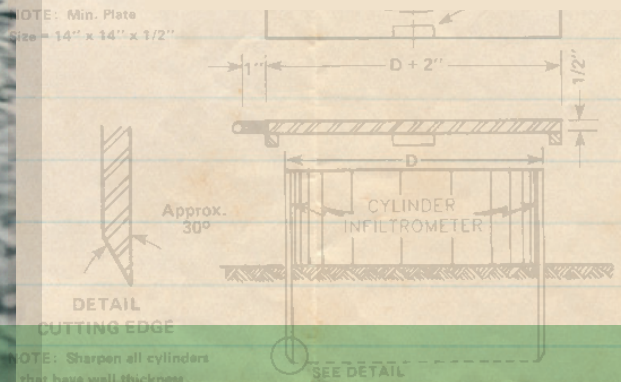
BEST MANAGEMENT PRACTICES
RAPID ASSESSMENT METHODOLOGY

BMP RAM
FIELD PROTOCOLS V4.4

FINAL
MARCH 2018



2NDNATURE
SCIENCE + SOFTWARE

Best Management Practices Rapid Assessment Methodology

(BMP RAM)

Field Observation Protocols v 4.4

March 2018

Technical elements developed by:

2NDNATURE SCIENCE + SOFTWARE

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2NDNATURE LLC 2018. Best Management Practices Rapid Assessment Methodology (BMP RAM) Field Observation Protocols v4.4. March 2018.

Background

BMP RAM v4.4 (released in March 2018) was collectively vetted with a selection of municipal stormwater managers and their respective regulatory representative at the Central Coast Regional Water Quality Control Board to identify priority technical and data management refinements to better balance municipal work flow needs and information required to evaluate regulatory compliance. Based on these feedback, BMP RAM v4.0 includes technical refinements and functional improvements toward a simple, practical and user-friendly tool, fully integrated with the 2NFORM Stormwater Software Suite. Even with these improvements, BMP RAM technical approach and data management platform will continually be improved and maintained to meet the needs of stormwater managers, funders, regulators and the community within the concise mission defined for the tool. User feedback is encouraged to ensure useful and feasible BMP RAM improvements are identified, allowing continued effective iterations.

Legal Notices

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BMP RAM Field Observation Protocols

The **BMP RAM Field Observation Protocols** are contained in alphabetical order and consist of the following:

1. Constant Head Permeameter (CHP)
2. Conveyance
3. Infiltrometer
4. Material Accumulation
5. Permeability
6. Remaining Capacity
7. Standing Water
8. Substrate Type
9. Vegetation Cover

The user will populate field datasheets by structural BMP type when conducting BMP RAM field observations. Blank **field datasheets** are provided at the end of this section in the following order. The user may also enter observation data directly into the website.

Centralized BMPs:

1. Bed Filter
2. Detention Basin
3. Dry Basin
4. Infiltration Basin
5. Media Filter
6. Treatment Vault
7. Wet Basin

Decentralized BMPs:

8. Biofiltration
9. Bioretention
10. Bioswale
11. Filtration Device
12. Sediment Trap
13. Infiltration Feature
14. Pervious pavement
15. Settling Basin

Conveyance BMP:

16. Drop Inlet

Field Observations by Structural BMP Type

Centralized BMPs

Structural BMP Type	Field Observations	Benchmark Observations
Bed Filter	Permeability	
	Conveyance	✓
Detention Basin	Material Accumulation	✓
	Conveyance	✓
Dry Basin	CHP or Infiltrometer	✓
	Vegetation Cover	✓
	Material Accumulation	✓
	Conveyance	✓
Infiltration Basin	CHP or Infiltrometer	✓
	Vegetation Cover	✓
	Conveyance	✓
Media Filter	Standing Water	
	Conveyance	✓
Treatment Vault	Remaining Capacity	✓
	Conveyance	✓
Wet Basin	Material Accumulation	✓
	Vegetation Cover	✓
	Conveyance	✓

Decentralized BMPs

Structural BMP Type	Field Observations	Benchmark Observations
Biofiltration	Remaining Capacity	✓
	Substrate Type	
	Permeability	
	Conveyance	✓
Bioretention	Remaining Capacity	✓
	Substrate Type	
	Permeability	
	Conveyance	✓
Bioswale	Vegetation Cover	✓
	Permeability	
	Conveyance	✓
Sediment Trap	Remaining Capacity	✓
	Conveyance	✓
Infiltration Feature	Vegetation Cover	✓
	Permeability	
	Conveyance	✓
Pervious Pavement	Permeability	
	Conveyance	
Settling Basin	Material Accumulation	✓
	Conveyance	✓
Filtration Device	Remaining Capacity	✓
	Conveyance	✓

BMP RAM Equipment List

The table below provides the equipment needed to carry out the various BMP RAM field protocols/ assessments. Where relevant we have included links and some photos of equipment used as a reference. Equipment can be found through a variety of sources and users are welcome to purchase from any vendor. We encourage users to review the field protocols and inventoried BMPs before purchasing all equipment to determine which equipment is needed to carry out assessment within your municipality

Field Protocol	Equipment Needed	Example
General	3-5 gallon jug or carboy to transport water Map of BMPs Field Protocols Field Datasheets (hard copy or mobile device)	
Conveyance	No additional equipment is needed	
Infiltrometer	Double Ring Infiltrometer Recommend 12" diameter and 4" high http://www.turf-tec.com/IN7lit.html Double Ring Driving Plate http://www.turf-tec.com/IN6lit.html Rubber Mallet Stop Watch Gallon Containers / Water Tape Measure / Ruler	
Material Accumulation	Staff Plate https://tinyurl.com/y8ef5dgg Mounting equipment is needed to install in BMP (this may vary depending on basin type). Picture at the right has staff plated installed in permeable surface mounted on wood 2x4.	

Remaining capacity	Telescoping Stadia Rod https://tinyurl.com/yaqwt3f4 Halogen Flashlight Tape Measure x 2 Hand-held sight level https://tinyurl.com/y9sstlme	
Permeability	Container to measure and pour specific volume; example 1L graduated cylinder OR Nalgene bottle with volume marks 1 gallon containers Plumbers Putty (PP) https://tinyurl.com/y8hn34p7 Metal Cylinder with 4” diameter recommend 28oz vegetable can https://tinyurl.com/y8kjuas4 Rubber Mallet Tape Measure/Ruler Stopwatch Water	
Standing Water	Telescoping Stadia Rod https://tinyurl.com/yaqwt3f4 Halogen Flashlight	
Substrate	Trowel or shovel Water Towel	
Vegetation Cover	No additional equipment is required	

FIELD OBSERVATION PROTOCOL

Constant Head Permeameter (CHP)

BMP RAM assessments utilize the accepted Constant Head Permeameter developed by the NRCS within the Lake Tahoe Basin.

Objective: Measure saturated hydraulic conductivity (Ksat) of the base of a structural BMP.

BENCHMARK OBSERVATION

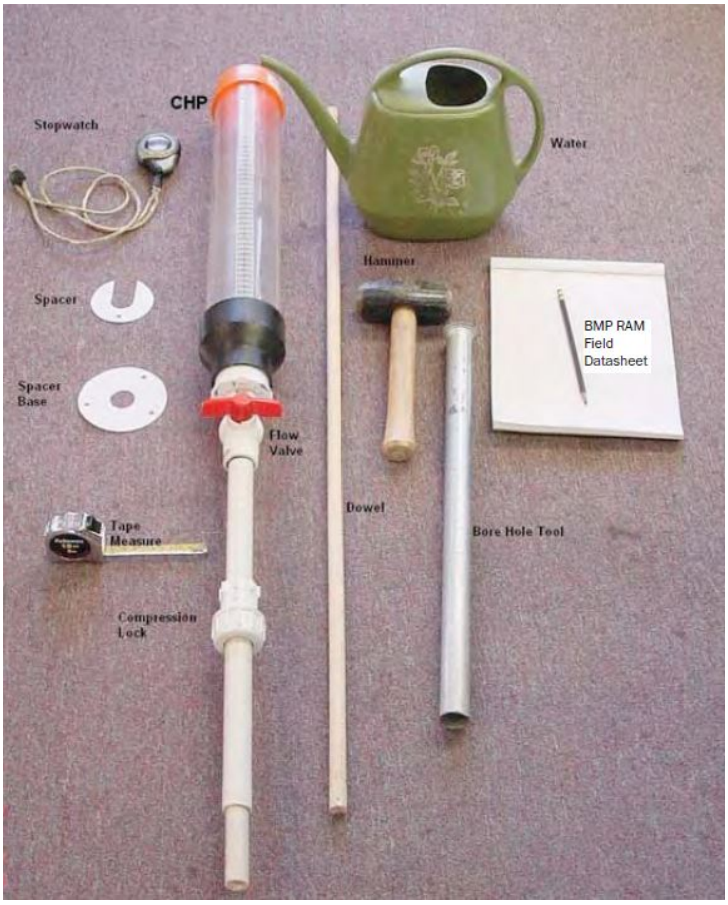
Benchmark observations should be made immediately following construction or complete maintenance actions, when the structural BMP is in best achievable condition. Benchmark observations are made following the field observation protocols detailed below.

