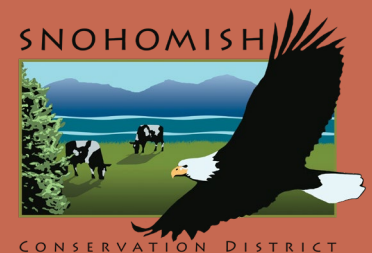


Detention Pond Care & Maintenance

Derek Hann P.E.
Design Engineer
(425) 377-7012
derek@snohomishcd.org

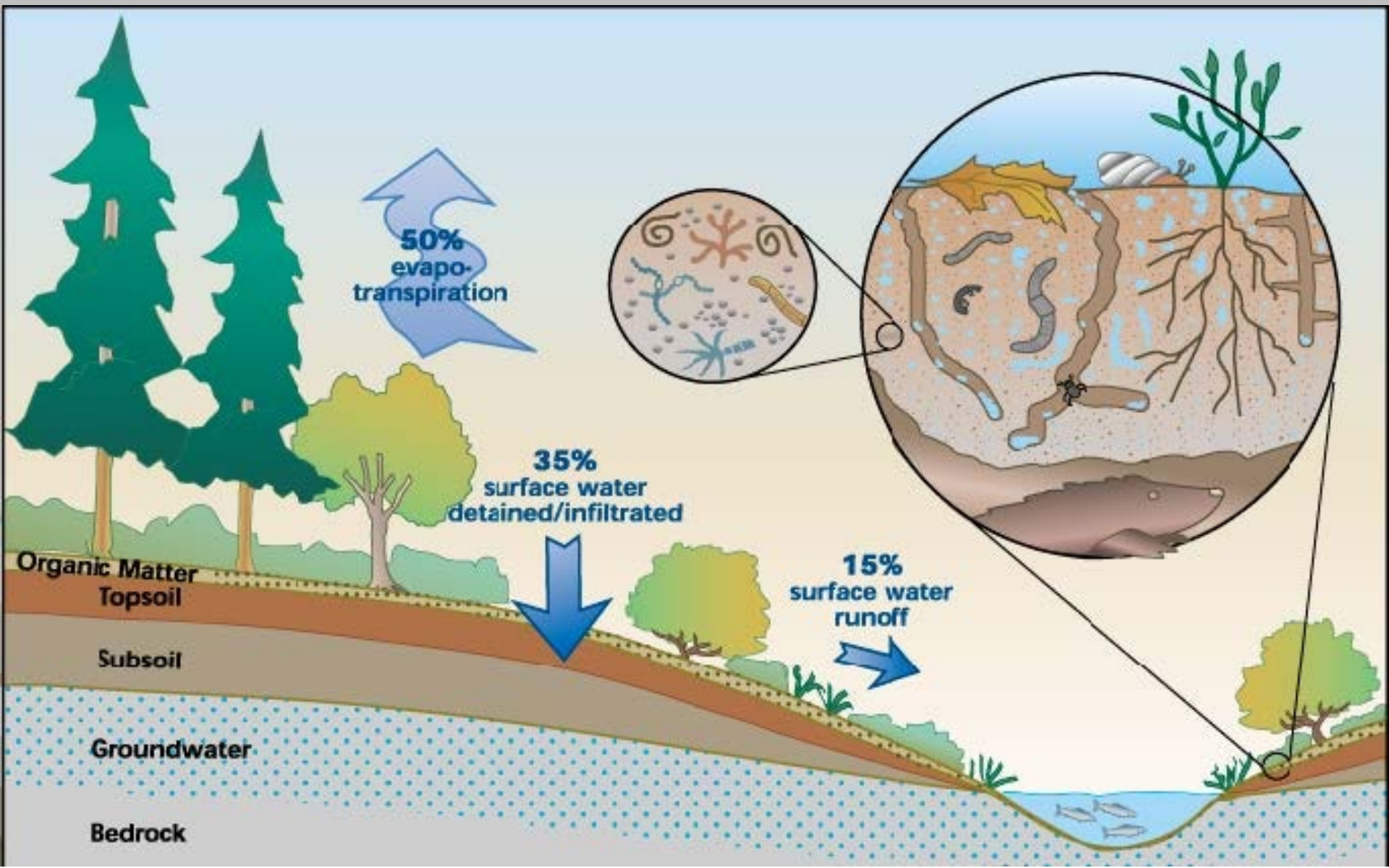


The Stormwater Problem



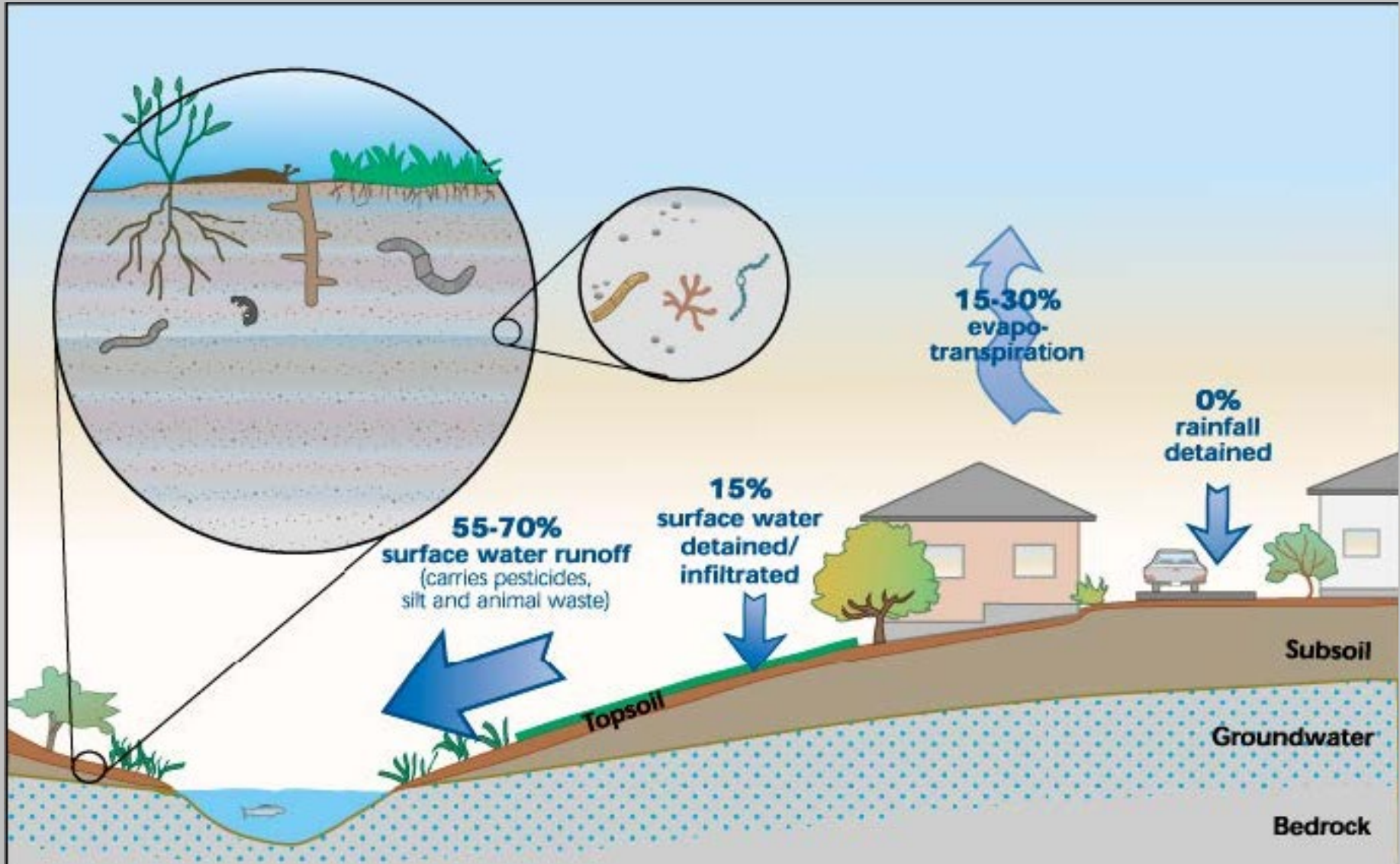


Pervious Forest





Impervious Development



The Stormwater Problem



FLOODING



SOIL EROSION



POLLUTION



LESS GROUNDWATER



