RETENTION BASIN RESTORATION

Aston Township

Delaware County, PA

Prepared For:

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EXECUTIVE SUMMARY

Aston Township owns and maintains various stormwater management facilities throughout the Township. Pennoni Associates conducted detailed investigations of all facilities. All deficiencies have been noted and the following report entails recommended improvements that would enhance the functionality of the stormwater control within the community.

The aforementioned stormwater facilities have been denoted on the enclosed plan (Exhibit 1). Field inspections were performed by Pennoni staff during the months of July and August 2014. The report has been comprised of various sections; investigative reports, recommendations, cost estimates, photos and other pertinent material.

The purpose of this report is to provide Aston Township with an inventory of all Township-owned basins. This report will provide the Township with approximate costs for the recommended improvements. The total cost for all improvements is estimated at $700,000.00 as shown in the cost estimate summary. The goal is to improve the basins thereby providing substantial gains towards meeting the NPDES MS4 requirements. During the field inspections it was observed that most of the outfall structures throughout the Township are degraded galvanized metal risers. It is the intent of this report to recommend improvements to all existing facilities including the replacement off all galvanized metal risers with concrete structures finished with a Brayman Drystack Formliner (Appendix B).

COST ESTIMATE SUMMARY

Aston Township Retention Basin Improvements and Priority Ranking
Engineers Opinion of Probable Cost

Priority	Location	Recommended Improvements	Retention Basin No.	Cost
1	Intersection of Glendale Blvd. and East Dublin Way	Replace degraded outfall structure; clearing and grubbing; install endwall; grading; landscaping	1	$ 138,375.00
2	Behind Houses along Crestview Ln. and Gettysburg Dr.	Clearing and grubing; eradicate invasive species; install an access road; install a draw-down device; install forebays; replace degraded outfall structure	8	$ 89,500.00
3	Intersection of Frazer Ln. and Schick Rd.	Replace degraded outfall structure; install forebays; clearing and grubing; re-establish baseflow	12	$ 50,625.00
4	East Evans Way	Replace degraded outfall structure; clear all inflows; install forebays; install a safety bench around pond perimeter; install aeration device	7	$ 76,500.00
5	Behind Houses along Giles Ln. and Scott Ln.	Install a safety bench around pond perimeter; install forebays; clearing and grubing	11	$ 51,975.00
6	Dudonis Lane	Install a draw-down device; install forebays; landscaping	3	$ 20,925.00
7	West Side of Sunny Bank Lane	Replace degraded outfall structure; install a draw-down device; install forebays; install landforms and baffles	5	$ 35,100.00
8	Intersection of East Dublin Way and Cashel Ct.	Clearing and grubing; eradicate invasive species; install an access road; install a draw-down device; install forebays	2	$ 51,300.00
9	North of the Intersection of Penns Court and Colonial Way	Replace degraded outfall structure; remove sediment buildup near inflow; various grading; install draw-down device	15	$ 23,625.00
10	Cul De Sac of Brake Ln.	Replace degraded outfall structure; install forebays; various grading; install draw-down device	14	$ 23,625.00
11	East side of Scott Ln. at the bend	Replace degraded outfall structure; install forebays; clearing and grubing; landscaping	10	$ 29,025.00
12	East Side of Sunny Bank Lane	Replace degraded outfall structure; install forebays	6	$ 33,075.00
13	Intersection of Thomas Rd. and Aston Ct.	Replace degraded outfall structure; install forebays; remove silt deposits; install a draw-down device	13	$ 28,350.00
14	Intersection of Legion Rd. and Old Pennell Rd.	Install a draw-down device; install forebays; clearing and grubbing	4	$ 15,525.00
15	West of the Intersection of Crestview Ln. and Gettysburg Dr.	Replace degraded outfall structure; install a draw-down device; landscaping; various grading	9	$ 31,700.00
16	West of the Intersection of Hoag Ln. and Birney Hwy.	Remove sediment buildup at inflow; various grading	16	$ 4,995.00
			TOTAL	**$ 704,220.00**

1. RETENTION BASIN NO. 1

1.1. EXISTING CONDITIONS

The existing facility, located west of the intersection of Glendale Boulevard and East Dublin Way, can be characterized as in overall poor condition. The existing facility appears to be short circuiting (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) due to severe erosion and channelization that has occurred in the facility. These channels may be classified as perennial streams due to the presence of significant baseflow that exists (see photo 2). Additional permitting will be required from the DEP for projects with recommended improvements to the perennial streams. The outlet structures are in extremely poor condition and have collapsed. These original riser structures are not functioning properly and therefore do not currently provide the intended stormwater management function (see photo 1). During the inspection on July 17, 2014, the basin bottom was observed as very wet with channelization occurring throughout the facility. The facility appeared to be maintained by mowing, however general maintenance and repairs have not been completed recently. It would appear, based upon the inspection, that a portion of the existing facility was retrofitted recently located on the upstream end of the facility. The retrofit was completed by placing a small riser structure and diverting flood flows around this new water quality improvement. However, this small water quality retrofit improvement has failed due to silt deposition, significant baseflow and invasive plant overgrowth.

Photo 1

Photo 2

1.2. RECOMMENDATIONS

The recommendation is to provide a complete stormwater management retrofit of the existing facility. The retrofitted facility would provide both water quality and quantity management at much higher levels than what is currently being provided in the existing facility. Since the

existing riser structures have failed and significant channel erosion and baseflow exists in the facility, very little quality and quantity control is currently being provided. Furthermore the original design was only intended to provide water quantity management and the existing facility would be brought to current standards that meet the NPDES permit requirements.

The recommendation is to convert the existing facility into a multi-step extended detention pond/wetland system. The system would contain a new riser with a low flow extended detention orifice and approximately four (4) separate wetland/detention pools that contain forebays and drop structures to eliminate erosion. Improvements to the previously retrofitted water quality portion would consist of converting the existing system by removal of invasive species and silt deposition. Significant water quality and quantity benefits could be obtained with this type of retrofitted facility and make substantial gains towards meeting the NPDES MS4 permit requirements (see exhibit 2 for example of proposed retrofit). Final improvements to the basin would be to restore the natural landscape with the use of native species in order to increase infiltration, evapotranspiration and recharge. The native herbaceous materials often require less intensive maintenances efforts and will be selected because they are customarily strong growers with a stronger and denser root and stem systems that do not require chemical treatment.

