environment 21
Global Stormwater Solutions
P.O. Box 55 | East Pembroke | NY 14056
Phone: 1-800-809-2801 | Fax: 1-585-815-4701
www.env21.com | enveng@env21.com
Technology That Separates

V2B1® SYSTEM MAINTENANCE

1.0 REQUIRED MAINTENANCE FREQUENCY

1.1 The required maintenance practice for the V2B1® System is to initially plan on quarterly inspections and an annual pump-out. After experience is gained, the schedule is more accurately determined.

1.2 The maintenance interval may be calculated using the following equation:

Estimated Maintenance Interval in Years =

$$\frac{\text{(50\% of the V2B1 Maximum Sediment Storage Volume)}}{\text{(3.366) (Maximum Treatment Flow Rate) (TSS Removal Efficiency)}}$$

This calculation was completed for the current V2B1 models and is included in Attachment A "V2B1 MODEL SIZES WITH DIMENSIONS AND COMPUTED MAINTENANCE INTERVALS" of this document.

1.3 It is required that the V2B1® System should be pumped out when the sediment depth in the first structure is at 50% of the design sediment storage depth, which is, minimally, every six months. Refer to the project design package for the storage depth.

1.4 Oil sheen and floating debris are retained in the second chamber of the V2B1® System. Annual accumulation of floatables is estimated at less than 0.50 inches but is site dependent.

2.0 CONDITIONS THAT CAUSE THE NEED FOR MAINTENENCE

2.1 The most common cause of poor performance of the V2B1® System is lack of maintenance. The V2B1® System removes pollution from the environment. If this pollution is not routinely removed, the effectiveness of the V2B1® System could be compromised. The following are things that trigger the need for maintenance and the consequences of not completing the maintenance.

2.1.1 Sediment build-up in the chambers. As the sediment level increases past the recommended maintenance interval less sediment would be removed from the runoff. Additionally a large

storm could cause entrainment of some of the sediment that was already captured.

2.1.2 Excess floatables in the chambers. Similar to sediment build-up floatables (oil and litter) build-up and risk downstream pollution

2.1.3 Obstructed piping/baffles due to improper maintenance and removal of floating debris. If the piping or baffles become obstructed flooding may occur upstream of the V2B1® System.

2.1.4 As with most buried structures, the vented covers could be moved out of position during extreme flooding conditions.

2.2 In addition to V2B1® System internal inspections, frequent site inspections should be conducted. These frequent site inspections are recommended as visual only and do not require tools or equipment or removal of the vented covers. Things to look for during these inspections are flooding at catch basins upstream of the V2B1® System, unexpected loss of outlet flow, out of place vented covers and downstream pollution (oil sheen, litter, etc.).

3.0 ACCESS POINTS AND REQUIRED INSPECTION

3.1 Maintenance access is through cast iron frames with vented covers that are provided, two per structure, in the V2B1® System roof.

3.2 Remove one of the cast iron vented covers of the V2B1® System. The floatables observation and measurement can be obtained from all access points.

3.3 Illuminate the water surface in the first stage of the V2B1® System while gently stirring the floatables to estimate the depth. Obtain a sample of the floatables, water, or sediment, if required to determine disposal. The depth of the oil sheen and floating debris will typically be less than one inch and can be skimmed from the surface prior to the pump-out of the sediment. Organic debris that has become waterlogged and settled to the floor is expected to be present in relatively small quantities that will be removed during the pump out of the mineral sediment.

3.4 Inspect all surfaces, which can be seen, of the V2B1® System for wear (e.g., cracking, spalling, etc.). Also, examine the inlet and elbow pipes for

wear, blockage, and damage (cracks, etc.). Report signs of degradation to the proper authorities (i.e., owner, municipality, etc.) as required.

3.5 Lower the measuring rod into the V2B1® System until a slight resistance to movement occurs; the rod is now at the top of the sediment pile. Obtain a measurement by sighting the rod measuring increments to a point on the cover frame. This is measurement A.

3.6 Twist the measuring rod into the sediment pile until the measuring rod is on the floor (verify the expected level using the project submittal drawings). Obtain a measurement by sighting the rod increments to the same point on the access frame as was used in step 3.5. This is measurement B.

3.7 Refer to the Environment 21 system specific design package for the design sediment storage depth. This is measurement C.

3.8 Plug the numbers obtained from the previous three steps into the following equation:

(B – A)/C. Multiply the answer by 100 to obtain the percent full sediment depth of the V2B1® System.

3.9 Complete Steps 3.2 through 3.8 for all of the chambers of the V2B1® System.

3.10 Contact the following for approval and notification of the intent to pump out the V2B1® System:

3.10.1 Obtain permission from the Owner to pump out the contents of the V2B1® System.

3.10.2 Verify the disposal requirements with the local regulatory agency

3.11 Obtain a standard truck-mounted sewer and catch basin cleaner with positive displacement rotary lobe vacuum pumps or other acceptable pump-out equipment.

3.12 Using the pump-out equipment, remove the floatables and hydrocarbons from the V2B1® System. Segregate this waste from the sediment and water as required.