FIELD OBSERVATION

Personnel Required: 1 field worker will require 20 minutes to make one measurement. Each structural BMP will require a minimum of 3 measurements depending upon size and the complexity of topography of the structural BMP footprint.

Equipment Required:

- Constant Head Permeameter
- Spacer and spacer base
- Bore hole tool (1" diameter pipe sharpened internally on one end)
- Wood dowel or rebar cleaner rod
- Hammer
- 1 gallon of water per measurement
- Stop watch
- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations



Optimal time to perform: May 1- June 30th

A. Preparation

- Avoid making observations within 24hrs of most recent runoff event.
- Determine structural BMP footprint area from the inventory (ft^2). Prior to making CHP measurement field observations field staff should conduct a general site assessment to determine the distribution of the structural BMP footprint that will experience different inundation frequencies. The surfaces at lower elevations will be inundated more frequently and have a greater rate of sediment and material accumulation. This characteristic will result in different infiltration rates in areas with different elevations. The goal of the CHP measurements is to complete 3 distinct measurements in both the frequently inundated and occasionally inundated areas. The table below summarizes the number of required measurements based on observed surface types as defined by inundation frequency (see graphic for examples of inundation

frequencies). Three measurements within both surface types allows verification of the Ksat expected by visual observation and relative inundation frequency.

- The most reliable CHP observations over time will be repeated in the same locations within each specific structural BMP. It is recommended that users create and maintain structural BMP specific maps on larger more centralized structural BMPs that require CHP BMP RAM observations to ensure that CHP measurement locations are repeated.

- Use the following table to determine the number and distribution of required measurements.

# of Measurements in *Frequently Inundated Area*	3
# of Measurements in *Occasionally Inundated Area*	3
Total Number of Measurements Required	**6**

B. Select measurement locations

- Visually determine the area of each distinct surface type within the footprint of the structural BMP. Within both the frequently inundated and occasionally inundated areas, distribute 3 required measurements per surface type throughout the structural BMP. The distinct surface types will collectively represent a range of the footprint characteristics of the structural BMP (i.e., some locations that are inundated during all smaller events and some locations that are only inundated during larger events). The three measurements per surface type will allow verification that the Ksat estimates are relatively similar for each surface type.
- All measurement locations must be close to level.
- Location ID is for the user to keep track of CHP measurements if desired. A simple map of the locations of each measurement may be useful, though the map is for internal use only. The measurement location should be consecutive numbers starting at 1 and going to 6, representing the number of CHP measurement conducted at the structural BMP.

C. Instrument setup

- Select location for measurement. The ground surface should be flat and free of debris.
- Record measurement location ID on field datasheet.
- Vertically hammer the bore hole tool into the ground to a depth of 4 inches.
- Gently remove the bore hole tool from the ground.
- Remove the soil from the bore hole tool with the dowel/rebar or by tapping the back of the tool on the ground or the hammer.
- *Note: In very sandy, dry, or uncompacted soils, material may fall out of the bore hole tool and back into the measurement hole when the tool is extracted. If this happens, slowly apply ~½ liter of water to the measurement hole and allow it to infiltrate; this will make the sediment more cohesive. Use the bore hole tool to clean out the hole to a depth of 4 inches.*
- Clean the soil debris away from the rim of the hole and place spacer base over the hole.
- Fill the CHP with water to the 175 mark. Do not over fill the CHP.
- Gently place the CHP tip through the hole in the spacer base, and slide in the spacer.

D. Observation

- Slowly open the flow valve. Bubbles will enter the water storage chamber as water flows down through the insertion probe and displaces air. The water level within the storage chamber should stabilize within 30 seconds.
- Begin the stop watch after opening valve.

- Take the first reading at 2 minutes. This allows the surrounding soils to saturate during the first 2 minutes. Record location ID (LOC ID), time as minute (Time), and reading (Reading). Note, the location ID cannot be 0.
- Take a second reading in the middle of the infiltration process within 8 minutes and record. Be sure to use the same location ID (LOC ID).
- Take a third reading at 15 minutes and record. Be sure to use the same location ID (LOC ID).
- If it appears that the entire volume of water may drain during 15min, record the reading and time on an even minute prior to the water level reaching 0. It is not necessary to refill the tank to complete the 15 minute period.

Troubleshooting

- If the CHP is losing water but no bubbles are observed in the chamber, air is coming in from the top. Reseal the cap.
- If small bubbles are observed, there may be leaking through the joints above or below the valve. This is common with new valves. If the small bubbles are accompanied by regular larger bubbles coming from the bore hole, the CHP is operating properly. This is because the Ksat of the soil is exceeding the minor air leak. To stop these small leaks try applying some silicone grease to both sides of the ball in the ball valve and reapply plumbers tape to the threads in the joints and tighten until snug.
- No water flow is observed when the CHP valve is open. Likely the CHP chamber has been overfilled. Empty all water and refill to 175.
- If a reading is mis-entered, delete the entry from the table (red X) and re-enter.

FIELD OBSERVATION PROTOCOL

Conveyance

Objective: Visually determine if the BMP inlets, outlets, bypass structures or drop inlets are capable of conveying stormwater as intended.

BENCHMARK OBSERVATION

Benchmark observations should be made at the time the BMP is inventoried and immediately following any changes in the design of the structural BMP.

Personnel Required: One field worker will require 5-10 minutes to walk the entire boundary of the structural BMP and identify each BMP inlet, outlet, bypass structure or drop inlet.

Equipment Required:

- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: Not season dependent.

A. Observations

- Walk the entire boundary of the structural BMP and visually identify all inlets, outlets and bypass structures conveying stormwater into and out of the structural BMP.
- At each inlet and outlet, note if a trash capture device has been installed to remove debris from the stormwater prior to entering or exiting the structural BMP.
- Enter the total count of inlets and outlets with trash capture devices. There is no need to create unique IDs for each location.
- If the total count of inlets and outlets is inconsistent with the number entered during the inventory step, edit the values in the inventory data entry form.

FIELD OBSERVATION

Personnel Required: One field worker will require 3 minutes to make an observation at each BMP inlet, outlet, bypass structure or drop inlet.

Equipment Required:

- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: Not season dependent.

A. Preparation

- Avoid making observations within 24hrs of most recent runoff event.

B. Observations

- Has a runoff event occurred in the past 24 hrs (yes/no)?
    - If yes, return at time when answer is NO.

- Visually inspect each inlet structure. Does the inlet appear capable of delivering stormwater to the structural BMP as intended (Yes/No)? The following are indications it is NOT functioning:
    - The elevation of the inlet is higher than the surrounding drainage area, preventing flow into the BMP.
    - The elevation of the inlet is below the BMP surface, such that water may not get to or exit the BMP through the inlet.
    - The slope of the inlet is too shallow and stormwater backflows from the structural BMP.
    - Evidence of a flowpath suggests water is diverted around or away from the inlet structure.
    - Inlet culvert is clogged or crushed.
    - Inlet pipe is separated and water is seeping out of culvert before entering BMP.
    - Trash capture device is full of debris and essentially clogged.

