

Streams and Runoff

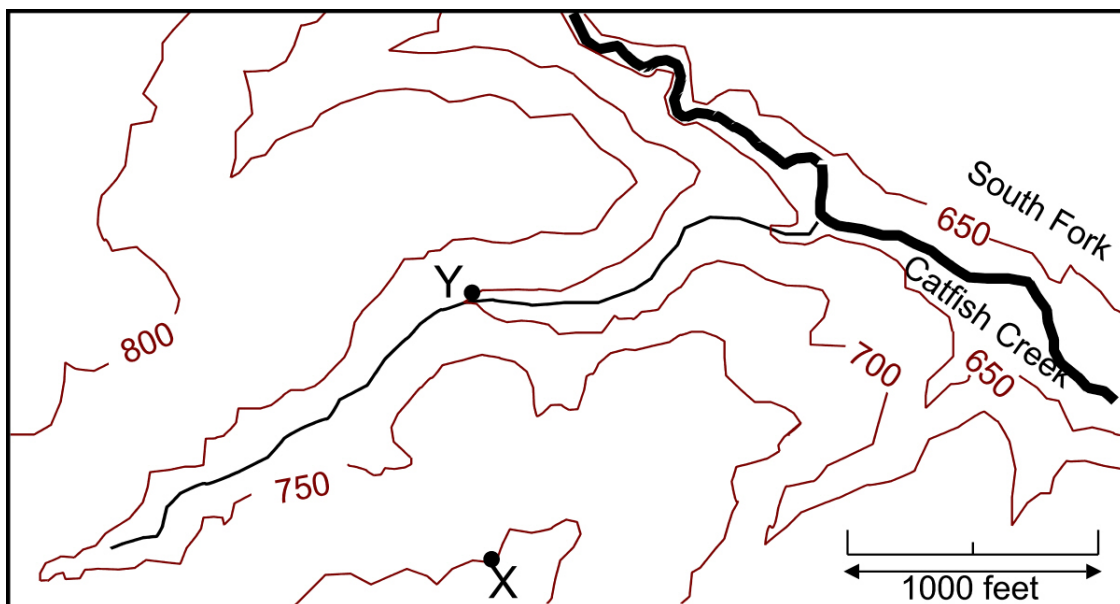
Esc 115 Physical Geology

Patterns and Predictions

1 Stream Gradient

1. The figure below is from a small tributary to the South Fork of Catfish Creek. Answer the following questions about the figure:

- (a) The map is contoured in feet. What is the contour interval? _____
- (b) What is the elevation at point X? _____
- (c) What is the elevation at point Y? _____
- (d) What is the distance from point X to Y? _____
- (e) What is the gradient from point X to Y? _____
- (f) Which direction does the tributary flow? _____



