



Post-Construction Stormwater Quality BMP Operations and Maintenance Manual

For:

DEERFIELD SECTION 1

**Runyon Road
White River Township, Johnson County, Indiana**

Project # W21-0353-1

**Prepared For:
Lennar Homes of Indiana, LLC
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Carmel, IN 46032
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**Prepared By: Travis P. Gaither, P.E.
Checked By: Jim E. Pence**

**Date:
August 17, 2022**

Revised:

I AFFIRM, UNDER THE PENALTIES FOR PERJURY, THAT I HAVE TAKEN REASONABLE CARE TO REDACT EACH SOCIAL SECURITY NUMBER IN THIS DOCUMENT, UNLESS REQUIRED BY LAW. –

Travis P. Gaither

THIS INSTRUMENT PREPARED BY: Travis P. Gaither

Operation and Maintenance Manual

Prepared For:

Deerfield Section 1

Johnson County, IN

Project #W21-0353-1

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Operation and Maintenance Manual

Prepared For:

Deerfield Section 1
Johnson County, IN
Project #W21-0353-1

Project Narrative

Lennar Homes of Indiana, LLC is proposing to develop a 96 lot single family residential subdivision to be known as “Deerfield” on a 51.6+/- acre tract of undeveloped land in Johnson County, Indiana. Section 1 of Deerfield consists of 49 lots on 26.71 acres. Said development is located east of Runyon Road, between Smith Valley Road and Olive Branch Road. Refer to **Figure 1.1**.

The proposed development is on a site at a Latitude of N 39° 35' 52" and Longitude W 86° 11' 05", falling within White River Township. The site is located in part of the Northwest Quarter of the Southeast Quarter of Section 3, Township 13 North, and Range 3 East, in Johnson County, Indiana.

Deerfield Section 1 falls under the Johnson County Soil and Water Conservation District. The stormwater runoff will be routed to one (1) proposed wet BMP detention basin to meet the Water Quality Requirements described in Section 6-102-5 of the Johnson County Subdivision Control Ordinance.

This O/M will be for the maintenance of the BMP’s proposed for said development. Refer to Figures for the location of the following BMP features for said development:

- Wet Detention Basin (BMP)

Site Information

Deed of Record: Refer to Recorded Plat for Deerfield Section 1

Owner:

Lennar Homes of Indiana, LLC
11555 N. Meridian Street, Suite 400
Carmel, IN 46032

BMP Owner Contact Information:

Deerfield Homeowner Association, Inc.
11555 N. Meridian Street, Suite 400
Carmel, IN 46032
Contact: Neil VanTrees
Phone: (317) 339-9936
Email: neil.vantrees@lennar.com

Definitions

Best Management Practice (BMP):

Best Management Practices, refer to structural or non-structural measures designed for the benefit of water quality and quantity.

Urban stormwater runoff contains many types and forms of pollutants. When compared to stormwater run-off from pre-developed conditions, high concentrations and some contaminants that are not naturally present in surface runoff from undeveloped local lands are found. Runoff from undeveloped watersheds contains metals, nutrients, sediment particles, oxygen-demanding compounds, and other constituents. Once developed, constituent loads increase because surface runoff volumes increase and the sources of many of these pollutants also increase. Supplemental applications of compounds, such as fertilizers, also tend to increase the availability of some pollutants to stormwater runoff.

Runoff water quality in urban areas can be extremely detrimental to local habitat. Paved surfaces and standing water bodies for stormwater management control elevate the temperature of water entering streams. Chemicals in standing water and ponds are oxidized, resulting in depressed levels of dissolved oxygen. Increased runoff volumes and rates create scour and deposition damage to instream habitat. Activities in urbanized areas, such as vehicular traffic, deposit pollutants such as heavy metals and oil & grease on paved surfaces where they easily wash off into the streams.

BMP Owner:

The owner of the BMP is typically the Homeowners Association. The BMP owner may also be the lessee of the property in the case of long-term leases of commercial and industrial zoned properties. The lessee is considered the BMP owner only if the lease specifically states that construction by the lessee must meet applicable local codes and regulations. The tenant must be provided a copy of this BMP Operations and Maintenance Plan.