- Visually inspect each outlet structure. Does the outlet appear capable of delivering stormwater from the structural BMP as intended (Yes/No)? The following are indications it is NOT functioning:
    - In BMPs where ponding should occur, the elevation of the outlet is too low to allow sufficient ponding and flow attenuation.
    - Flow is being diverted around or away from the outlet.
    - Outlet culvert is clogged or crushed.
    - Outlet pipe is separated and water is seeping out of culvert before entering the stormwater conveyance system as intended.
    - Trash capture device is full of debris and essentially clogged.

- Visually inspect each bypass structure. Does the bypass structure appear capable of conveying stormwater around the structure BMP as intended (Yes/No)? The following are indications it is NOT functioning:
    - For bypass structures near inlets, the bypass invert elevation is below the inlet invert and stormwater is diverted away from the structural BMP.
    - For bypass outlet structures, bypass invert elevation is below the outlet invert and stormwater short-circuits the primary flow path and treatment provided by the BMP.
    - Bypass structure is clogged, crushed, or full of holes.

C. Next Steps

- If the answer for any inlet or outlet is NO, further evaluate the site to direct the proper actions to improve the conveyance function at the structural BMP:
    - Does the conveyance feature appear to require debris removal in order to restore intended function?
    - Does it appear that the conveyance feature may need to be replacement, re-plumbing, or other more substantial improvement? Consider perceived issues including safety hazard identified, liability to create flooding upstream identified, etc in the notes section.
    - Photograph any inlet or outlet that appears to need maintenance and/or replacement.

FIELD OBSERVATION PROTOCOL

Infiltrometer

Objective: Quantitatively measure the infiltration rate of a structural BMP.

BENCHMARK OBSERVATION

Benchmark observations should be made immediately following construction or complete maintenance actions, when the BMP is in best achievable condition. Benchmark observations are made following the field observation protocols detailed below.

FIELD OBSERVATION

Personnel Required: One field worker will require 10 minutes to conduct one infiltration measurement. Observation will take 15 to 30 minutes per structural BMP depending upon the number of measurements required.

Equipment Required:

- 2 gallons of water (per measurement)
- Double-ring infiltrometer (for example http://www.turf-tec.com/IN7lit.html)
- Ruler or tape measure
- Rubber mallet
- Stop watch
- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: May 1- June 30th

A. Preparation

- Avoid making observation within 24 hrs of most recent runoff event.
- Prior to making infiltrometer measurements field observations should be conducted to determine the distribution of the structural BMP footprint that will experience different inundation frequencies. The surfaces at lower elevations will be inundated more frequently and have a greater rate of sediment and material accumulation (see graphic for examples of inundation frequencies). This characteristic will result in different infiltration rates in areas with different elevations. The goal of the infiltrometer measurements is to complete 3 distinct measurements in both the frequently inundated and occasionally inundated areas. Three measurements within each surface type allows verification of the infiltration rate expected by visual observation and relative inundation frequency.

- Use the following table to determine the number and distribution of required measurements.

# of Measurements in *Frequently Inundated Area*	3
# of Measurements in *Occasionally Inundated Area*	3
Total Number of Measurements Required	**6**

- If the observation is being conducted to establish the benchmark value, indicate Y on the field datasheet.

B. Select Measurement Locations

- Divide the structural BMP into equal sections based on the number of required measurements.
- Location ID is for the user to keep track of infiltrometer measurements if desired. A simple map of the locations of each measurement may be useful, though the map is for internal use only. The measurement location should be consecutive numbers starting at 1 and going to 6, representing the number of infiltrometer measurement conducted at the structural BMP.
- It is not necessary for user to repeat exact measurement location during each subsequent field observation.

C. Instrument Setup

- Place the infiltrometer on the area to be tested.
- Push down on the handle while moving the instrument back and forth until the rings are 2" into the soil.
  - If harder soils are being tested, use a rubber mallet to insert rings into the soil. Be careful not to damage or bend the rings with excessive force.
  - If using an infiltrometer on gravel surface, excavate gravel where rings will be inserted and push and twist the instrument into place.
- Tamp down the disturbed soil, or replace excavated gravel, adjacent to the ring on the inside of the outer ring and both sides of the inner ring to ensure a seal.
- Set ruler inside the inner ring to monitoring water depth.

D. Observation

- Fill both the inner and outer rings with at least 4" of water (about 2 gallons).
- Begin the stopwatch and measure the height of water in the inner ring using the ruler.
- Record the location (LOC ID), time as 0 (Time), and reading as water height (Reading). Note, the location ID cannot be 0.
- At 2 minutes, record the location (LOC ID), time as 2, and the water level in the inner ring to tenths of an inch (Reading). If the water infiltrates completely prior to 2 minutes, record the time as 2 and the reading as 0.
- Take a third reading at 5 minutes and record location, time and reading.
- Gently extract the infiltrometer from the soil.
- Repeat instrument set up and observation at the next measurement location.
- o If a reading is mis-entered, delete the entry from the table (red X) and re-enter.

FIELD OBSERVATION PROTOCOL

Material Accumulation

Objective: Determine the level of material accumulated within a structural BMP using permanent staff plates installed within the structural BMP.

BENCHMARK OBSERVATION

Benchmark observations should be made immediately following construction or complete maintenance actions, when the BMP is in best achievable condition.

Personnel Required: One to two field workers will require 15-30 minutes to install one staff plate within the structural BMP.

Equipment Required:

- Metal staff plate similar to Ben Meadows Product #113470 in tenths of feet.
- Cement screw, wood screws or nails
- Power drill
- Saw
- 2x4 wood post
- Rebar or fence posts
- Fence post driver or mallet
- Hose clamps
- Permanent marker or paint
- Stadia rod or tape measure

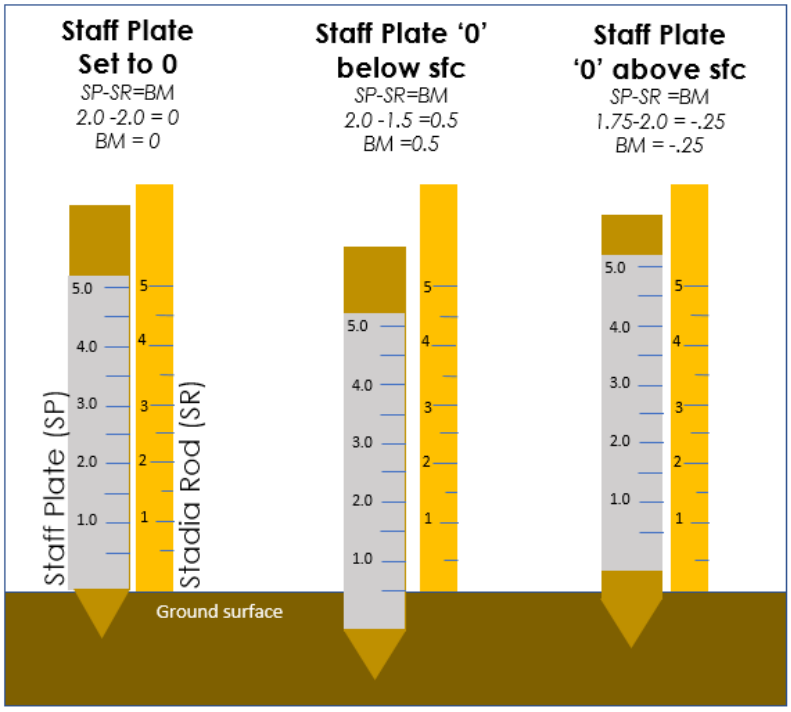
A. Installation

- *If base of structural BMP cannot be penetrated*:
  - Mount staff plate to vertical wall of structural BMP using cement screws and a power drill.
- *If base of the structural BMP can be penetrated*:
  - Cut the corners of one end of a 2x4 to create a point for insertion into ground.
  - Mount the staff plate to the 2x4 using nails or screws. The zero (0) on the staff plate should be mounted 6" from the bottom of the 2x4. The top of the staff plate does not need to extend vertically above the maximum water quality depth of the structural BMP.
  - Using a fence post driver or mallet, drive the fence posts vertically into the base of the BMP as far as possible to provide support.
  - Drive the staff plate vertically between the two fence posts, aligning the zero (0) with the base of the structural BMP. The fence posts should be on either side of the staff plate to provide support.
  - Attach staff plate with hose clamps.
- Write the ID on the staff plate either with paint, permanent marking or engraving into the 2x4 for simple reference by the field personnel in the future.