3.13 Using the pump-out equipment, remove the standing water and sediment from the V2B1® System. Segregate this waste from the hydrocarbons and floatables as required.

3.14 Locate and use a water supply to wash down the interior surface of the V2B1® System and remove the remaining waste from the bottom of the structure.

3.15 Repeat steps 3.12 through 3.14 for all of the chambers of the V2B1® System.

3.16 Using a flood light inspect all surfaces, which can be seen, of the V2B1® System for wear (e.g., cracking, spalling, etc.). Also examine the inlet and elbow pipes for wear, blockage, and damage (cracks, etc.). Report signs of degradation to the proper authorities (i.e., owner, municipality, etc.) as required.

3.17 Refill the V2B1® System, with clean water, to the inlet/outlet pipe invert elevation.

3.18 Properly dispose of the waste removed from V2B1® System

3.19 Verify that no personnel, tools or equipment are in the V2B1® System.

3.20 Inspect the cast iron access frames and covers for damage (e.g., cracks, excessive wear, etc.).

3.21 Clear the cast iron access frames of any extraneous material and carefully replace the cast iron vented covers using proper lifting and rigging equipment. Verify that the covers are properly seated.

3.22 Remove the site set-up (tools, equipment, etc.) and verify the work area has been returned to its pre-work, or better, condition.

3.23 Complete an inventory of all tools and equipment used for this work, accounting for lost, damaged, or stolen tools or equipment.

3.24 Maintenance is a very important aspect in keeping the V2B1® System performance up to par. Attachment B "V2B1® SYSTEM MAINTENANCE DATA SHEET" is provided and should be used to document the maintenance performed on the V2B1® System.

3.25 Provide a copy of the "V2B1® SYSTEM MAINTENANCE DATA SHEET" to the owner, required government agencies, and Environment 21, LLC (P.O. Box 55, East Pembroke, NY 14056-1055).

4.0 REQUIRED TRAINING

4.1 Safety is a priority and the most stringent of regulations (local, OSHA, etc.) should be followed while performing maintenance on V2B1® System.

4.2 An advantage of the design of the V2B1® System is such that all of the maintenance may be completed without entry. In the remote chance that entry into the V2B1® System is required refer to regulations (local, OSHA, etc.) for requirements and definitions.

4.3 A running inventory of all tools and equipment used for completion of this procedure should be maintained while performing maintenance on the V2B1® System.

4.4 The V2B1® System has cast iron access frames with vented covers, which provide access to all of the V2B1® System. The openings are normally at ground level so the work area should be staged properly with safeguards to prevent anyone or anything from inadvertently falling through an opening in the V2B1® System.

4.5 After maintenance has been completed on the V2B1® System, the cast iron vented covers should be set securely in place, all materials and equipment should be removed, and the area should be cleared of slip and trip hazards.

4.6 Other than this procedure and the specific project data there is currently no other training media (e.g., videos). This document along with the project specific data captures the maintenance procedure and training. Maintenance questions can be answered by calling Environment 21 at 800-809-2801.

5.0 REQUIRED EQUIPMENT

5.1 Some of the recommended tools are a flood light, proper lifting and rigging equipment, and an unbending measuring rod (increments in inches

marked on the rod) that will reach the floor of the V2B1® System and still extend a minimum of 2' above the cast iron access frame.

5.2 Environment 21, LLC should be contacted if any repairs or replacement of parts are required so the correct repairs and parts may be obtained.