Wet Detention Basin:

A Wet Detention Pond is a facility, which removes sediment, biochemical oxygen demand (BOD), organic nutrients, and trace metals from stormwater runoff. This is accomplished by slowing down stormwater using an in-line permanent pool or pond affection settling pollutants. The wet pond is similar to a dry pond, except that a permanent volume of water is incorporated into the design. The drainage area should be such that as adequate base flow is maintained in the pond. Biological processes occurring in the permanent pond pool aid in reducing the amount of soluble nutrients present in the water such as nitrate and ortho-phosphorus.

Stormwater Infrastructure:

Storm water infrastructure and structures refers to structural or non-structural measures designed for the benefit of storm water conveyance. Storm water is the rainfall/ snowmelt that flows over our yards, streets, parking lots, and buildings and either enters the storm drain system or runs directly into a lake or stream. Owners of storm water infrastructure and structures are typically the property owner. The storm water infrastructure owner may also be the lessee of the property in the case of long-term leases of commercial and industrial zoned properties. The lessee is considered the owner only if the lease specifically states that construction by the lessee must meet applicable local codes and regulations.

Catch basins:

Catch basin/inlet cleaning and repair has traditionally been performed to respond to localized flooding problems in streets. Catch basins are inlets at the curb with a small trap (usually six inches to one foot deep) below the sewer pipe. These devices help to clean storm water because particles in street runoff settle into the trap before the water enters the storm sewers. Catch basins require regular cleaning of the sediment trap to be. The inlets do not trap sediments and don't need cleaning unless they are plugged. Cleaning for either catch basins or inlets can be done by hand (e.g., with a clamshell or shovel) or with a vacuum truck.

Conveyance Storm Pipes:

A good rule of thumb is to conduct inspection of storm drain inlets, ditches, channels, ponds and other treatment facilities at least once a year, prior to the beginning of the rainy season. Complete inspections early enough so that repairs can be made during dry weather. Catch basins should be inspected at least once every six months. Some storm water treatment devices, such as oil/water separators, may require more frequent inspection. For these, check the manufacturer's specification or other design guidance handbooks. Sewer pipes and culverts should be inspected every three to five years, or in response to a reported problem. Most agencies inspect their sewer pipes six inches or larger with a TV camera, and pipes 36 inches or larger with a walk-through inspection. All other parts of the system are inspected visually.

Look for excessive silt build-up, erosion, unusual algal growth, cracked or collapsed pipes, misaligned joints, and other signs of problems such as a sheen on the water surface, discolored water, or an unpleasant odor. Check with product manufacturers or storm water handbooks for advice on what to look for when inspecting more sophisticated treatment devices such as flow splitters and diverters. When a problem is noted, take steps to correct the problem, or route this information immediately to the appropriate individual(s) in your organization who can respond. If needed, develop a good response plan to ensure quick follow-up in the future.

Inspections

The first inspection shall be performed immediately after construction is completed. If there are any deficiencies are found during the inspection, these should be addressed in a timely manner.

Construction Completion	Type of Inspection	Inspection Due Date	Subsequent Due Dates
Date:	Storm Structures	1 year after construction completion date	Annually
Date:	Wet Pond	1 year after construction completion date After every rain event >1 inch over a 24 hour period	Annually

Routine inspections are the responsibility of the BMP owner. Maintenance is also the responsibility of the owner. The BMP owner shall be financially responsible for any maintenance or repairs required by the County or its representatives during the County's inspections. The approval maintenance plan and inspection forms provided with this manual should be used as guidance for performing maintenance activities. Completed inspection forms must be maintained by the BMP owner and produced upon request by the County. The County must be notified of any changes in BMP ownership, major repairs or BMP failure in writing within 30 days. The letter should be addressed to:

Johnson County Soil and Water Conservation District
 550 E. Jefferson St., Ste 202
 Franklin, IN 46131

The County and/or its representatives have the right to enter the property to inspect BMPs. In the event that the County finds a BMP in need of maintenance or repair, the County will notify the BMP owner of the necessary maintenance or repairs and give the landowner a timeframe for completing the maintenance or repairs. If the maintenance or repairs are not completed within the designated timeframe, the County shall perform the maintenance or repairs and bill the landowner for the actual costs for the work.