1.3. ESTIMATED COSTS

The estimated cost of the proposed improvements is **$138,375.00** as shown in the attached cost estimate**.**

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 1 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 8,000.00	$ 8,000.00
2	Clearing and Grubbing	LS	1	$ 2,000.00	$ 2,000.00
3	Endwall/Flared End Section	EA	3	$ 1,500.00	$ 4,500.00
4	Erosion and Sedimentation Controls	LS	1	$ 25,000.00	$ 25,000.00
5	Grading/Earthwork	LS	1	$ 15,000.00	$ 15,000.00
6	Planting/Landscaping	LS	1	$ 15,000.00	$ 15,000.00
7	Mobilization	LS	1	$ 25,000.00	$ 25,000.00
8	Survey	LS	1	$ 8,000.00	$ 8,000.00
				Subtotal	*$ 102,500.00*
9	Construction Inspection				$ 10,250.00
10	Permitting/Engineering/Design				$ 25,625.00
				TOTAL	**$ 138,375.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

2. RETENTION BASIN NO. 2

2.1. EXISTING CONDITIONS

The existing facility is located at the east corner of the intersection of West Dublin Way and East Dublin Way. The existing stormwater basin is functioning as an extended detention pond with a moderate amount of continuous base flow. The facility is approximately 1-acre in size and is heavily vegetated with various species of vegetation (see photo 1). The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on July 17, 2014, the basin appeared to be functioning adequately with the presence of a base flow condition visible at the riser structure and at the outfall endwall (see photo 2). We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak conditions. It was observed that the basin bottom was very wet and had no maintenance access to the basin bottom or the riser outfall structure. The facility appeared to be maintained by mowing on the perimeter bench; however general clearing and grubbing have not been completed recently.

Photo 1

Photo 2

2.2. RECOMMENDATIONS

The recommendation is to eradicate all invasive species throughout the basin and to construct a maintenance access to provide clear access to the bottom of the basin, riser structure, forebays and the outfall. We also recommend that a draw-down device (see exhibit 3) be installed and attached to the existing outfall riser structure to provide both water quality and quantity management at higher levels than what is currently being provided in the existing facility. The addition of a draw down device will need to be investigated further and pond routing computations may be required to confirm that additional storage can be provided. The draw down device will also provide a better protection from debris and clogging, enhancing the

maintenance capacity. Additional improvements would include forebays at the pipe inflows which will offer further protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements. Based upon funding and the basins capacity, the basin could potentially be converted into a wet extended detention pond. By converting the facility at a later date, if capacity exists, additional water quality benefits might be obtained which will provide gains towards meeting the NPDES MS4 permit requirements.

2.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$51,300.00** as shown in the attached cost estimate.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 2 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Clearing and Grubbing	LS	1	$ 5,000.00	$ 5,000.00
2	Invasive Species Eradication	LS	1	$ 5,000.00	$ 5,000.00
3	Access Road for Maintenance	LS	1	$ 2,500.00	$ 2,500.00
4	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
5	Erosion and Sedimentation Controls	LS	1	$ 5,000.00	$ 5,000.00
6	Grading/Earthwork - Forebays	LS	1	$ 5,000.00	$ 5,000.00
7	Mobilization	LS	1	$ 5,000.00	$ 5,000.00
8	Survey	LS	1	$ 8,000.00	$ 8,000.00
				Subtotal	*$ 38,000.00*
9	Construction Inspection				$ 3,800.00
10	Permitting/Engineering/Design				$ 9,500.00
				TOTAL	**$ 51,300.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

3. RETENTION BASIN NO. 3

3.1. EXISTING CONDITIONS

The existing facility is located on the Northern side of Dudonis Lane. The stormwater basin is functioning as a dry extended detention pond. The size of the basin is approximately 5000 square feet and is currently being mowed with no large sized vegetation present within the basin. Due to silt deposition the endwall discharging into the basin has become clogged at the outlet (see photo 1). The riser structure has an existing low flow orifice (see photo 2) that has become clogged with branches, stones, trash and overgrown vegetation; however the basin is generally in good condition. The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on July 17, 2014 the basin appeared to be functioning properly. We recommend that there be a follow up inspection during a heavy storm event to verify that the basin is functioning correctly during storm event peak conditions.

Photo 1

Photo 2

3.2. RECOMMENDATIONS

The recommendation is to clean all debris and silt deposition from the endwall inflow discharge pipe area, remove the "animal screen" from the endwall and to install a forebay at the discharge area. These recommendations will help prevent further silt deposition, clogging and provide additional water quality management. Further upgrades should be made to the riser structure to ensure no future clogging. Our recommendation for the riser structure is to install a horizontal draw-down device (see exhibit 3) to the existing low flow orifice thereby potentially increase the water quality control capacity. Native species shall be planted within the basin in order to increase infiltration, evapotranspiration and recharge. The native herbaceous materials often require less intensive maintenances efforts and will be selected because they are customarily

strong growers with a stronger and denser root and stem systems that do not require chemical treatment.

Additional improvements include the installation of landforms/baffles to reduce short circuit flows during storm events (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment).

3.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$20,925.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 3 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
2	Erosion and Sedimentation Controls	LS	1	$ 1,500.00	$ 1,500.00
3	Grading - Forebay	LS	1	$ 3,000.00	$ 3,000.00
4	Planting/Landscaping	LS	1	$ 4,000.00	$ 4,000.00
5	Mobilization	LS	1	$ 2,500.00	$ 2,500.00
6	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 15,500.00*
7	Construction Inspection				$ 1,550.00
8	Permitting/Engineering/Design				$ 3,875.00
				TOTAL	**$ 20,925.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

4. RETENTION BASIN NO. 4

4.1. EXISTING CONDITIONS

The existing facility is located at the northwest corner at the intersection of Legion Road and Old Pennell Road. The stormwater basin is functioning as a dry extended detention pond and appears to be in good functioning condition. The size of the basin is approximately 13,200 square feet and is currently being mowed. The endwall discharging to the basin has become overgrown with vegetation (see photo 2). The riser structure appears to be in good condition and during the inspection there were no signs of clogging. The perimeter fencing is in fair condition and the access gate has become overgrown with vegetation. It appears that the basin has been accessed through a damaged or altered section that maybe more convenient for the maintenance personnel. During a preliminary inspection on July 17, 2014, the basin appeared to be functioning properly, however we recommend that there be a subsequent inspection during a storm event to verify that the basin is functioning correctly during peak flow conditions.

Photo 1

Photo 2

4.2. RECOMMENDATIONS

The recommendation is to clear all heavy vegetation from the basin area including the endwall discharging into the basin and to install forebays. This installation will offer further protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements. Further upgrades should be made to the riser structure to ensure no future clogging. Our recommendation for the riser structure is to install a draw-down device (see exhibit 3) to the existing low flow orifice to prevent clogging and to potentially increase the water quality control. Additional improvements would consist of

possible earthen berms and baffles to reduce short circuiting (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment).