PLEASE DON'T



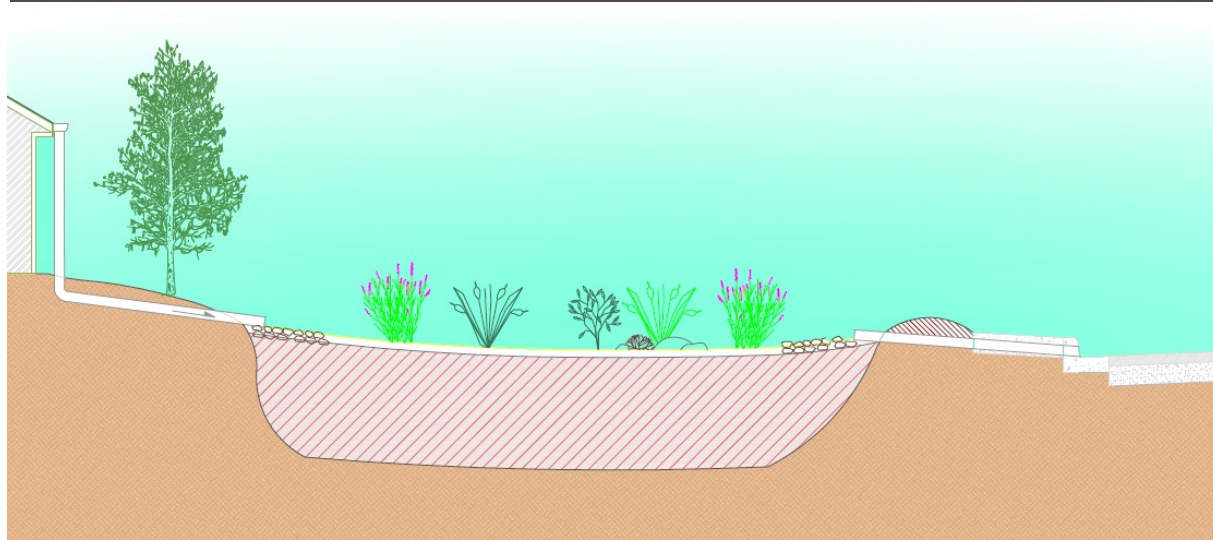
PUT THIS IN THE



Detention



Bioretention (GSI)



Filter Treatment



DETENTION VS RETENTION



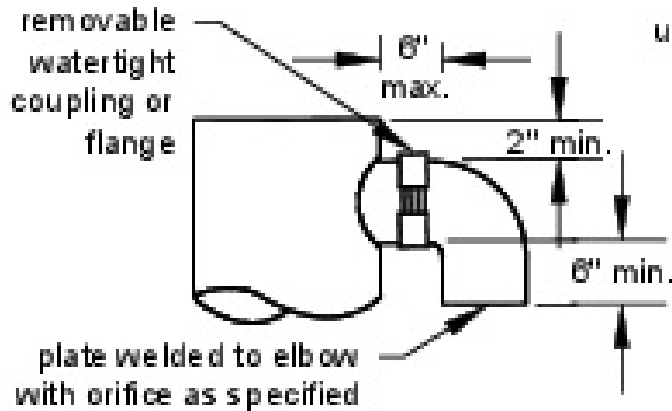
DETENTION POND ELEMENTS

- Access Ramp
- Inlet
- Outlet
- Pond bottom (Wet vs. Dry)
- Emergency overflow
- Berms dividing cells

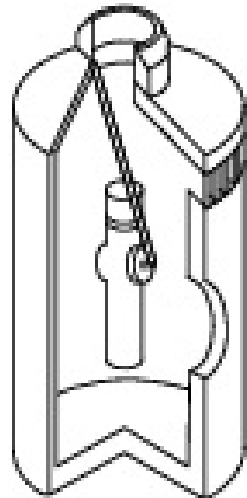
CATCH BASINS (TYPE 1&2)