Inspection & Maintenance Activities

Refer to the checklist provided with this manual for operation, maintenance and inspection of BMP and storm water infrastructure. The checklist is for the use of the BMP owner in performing routine inspections. The County will perform annual inspections of BMPs, using similar checklist. The BMP owner must maintain and update the BMP operations and maintenance plan. At a minimum, the operations and maintenance plan must include, but is not limited to:

1. Visual inspect and removal of debris from inlet, outlet, and sump structures
2. Removal of woody vegetation from the embankments

BMP owners must routinely inspect BMPs to verify that all BMP components are functioning as designed and are not in danger of failing. All BMPs need maintenance to function as water quality and quantity enhancements. Maintenance can range from dredging sediment out of the treatment area to mowing grass.

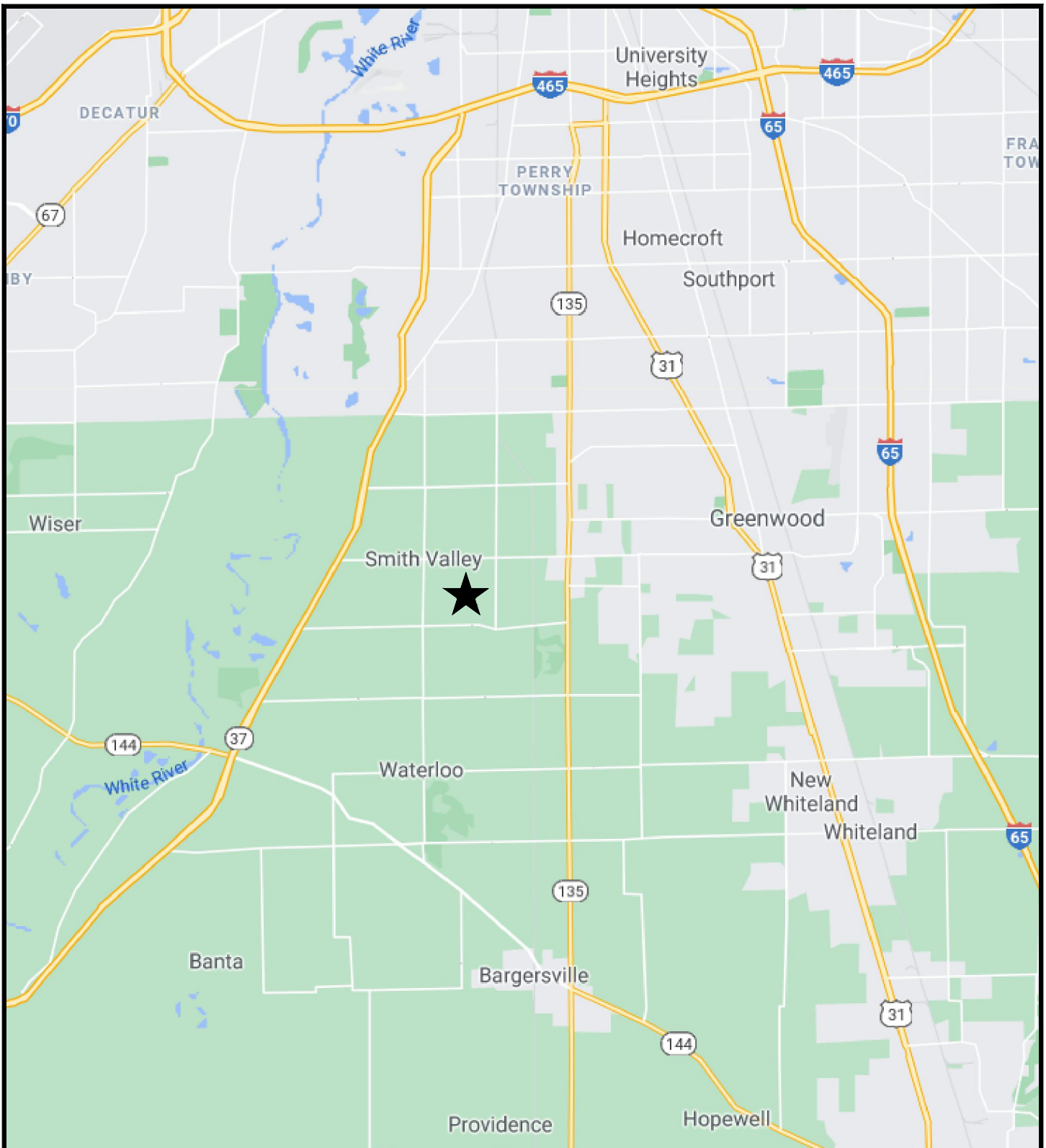
The BMP owner agrees to the maintenance and inspection programs attached with this manual. Inspections must be documented on the inspection forms included in this Operation and Maintenance Manual.