4.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$15,525.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 4 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
2	Clearing and Grubbing	LS	1	$ 1,500.00	$ 1,500.00
3	Grading - Forebay	LS	1	$ 3,000.00	$ 3,000.00
4	Mobilization	LS	1	$ 2,500.00	$ 2,500.00
5	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 11,500.00*
6	Construction Inspection				$ 1,150.00
7	Permitting/Engineering/Design				$ 2,875.00
				TOTAL	**$ 15,525.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

5. RETENTION BASIN NO. 5

5.1. EXISTING CONDITIONS

The existing facility is located at the northwest corner of the intersection of Sunnybank Lane and Tyrens Road. The existing stormwater basin is functioning as a dry extended detention pond. The size of the facility is approximately 7,500 square feet and is currently being mowed (see photo 1). The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on July 17, 2014, the basin appeared to be functioning properly; however the basin bottom was observed to be very wet. At the time of inspection there was evidence of short circuiting of storm flows (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) and there appeared to be vegetation starting to overgrow the riser structure (see photo 2). The riser was observed to have 1-foot of standing water in the bottom of the structure. As seen in photo 2, the riser structure has a trash rack however the entire structure and trash rack are visually unattractive and the track rack is not securely welded to the structure. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

5.2. RECOMMENDATIONS

The recommendation is to construct a forebay with the possible addition of earthen berm baffles to reduce short circuiting and silt deposition within the basin. The existing riser structure should be replaced with a concrete riser of adequate size and properly designed orifices. We also recommend that a horizontal draw-down device (see exhibit 3) be installed and attached to the outfall riser structure to provide both water quality and quantity management at higher levels than what is currently being provided in the existing facility. The addition of a draw down

device will require further investigation and pond routing computations to confirm that additional storage can be provided. The draw down device will also provide a better protection from debris and clogging, enhancing the maintenance capacity. Additional improvements would include the installation of a forebay to accept overland runoff from the west which will offer further protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements. Additionally, a small pipe on the East side of the facility appears to have been added as a retrofit. This pipe, inlet and outfall appear to be clogged with sediment and we recommend a new system with a forebay be added at this location. This improvement will increase water quality treatment and reduce erosion potential.

5.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$35,100.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 5 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
3	Erosion and Sedimentation Controls	LS	1	$ 3,000.00	$ 3,000.00
4	Grading - Forebay	EA	2	$ 2,500.00	$ 5,000.00
5	Earthwork - Landforms/Baffles	LS	1	$ 4,000.00	$ 4,000.00
6	Mobilization	LS	1	$ 3,000.00	$ 3,000.00
7	Survey	LS	1	$ 2,500.00	$ 2,500.00
				Subtotal	*$ 26,000.00*
8	Construction Inspection				$ 2,600.00
9	Permitting/Engineering/Design				$ 6,500.00
				TOTAL	**$ 35,100.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

6. RETENTION BASIN NO. 6

6.1. EXISTING CONDITIONS

The existing facility is located at the northeast corner of the intersection of Sunnybank Lane and Tyrens Road. The existing stormwater basin appears to have been designed to function as a dry extended detention pond. The size of the facility is approximately 6,500 square feet and is currently being mowed along the perimeter of the basin. The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on July 17, 2014, the basin appeared to be functioning properly; however the basin bottom was observed to be very wet. The basin is overgrown with Cattails, Phragmites and other plant species. At the time of inspection there was evidence of short circuiting of storm flows (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) and there appeared to be vegetation starting to overgrow the riser structure (see photo 1). The inflow has become clogged with silt deposition and is an inadequate conveyance system for stormwater runoff (see photo 2). The location of said inflow is less than ideal as it is located within close proximity of the outfall structure and thus promotes short circuiting. As seen in photo 1, the riser structure has a trash rack however, the entire structure and trash rack are visually unattractive and the trash rack is not securely welded to the structure. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

6.2. RECOMMENDATIONS

The recommendation is to construct a forebay with the possible addition of earthen berm baffles to reduce short circuiting and silt deposition within the basin. The silt deposits in and around the

inflows must be removed and re-graded. The inflow closest to the outfall structure (photo 1) shall be relocated to a more appropriate location within the basin to allow for the proper discharge into the basin. The alternative to relocating the pipe would be to install baffles to circulate the discharge throughout the basin and therefore will further reduce the possibility of any short circuiting. The existing riser structure should be replaced with a concrete riser of adequate size and properly designed orifices. The inflow on the north end of the basin should be cleared of any vegetation. The white PVC yard drain on the north side of the basin should be removed because it is exposed and will cause further erosion and sediment build-up within the basin. Additional improvements would include removing any invasive species within the basin to reduce the future overgrowth of unwanted vegetation. In conclusion, the installation of forebays, baffles and a properly sized outfall structure will offer protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements.

6.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$33,075.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 6 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Erosion and Sedimentation Controls	LS	1	$ 3,000.00	$ 3,000.00
3	Grading - Forebay	EA	2	$ 2,500.00	$ 5,000.00
4	Earthwork - Landforms/Baffles	LS	1	$ 5,000.00	$ 5,000.00
5	Mobilization	LS	1	$ 3,000.00	$ 3,000.00
6	Survey	LS	1	$ 2,500.00	$ 2,500.00
				Subtotal	*$ 24,500.00*
7	Construction Inspection				$ 2,450.00
8	Permitting/Engineering/Design				$ 6,125.00
				TOTAL	**$ 33,075.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

7. RETENTION BASIN NO. 7

7.1. EXISTING CONDITIONS

The existing facility can be accessed from behind the properties along the east side of the cul-de-sac along East Evans Way. The existing stormwater basin appears to have been designed to function as a wet extended detention pond. The size of the facility is approximately 19,400 square feet and is currently being mowed along the perimeter of the pond. The perimeter fencing is in fair to poor condition, but appears to do an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on July 30, 2014, the basin appeared to be functioning as previously altered. There were various weeds and plantings along the perimeter of the pond including a large amount of poison ivy. The inflow has not been maintained and the child-proof rack attached to the headwall has become clogged with debris and leaves. The rip-rap at the discharge point of the inflow has become overgrown with weeds, vines and silt deposition was observed (see photo 2). The ponded water within the basin is covered with algae and there is no aeration within the basin. The riser structure appears to be functioning, however it has become extremely rusted and there are multiple holes near the base of the structure (previously altered) (see photo 1). The riser structure has obvious evidence of degradation and is visually unattractive to the nearby residents. During the inspection, there was a small discharge pipe located at the gate to the basin. It appeared that the pipe was discharging from the adjacent resident's property. Due to the poor location of the drain pipe, it poses as a potential tripping hazard as well as a potential illicit discharge source. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions and observe other noted deficiencies.

Photo 1

Photo 2

7.2. RECOMMENDATIONS

The recommendation is to install a new riser structure and design and construct a safety bench around the wetted perimeter within the basin. Additionally, we recommend that forebays be installed at all inflows present at the site. The silt deposits in and around the inflows must be removed and the headwalls must be maintained properly in the future. The inflow near the southwest entrance to the basin should be re-graded and maintained. Additionally, the inflow near the northwest corner of the basin should have all vegetation removed from the discharge area. The yard drain pipe located at the entrance to the basin should be removed or relocated to a more practical location and determined if illicit discharges exist. It is highly recommended that some form of aeration device be installed within the basin to prevent algae growth and other anaerobic microbes. Additional improvements would include removing any invasive species within the basin to reduce the future overgrowth of unwanted vegetation. In conclusion, the installation of an aeration device, forebays, a safety bench and a properly sized outfall structure will offer additional safety and water quality while improve maintenance activities, thereby providing substantial gains towards meeting the NPDES MS4 permit requirements.