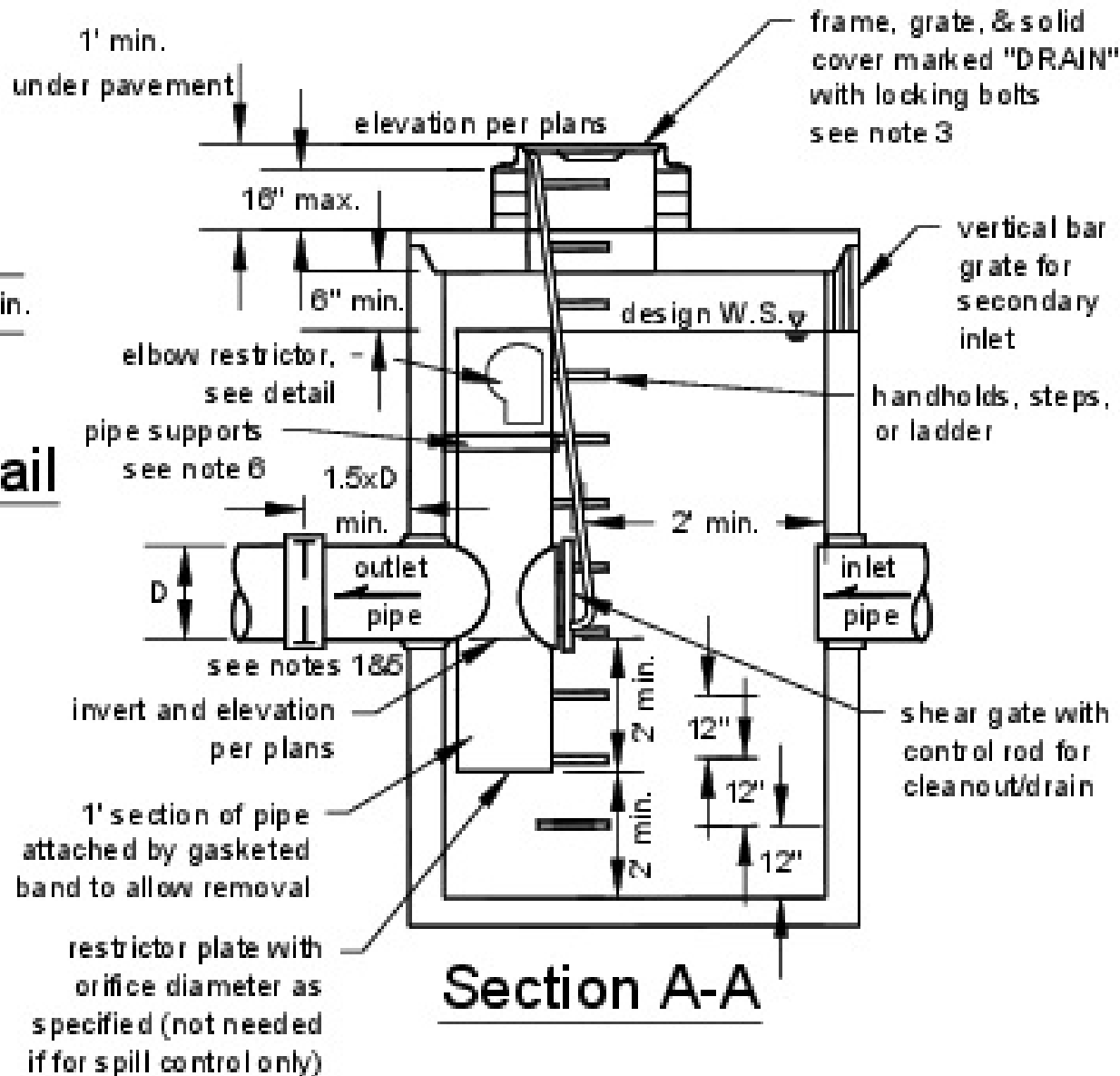
Control Structure



Elbow Restrictor Detail



Isometric



FENCING AND SECURITY