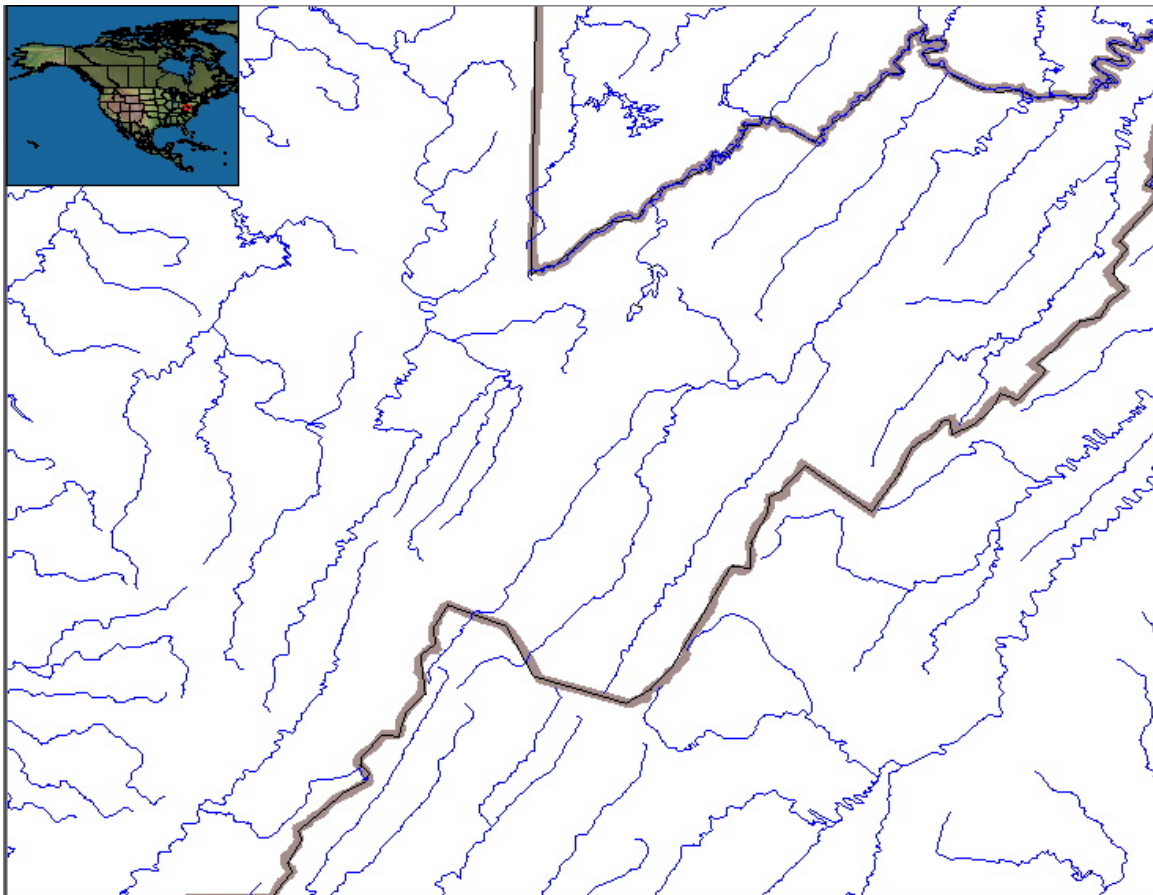
2 Stream patterns

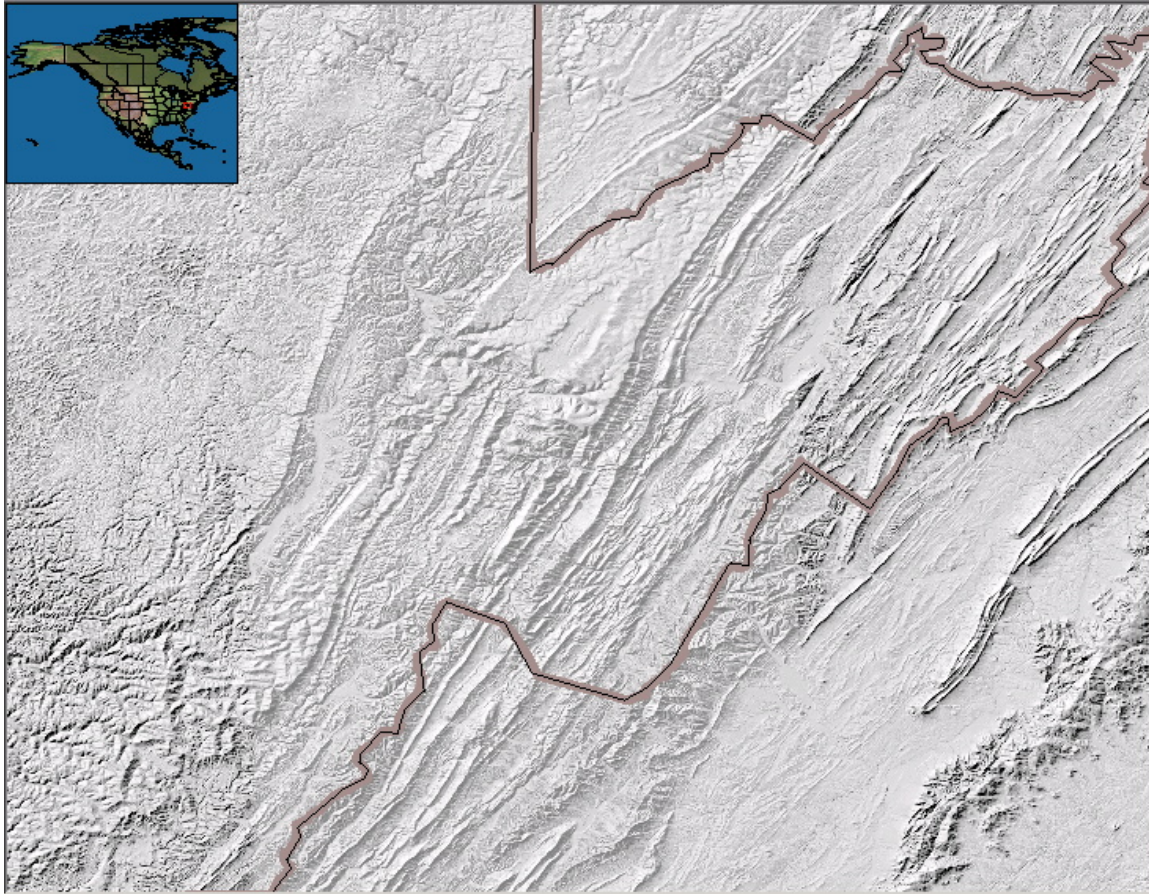
2. The following two maps are from the area where Virginia, West Virginia, and Maryland meet. Use these two maps to answer the following questions.