A self-monitoring program by the project site owner is required during construction and during a maintenance schedule of any project described. A trained individual employed or retained by the project site owner shall prepare and maintain a written evaluation of the project site by the end of the next business day following each measurable Inspection.

Inspection during construction should be after a storm event and at a minimum, one (1) time a week.

Inspection during the maintenance schedule must routinely inspect all storm water infrastructures to verify that all components are functioning as designed and are not in danger of failing. They should be inspected a minimum of an annual basis or upon observed failure.

LOCATION MAPS



★ PROJECT LOCATION

DEERFIELD
JOHNSON COUNTY, IN

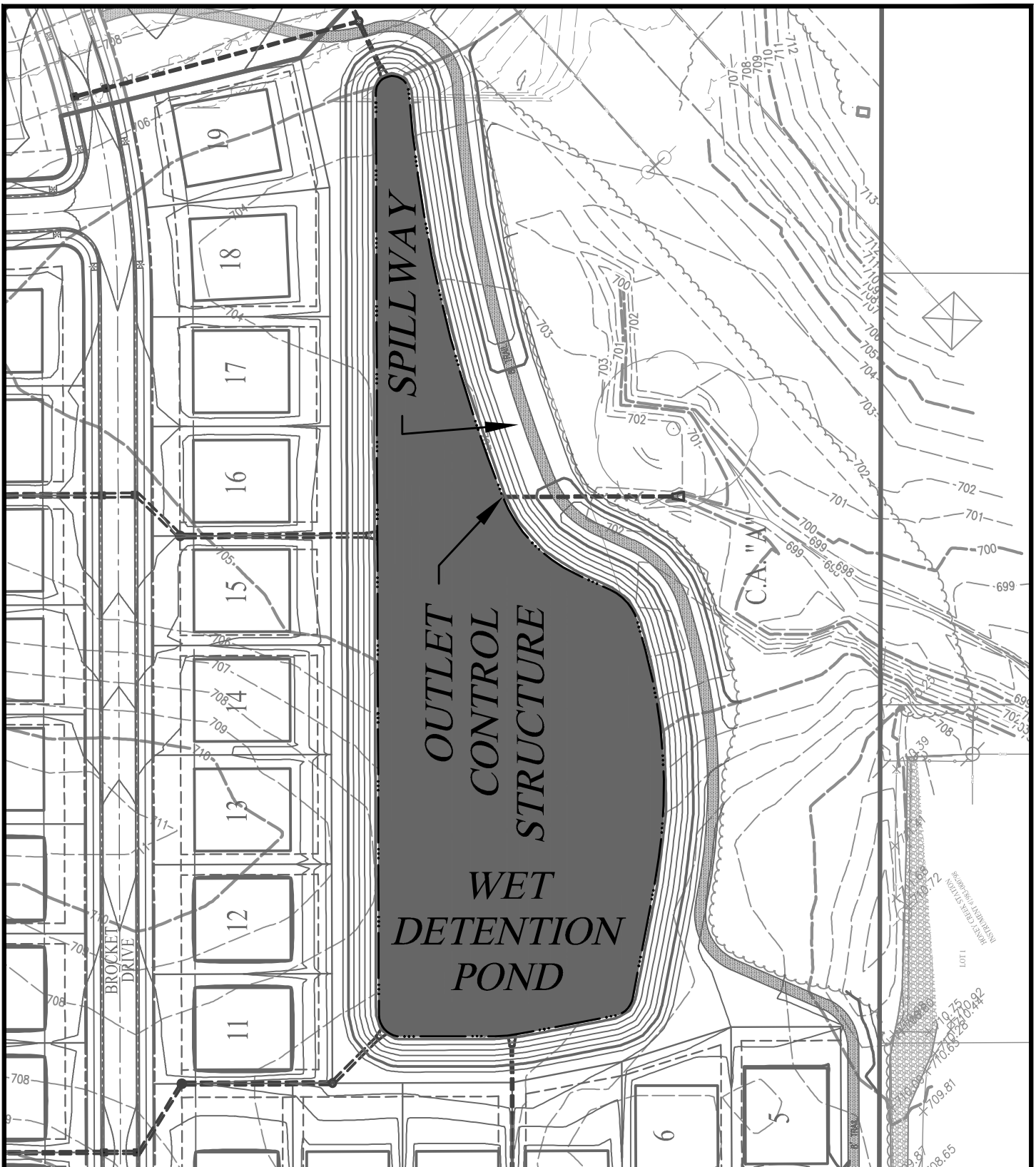
WEIHE
ENGINEERS

10505 N. College Avenue
Indianapolis, Indiana 46280
weihe.net
317 | 846 - 6611

LOCATION MAP

FIGURE 1.1

Date: May 25, 2022



DEERFIELD
 JOHNSON COUNTY, IN

WEIHE
 ENGINEERS

10505 N. College Avenue
 Indianapolis, Indiana 46280
 weihe.net
 317 | 846 - 6611

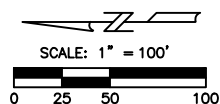


FIGURE 2

WATER QUALITY LOCATION EXHIBIT

Date: August 17, 2022

CHECKLISTS AND MAINTENANCE ACTIVITIES

Detention Pond Operation, Maintenance, and Management Inspection Checklist

Project: _____

Location: _____

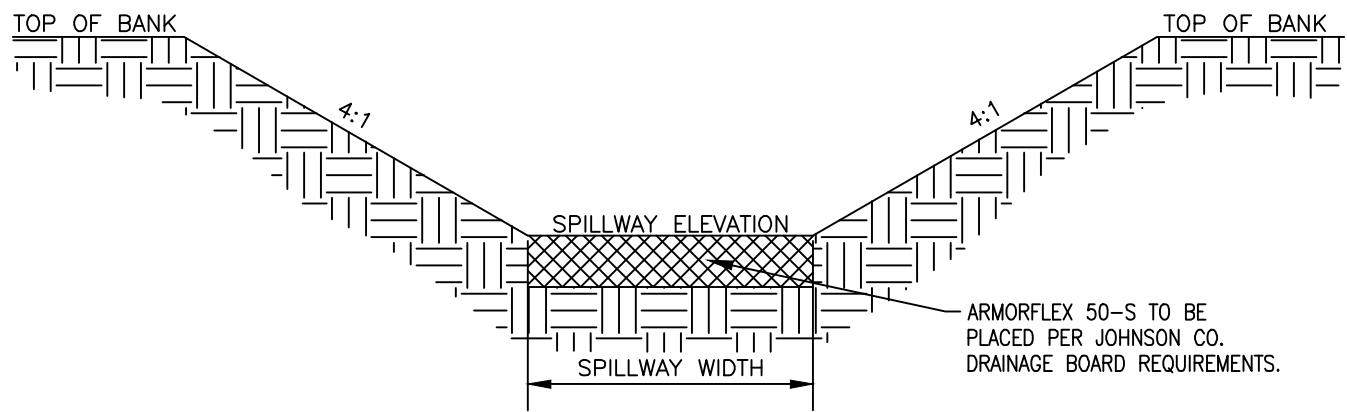
Date: _____ **Time:** _____

Inspector: _____ **Title:** _____

Signature: _____