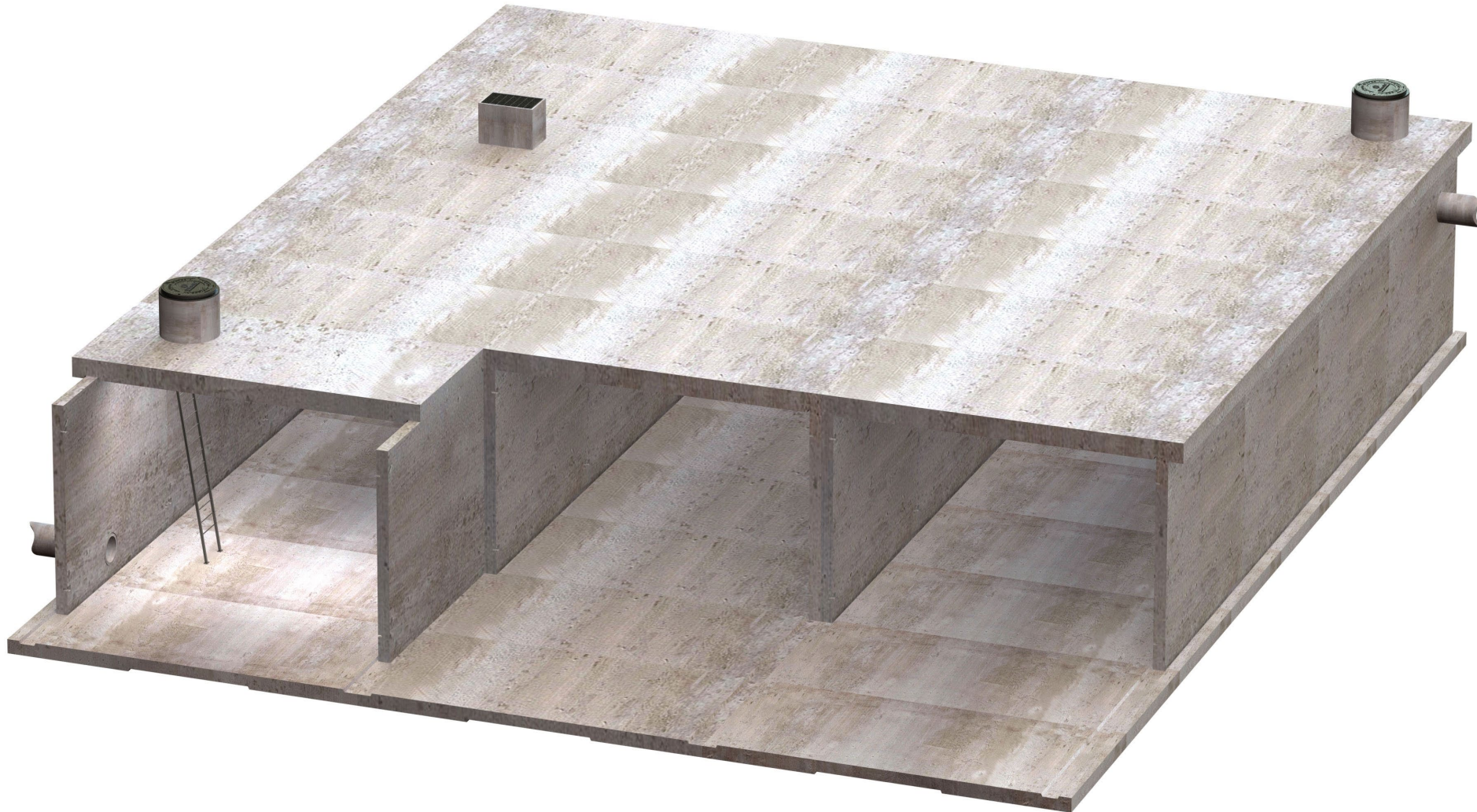


FENCING AND SECURITY



- When is a fence required?
- Liability and Dangers
- Fence drawbacks
- Steepness and Depth