What is the primary drainage pattern in this the northeast section of West Virginia? Mark on the map a clear example. _____

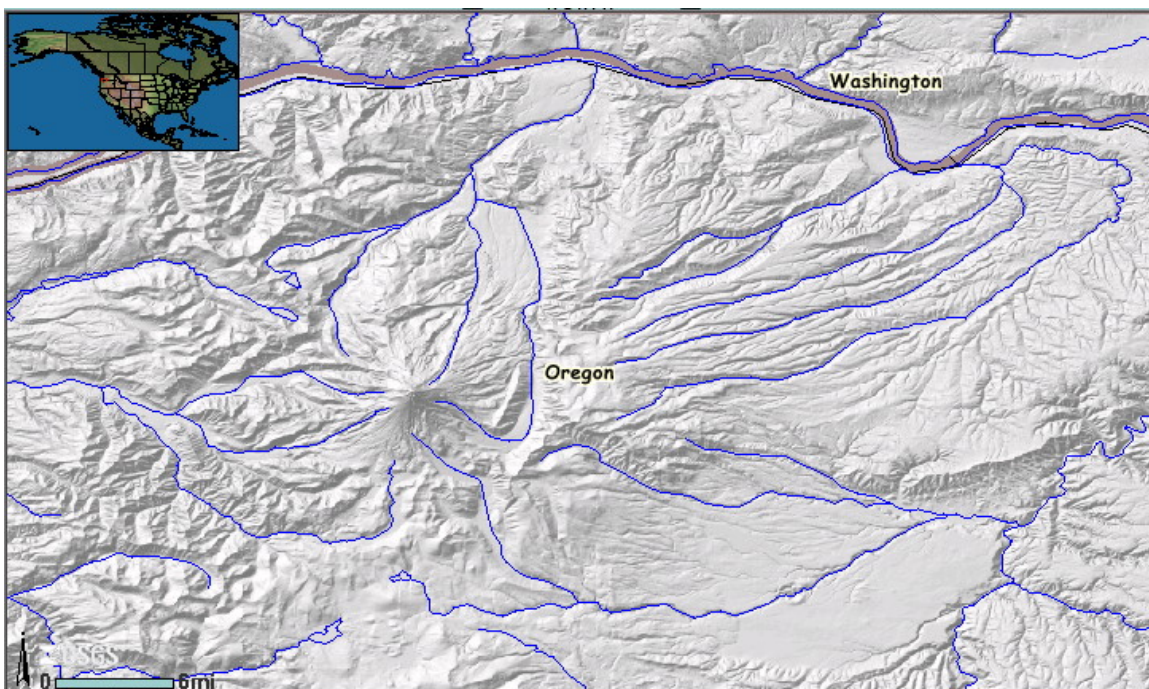
What is the topographic pattern in the same area? What do you think might be causing it?

In the west and northwest portion of the map, the drainage and topography look different. Explain how and why.