ATTACHMENT A

V2B1 MODEL SIZES WITH DIMENSIONS AND COMPUTED MAINTENANCE INTERVALS

V2B1 MODEL	M1 DIA. (ft.)	M2 DIA. (ft.)	M1 INLET DIA. RANGE (in.)	M1 OUTLET DIA. RANGE (in.)	M2 INLET DIA. RANGE (in.)	M2 OUTLET DIA. RANGE (in.)	BYPASS RANGE (in.)	MIN. SUMP DEPTH (ft.)	MTFR (ft^3/s)	TSS REM. EFF. (%)	MIN. STORAGE VOLUME (ft^3)	COMPUTED MAINT. INTERVAL (years)
2	4	4	8 - 12	8 - 24	8 - 24	8 - 24	4 - 10	3.5	0.51	50%	18.85	11.0
3	4	5	10 - 16	10 - 24	10 - 24	10 - 24	4 - 10	3.5	0.66	50%	22.38	10.1
4(1)	5	5	12 - 21	12 - 36	12 - 36	12 - 36	6 - 12	5.5	0.80	50%	29.45	10.9
6	6	5	12 - 24	12 - 36	12 - 36	12 - 36	6 - 12	4.5	0.98	50%	38.09	11.5
7	6	6	12 - 24	12 - 36	12 - 36	12 - 36	6 - 15	4.5	1.15	50%	42.41	11.0
8	7	6	15 - 30	15 - 36	15 - 36	15 - 36	6 - 15	4.5	1.36	50%	52.62	11.5
9	7	5	15 - 30	15 - 36	15 - 36	15 - 36	6 - 12	4.5	1.18	50%	48.30	12.2
10	8	5	15 - 36	15 - 36	15 - 36	15 - 36	6 - 12	4.5	1.42	50%	60.08	12.6
11	8	6	15 - 36	15 - 36	15 - 36	15 - 36	6 - 15	4.5	1.60	50%	64.40	12.0
12	8	7	15 - 36	15 - 42	15 - 42	15 - 42	6 - 18	4.5	1.81	50%	69.51	11.4
13	8	8	15 - 36	15 - 48	15 - 48	15 - 48	6 - 18	5.0	2.05	50%	75.40	10.9
14	10	5	18 - 42	18 - 36	18 - 36	18 - 36	6 - 12	5.0	2.00	50%	88.36	13.1
15	10	6	18 - 42	18 - 36	18 - 36	18 - 36	6 - 15	5.0	2.18	50%	92.68	12.6
16	10	7	18 - 42	18 - 42	18 - 42	18 - 42	6 - 18	5.0	2.38	50%	97.78	12.2
17	10	8	18 - 42	18 - 48	18 - 48	18 - 48	8 - 24	5.0	2.62	50%	103.67	11.8
18	10	10	18 - 48	18 - 60	18 - 60	18 - 60	8 - 36	5.5	3.20	50%	117.81	10.9
19	12	5	21 - 48	21 - 36	21 - 36	21 - 36	6 - 12	5.0	2.70	50%	122.92	13.5
20	12	6	21 - 48	21 - 36	21 - 36	21 - 36	6 - 15	5.0	2.88	50%	127.23	13.1
21	12	7	21 - 48	21 - 36	21 - 36	21 - 36	6 - 18	5.5	3.09	50%	132.34	12.7
22	12	10	21 - 48	21 - 48	21 - 48	21 - 48	10 - 36	5.5	3.90	50%	152.37	11.6
25	12	8	21 - 48	21 - 48	21 - 48	21 - 48	6 - 15	5.5	3.33	50%	138.23	12.3
50	16	10	24 - 72	24 - 60	24 - 60	24 - 60	10 - 36	6.0	5.70	50%	240.33	12.5
60	20	10	30 - 80	30 - 60	30 - 60	30 - 60	10 - 36	6.0	8.00	50%	353.43	13.1

(1) This model was used for testing.

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ATTACHMENT B

V2B1 SYSTEM MAINTENANCE DATA SHEET

STRUCTURE NO.:_____ **ADDRESS:**_____

OWNER:_____ **V2B1 MODEL**_____

DATE INSTALLED:_____ **MUNICIPALITY:**_____

DATE	SEDIMENT PILE DEPTH * 1st	2nd	3rd	OIL SHEEN YES/NO * 1st	2nd	3rd	FLOATABLE DEPTH * 1st	2nd	3rd	PUMPOUT REQ. YES/NO	SAMPLED YES/NO	SAMPLE RESULTS

PUMPOUT DATA (IF APPLICABLE)

DATE	SEDIMENT VOLUME REMOVED	FLOATABLES VOLUME REMOVED	DISPOSAL INFORMATION SEDIMENT	FLOATABLE:

1st, 2nd, and 3rd refer to the three chambers of the V2B1.

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ATTACHMENT B

PRIOR TO START OF WORK

OWNER NOTIFIED AS REQUIRED. ☐

LOCAL AGENCIES NOTIFIED AS REQUIRED. ☐

INSPECTION

PIPING	YES	NO
ANY VISIBLE CRACKS/DAMAGE	☐	☐
ANY VISIBLE DISPLACEMENT/LEAKS	☐	☐
ANY VISIBLE OBSTRUCTIONS	☐	☐

STRUCTURE	YES	NO
ANY VISIBLE CRACKS/SPALLING/DAMAGE	☐	☐
ANY VISIBLE LEAKS	☐	☐
ANY VISIBLE SURFACE WEAR	☐	☐

1st, 2nd, and 3rd refer to the three chambers of the V2B1.

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ATTACHMENT B

VENTED COVERS/FRAMES	YES	NO
ANY VISIBLE CRACKS/DAMAGE	☐	☐
ANY VISIBLE SEAT SURFACE OBSTRUCTIONS	☐	☐
WERE COVERS PROPERLY SEATED AS FOUND	☐	☐

AFTER WORK COMPLETION

ALL CAST IRON COVERS HAVE BEEN PROPERLY REPLACED.	☐	☐
NO HAZARDOUS CONDITIONS EXIST AS A RESULT OF THE MAINTENANCE WORK.	☐	☐
ALL PPE, TOOLS, AND EQUIPMENT HAVE BEEN INVENTORIED AND REMOVED FROM THE SITE.	☐	☐
THE WORK AREA HAS BEEN RETURNED TO A SAFE PRE-WORK CONDITION.	☐	☐
ALL NOTIFICATIONS HAVE BEEN MADE, AS REQUIRED, THAT THE WORK IS COMPLETED.	☐	☐

CORRECTIVE ACTIONS TAKEN: _____

_____

DATE: _____ **SIGNATURE:** _____

1st, 2nd, and 3rd refer to the three chambers of the V2B1.