7.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$76,500.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 7 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Erosion and Sedimentation Controls	LS	1	$ 10,000.00	$ 10,000.00
3	Clearing of Inflows	LS	1	$ 500.00	$ 500.00
4	Grading - Forebay	EA	2	$ 2,500.00	$ 5,000.00
5	Grading - Safety Bench	LS	1	$ 5,000.00	$ 5,000.00
6	Mobilization	LS	1	$ 10,000.00	$ 10,000.00
7	Aeration Device	LS	1	$ 10,000.00	$ 10,000.00
8	Survey	LS	1	$ 5,000.00	$ 5,000.00
				Subtotal	*$ 51,500.00*
8	Construction Inspection				$ 5,000.00
9	Permitting/Engineering/Design				$ 20,000.00
				TOTAL	**$ 76,500.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

8. RETENTION BASIN NO. 8

8.1. EXISTING CONDITIONS

The existing facility is located behind the properties along Crestview Lane and Gettysburg Drive. The existing stormwater basin is functioning as a large or regional extended detention facility with a moderate amount of continuous base flow. The facility is approximately 1-acre in size and is heavily vegetated with various species of vegetation (see photo 1). The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. It should be noted that residents have planted a garden and are accessing area through the perimeter fenced area in the North West corner. During a preliminary inspection on July 30, 2014, the basin appeared to be functioning adequately with the presence of a base flow condition visible at the riser structure (see photo 2). The riser structure had a large diameter low flow orifice, which allowed the base flow to bypass the facility without any attenuation (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) within basin. It was observed that the basin bottom was very wet and had no maintenance access to the basin bottom or the riser outfall structure. The facility could potentially be classified as a high hazard dam and the dam area is currently only being partially maintained. The facility is being mowed on the perimeter bench; however general clearing and grubbing have not been completed recently. It was observed that various locations along the perimeter, including the dam, have evidence of erosion, holes and gullies.

Photo 1

Photo 2

8.2. RECOMMENDATIONS

The recommendation is to eradicate all invasive species throughout the basin and to construct a maintenance access to provide clear access to the bottom of the basin, riser structure, forebays and the outfall. We also recommend that a draw-down device (see exhibit 3) be installed and

attached to the existing outfall riser structure to provide both water quality and quantity management at higher levels than what is currently being provided in the existing facility. The addition of a draw down device will need to be investigated further and pond routing computations may be required to confirm that additional storage can be provided. The draw down device will also provide a better protection from debris and clogging, enhancing the maintenance capacity. Additional improvements would include forebays at the pipe inflows which will offer further protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements. We also recommend that there be a subsequent inspection including a geotechnical evaluation of the facility including the dam area, outfall pipe and structure. Additional inspections during a heavy rain event may be necessary to verify that the basin is functioning correctly during high flow/peak conditions. There is potential loss of life associated with the failure of this dam during a storm event. Several homes exist directly down stream of this facility. The outfall pipe (appears to approximately 60" diameter) is placed between two residential homes. This outfall pipe doesn't appear to be encased in concrete and the condition is unknown. We recommend a full geotechnical inspection of the outfall system be completed.

8.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$89,500.00** as shown in the attached cost estimate.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 8 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Clearing and Grubbing	LS	1	$ 5,000.00	$ 5,000.00
2	Invasive Species Eradication	LS	1	$ 5,000.00	$ 5,000.00
3	Access Road for Maintenance	LS	1	$ 10,000.00	$ 10,000.00
4	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
5	Erosion and Sedimentation Controls	LS	1	$ 10,000.00	$ 10,000.00
6	Grading/Earthwork - Forebays	LS	1	$ 10,000.00	$ 10,000.00
7	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
8	Mobilization	LS	1	$ 5,000.00	$ 5,000.00
9	Survey	LS	1	$ 8,000.00	$ 8,000.00
				Subtotal	*$ 61,500.00*
10	Construction Inspection				$ 8,000.00
11	Permitting/Engineering/Design				$ 20,000.00
				TOTAL	**$ 89,500.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

9. RETENTION BASIN NO. 9

9.1. EXISTING CONDITIONS

The existing facility is located west of the intersection of Crestview Lane and Gettysburg Drive. The size of the facility is approximately 17,400 square feet and appears to have regular maintenance and mowing. The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. The existing facility appears to be short circuiting (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) due to erosion and channelization that has occurred within the facility. These channels may be classified as perennial streams due to the presence of significant baseflow that exists. Additional permitting will be required from the DEP for projects with recommended improvements to the perennial streams. The outlet structure appears to be allowing the baseflow to pass without attenuation and could be considered visually unattractive. The basin has incorporated good environmental features and with the exception of the baseflow short circuiting, the basin appears to be in overall good condition. The emergency spillway is unique in that it is piped with the use of inlets at the top and bottom of the dam/berm and further inspections should be done to confirm that adequate capacity exists during large storm events. Basin No. 8 appears to drain directly into this basin, so further analysis is recommended to confirm that adequate volume and capacity is being provided within the basin(s). During the inspection on July 30, 2014, the basin bottom was observed as very wet with channelization/erosion occurring throughout the facility.

Photo 1

Photo 2

9.2. RECOMMENDATIONS

The recommendation is to replace the existing riser structure with one of adequate sized and properly designed orifices to prevent future short circuiting within the basin. The outfall structure shall have a draw-down device (see exhibit 3) attached, to provide both water quality and quantity management at higher levels than what is currently being provided in the existing facility. Additional improvements to the basin consist of restoring the natural landscape with the use of native species in order to increase infiltration, evapotranspiration and recharge. The native herbaceous materials often require less intensive maintenances efforts and will be selected because they are customarily strong growers with a stronger and denser root and stem systems that do not require chemical treatment. Significant water quality and quantity benefits could be obtained with the recommended improvements to the facility and make substantial gains towards meeting the NPDES MS4 permit requirements.

9.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$31,700.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 9 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Draw-Down Device	EA	1	$ 2,500.00	$ 2,500.00
3	Erosion and Sedimentation Controls	LS	1	$ 1,500.00	$ 1,500.00
4	Landscaping - Native Plantings	LS	1	$ 3,000.00	$ 3,000.00
5	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
6	Grading and Stabilizing Channels	LS	1	$ 5,000.00	$ 5,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 22,000.00*
7	Construction Inspection				$ 2,200.00
8	Permitting/Engineering/Design				$ 7,500.00
				TOTAL	**$ 31,700.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

10. RETENTION BASIN NO. 10

10.1. EXISTING CONDITIONS

The existing facility is located along the south side of Scott Lane. The existing stormwater basin appears to have been designed to function as a dry extended detention pond. The size of the facility is approximately 26,600 square feet and is currently being mowed along the perimeter of the basin. The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on August 7, 2014, the basin appeared to be functioning properly; however the basin bottom was observed to be very wet and overgrown with Phragmites and other plant species. At the time of inspection there was evidence of short circuiting of storm flows (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment). There also appeared to be vegetation starting to overgrow the riser structure (see photo 1). The inflow appears to be structurally stable; however, there is an abundance of vegetation within close proximity to the structure (see photo 2). As seen in photo 1, the riser structure has a trash rack however the entire structure and trash rack are visually unattractive and the trash rack is not securely welded to the structure. Yard drains discharging into the basin showed evidence of erosion within the discharge area. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

10.2. RECOMMENDATIONS

The recommendation is to construct a forebay with the possible addition of earthen berm baffles to reduce short circuiting and silt deposition within the basin. All invasive vegetation should be removed from the basin and replaced with native species. We recommend restoring the natural landscape with the use of native species in order to increase infiltration, evapotranspiration and recharge. The native herbaceous materials often require less intensive maintenances efforts and will be selected because they are customarily strong growers with a stronger and denser root and stem systems that do not require chemical treatment.

