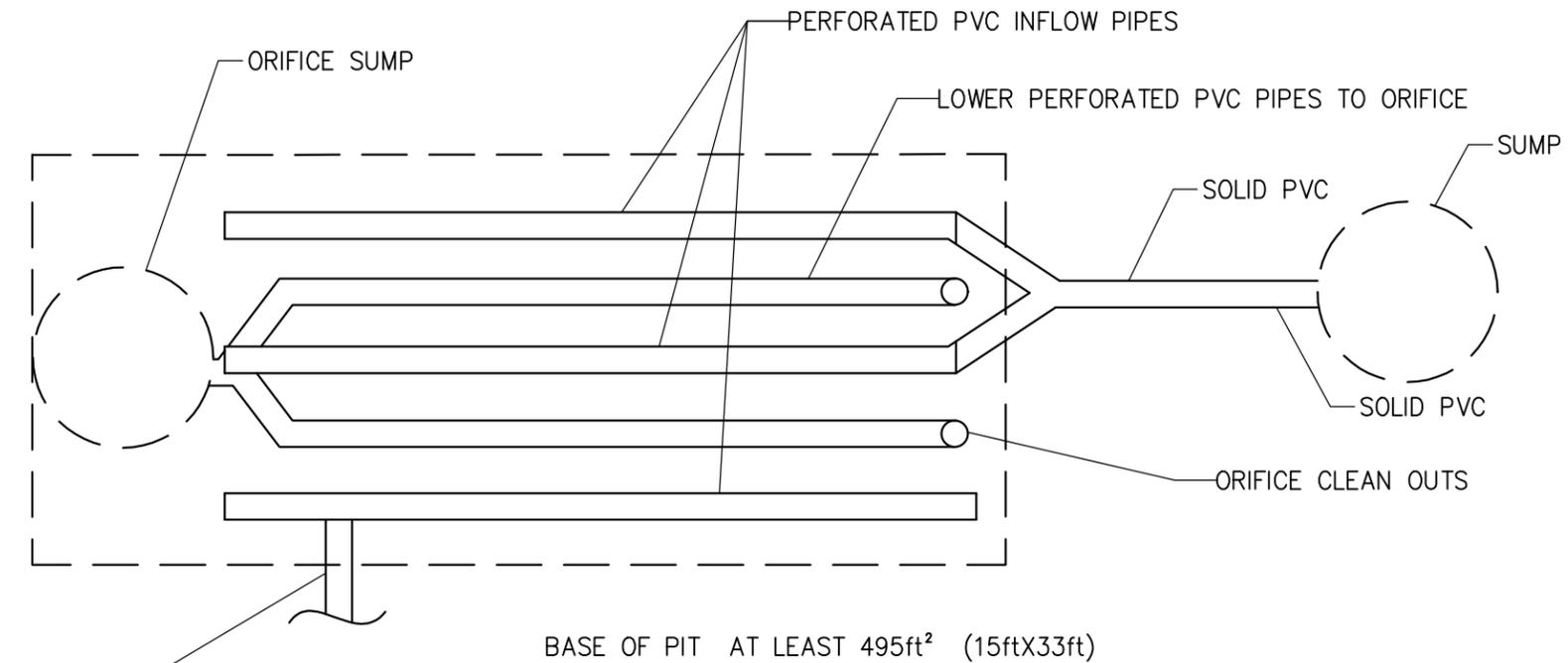
Client Trasolini Chetner Construction Development			
Project Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC			
Project no. 15-6467	Drawn DD	Design JO	Checked SH

Title STORMWATER MANAGEMENT DESIGN Longitudinal Section Schematic - Laneway Cottage		
Date January 8, 2016	Scale NTS	Drawing no. 15-6467-4