DETENTION VAULTS



DETENTION VAULTS

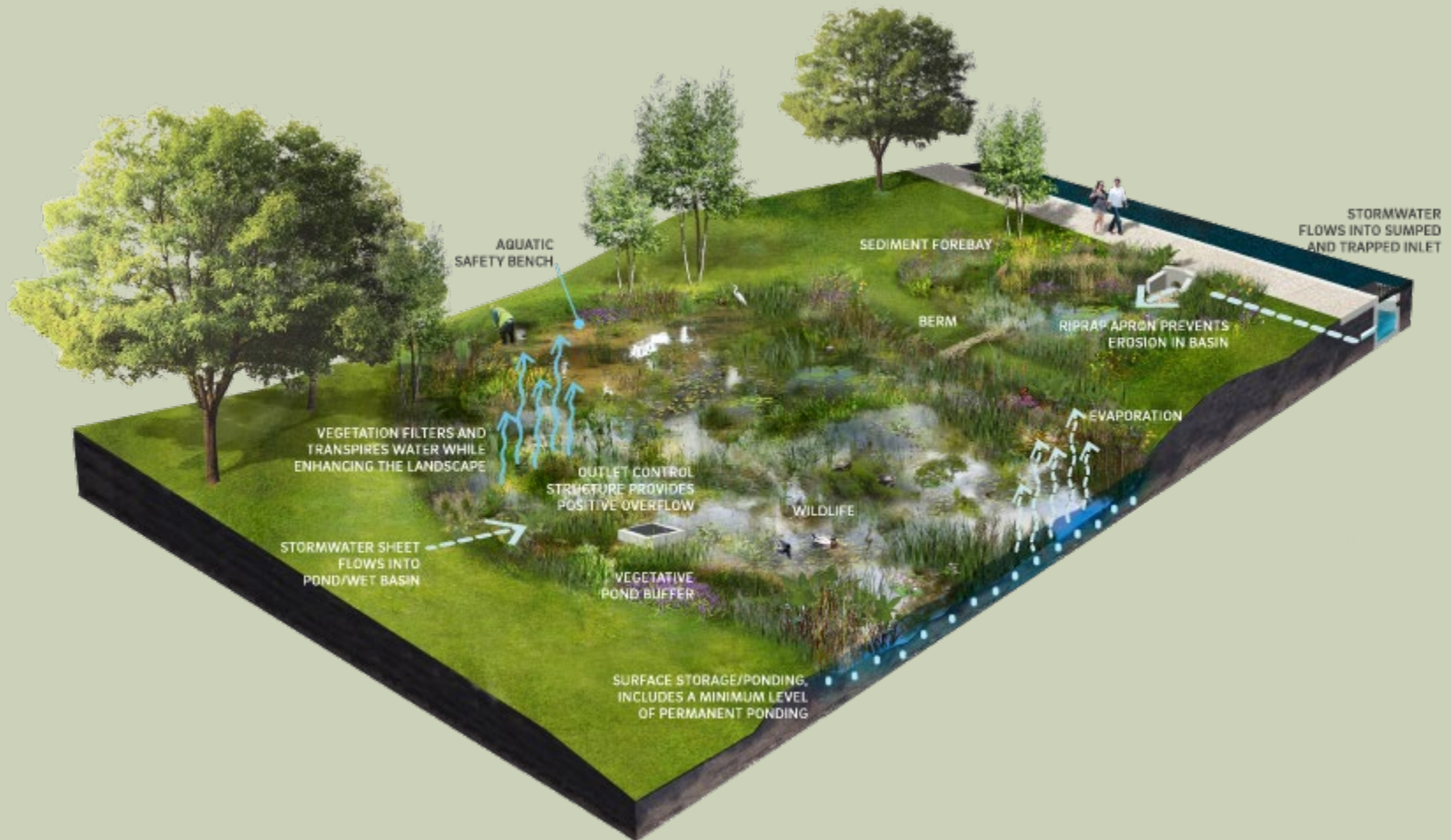


PLANTS

- Grass
- Trees & Shrubs
- Invasive species



VEGETATED WETPOND



TREATMENT-CARTRIDGE FILTER



TREATMENT-BIOSWALE

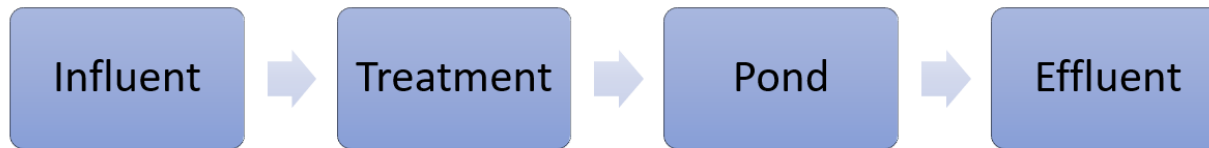


TREATMENT-OTHER

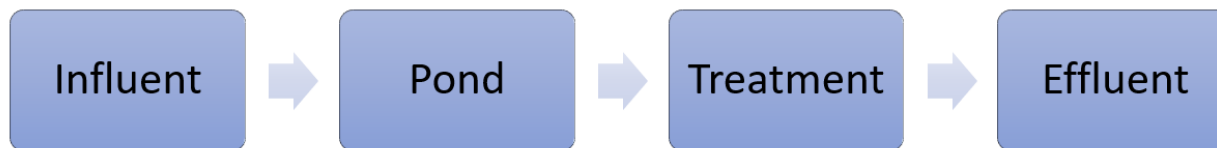


TREATMENT UPSTREAM VS DOWNSTREAM

Upstream Treatment Chain



Downstream Treatment Chain



DETENTION POND MAINTENANCE



LEGAL REQUIREMENTS

- What do you own?
- What condition is it in?
- What jurisdiction are you in? (City or County)
- When was it last maintained?
- What agreements do you have?



WHAT THINGS DO YOU NEED A CONTRACTOR FOR?

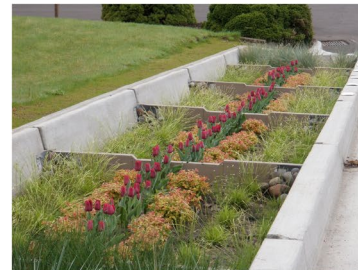


- Confined Space Work
- Dense or tall vegetation removal
- Steep Slopes
- Deep Water
- Heavy Equipment
- Vactoring

RULES AND REGULATIONS

- Stormwater Management Manual for Western Washington
- County Code
- City Municipal Code

Stormwater Management Manual for Western Washington



July 2019



Publication Number 19-10-021

VEGETATION



- Trimming and Mowing- Proceed with caution during nesting season
- Invasive
- Green Waste

WILDLIFE

- Amphibians and reptiles

- Most common species- Pacific chorus frog