B. Data Entry

- For each staff plate installed, enter a brief description, recommended as the ID written on the staff plate, as Description and the bottom-most value that can be read on the staff plate as Depth (ft).
- Click Save.

- Note: at wet basins where standing water is present year around, installing a staff plate where 0 is level with the ground surface may be challenging. Benchmark measurements may be established using a second measurement using a stadia rod or tape measure.
    i. Place the stadia rod next to the installed staff plate.
    ii. Compare measurements on the staff plate to the stadia rod at a designated height that is easy to read and see.
    iii. Subtract the stadia rod height from staff plate height. A positive number indicates the staff plate's 0 is buried below the surface and a negative number indicates the staff plate's 0 value is above the ground surface.
    iv. Enter the calculated value for the benchmark measurement as a positive or negative value, that accounts for the difference between the staff plate's 0 value and the ground surface.



Various staff plate positions to the ground surface and establishing benchmark (BM).

FIELD OBSERVATION

Personnel Required: One field worker will require 5 – 10 minutes to make observation, with 1 – 3 measurements required per structural BMP depending on the number of staff plates installed.

Equipment Required:

- Installed permanent staff plate
- Stadia Rod or tape measure (for a second measurement at wet basins)
- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

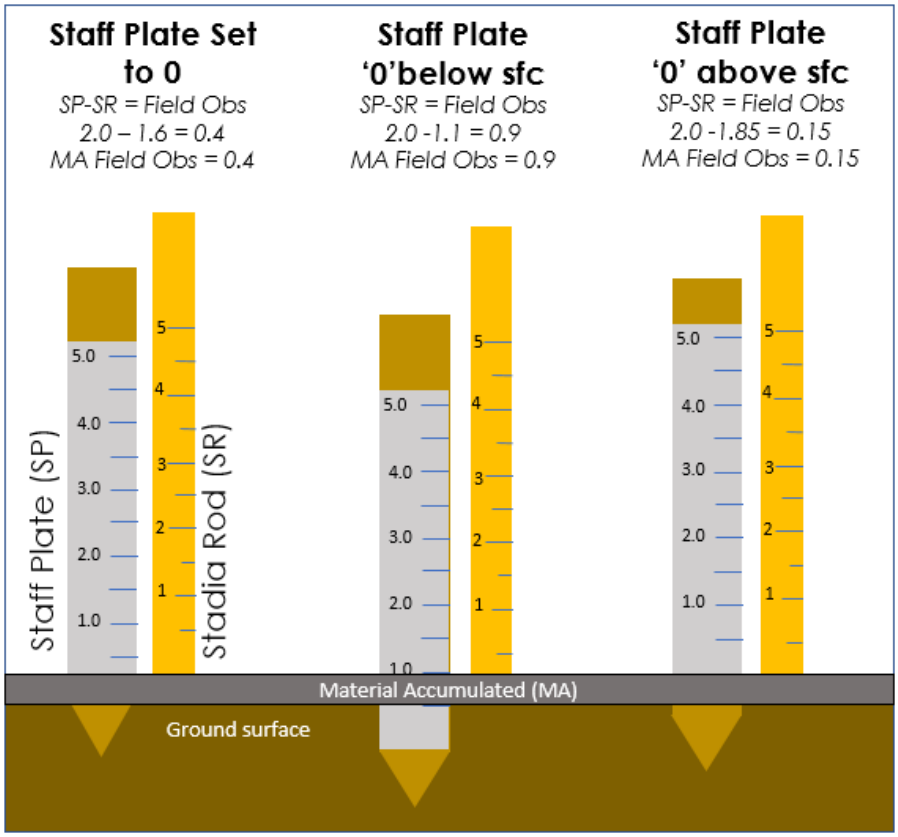
Optimal time of year to perform: Not season dependent, but avoid completing when standing water is present, if possible.

A. Preparation

- Avoid making observations within 24hrs of most recent runoff event.

B. Observations

- Locate the BMP RAM staff plates within the structural BMP for evaluation.
- Record the lowest value visible on the staff plate as Depth (ft) for each staff plate.
- At wet basins where the lowest value is submerged, use a stadia rod adjacent to the staff plate to measure material accumulation
    i. Place the stadia rod next to the installed staff plate.
    ii. Compare measurements on the staff plate to the stadia rod at a height that is easy to see and read.
    iii. Subtract the stadia rod height from staff plate and record this value for each staff plate.



Field observations measure material accumulated over time. When the bottom of the staff plate is not visible, use a stadia rod to compare depths on the staff plate. Calculate and record the difference between the staff plate and stadia rod. Note: BMP RAM incorporates the benchmark depth into the material accumulation score.

FIELD OBSERVATION PROTOCOL

Permeability

Objective: Qualitatively estimate the degree to which a surface is able to rapidly infiltrate stormwater.

BENCHMARK OBSERVATION

No benchmark observations are necessary for this protocol.

FIELD OBSERVATION

Personnel Required: One field worker will require 10-15 minutes to conduct observation, depending upon the number of measurements required.

Equipment Required:

- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations
- Water
- 1L Graduated cylinder or bottle with volume markings
- Stopwatch
- Ruler/tape measure
- For pervious pavement:
  - 24-oz metal can (typical canned vegetable container) with 4" diameter with top and bottom removed
  - Plumber's putty
- For bioretention, bioswale, biofiltration, and infiltration feature:
  - 24-oz metal can (typical canned vegetable container) with 4" diameter with top and bottom removed
  - Rubber mallet

Optimal time to perform: May 1st – June 30th.

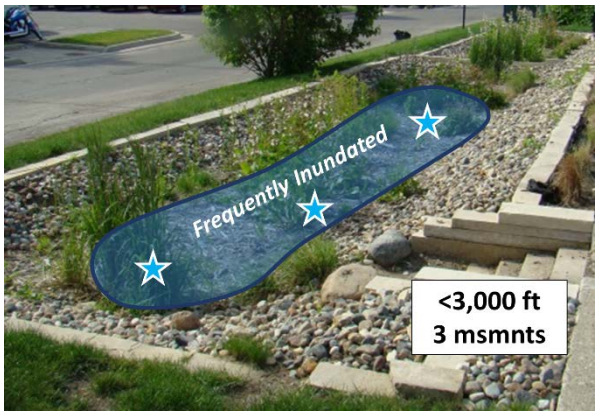
A. Preparation and Observation Locations

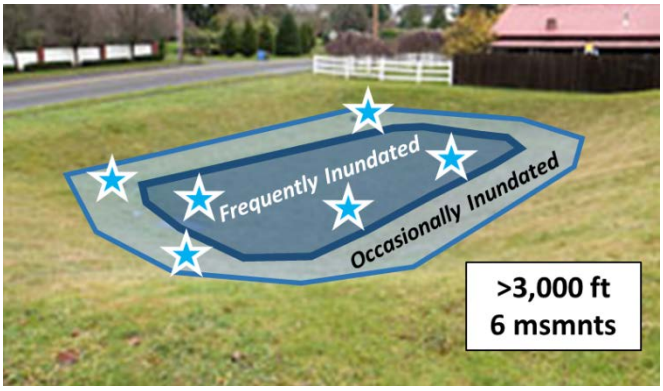
- Avoid making observation within 24hrs of most recent runoff event.
- Infiltration ability of a structural BMP can vary spatially based on BMP design, maintenance actions, etc. To improve the consistency of the observation results across users, upon arrival to the site the user should walk the entire boundary of the structural BMP and visually determine structural BMP inundation regime boundaries. Visually identify areas within the primary stormwater flow path that are frequently inundated (BMP inlet, outlet, and topographic lows where water collects during smaller sized events) and those at a slightly higher elevation that are occasionally inundated during

larger volume runoff events. Note: pervious pavement often does not have an obvious primary flow path, see instructions below.