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1. Embankment and emergency spillway		
Healthy vegetation with at least 85% ground cover.		
No signs of erosion on embankment.		
No animal burrows.		
Embankment is free of cracking, bulging, or sliding.		
Embankment is free of woody vegetation.		
Embankment is free of leaks or seeps		
Emergency spillway is clear of obstructions.		
Vertical/horizontal alignment of top of dam "As-Built"		
2. Riser and principal spillway		
Low flow outlet free of obstruction.		
Trash rack is not blocked or damaged.		
Riser is free of excessive sediment buildup		
Outlet pipe is in good condition.		
Control valve is operational		
Outfall channels are stable and free of scouring.		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
3. Permanent Pool (Wet Ponds)		
No Evidence of undesirable vegetation		
No accumulation of floating or floatable debris		
No evidence of shoreline scour or erosion		
4. Sediment Forebays		
Sediment is being collected by forebay(s)		
Forebay is not in need of cleanout (less than 50% full)		
5. Dry Pond Areas		
Healthy vegetation with at least 85% ground cover.		
No undesirable woody vegetation		
Low flow channels clear of obstructions		
No evidence of sediment and/or trash accumulation		
6. Condition of Outfall into Ponds		
No riprap failures		
No evidence of slope erosion or scouring		
Storm drain pipes are in good condition, with no evidence of non-stormwater discharges		
End walls/Headwalls are in good condition		