The existing riser structure should be replaced with a multistage concrete principal spillway of adequate size and properly designed orifices to control multiple storm events. The inflow on the northwest end of the basin should be cleared of any vegetation. The yard drains discharging to the basin should be removed to prevent future erosion and sediment build-up within the basin. The installation of forebays, baffles and a properly sized principal spillway structure will offer improved conveyance and flood control, protection from erosion, enhanced water quality treatment and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements. To further enhance pollutant reduction capacity, the basin could be retrofitted to an extended detention shallow wetland facility. The existing hydrology appears to support a wetland system that would offer improved sediment and nutrient removal capacity.

10.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$31,700.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 10 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Grading - Forebays	EA	1	$ 2,000.00	$ 2,000.00
3	Erosion and Sedimentation Controls	LS	1	$ 2,500.00	$ 2,500.00
4	Clearing and Grubing	LS	1	$ 4,000.00	$ 4,000.00
5	Landscaping - Native Plantings	LS	1	$ 3,000.00	$ 3,000.00
6	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 21,500.00*
8	Construction Inspection				$ 2,150.00
9	Permitting/Engineering/Design				$ 5,375.00
				TOTAL	**$ 29,025.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

11. RETENTION BASIN NO. 11

11.1. EXISTING CONDITIONS

The existing facility can be accessed from behind the properties along the south side of Giles Lane. The existing stormwater basin appears to have been an existing pond that was retrofitted to function as a wet extended detention pond. The size of the facility is approximately 1-Acre and is currently being mowed along the perimeter of the pond; however, there appears to be no safety bench along the water surface perimeter. The fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on August 7, 2014, the basin appeared to be functioning properly. The perimeter of the wet pond was heavily vegetated with various plantings including large diameter trees. The inflow has not been maintained, there was vegetation growing along the wingwalls and the structural integrity is possibly compromised. The pond water was observed to be dirty and murky, evidence of erosion and suspended solids. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

11.2. RECOMMENDATIONS

The recommendation is to clear all invasive vegetation along with any large diameter trees that would compromise the integrity of the basin. A safety bench is recommended to be constructed around the wetted perimeter of the basin. Additionally, we recommend that all vegetation surrounding the inflow be removed as well as forebays be installed at all inflows present at the site. We also recommend that vegetation be cleared away from the bank near the principal spillway to allow visual inspection and access for maintenance. General maintenance and shrub

cleaning is required; concluding the clearing and grubbing a subsequent inspection shall be performed to verify the functionality of the basin.

11.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$51,975.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 11 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Grading - Safety Bench	EA	1	$ 15,000.00	$ 15,000.00
2	Grading - Forebay	LS	1	$ 5,000.00	$ 5,000.00
3	Erosion and Sedimentation Controls	LS	1	$ 2,500.00	$ 2,500.00
4	Clearing and Grubing	LS	1	$ 12,000.00	$ 12,000.00
5	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
6	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 38,500.00*
7	Construction Inspection				$ 3,850.00
8	Permitting/Engineering/Design				$ 9,625.00
				TOTAL	**$ 51,975.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

12. RETENTION BASIN NO. 12

12.1. EXISTING CONDITIONS

The existing facility can be accessed from the cul-de-sac along West Evans Way. The size of the facility is approximately 38,000 square feet and is heavily wooded with no stabilized grasses within the basin. The existing facility appears to be short circuiting due to severe erosion and channelization that has occurred in the facility. These channels may be classified as perennial streams due to the presence of significant baseflow that exists (see photo 2). Additional permitting will be required from the DEP for projects with recommended improvements to the perennial streams. The outlet structure is in extremely poor condition and has become clogged with silt covering the low flow orifice (see photo 1). During a preliminary inspection on August 7, 2014, the basin appeared to be functioning properly; however the basin bottom was observed to be very wet with channelization occurring throughout the facility. The basin is overgrown with various plantings including large diameter trees. The entire basin bottom was comprised of silt deposits and does not appear to have been maintained or excavated down to the original design depth. The inflow located on the northeast side of the basin appears to be structurally stable; however, there is an abundance of vegetation within close proximity to the structure. As seen in photo 1, the riser structure is visually unattractive and has become extremely degraded. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

12.2. RECOMMENDATIONS

The recommendation is to construct forebays at all inlets into the basin. Additionally we recommend the possible addition of earthen berm baffles to reduce short circuiting and silt

deposition within the basin. All invasive vegetation should be removed from the basin including large diameter trees. The existing riser structure should be replaced with a multistage concrete principal spillway of adequate size and properly designed orifices to manage multiple storm events. The inflow on the northeast side of the basin should be cleared of any vegetation. Due to the volume of silt observed in the basin reservoir area and the presence of extensive vegetation, it is likely the basin is not functioning hydraulically as designed, Once the necessary clearing and grubbing has been performed throughout the basin we recommend that a subsequent survey inspection and a hydrologic and hydraulic analysis be performed. The analysis will determine if the basin is hydraulically functioning properly and will indicate if further design is necessary to bring the existing facility up to standards. The installation of forebays, baffles and a properly sized outfall structure will offer protection from erosion, enhanced pollutant removal capacity and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements.

12.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$50,625.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 12 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Grading - Forebay	EA	2	$ 2,500.00	$ 5,000.00
3	Clearing and Grubing	LS	1	$ 15,000.00	$ 15,000.00
4	Re-establish stream/baseflow	LS	1	$ 5,000.00	$ 5,000.00
5	Erosion and Sedimentation Controls	LS	1	$ 2,500.00	$ 2,500.00
6	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 37,500.00*
8	Construction Inspection				$ 3,750.00
9	Permitting/Engineering/Design				$ 9,375.00
				TOTAL	**$ 50,625.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

13. RETENTION BASIN NO. 13

13.1. EXISTING CONDITIONS

The existing facility is located at the southwest corner of the intersection of Aston Court and Thomas Road. The existing stormwater basin is functioning as a dry extended detention pond. The size of the facility is approximately 10,800 square feet and is currently being mowed. The perimeter fencing is in fair condition with moderate rusting and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on August 7, 2014, the basin appeared to be functioning properly; however the basin bottom appeared to be largely silt depositions. At the time of inspection there was evidence of short circuiting of storm flows (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) from the northern discharge point. The riser structure appears to be functioning correctly however the entire structure and the anti-vortex trash rack are visually unattractive. The inflow at the southern end of the basin was observed to have ponding at the discharge point. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

13.2. RECOMMENDATIONS

The recommendation is to construct forebays at all discharge points into the basin. Additionally, we recommend constructing earthen berm baffles to reduce short circuiting and silt deposition within the basin. The existing riser structure which appears to be a temporary outlet structure that was left in place should be replaced with a multistage concrete principal spillway of

adequate size and properly designed orifices to manage multiple storm events. We also recommend that a horizontal draw-down device (see exhibit 3) be installed and attached to the outfall structure to provide both water quality and quantity management at higher levels than what is currently being provided in the existing facility. The addition of a draw down device will require further investigation and pond routing computations to confirm that additional storage can be provided. The draw down device will also provide a better protection from debris and clogging, enhancing the maintenance capacity. These improvements will increase water quality treatment and reduce erosion potential thereby providing substantial gains towards meeting the NPDES MS4 permit requirements.