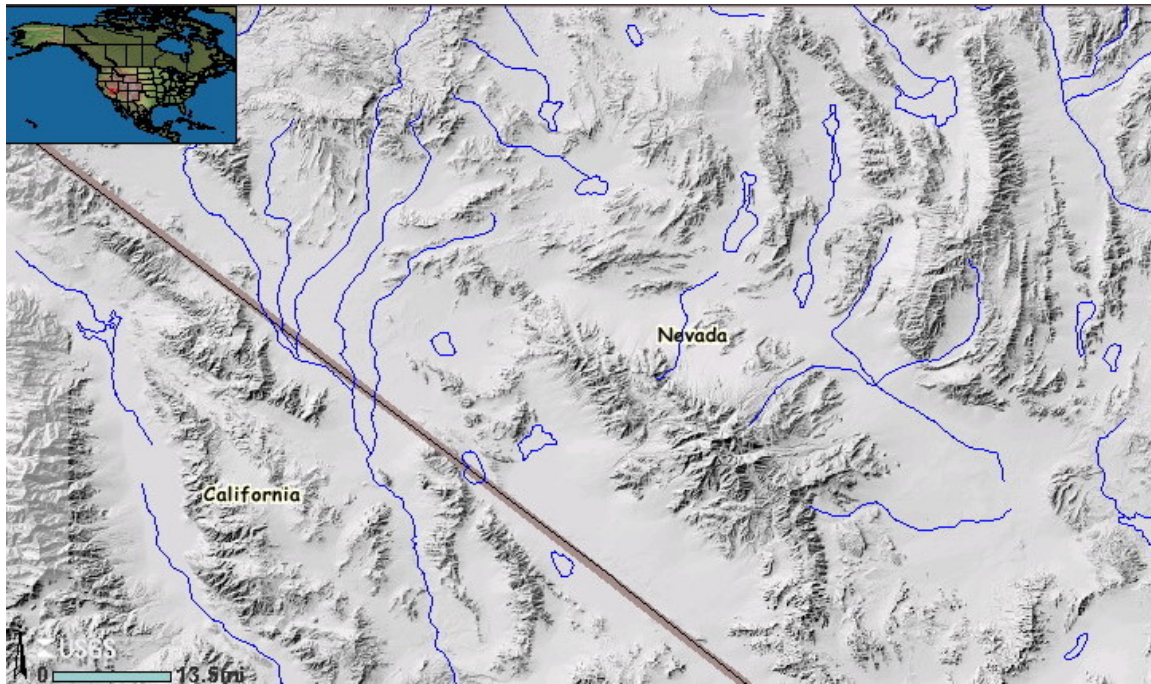




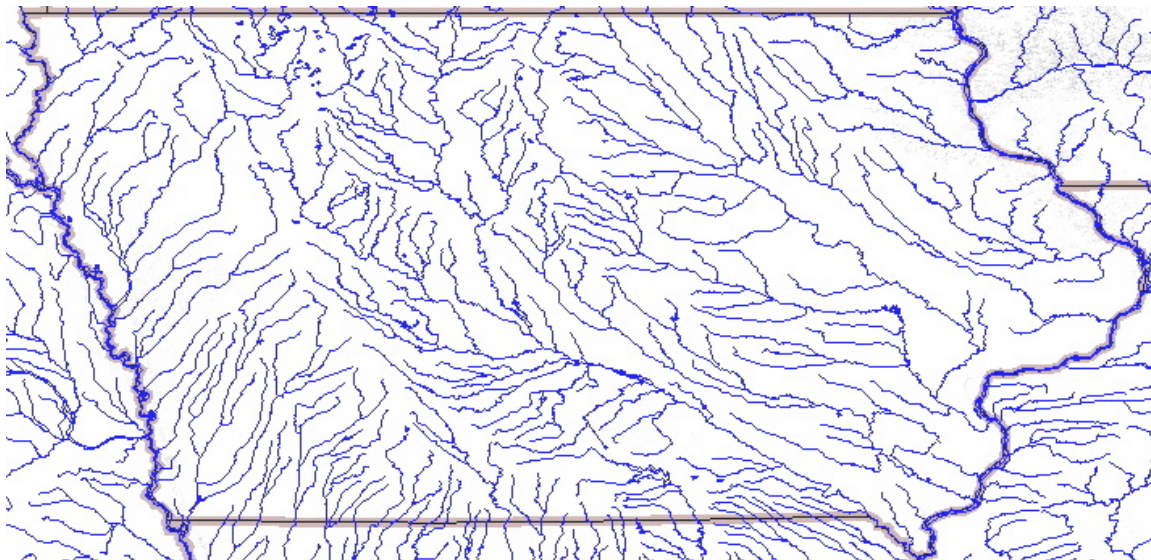
3. What type of drainage pattern do you see in the figure below? What is controlling the formation of those patterns?