- Divide the area of frequent inundation into equal thirds along the primary flow path, where the first third is closest to the inlet and the last third is closest to the outlet. Within each third, select an observation location within the frequently inundated. For BMPs that are <3,000 sq-ft, perform 3 runoff observations in the primary flowpath. For BMPs that are >3000 sq-ft, perform 6 runoff observations (3 in the primary flowpath and 3 in the occasionally inundated flowpath).

BMP Surface Area (sq-ft)	<3,000	>3,000
Number of Measurements Required	3	6





- It is not necessary for user to repeat exact measurement location during each subsequent field observation.
- At pervious pavement, determine the BMPs square footage, and perform a minimum of 3 and maximum of 6 runoff observations. Observations locations should be distributed across the pervious pavement. See table below to determine the number of required measurements for the BMP.

Pervious pavement BMP Surface Area (sq-ft)	1,000	2,000	3,000	4,000
Number of Measurements Required	3	4	5	6

B. Observation

- Select the observation method. There are different runoff methods depending on the BMP surface:
  - **Pervious Pavement/Pavers:** Secure the bottom of the 4" diameter can to the pavement surface using the plumber's putty. At paver surfaces, secure the can over an intersection of permeable cracks. Ensure a watertight seal is formed around the entire edge of the can. Best performance occurs when the putty is on both the inside and outside of the can.

  - **Concrete grid pavers (CGP):** Secure metal can in the pervious square space. If the pervious space is too narrow to fit the metal can, use plumbers putty to form a watertight seal between the can and concrete around the pervious surface (see photo).

- **Gravel or smaller substrate:** For structural BMPs where the main flow path substrate is gravel or smaller, insert the metal can approximately ½" into the substrate. Use the rubber mallet as necessary to ensure an appropriate seal between the can and substrate.
- **Cobble or larger substrate:** For structural BMPs where the main flow path surface is cobble or larger, select an embedded cobble that is approximately 4" in diameter and remove it from the substrate. The remaining depression should be approximately 2.5" deep and will form a surface for adding water.

- Fill the graduated cylinder (or similar) with 400ml of water.
- Pour the 400ml into the can or depression in less than 5 seconds. Note, if the depression cannot contain the 400ml, fill the available depression or crack with appropriate water and keep adding as water is infiltrated until the total volume has been poured.
- Start the stopwatch as soon as the pouring begins.
- Stop the stopwatch when all the water has infiltrated or after 10 minutes, whichever is shorter in duration.
- Record the number of minutes and seconds under Time.
- If the water did not fully infiltrate within 10 minutes, record the height or the remaining water in inches.
- Repeat for all measurement locations.
- If data is mis-entered, delete the observation from the table (red X) and enter again.

FIELD OBSERVATION PROTOCOL

Remaining Capacity

Objective: Rapidly determine the remaining capacity of a structural BMP.

BENCHMARK OBSERVATION

Benchmark observations should be made immediately following construction or complete maintenance actions, when the BMP is in best achievable condition.

Personnel Required: One to two field workers will require 5-10 minutes to identify measurement locations and conduct initial depth measurement.

Equipment Required:

- Tape measure/ stadia rod / ruler
- Level or hand-held sight level (bioretention/biofiltration)
- Halogen Flashlight (confined spaces)
- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: Any, observation is not season dependent.

A. Measurement Locations

- *For structural BMPs with confined space field protocols*
  - There are a variety of proprietary systems available that treat stormwater. Treatment vaults are an example of proprietary BMPs with confined space. BMP RAM users **should not** enter confined space for any reason. Each manufacturer has specific installation specifications and maintenance recommendations. The BMP RAM user must determine the specific configuration of the system and associated access ports in order to perform the appropriate remaining capacity field observations. Underground structural BMPs vary greatly in their individual design characteristics, but all have one or more chambers where floatables and sediment accumulate.

  - Consult available documentation provided by the manufacturer to locate access points (manholes) where vertical measurements to bottom can be made with stadia rod. Identify as many access chambers as possible to improve the spatial distribution of material accumulation estimates. In most configurations, a maximum of 5 discrete measurements is adequate. The measurement locations should be verified in the field.
  - Each access port (i.e., manhole) should be identified with an ID to distinguish it and ensure it can be relocated by the field personnel during each subsequent BMP RAM field observation.
  - Write the ID on the manhole or on the cement nearby with spray paint for reference in the future. Note locations of each access point in field notebook, drawing a sketch of site.
- *For decentralized BMPs:*
  - Locate where outflow occurs. Often the outlet is just the top of vertical corrugated metal pipe (CMP), a raised grate, or sump at the down gradient edge. If there are multiple outlets, each outlet should be considered a unique measurement location.
  - Identify each outlet with a simple ID to ensure it can be relocated by field personnel during subsequent field observations.

- Write the ID on the outlet or on the cement nearby with spray paint for reference in the future.

B. Observations

- When the structural BMP is known to be free of debris (following installation and/or recent maintenance) measure the depth:
  - Treatment Vaults: from the bottom of the clean vault to top of the manhole used for access for each measurement location.
  - Bioretention/Biofiltration: from the lowest point of the ponding surface to the invert of the outlet structure.
  - Sediment Trap: from the bottom of the clean BMP to the lowest elevation at which water can flow out of the BMP.
- For each identified measurement location, enter a brief description, recommended as the ID written at the access point or outlet, as Description and the total depth measured as Depth (ft).

FIELD OBSERVATION

Personnel Required: One to two field workers will require 10-15 minutes to conduct observation, depending upon the number of measurements required.

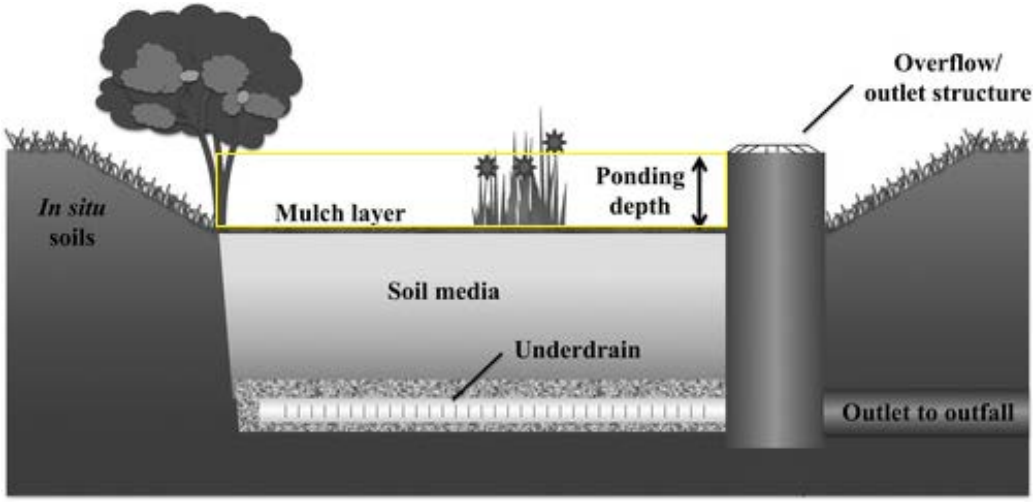
Equipment Required:

- Tape measure/ stadia rod / ruler
- Level or hand-held sight level (bioretention/biofiltration)
- Halogen Flashlight (confined spaces)
- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: Any, observation is not season dependent.

A. Preparation

- Avoid making observation within 24hrs of most recent runoff event.
- Arrive at structural BMPs and locate measurement locations. Identify and verify each measurement location and ID.