Photo credit: Vikki Jackson

- Breeding period
Feb. – June

- Egg masses are submerged underwater, attached to sticks or vegetation



Photo credit: Gregg Thompson

- Pacific Chorus frogs can change their skin color from light to dark (or vice versa) to blend into their environment

WILDLIFE

- Proceed with caution when removing vegetation during the spring and summer.
 - Most birds are protected under the Migratory Bird Treaty- Nests should not be disturbed
- Primary nesting season starts in April- August
 - Birds such as spotted towhees, sparrows, waterfowl like mallards, Western meadowlarks, warblers, and thrushes' nest on or near the ground (some up to 12 feet high)
- *The federal Migratory Bird Treaty Act makes it illegal to pursue, hunt, capture, kill or transport any migratory bird or the parts, nests or eggs of such a bird except under the terms of a valid federal permit*



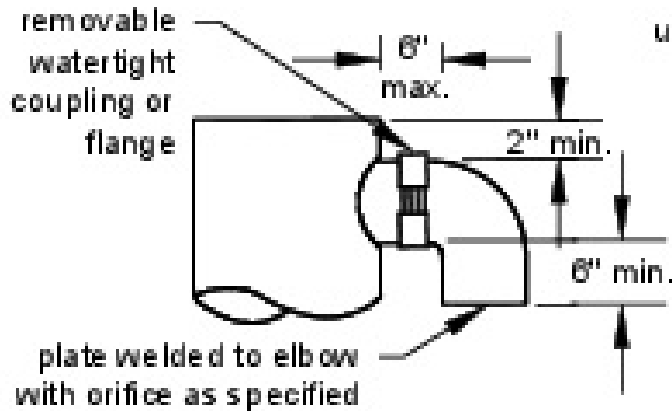
White-crowned sparrow nest

CONTROL STRUCTURE

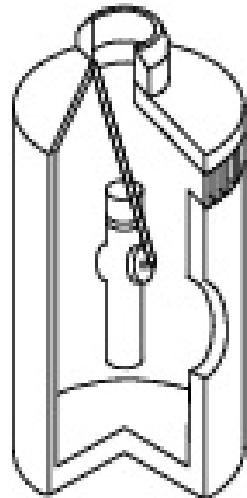


- Manhole Lid
- Manhole Structure
- Orifices or Notches
Weirs
- Gate Valves & Gate
Valve Handle
- Ladder
- Bottom Orifice
- Overflow
- Sediment and Debris