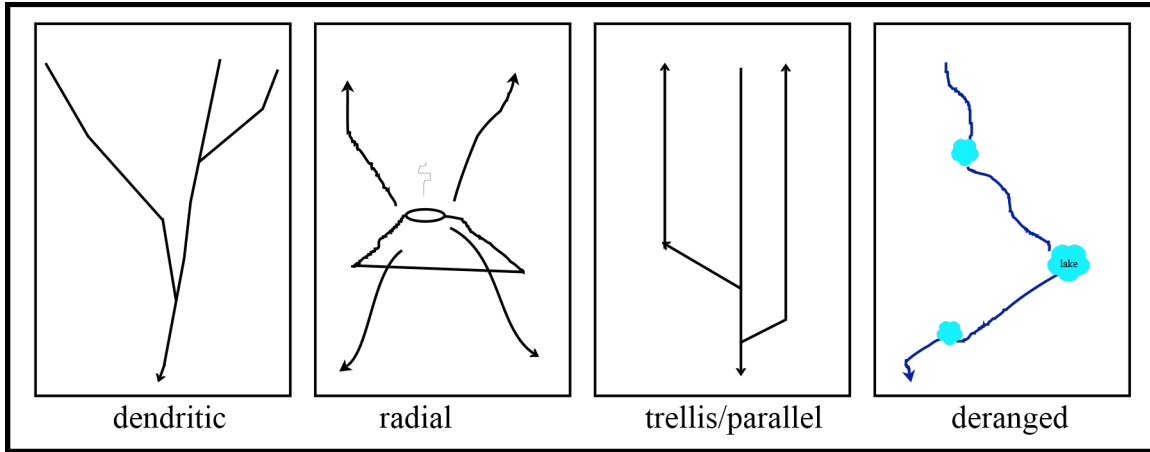


4. What type of drainage pattern do you see in the figure below? What are the little enclosed areas? Why do they form?



5. The map below shows the streams of Iowa. On the map, sketch the drainage divide between the Missouri River and the Mississippi River. Why is it not in the center of the state?





Reference figure for drainage patterns.

3 Rainfall and Urbanization

A new housing development called *Easley Estates* (figure below) is being considered near a tributary to Catfish Creek. One of the concerns is about the amount of runoff generated during rainstorms. For this portion of the exercise, you'll need the following information about the development:

- Each house is 50 feet by 50 feet.
- Each house sites on a lot 200 feet by 200 feet.
- Roads into and out of the development are 20 feet wide.
- Driveways are 10 feet wide and average 75 feet in length.
- Sidewalks are 5 feet wide.

At the top of the next page is a diagram of the proposed development. Use it to answer the following questions, including those on the next page.

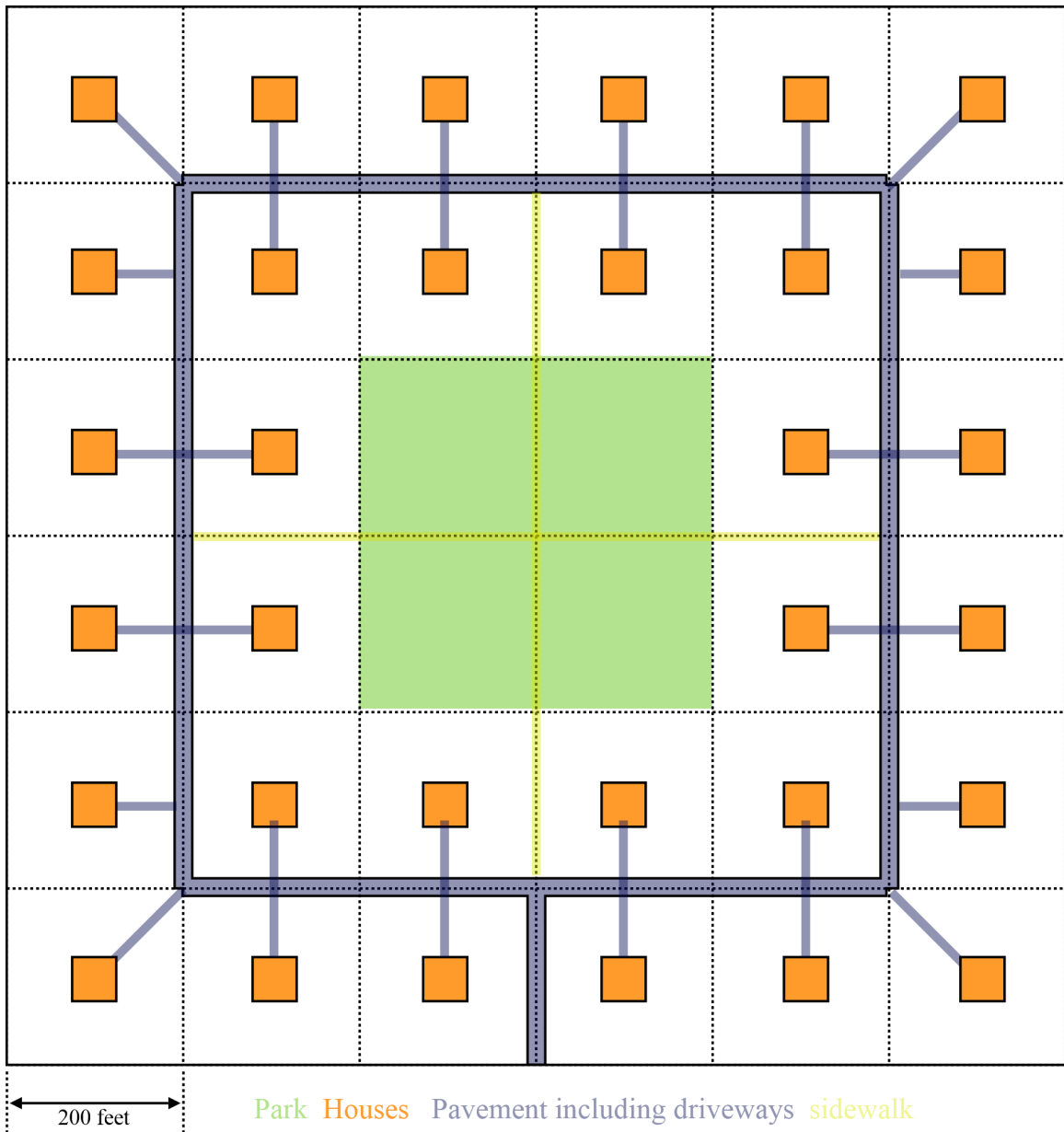
1. What is the total area of the development? _____