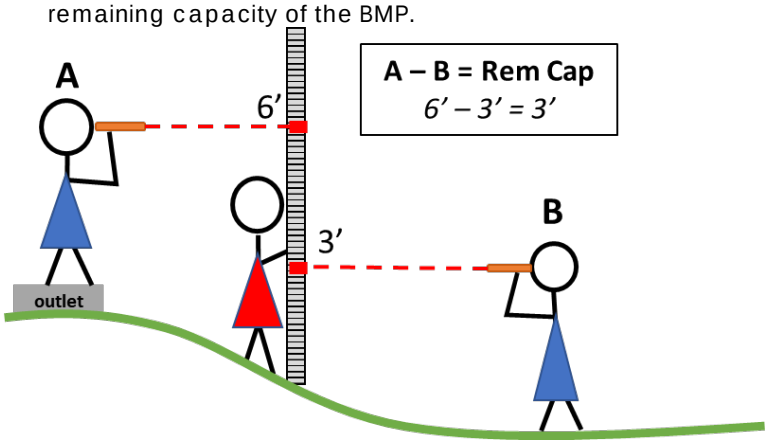


B. Observation

- Measure the remaining capacity of the structural BMP:

- **Confined Spaces**: Measure and record the vertical distance between the bottom of the system and the top manhole using a stadia rod or tape measure.
- **Bioretention/Biofiltration**: Locate the ponding area within the structural BMP and identify the deepest location. Measure the vertical distance from the deepest spot to the invert of the outlet structure (as illustrated in yellow in the schematic above). In some cases, the ponding area may be some distance from the outlet structure. Remaining capacity measures the vertical ponding depth at the deepest point and can be measured in 2 ways:
  - Use a tape measure and ruler. One field crew member pulls a tape measure level from the outlet to the deepest point. The second field staff uses a ruler or a second tape measure to determine the vertical ponding depth.
  - Utilize a handheld sight level tool and a stadia rod to determine an accurate ponding depth. Sight levels can be used to calculate depth in multiple ways. Use preferred method or follow the example below.

    - Have one field crew member hold a stadia rod at a point in between the outlet and the lowest ponding depth. The other field crew member uses the handheld sight level to make 2 separate height readings on the stadia rod – one from the outlet structure looking towards the deepest part (A) and another standing in the deepest part looking towards the outlet (B). Calculate the difference in stadia rod readings. This difference is the remaining capacity of the BMP.



- **Sediment Trap**: Measure the vertical distance between the lowest elevation at which water can flow out of the BMP and the top of the material accumulated within it.
  - In order to measure the amount of material accumulated, be careful not to force the measuring tool into accumulated debris.
  - Record depth to the nearest tenth of foot (Depth).
  - Repeat for all established measurement locations.

FIELD OBSERVATION PROTOCOL

Standing Water

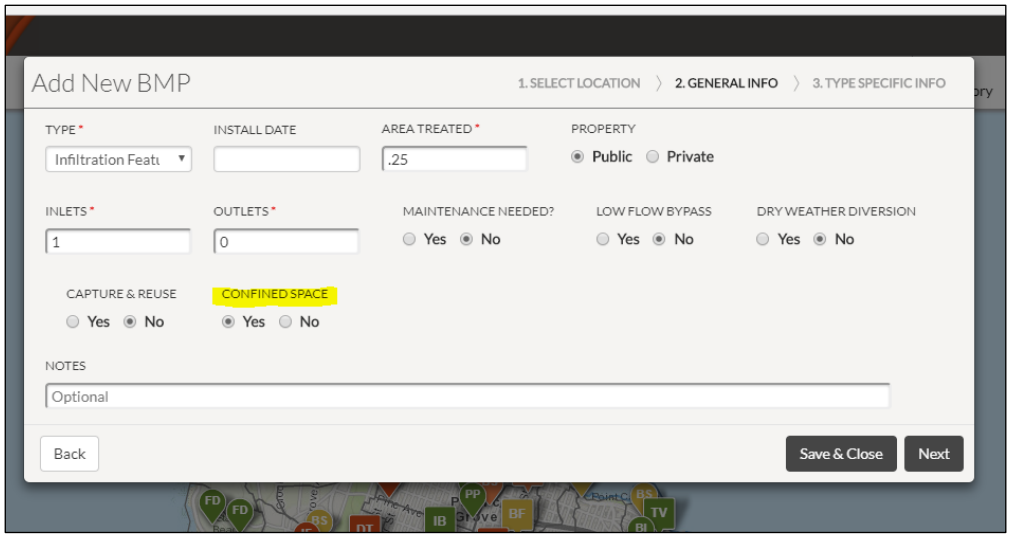
Some structural BMPs are constructed underground, or require entry through manholes, limiting access to make standard field observations. BMP RAM field personnel are not certified to enter confined spaces to perform assessments or make observations. Some confined space structural BMPs have observation ports to inspect standing water or material accumulation. Qualitative observations can be made by field personnel when observation ports exist. Instances where observation ports do not exist, or field personnel cannot access or see into the BMP whatsoever, are classified as "Inaccessible" and must be maintained on recommended maintenance interval specified by the manufacturer.

This confined space protocol provides the user with the proper steps to inventory and assess inaccessible confined spaces and confined spaces with visual ports.

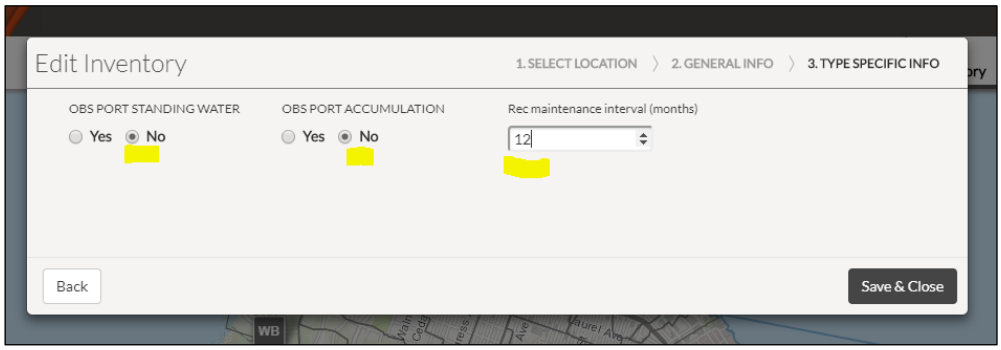
Objective: Determine the presence/absence of standing water or material accumulation in the confined space.

Note: Inaccessible BMPs are designated at inventory under general information.

Fill out all relevant general information about the BMP. Indicate the BMP is in a confined space. Click Next.



Click "No" when no visual observation ports exist to view standing water or material accumulation. Enter the manufacturer's specified maintenance interval.



BENCHMARK OBSERVATION @ INACCESSIBLE BMP

No benchmark observations are necessary for Inaccessible BMPs.

FIELD ASSESSMENT @ INACCESSIBLE BMP

Field assessments will calculate score based on maintenance intervals.

BENCHMARK OBSERVATION @ OBSERVATION PORTS

No benchmark observations are necessary for Confined Space BMPs.

FIELD OBSERVATION @ OBSERVATION PORTS

Personnel Required: One field worker will require 10 minutes to make visual assessment.

Equipment Required:

- Halogen Flashlight (good flashlight is very important)
- Stadia rod and/or long wooden dowel
- Field datasheet, either hard copy or accessed on website through mobile device
- *Map of structural BMP locations*

Optimal time to perform: Not season dependent, but recommended from May 1 – June 30th.

A. Preparation

- Avoid making observations within 24hrs of most recent runoff event.

B. Observations

- Has a runoff event occurred in the past 24 hrs (yes/no)?
  - If yes, return at time when answer is NO.
- Open the access observation port to inspect for standing water.
- Visually inspect each observation port. Does the structure have standing water on the floor? If yes, return 24 hours later to inspect again and if standing water still exist (yes/no).

FIELD OBSERVATION PROTOCOL

Substrate Type

Objective: Qualitatively estimate the biogeochemical cycling capacity of the substrate material of the structural BMP.

BENCHMARK OBSERVATION

No benchmark observations are necessary for this protocol.

FIELD OBSERVATION

Personnel Required: One field worker will require 10-15 minutes to conduct observation.

Equipment Required:

- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations
- Hand trowel
- Water
- Towel

Optimal time to perform: Any, observation is not season dependent.

