

Name: _____
Date: _____

Module 3.6: Intermediate LID Design: Hydrologic Modeling

General instructions: You may model facility dimensions to the nearest half foot.

Exercise #2: Modeling Bioretention and Permeable Pavement

Site: WSU Extension in Everett
2000 Tower St. Everett, WA 98201
Site Design Assumptions:
Predominant Soil: Till
Pre-developed Land Cover: Forest

Exercise #2a: Bioretention (Water Quality)

Site: Post-developed Land Cover: Impervious
Design Standard: Water Quality Treatment (91% Infiltration)

Project: New construction of 5,000 square foot **moderately sloped parking lot**. Design a **bioretention** system to provide water quality treatment for all 5,000 sf of parking area.

Facility Design Assumptions:

Sideslopes: 3:1
Ponding Depth: 6 inches
Freeboard: 6 inches
BSM Thickness: 18 inches
BSM Porosity: 40 % effective porosity ("porosity" - "wilting")
(46 % porosity in WWHM)
BSM Infiltration Rate: 6 inches/hour
Native Soil Infiltration Rate: 0.5 inches/hour
Overflow pipe diameter: 12 inches

Assume: No underdrain permitted
Square facility geometry
Neglect facility footprint in post-developed area
15 minute computational timestep

Results: WWHM

Facility Bottom Area: _____ square feet
Facility Footprint: _____ square feet
Percent of Development: _____ % (top area)

MGSFlood

Facility Bottom Area: _____ square feet
Facility Footprint: _____ square feet
Percent of Development: _____ % (top area)

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Exercise #2b: Bioretention (Flow Control)

Site: Post-developed Land Cover: Impervious
Design Standard: Flow Control (match predeveloped flows and durations from 50% 2-year to full 50-year recurrence interval flow)
Project: New construction of 5,000 square foot **moderately sloped parking lot**. Design a **bioretention** system to provide **flow control** for all 5,000 sf of parking area. Use same facility assumptions as Exercise 1a.

Use a 15 minute computational timestep.

Results: MGSFlood
Facility Bottom Area: _____ square feet
Facility Footprint: _____ square feet
Percent of Development: _____ %

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Exercise #2c: Permeable Pavement

Site: Post-developed Land Cover: Impervious/Permeable Pavement
Design Standard: Flow Control (match predeveloped flows and durations from 50% 2-year to full 50-year recurrence interval flow)

Project: New construction of 5,000 square foot parking lot. Design permeable pavement facility to provide flow control for 2,000 square feet of permeable pavement (parking stalls) and run-on from 3,000 square feet of adjacent impervious parking area (driving lanes).

Facility Design Assumptions:

Pervious Area: 2,000 square feet
Pavement Slope: 2% (model as flat, layout check dams outside of model to provide required ponding)
Pavement Infiltration Rate: 50 inches/hour
Gravel Porosity: 30%
Native Soil Infiltration Rate: 0.5 inches/hour

Use a 15 minute computational timestep.

Results: WWHM

Average Ponding Depth: _____ feet

MGSFlood

Average Ponding Depth: _____ feet