2. What is the total impervious area?

- roads _____
- rooftops _____
- driveways _____
- sidewalks _____
- **Total impervious area:** _____

3. What is the impervious area as percentage of total area: _____

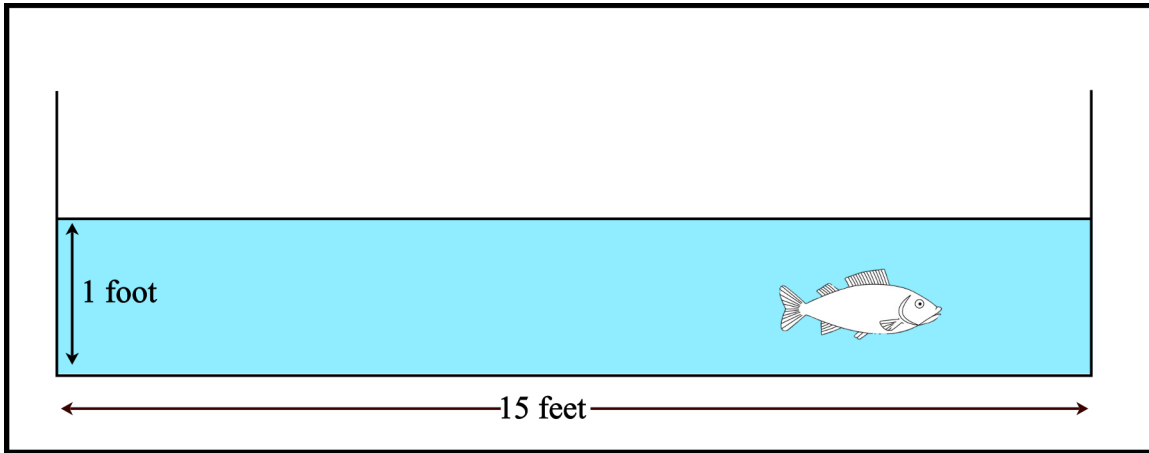
Easley Estates
Fine Living in a Planned Community



4. If it rains two inches in an hour, what is the total runoff from the impervious area? _____

5. If a retention basin was built 100 feet by 100feet, how deep would it need to be to held the water from a 2-inch storm? _____

6. Below is a cross-section of Catfish Creek before a storm. What is its discharge if its velocity is 30 feet/minute? _____



7. If the hydrograph below is created prior to the development's construction, how is it likely to change afterward? Sketch on the figure.