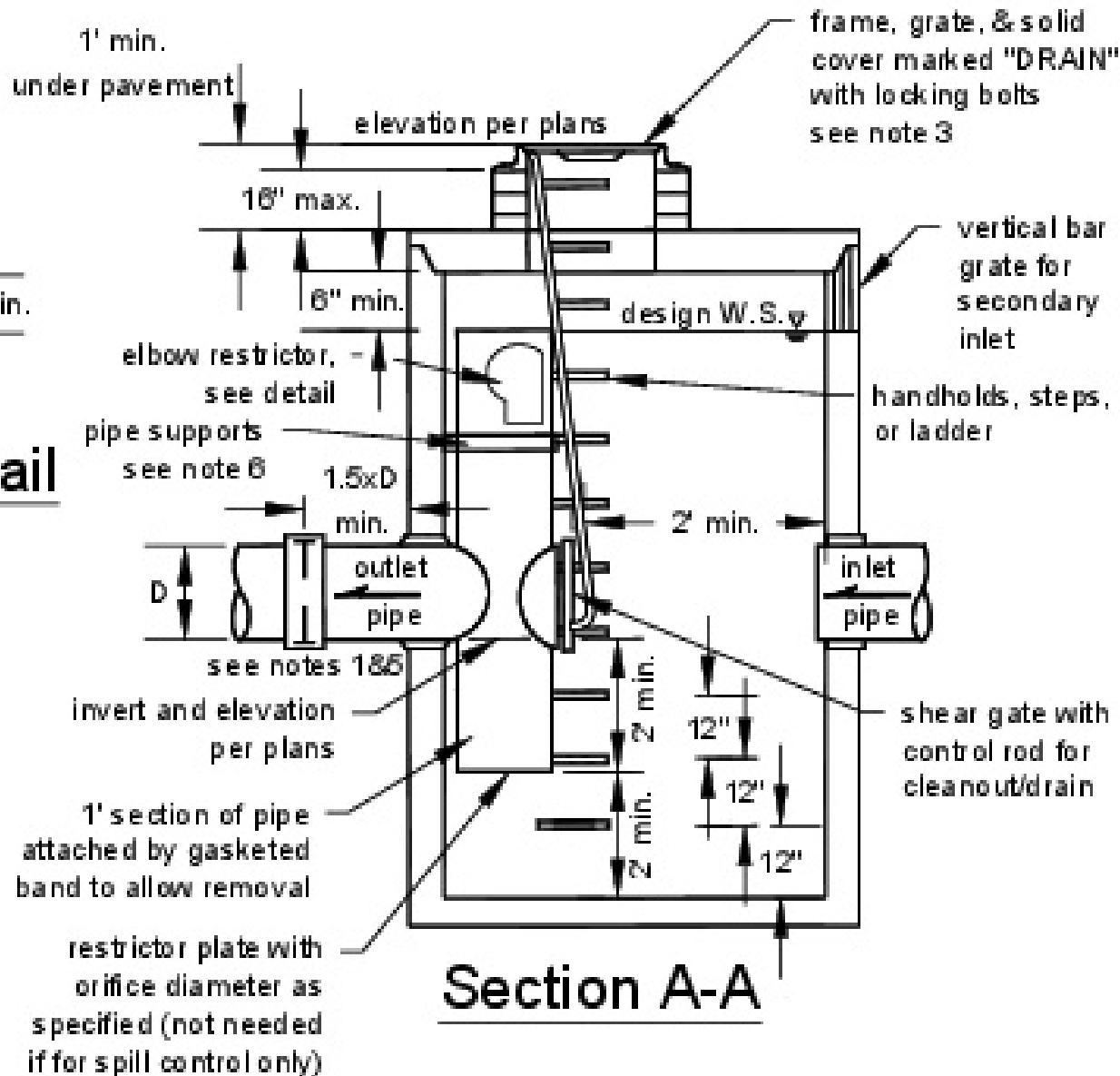
Control Structure



Elbow Restrictor Detail



Isometric



Section A-A

TRASH AND DEBRIS

- Clogged Pipes
- Plant Debris and Choosing Species
- Sediment
- Erosion



FAILED SYSTEMS



- Flooding
- Pollution
- Over Vegetation
- Sedimentation (Loss of Volume)
- Slope Failure
- Short Circuiting
- No Ponding