LOCATION:	TOP OF BANK ELEV.:	100YR ELEV.:	SPILLWAY ELEV.:	SPILLWAY WIDTH:
POND	706.0	704.32	704.3	60'

DETAIL EXHIBIT

Inspection and Maintenance Checklist

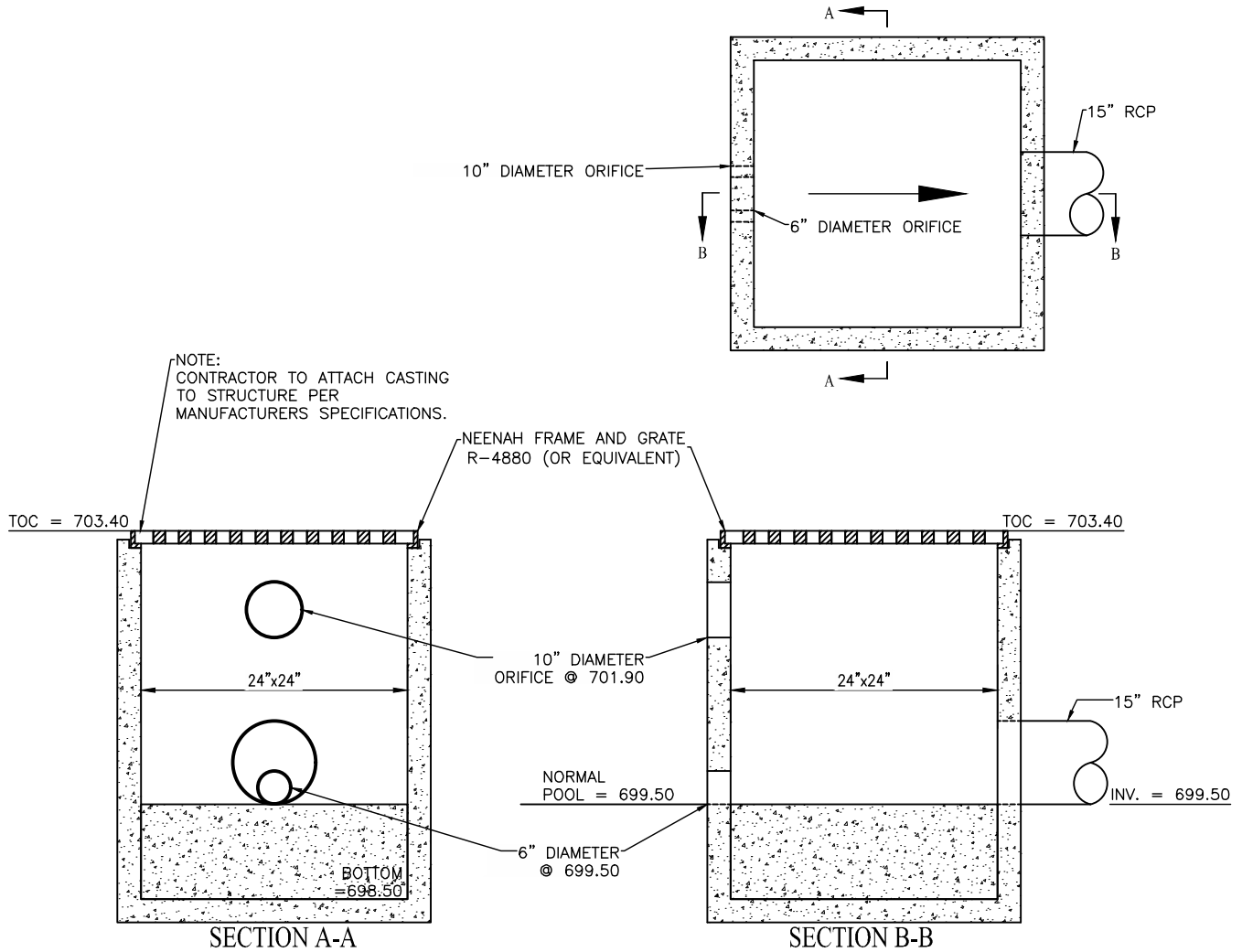
Low Flow Outlet Structure

Site Name:	
Owner Name:	
Owner Address:	
Owner Phone Number:	
Emergency Phone Number:	
Location:	
Date:	
Time:	
Inspector:	
Change in ownership since last inspection?	Y OR N