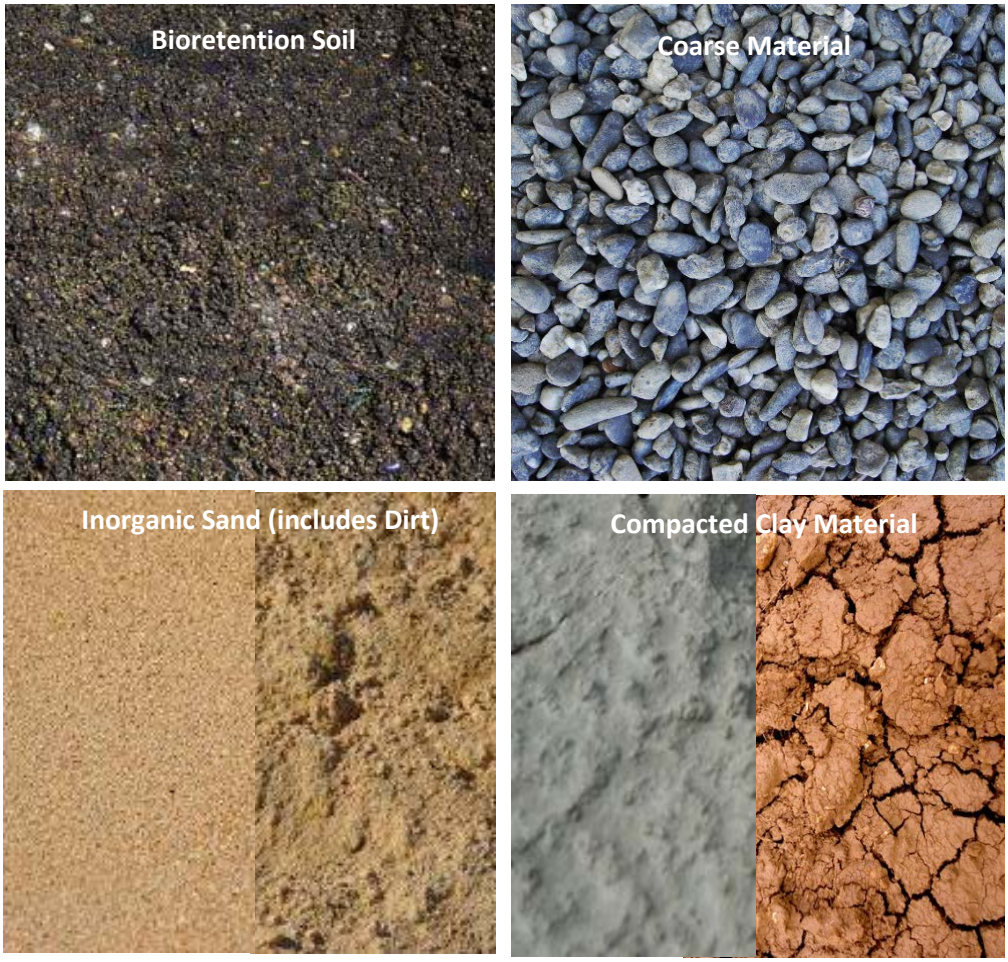
A. Preparation

- Upon arrival to the site the user should walk the entire boundary of the structural BMP and visually determine structural BMP inundation regime boundaries. Visually identify areas within the primary stormwater flow path that are frequently inundated (BMP inlet, outlet, and topographic lows where water collects during smaller sized events).
- Divide the area of frequent inundation into equal thirds along the primary flow path, where the first third is closest to the inlet and the last third is closest to the outlet.
- It is not necessary for user to repeat exact measurement location during each subsequent field observation.

B. Observation

- Within each third of the BMP, select a location within the primary flow path to collect a sample.
- Use the hand trowel to remove any surface layer material (mulch, pea gravel, vegetation debris) to investigate the top 6 inches of the substrate material.

- Determine the primary substrate with the highest distribution at the location as:
    - Bioretention soil (BRS) – uncompacted, soft, organic material that is easy to dig and crumbles in hand.
    - Coarse material – larger-sized cobbles, gravel, pea gravel or coarse sand with minimal organic content.



    - Inorganic sand – smaller size material that is easy to dig, easily sifts through fingers. Regular, uncompacted dirt with little organic material is considered functionally equivalent to inorganic sand, and should be classified accordingly.
    - Clay compacted soil – fine grained, dense material that is hard to dig. If water is added to this material, you can easily roll between your hands to create a 'worm'.
- If more than one substrate material is present, determine the substrate type with the second highest distribution from the four options.
- For each location, use the drop-down list to select the primary and secondary (if present) substrate types.
- If the user is unsure of which substrate to select, follow the soil texture flowchart on the following page (Modified from S.J. Thien. 1979. *A flow diagram for teaching texture by feel analysis.* Journal of Agronomic Education. 8:54-55).
- Once the texture is determined, enter the correct substrate type in BMP RAM.

Start
Place approximately 25g soil in palm. Add water dropwise and knead the soil to break down all aggregates. Soil is at the proper consistency when plastic and moldable, like moist putty.
Add dry soil to soak up water
yes
yes
Does soil remain in a ball when squeezed?
no
Is soil too dry?
no
Is soil too wet?
no
Inorganic Sand
yes
Place ball of soil between thumb and forefinger gently pushing the soil with the thumb, squeezing it upward into a ribbon, Form a ribbon of uniform thickness and width. Allow the ribbon to emerge and extend over the forefinger, breaking from its own weight.
Inorganic Sand
no
Does soil form a ribbon?
yes
Does soil make a weak ribbon less than 2.5cm long before breaking?
no
Does soil make a medium ribbon 2.5-5 cm long before breaking?
no
Does soil make a strong ribbon 5cm or longer before breaking?
yes
yes
yes
Excessively wet a small pinch of soil in palm and rub with forefinger.
Bioretention Soil
yes
Does soil feel very gritty?
Bioretention Soil
yes
Does soil feel very gritty?
Bioretention Soil
yes
Does soil feel very gritty?
no
no
no
Bioretention Soil
yes
Does soil feel very smooth?
Clay Material
yes
Does soil feel very smooth?
Clay Material
yes
Does soil feel very smooth?
no
no
no
Bioretention Soil
yes
Neither gritty nor smooth
Clay Material
yes
Neither gritty nor smooth
Clay Material
yes
Neither gritty nor smooth

FIELD OBSERVATION PROTOCOL

Vegetation Cover

Objective: Qualitatively estimate the relative density of each type of vegetative present within a structural BMP.

BENCHMARK OBSERVATION

No benchmark observations are necessary for this protocol. Benchmark values are set as default values based on typical design standards by structural BMP type.

FIELD OBSERVATION

Personnel Required: One field worker will require 10-15 minutes to conduct observation, depending upon the number of measurements required.

Personnel Required: One field worker will require 10 minutes to conduct observations.

Equipment Required:

- Field datasheet, either hard copy or accessed on website through mobile device
- Map of structural BMP locations

Optimal time to perform: May 1st -June 30th.

A. Preparation

- Qualitative estimates of % cover can be difficult and subject to user discretion. To improve the consistency of the observation results across users, upon arrival to the site the user should walk the entire boundaries of the structural BMP and visually determine structural BMP inundation regime boundaries. Visually identify areas within the primary stormwater flow path that are frequently inundated (BMP inlet, outlet, and topographic lows where water collects during smaller sized events). Then locate and evaluate the areas that are at a slightly higher elevation and are occasionally inundated during larger volume runoff events. Assess the vegetation within the area of the two inundation regimes (frequently and occasionally inundated).
- The user must review and become familiar with potential examples of the 3 different vegetation types: wetland/riparian species, trees, and grasses. These primary vegetation types defined by the BMP RAM require different inundation and soil saturation regimes. Thus, the user may be able to identify distinct vegetation zonations within a structural BMP that has a soil substrate and inundation regime capable of supporting vegetation.
- The user must estimate % vegetation cover for the vegetation that is rooted within the potentially inundated surface area of the structural BMP. The user will not consider the vegetation cover that is rooted at an elevation higher than the top of the structural BMP outlet.