13.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$28,350.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 13 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Grading - Forebay	EA	3	$ 1,000.00	$ 3,000.00
3	Remove Silt Deposits	LS	1	$ 3,000.00	$ 3,000.00
4	Draw-down Device	LS	1	$ 2,500.00	$ 2,500.00
5	Erosion and Sedimentation Controls	LS	1	$ 2,500.00	$ 2,500.00
6	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 21,000.00*
8	Construction Inspection				$ 2,100.00
9	Permitting/Engineering/Design				$ 5,250.00
				TOTAL	**$ 28,350.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

14. RETENTION BASIN NO. 14

14.1. EXISTING CONDITIONS

The existing facility is located at the end of the cul-de-sac along Brake Lane. The existing stormwater basin is functioning as a dry extended detention pond. The size of the facility is approximately 7,600 square feet and is currently being mowed. The perimeter fencing is in good condition and does an adequate job of deterring pedestrians from entering the basin. During a preliminary inspection on August 8, 2014, the basin appeared to be functioning properly; however the basin bottom was observed to be very wet. At the time of inspection there was evidence of short circuiting of storm flows (conveyance of flow from an inlet directly to the principal spillway without adequate detention time for treatment) and erosion and channelization occurring on the basin bottom. The riser structure is extremely degraded and is clogged with debris and grass (see photo 2). The discharge area at the inflow appears to function properly however during heavy storms the drop in elevation may cause erosion (see photo 1). There were animal burrows observed within the basin and the embankment. We recommend that there be a subsequent inspection during a heavy rain event to verify that the basin is functioning correctly during high flow/peak event conditions.

Photo 1

Photo 2

14.2. RECOMMENDATIONS

The recommendation is to construct a forebay at the inflow to prevent erosion and future degradation of the basin. The existing riser structure should be replaced with a concrete riser of adequate size and properly designed orifices. We also recommend that a horizontal draw-down device (see exhibit 3) be installed and attached to the outfall riser structure to provide both water quality and quantity management at higher levels than what is currently being provided in the

existing facility. The draw down device will also provide a better protection from debris and clogging, enhancing the maintenance capacity. Additional improvements to the basin will include miscellaneous grading to repair various erosion areas and relocating or removing any yard drains to prevent future erosion. The installation of the forebay, draw-down device and a properly sized outfall structure will offer protection from erosion and improve maintenance activities thereby providing substantial gains towards meeting the NPDES MS4 permit requirements.

14.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$23,625.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 14 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Grading - Forebay	EA	1	$ 1,500.00	$ 1,500.00
3	Regrade Erosion Areas	LS	1	$ 2,000.00	$ 2,000.00
4	Draw-down Device	LS	1	$ 2,500.00	$ 2,500.00
5	Erosion and Sedimentation Controls	LS	1	$ 1,500.00	$ 1,500.00
6	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 17,500.00*
8	Construction Inspection				$ 1,750.00
9	Permitting/Engineering/Design				$ 4,375.00
				TOTAL	**$ 23,625.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

15. RETENTION BASIN NO. 15

15.1. EXISTING CONDITIONS

The existing facility is located on the Northeast corner at the intersection of Colonial Way and Penns Court. The stormwater basin is functioning as a dry extended detention pond. The size of the basin is approximately 7,600 square feet and is currently being mowed. The inflow on the southern end of the basin has become overgrown due to silt deposition (see photo 1). The riser structures have become degraded and are visually unattractive (see photo 2). The most northern riser structure has become filled with garbage and debris. It has become apparent that the trash racks do not function properly. During a preliminary inspection on August 8, 2014 the basin appeared to be functioning properly. There is no perimeter fencing and at the time of inspection there were children's toys within the basin. We recommend that there be a follow up inspection during a heavy storm event to verify that the basin is functioning correctly during storm event peak conditions.

Photo 1

Photo 2

15.2. RECOMMENDATIONS

The recommendation is to clean all debris and silt deposition from the inflow discharge pipe area, and to install a forebay at the discharge area. These recommendations will help prevent further silt deposition, clogging and provide additional water quality management. Further upgrades should be made to the riser structure to ensure no future clogging. Our recommendation for the riser structure is to replace the existing structure with one of adequate size and to install a horizontal draw-down device (see exhibit 3) to the existing low flow orifice thereby increasing the water quality control capacity. Additional improvements would consist of plantings and possible earthern berm baffles to reduce short circuit flows during storm events.

15.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$17,550.00** as shown in the cost estimate below.

ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 15 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Outfall Structure	EA	1	$ 6,000.00	$ 6,000.00
2	Remove Sediment Buildup at Inflow	EA	1	$ 1,500.00	$ 1,500.00
3	Regrade Erosion Areas	LS	1	$ 2,000.00	$ 2,000.00
4	Draw-down Device	LS	1	$ 2,500.00	$ 2,500.00
5	Erosion and Sedimentation Controls	LS	1	$ 1,500.00	$ 1,500.00
6	Mobilization	LS	1	$ 2,000.00	$ 2,000.00
7	Survey	LS	1	$ 2,000.00	$ 2,000.00
				Subtotal	*$ 17,500.00*
8	Construction Inspection				$ 1,750.00
9	Permitting/Engineering/Design				$ 4,375.00
				TOTAL	**$ 23,625.00**

*Unit price based on RS-Means/ECMS

PENNONI ASSOCIATES INC.

16. RETENTION BASIN NO. 3

16.1. EXISTING CONDITIONS

The existing facility is located south of the intersection of Birney Highway and Mclaughlin Drive and can be access from Mclaughlin Drive. The stormwater basin is functioning as a dry extended detention pond and appears to be in good functioning condition. The size of the basin is approximately 23,400 square feet and is currently being mowed and maintained. The endwall discharging to the basin has evidence of minor silt and gravel deposition (see photo 1). The riser structure appears to be in good condition and during the inspection there were no signs of clogging. The perimeter fencing is in good condition. There appears to be minor erosion near the location of the emergency spillway (see photo 2). During a preliminary inspection on August 8, 2014, the basin appeared to be functioning properly, however we recommend that there be a subsequent inspection during a storm event to verify that the basin is functioning correctly during peak flow conditions.

Photo 1

Photo 2

16.2. RECOMMENDATIONS

The recommendation is to clear the discharge are of the inflow of all silt and gravel deposits. The area near the emergency spillway should be regarded and stabilized to prevent further erosion. In conclusion the basin appears to be function properly and requires minimal improvements.

16.3. ESTIMATE COSTS

The estimated cost of the proposed improvements is **$4,995.00** as shown in the attached cost estimate.