Maintenance Item	Maintenance (1 or 2)*	Maintenance is needed:	Comments
Trash & Debris		Trash or debris which is located immediately in front of the catch basin opening or is blocking inletting capacity of the basin by more than 10%	
		Trash or debris (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of six inches clearance from the debris surface to the invert of the lowest pipe.	
		Trash or debris in any inlet or outlet pipe blocking more than 1/3 of its height.	
		Dead animals or vegetation that could generate odors that could cause complaints or dangerous gases (e.g., methane).	
Sediment		Sediment (in the basin) that exceeds 60 percent of the sump depth as measured from the bottom of basin to invert of the lowest pipe into or out of the basin, but in no case less than a minimum of 6 inches clearance from the sediment surface to the invert of the lowest pipe.	
Structure Damage to Frame and/or Top Slab		Top slab has holes larger than 2 square inches or cracks wider than 1/4 inch (Intent is to make sure no material is running into basin).	
		Frame not sitting flush on top slab, i.e., separation of more than 3/4 inch of the frame from the top slab. Frame not securely attached	
Fractures or Cracks in Basin Walls/Bottom		Maintenance person judges that structure is unsound.	
		Grout fillet has separated or cracked wider than 1/2 inch and longer than 1 foot at the joint of any inlet/outlet pipe or any evidence of soil particles entering catch basin through cracks.	
Settlement/Misalignment		If failure of basin has created a safety, function, or design problem.	
Vegetation		Vegetation growing across and blocking more than 10% of the basin opening.	
		Vegetation growing in inlet/outlet pipe joints that is more than six inches tall and less than six inches apart.	
Contaminants and Pollution		Any evidence of oil, gasoline, contaminants or other pollutants (Coordinate removal/cleanup with local water quality response agency).	

Catch Basin Cover		Cover is missing or only partially in place. Any open catch basin requires maintenance.	
		Mechanism cannot be opened by one maintenance person with proper tools. Bolts into frame have less than 1/2 inch of thread.	
		One maintenance person cannot remove lid after applying normal lifting pressure (Intent is to keep cover from sealing off access to maintenance).	
Ladder		Ladder is unsafe due to missing rungs, not securely attached to basin wall, misalignment, rust, cracks, or sharp edges.	
Metal Grates		Trash and debris that is blocking more than 20% of grate surface inletting capacity.	

*Maintenance: Enter 1 if maintenance is need and include WO#. Enter 2 if maintenance was performed same day.



POND OUTLET STRUCTURE #401
NOT TO SCALE

DETAIL EXHIBIT

Inspection and Maintenance Checklist Conveyance Stormwater Pipe

Site Name:	
Owner Name:	
Owner Address:	
Owner Phone Number:	
Emergency Phone Number:	
Location:	
Date:	
Time:	
Inspector:	
Change in ownership since last inspection?	Y OR N

Maintenance Item	Maintenance (1 or 2)*	Maintenance is needed:	Comments
Sediment & Debris		Accumulated sediment exceeds buildup 1/4" of the pipe diameter up to maximum of 6"	
Vegetation		Vegetation that reduces free movement of water through the pipes	
Damaged Pipe		Protective coating is damaged; rust is causing more than 50% deterioration to any part of the pipe	
		Any dent that decreases the cross section area of pipe by more than 20% or puncture that impacts performance	

*Maintenance: Enter 1 if maintenance is need and include WO#. Enter 2 if maintenance was performed same day.

Inspection and Maintenance Checklist Conveyance Open Ditch			
Site Name:			
Owner Name:			
Owner Address:			
Owner Phone Number:			
Emergency Phone Number:			
Location:			
Date:			
Time:			
Inspector:			
Change in ownership since last inspection?	Y OR N		
Maintenance Item	Maintenance (1 or 2)*	Maintenance is needed:	Comments
Sediment & Debris		Accumulated sediment that exceeds 20% of the design depths	
Vegetation		Vegetation that reduces free movement of water through the ditches	
Erosion Damage to Slopes and Channel Bottom		Eroded damage over 2 inches deep where cause of damage is still present or where there is potential for continued erosion	
		Any erosion observed on a compacted berm embankment	
Trash and Debris		Trash and debris > 5cf per 1,000 sf (one standard size garbage can	
		Visual evidence of dumping	

*Maintenance: Enter 1 if maintenance is need and include WO#. Enter 2 if maintenance was performed same day.