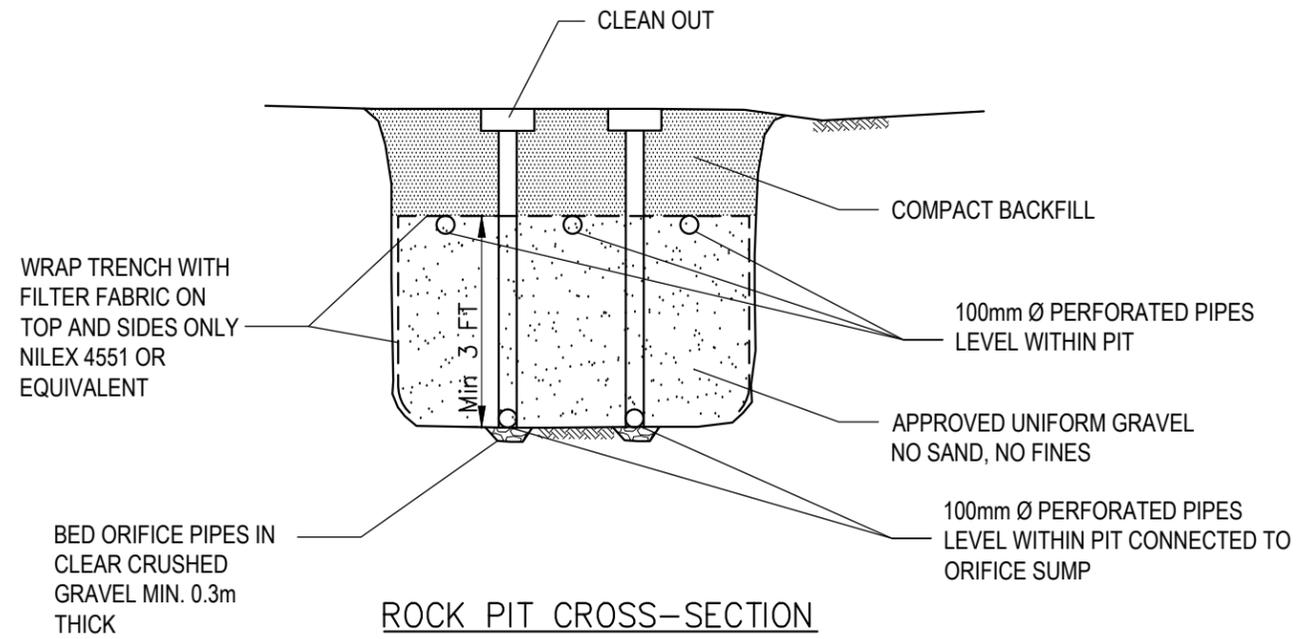


Rev.	Description	Date	Client	Title			
Rev 0	Issued for Review	Jan. 8, 2016	Trasolini Chetner Construction Development	STORMWATER MANAGEMENT DESIGN Longitudinal Section Schematic - Accessory Buildings			
			Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC				
			Project no. 15-6467	Drawn DD	Design JO	Checked SH	Date January 8, 2016
							Scale NTS
							Drawing no. 15-6467-6

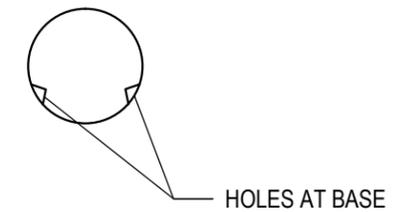


SOLID PVC PIPE FROM GARDEN COTTAGE

PLAN VIEW



ROCK PIT CROSS-SECTION



PERFORATED PIPE ORIENTATION



Rev.	Description	Date	Client	Title					
Rev 0	Issued for Review	Jan. 8, 2016	Trasolini Chetner Construction Development	STORMWATER MANAGEMENT DESIGN DETAILS					
			Proposed Development Project "Vinson House" 1425 Gordon Avenue, West Vancouver, BC						
			Project no. 15-6467	Drawn DD	Design JO	Checked SH	Date January 8, 2016	Scale NTS	Drawing no. 15-6467-7