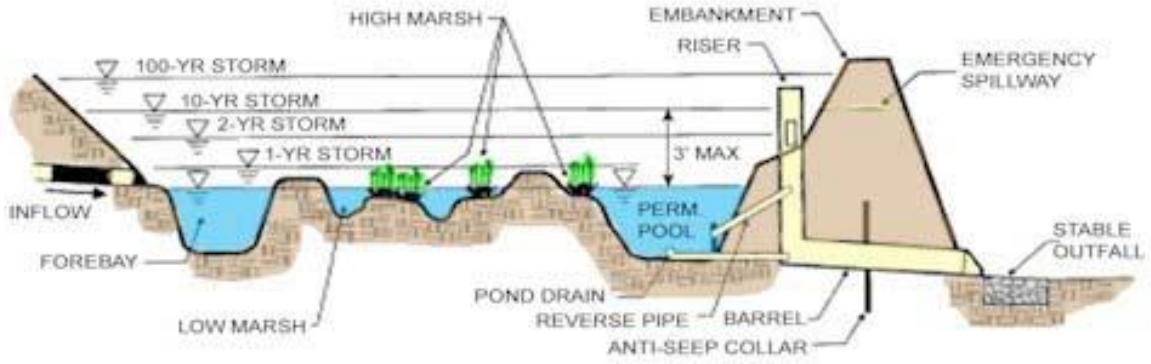
ENGINEER'S OPINION OF PROBABLE COSTS
ASTON TOWNSHIP RETENTION BASIN NO. 16 IMPROVEMENTS

Item	Description		Quantity	Unit Price	Amount
1	Remove Sediment Buildup at Inflow	EA	1	$ 500.00	$ 500.00
2	Regrade Erosion Area at Spillway	LS	1	$ 700.00	$ 700.00
3	Erosion and Sedimentation Controls	LS	1	$ 500.00	$ 500.00
4	Mobilization	LS	1	$ 1,000.00	$ 1,000.00
5	Survey	LS	1	$ 1,000.00	$ 1,000.00
				Subtotal	*$ 3,700.00*
6	Construction Inspection				$ 370.00
7	Permitting/Engineering/Design				$ 925.00
				TOTAL	**$ 4,995.00**
	*Unit price based on RS-Means/ECMS				
	PENNONI ASSOCIATES INC.				

EXHIBITS

EXHIBIT 1: Location Plan

EXHIBIT 2: Constructed Wetland



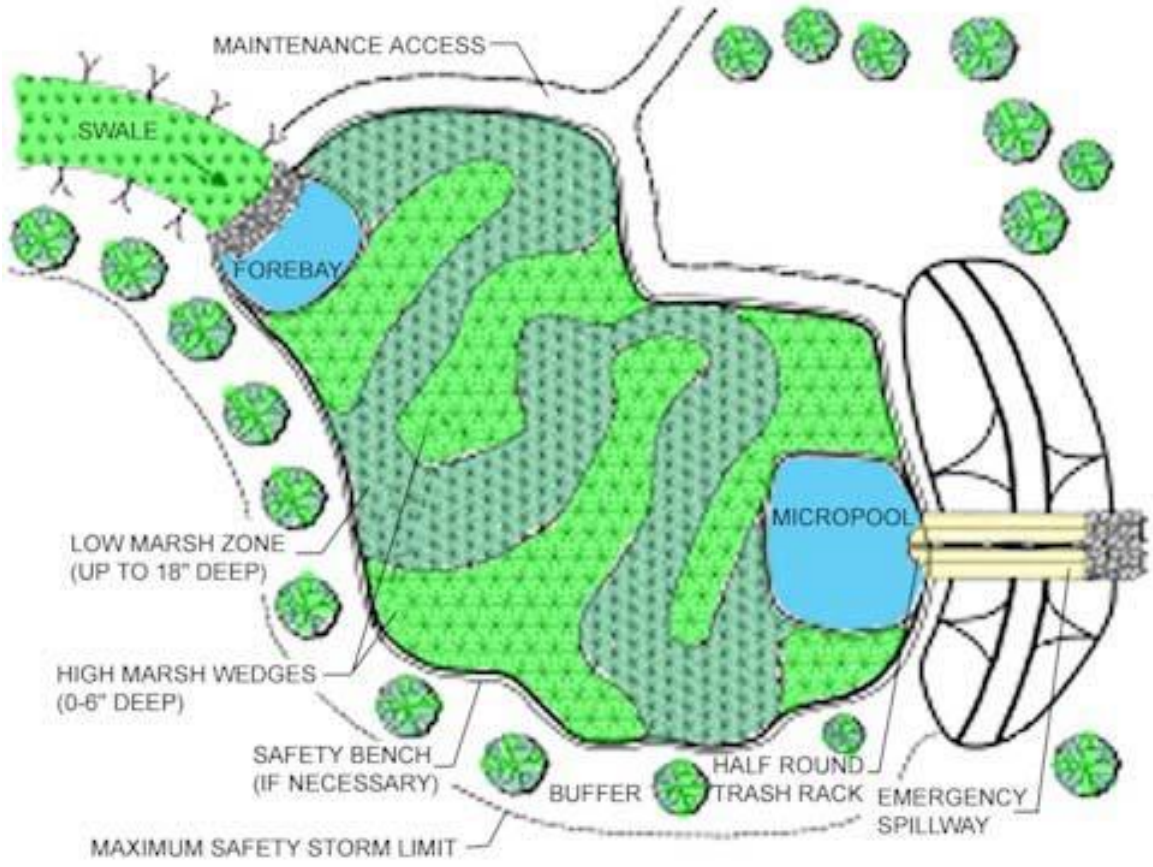
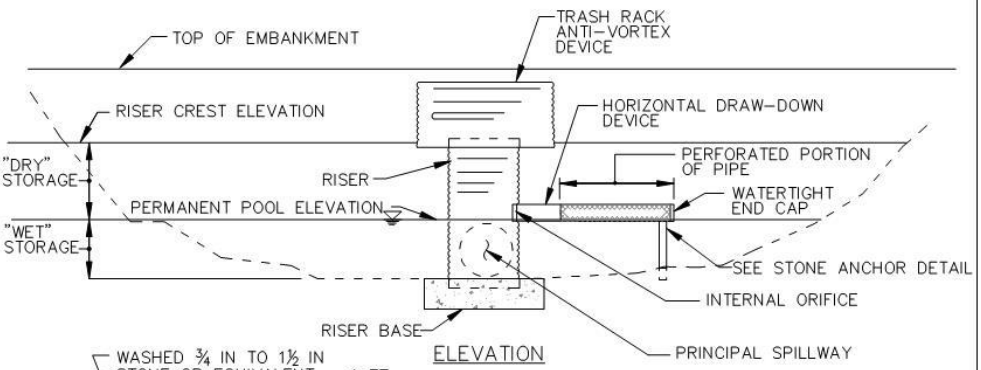


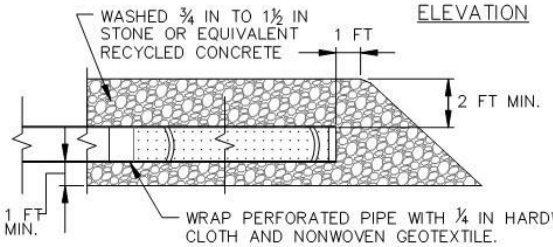
EXHIBIT 3: Horizontal Draw-Down Device (Detail and Image)