HIRING A CONTRACTOR

- May need to hire different contractors for different jobs
- Licensed and Insured
- Previous Experience
- References
- Budgeting



INSPECTION AND REPORTING

- Contact the City or County
- Maintain Schedule

Post-Construction BMP Inspection Checklist

Detention Pond

Detention Pond Operation, Maintenance, and Management Inspection Checklist

Project: _____

Location: _____

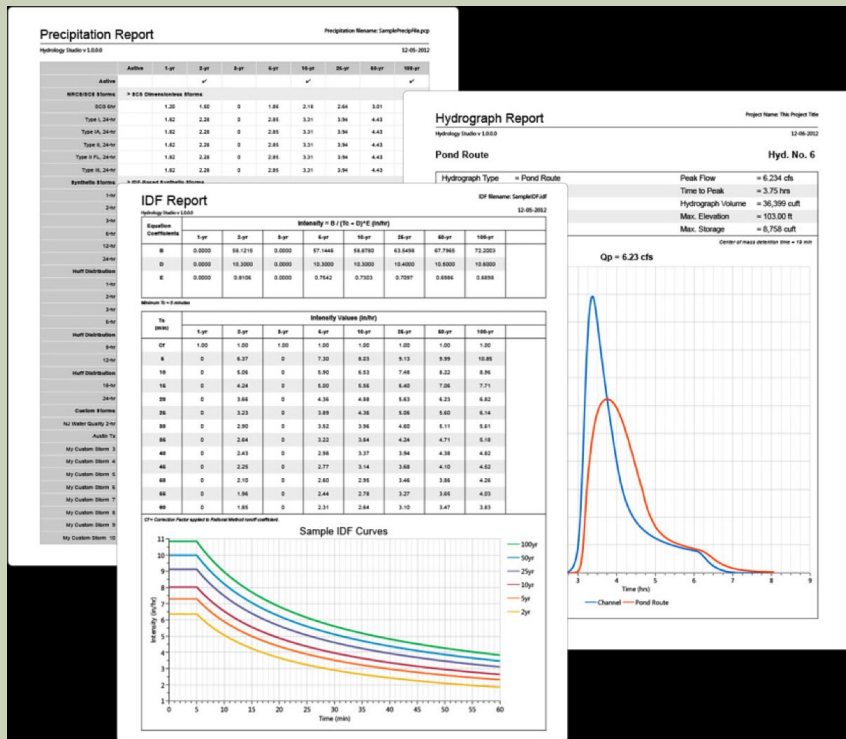
Date: _____ Time: _____

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.		

DOCUMENTATION



- Keep notes
- Photos
- Existing reports and plans

BUDGETING

Typical Costs for Detention Ponds

Wet Ponds

\$17.50-\$35 per Cubic Meter

\$0.50-\$1.00 per cubic foot

Dry

\$10 per square meter for smaller ponds

(\$0.30 per cubic foot)

\$5 per square meter for larger pond

(\$0.15 per cubic foot)

(May vary by region)



BUDGETING

Routine Maintenance



Routine maintenance can be estimated at 3-5% of the construction cost annually.

Mowing can be \$200-600 per visit. Intensive maintenance can be upwards of \$1,000 annually.

Good planting and regular maintenance can reduce these costs.

BUDGETING

Non-Routine Maintenance

Removing sediment can cost from \$50-100 per cubic yard, including dredging and disposal. Mobilization for dredging work can cost around ~\$4,000.

Repairing structures is highly variable and will require a quote.

Repairing and dredging may require permits from local municipalities, those costs should also be included in your estimates.



BUDGETING

Budgeting Resources

<https://www.rdanorthwest.com/mt-content/uploads/2016/04/detention-basin-retrofits-and-maintenance.pdf>

[http://nrcsolutions.org/floodwater-detention/#:~:text=According%20to%20the%20EPA%2C%20typical,cubic%20foot\)%20for%20larger%20basins](http://nrcsolutions.org/floodwater-detention/#:~:text=According%20to%20the%20EPA%2C%20typical,cubic%20foot)%20for%20larger%20basins)

WORKING WITH THE CITY



- Identify your inspector
- Keep things simple
- Keep good records
- Helping out the City/County
- Knowing who to talk to

RESOURCES

- City or County Records
- City and County GIS (IMAP, SCOPI, etc)
- Drainage Report
- Drainage Plans
- DOE Stormwater Management Manual for Western Washington
- Maintenance Agreement
- Auditor and Inspector Files
- Google Maps
- Snohomish Conservation District

Questions?

Derek Hann P.E.
Design Engineer
(425) 377-7012
derek@snohomishcd.org

