MONTANA STATE MEMORANDUM

TO: KYLE MEHRENS

FROM: MADELEINE PORTER, ROBERT ROOT, ZACK RAVEN, AND JACK KAHLE

SUBJECT: CITY OF BOZEMAN STORMWATER MANAGEMNT ASSESSMENT

DATE: APRIL 29, 2020

CC: CATHERINE KIRKLAND

The purpose of this memo is to provide an overview of the proposed homeowner association's, stormwater facility assessment tools and implementation plan. With over 600 stormwater facilities constructed in the past 30 years, the city does not have the funding to provide adequate inspection of all stormwater facilities. Recently the city found out that only 25% of these facilities were being maintained properly. Many of these facilities are located on private subdivisions. The city is having trouble mandating maintenance of the stormwater facilities because the subdivisions homeowner's association (HOA) have jurisdiction over them. The main issue is unmaintained facilities can build up sediment and vegetation over time. With an increase amount of sediment and vegetation build up, they start to impede the outflow piping, as well as reduce the flow though the facilities. Below is the proposed solution to quantitatively assess HOA stormwater facilities.

To approach this problem, a quantitative system will be put in place that will work for all subdivision stormwater facilities. The methods help determine the loss in capacity of the stormwater facilities. These systems will be simplistic for anyone to follow. HOA representatives would be able to assess them unaccompanied by city staff. The data collected will then be used to show the HOA that their stormwater facilities need maintenance.

Four different methods are outlined in the assessment sheet for determining the loss of capacity in each stormwater facility. Method 1 can be done when a pond has standing water in it. This method is conducted by casting a sonar bobber into the stormwater facility and measuring the depth down to the bottom. Method 2 uses basic surveying equipment to determine the sediment buildup by monitoring the elevation changes in the dry pond. Method 3 can be done with a dry stormwater facility and is conducted by inserting a pvc tube into the basins soil and collecting a soil sample. From the sample the thickness of built up sediment can be measured and then used to calculate the reduction in the volume of the basin. The instructions for conducting these methods can be found using the attached instruction sheet.

The alternatives are relatively inexpensive, approximately $240.00 for method 1 and $10.00 for method 3. While method 2 might be the most expensive option, if the HOA and city are willing to work together it should cost the city any extra money. Given the methods low price point, a minimal increase in HOA fees would be experienced by residences, lowering the possibility of upsetting residents. This system will allow the city to keep adequate records and hold the HOAs responsible for not properly maintaining their facilities all while not greatly increasing funding for Bozeman's stormwater division.

INSTRUCTIONS

Pond

If a stormwater pond has elevated standing water in it, there may be a blockage in the outlet structure. This can cause flooding, erosion, and pollution of nearby water bodies. It is important to recognize this problem and solve it. An inexpensive sonar buoy can be bought online and can give the user the water depth if deemed necessary. This water depth should be monitored every year. With a standing water pond, most of the data will have to come from visual observations. Record the appearance of the pond in the provided assessment sheet. If the pond is clear and the bottom looks clean, it is likely that this pond is in good condition. If the pond is silty or cloudy, it is likely a rain event recently occurred, possibly giving a reason to elevated water depths. A swamp-like pond would be a clear sign of too much sediment and poor maintenance.

Elevation: Level Line Method

In a dry stormwater pond, it is possible to find out exactly how much sediment has built up in the pond since the last visit. A level line method will be used to do this. This method is a common surveying technique and does not require very expensive equipment. A solid benchmark that is unlikely to move is the most important part of this method. Common examples of benchmarks are fire hydrants, corners of concrete pads, a nail in a power pole, etc. An auto-level is commonly used for this technique, but it could also be completed using a common laser level (often sold at hardware stores). If there is access to an auto-level, it will then be set up over the benchmark and made level. It is very important that an accurate height of this instrument be found to the nearest hundredth of an inch. Next, the user will look through the auto-level and observe a measurement on a leveling rod. Again, this piece of survey equipment could be substituted for a yardstick or a long pole with a precise marking for each tenth of a foot. Using the provided assessment sheet, the instrument height and rod-reading will be recorded. To find an accurate elevation of the pond sediment, the user will subtract the instrument height from the rod reading and record this in the assessment sheet. This method uses a local elevation system, in other words, you are not finding the ‘feet above sea level’ elevation. This system will, however, allow you to compare elevations from year to year to see changes in sediment depth, which is the primary goal.

Soil Condition:

Using a PVC pipe with a diameter greater than an inch, go to the inlet and outlet structures and collect a soil core sample. Take the pipe and insert it about 12 inches into the soil. Using a twisting motion, pull the pipe up from the ground, making sure soil is contained in the pipe. Once the pipe is out of the ground, discharge the soil from the pipe (try to keep in one piece). Measure the soil sample and document it. Make notes about the soil’s appearance, making sure to highlight any changes to the color or texture of soil layers.

Vegetation:

Follow the outlined instructions on the assessment sheet

Subdivision : _____ **Date:** _____

Inspector: _____

Previous 48 hr Weather: _____

_____

Current Water Depth: _____ **ft**

Pond	**If Standing Water*

Sonar Readings/Water Depth(ft)		
	Previous	Current
INLET		
OUTLET		

Is Water: (*Circle One)*

a. Clear **b.** Silty/cloudy **c.** Swamp Like

Is Inlet Structure Blocked?

Yes No (*Circle One)*

Is Outlet Structure Blocked?

Yes No (*Circle One)*

Notes: _____

ELEVATION: LEVEL LINE METHOD

Bench Mark Location: _____ *(Reference map if needed)*

Instrument Height: _____ ft

Rod Reading: _____ ft

(Continue to next page)

Evelation (Rod Reading -Instrument Height):

_____ ft (Current)

_____ ft (Previous)

Current - Previous = _____ ft (△ Depth)

Soil Condition		*This section only applies to dry basins.	
		Depth (in)	Notes
	INLET		
	OUTLET		

Vegetation	*This section is to help quantify vegetation growth in the basin.

Date Last Mowed: _____

Reed &Weed Growth:	*(Circle One)*

Pond Vegetation:

a. Unchanged **b.** Moderate New Growth **c.** Needs Attendance

Bank Vegetation:

a. Unchanged **b.** Moderate New Growth **c.** Needs Attendance

Debris

Does Pond Need Debris Removal at:

Inlet:	Yes	No	*(Circle One)*
Outlet:	Yes	No	*(Circle One)*
Center:	Yes	No	*(Circle One)*
Banks:	Yes	No	*(Circle One)*