DETAIL G-2-6 SEDIMENT BASIN SCHEMATIC HORIZONTAL DRAW-DOWN DEVICE

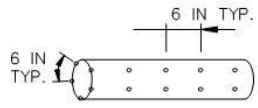
STANDARD SYMBOL

HDDD

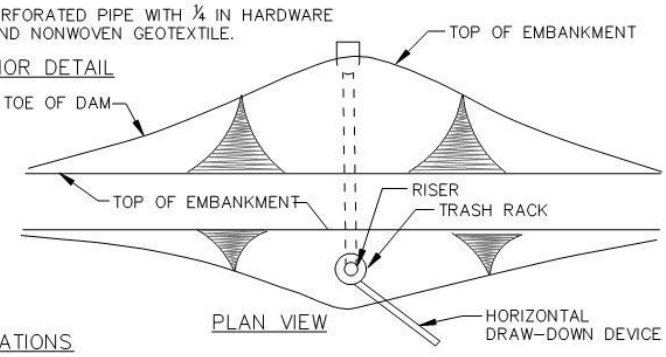




STONE ANCHOR DETAIL



PERFORATION SPACING



NOTE: THIS DETAIL MAY BE USED WITH VARIOUS SPILLWAYS INCLUDING CMP RISERS, CONCRETE RISERS, AND WEIR WALLS.

CONSTRUCTION SPECIFICATIONS

1. PERFORATE PIPE WITH 1 INCH DIAMETER PERFORATIONS SPACED 6 INCHES APART LONGITUDINALLY AND RADIALLY OR IN ACCORDANCE WITH APPROVED PLAN.
2. WRAP THE PERFORATED PORTION OF THE DRAW-DOWN DEVICE FIRST WITH ¼ INCH GALVANIZED HARDWARE CLOTH, THEN WITH NONWOVEN GEOTEXTILE. USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS. DO NOT WRAP WITH MORE THAN ONE LAYER OF GEOTEXTILE.
3. AS AN ALTERNATE TO STONE ANCHORING, SECURE DRAW-DOWN DEVICE WITH TWO 1 INCH STEEL ANGLES SET 3 FEET MINIMUM INTO THE GROUND ATTACHED TO DRAW-DOWN DEVICE BY A 1 INCH WIDE GALVANIZED STEEL STRAP OR 12 GAUGE OR HEAVIER WIRE.
4. REMOVE SEDIMENT WHEN IT ACCUMULATES TO CLEANOUT ELEVATION (50% OF THE WET STORAGE DEPTH). DEPOSIT REMOVED SEDIMENT IN AN APPROVED AREA IN A SUCH A MANNER THAT IT WILL NOT ERODE. MAINTAIN WATER TIGHT CONNECTIONS. REPLACE GEOTEXTILE AROUND PERFORATED RISER IF DRY STORAGE VOLUME DOES NOT DRAW DOWN WITHIN 10 HOURS.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL

U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE	2011	MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

G.48

APPENDICES

APPENDIX A

Basin Inventory

Retention Basin No.	Approximate Location	Inspection Date
1	Intersection of Glendale Blvd. and East Dublin Way	7/17/2014
2	Intersection of East Dublin Way and Cashel Ct.	7/17/2014
3	Dudonis Lane	7/17/2014
4	Intersection of Legion Rd. and Old Pennell Rd.	7/17/2014
5	West Side of Sunny Bank Lane	7/30/2014
6	East Side of Sunny Bank Lane	7/30/2014
7	East Evans Way	7/30/2014
8	Behind Houses along Crestview Ln. and Gettysburg Dr.	7/30/2014
9	West of the Intersection of Crestview Ln. and Gettysburg Dr.	7/30/2014
10	East side of Scott Ln. at the bend	8/7/2014
11	Behind Houses along Giles Ln. and Scott Ln.	8/7/2014
12	Intersection of Frazer Ln. and Schick Rd.	8/7/2014
13	Intersection of Thomas Rd. and Aston Ct.	8/7/2014
14	Cul De Sac of Brake Ln.	8/8/2014
15	North of the Intersection of Penns Court and Colonial Way	8/8/2014
16	West of the Intersection of Hoag Ln. and Birney Hwy.	8/8/2014

APPENDIX B

FormLiner

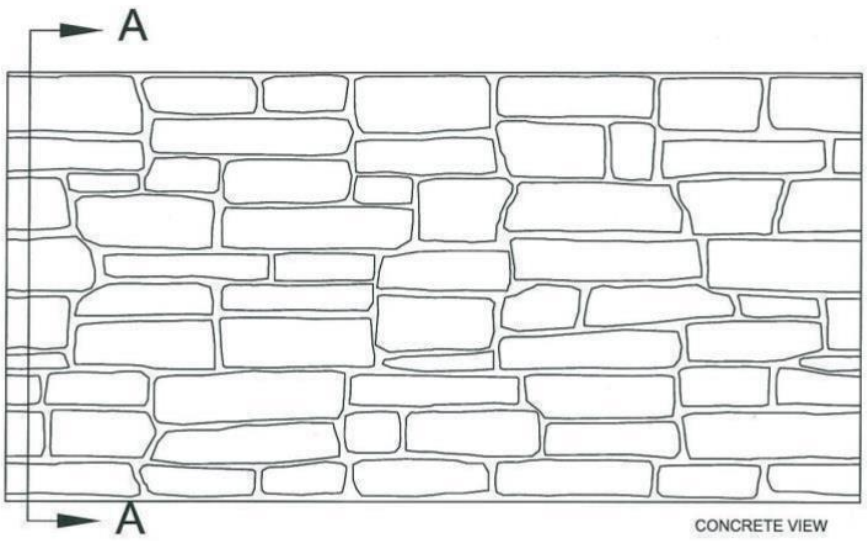
FITZGERALD FORMLINERS
Forming The Future ™

PATTERN 17008
Brayman Drystack

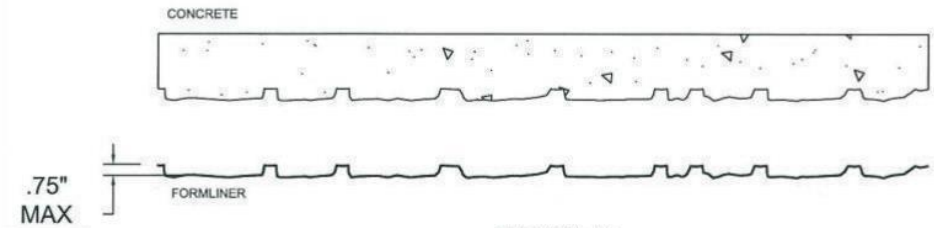
Large, Irregular Cut Rock

Vac-U-Form™
Styrene - Single Use.
ABS Plastic - Up to 15 reuses.

Stone & Rock
Part Size:
Max Depth: 0.75"
Stone Sizes: 6.5"- 29" W
1.5"- 7" H
Grout Width: Varies
Pattern matched panels



CONCRETE VIEW



SECTION A-A

FORMLINER DETAIL

FITZGERALD FORMLINERS
1500 East Chestnut Avenue • Santa Ana, CA 92701 • Fax (714) 245-9715
Ph: (800) 547-7760 • Ph (714) 547-6710 • www.formliners.com

Pattern can be requested in AutoCad format.

File Name: S-17008-VF-3-6-07 Page 1 of 3

FIELD INSPECTION FORMS: #1-16