B. Observation

- For each vegetation type, estimate the % cover within the structural BMP surface areas that is in the area of frequent and occasional inundation. Enter this estimate in the field datasheet.
- The estimate percent cover of bare soil is automatically calculated by the database so that the total percent cover sums to 100.

FIELD OBSERVATION DATASHEETS

The user will populate field datasheets by structural BMP type when conducting BMP RAM field observations. Blank **field datasheets** are provided in the following order:

Centralized BMPs:
1. Bed Filter
2. Detention Basin
3. Dry Basin
4. Infiltration Basin
5. Media Filter
6. Treatment Vault
7. Wet Basin

Decentralized BMPs:
8. Biofiltration
9. Bioretention
10. Bioswale
11. Filtration Device
12. Infiltration Feature
13. Pervious pavement
14. Sediment Trap
15. Settling Basin

Conveyance BMP:
16. Drop Inlet

Bed Filter

BMP RAM v4.0 Field Observation Datasheet	
BMP ID	
Observation Date	
Observer Name	

Permeability		
Location	Time (minutes & seconds)	Remaining water height (inches)
First Third - Frequent		
First Third – Occasional		
Middle Third – Frequent		
Middle Third – Occasional		
Last Third – Frequent		
Last Third - Occasional		

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Detention Basin

BMP RAM v4.0 Field Observation Datasheet				
BMP ID				
Observation Date				
Observer Name				
Material Accumulation (Depth)				
Staff Plate Description				Depth (ft) Lowest value visible
Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Dry Basin

BMP RAM v4.0 Field Observation Datasheet	
BMP ID	
Observation Date	
Observer Name	

Vegetation Cover

	Vegetation Type				
	Wetland / Riparian Species	Tree Species	Grass Species	No Vegetation (Bare Soil)	Total = 100%
% cover					

Infiltration Observations

Number of Surface Types & # of measurements necessary		Measurement Type	

Location

LOC	1		2		3		4		5		6		7	
MSMTS	t*	r*	t	r	t	r	t	r	t	r	t	r	t	r

***Where t is Time in minutes and r is Reading in inches**

Material Accumulation

Staff Plate Description	Depth (ft) Lowest value visible

Conveyance

Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Infiltration Basin

BMP RAM v4.0 Field Observation Datasheet	
BMP ID	
Observation Date	
Observer Name	

Vegetation Cover

	Vegetation Type				
	Wetland / Riparian Species	Tree Species	Grass Species	No Vegetation (Bare Soil)	Total = 100%
% cover					

Infiltration Observations

Number of Surface Types & # of measurements necessary*		Measurement Type	

Location

LOC	1		2		3		4		5		6		7	
MSMTS	t*	r*	T	r	t	r	t	r	t	r	t	r	t	r

***Where t is Time in minutes and r is Reading in inches**

Conveyance

Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Media Filter

BMP RAM v4.0 Field Observation Datasheet				
BMP ID				
Observation Date				
Observer Name				
Standing Water				
Does the floor of the structural BMP have standing water? (Y/N)				
If yes, repeat observation in 24 – 48hrs: Does the floor of the structural BMP have standing water? (Y/N)				
Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Treatment Vault

BMP RAM v4.0 Field Observation Datasheet				
BMP ID				
Observation Date				
Observer Name				
Remaining Capacity (Depth)				
# of measurements				
Location Description				Depth (ft)
Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Wet Basin

BMP RAM v4.0 Field Observation Datasheet					
BMP ID					
Observation Date					
Observer Name					
Vegetation Cover					
	Vegetation Type				
	Wetland / Riparian Species	Tree Species	Grass Species	No Vegetation (Bare Soil)	Total = 100%
% cover					

Material Accumulation	
Staff Plate Description	Depth (ft) Lowest value visible

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Biofiltration

BMP RAM v4.0 Field Observation Datasheet		
BMP ID		
Observation Date		
Observer Name		
	Substrate Type	
Location	Primary Type	Secondary Type
First Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Middle Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Last Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Permeability		
Location	Time (minutes & seconds)	Remaining water height (inches)
First Third - Frequent		
First Third – Occasional		
Middle Third – Frequent		
Middle Third – Occasional		
Last Third – Frequent		
Last Third - Occasional		
Remaining Capacity (Depth)		
# of measurements		
Location Description		Depth (ft)

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Bioretention

BMP RAM v4.0 Field Observation Datasheet		
BMP ID		
Observation Date		
Observer Name		
	Substrate Type	
Location	Primary Type	Secondary Type
First Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Middle Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Last Third	Bioretention Soil Coarse Material Inorganic Sand Clay	Bioretention Soil Coarse Material Inorganic Sand Clay
Permeability		
Location	Time (Minutes & Seconds)	Remaining water height (inches)
First Third - Frequent		
First Third – Occasional		
Middle Third – Frequent		
Middle Third – Occasional		
Last Third – Frequent		
Last Third - Occasional		
Remaining Capacity (Depth)		
# of measurements		
Location Description		Depth (ft)

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Bioswale

BMP RAM v4.0 Field Observation Datasheet					
BMP ID					
Observation Date					
Observer Name					
Vegetation Cover					
	Vegetation Type				
	Wetland / Riparian Species	Tree Species	Grass Species	No Vegetation (Bare Soil)	Total = 100%
% cover					

Permeability		
Location	Time (minutes & seconds)	Remaining water height (inches)
First Third - Frequent		
First Third – Occasional		
Middle Third – Frequent		
Middle Third – Occasional		
Last Third – Frequent		
Last Third - Occasional		

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Sediment Trap

BMP RAM v4.0 Field Observation Datasheet					
Observation Date					
Observer Name					
Remaining Capacity		**Conveyance**			
BMP ID	Depth (ft)	Inlet/Outlet TCD (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
				Requires debris removal?	Possible advanced maintenance?
			(Y/N)	(Y/N)	(Y/N)

Notes:

Filtration Device

BMP RAM v4.0 Field Observation Datasheet					
Observation Date					
Observer Name					
Remaining Capacity		**Conveyance**			
BMP ID	Depth (ft)	Inlet/Outlet TCD (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
				Requires debris removal?	Possible advanced maintenance?
			(Y/N)	(Y/N)	(Y/N)

Notes:

Infiltration Feature

BMP RAM v4.0 Field Observation Datasheet					
BMP ID					
Observation Date					
Observer Name					
Vegetation Cover					
	Vegetation Type				
	Wetland / Riparian Species	Tree Species	Grass Species	No Vegetation (Bare Soil)	Total = 100%
% cover					

Permeability		
Location	Time (minutes & seconds)	Remaining water height (inches)
First Third - Frequent		
First Third – Occasional		
Middle Third – Frequent		
Middle Third – Occasional		
Last Third – Frequent		
Last Third - Occasional		

Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Pervious pavement

BMP RAM v4.0 Field Observation Datasheet				
BMP ID				
Observation Date				
Observer Name				
Permeability *				
Location	Time (minutes & seconds)	Remaining water height (inches)		
Measurement 1				
Measurement 2				
Measurement 3				
Measurement 4*				
Measurement 5*				
Measurement 6*				
Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

*dependent on size of pervious pavement; 3 measurements are required, and additional measurements should it be larger than 3000 sq-ft

Notes:

Settling Basin

BMP RAM v4.0 Field Observation Datasheet				
BMP ID				
Observation Date				
Observer Name				
Material Accumulation (Depth)				
Staff Plate Description				Depth (ft) Lowest value visible
Conveyance				
Location (Inlet/ Outlet)	Trash Capture Device (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
			Requires debris removal?	Possible advanced maintenance?
		(Y/N)	(Y/N)	(Y/N)

Notes:

Drop Inlet

BMP RAM v4.0 Field Observation Datasheet			
Observation Date			
Observer Name			
Conveyance			
BMP ID TCD (Y/N)	Functioning as intended?	If **NOT** functioning as intended, indicate type of action required	
		Requires debris removal?	Possible advanced maintenance?
	(Y/N)	(Y/N)	(Y/N)

Notes: