TSM 352 HOMEWORK ASSIGNMENT 06

**Due Monday, March 16th at 11:59 pm**

1. Use the Drainage Water Management Plan Template on the Illinois Drainage Guide to develop a drainage water management plan for the field in Lab 7.
2. Determine the decrease in the time of concentration resulting from the development of a four-acre drainage area with before and after flow segments as shown below. The flow segments are in series, the roughness coefficient and hydraulic radius of the roadside channel are 0.15 and 1.0 ft, respectively, and the roughness coefficient for the concrete pipe is 0.011.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Development**  **Condition** | **Flow**  **segment** | **Slope** | **Flow Length** | **Type of Flow** |
| **(%)** | **(ft)** |  |
| Before Development | 1 | 1 | 140 | Overland (Forest) |
| 2 | 0.8 | 260 | Grassed waterway |
| 3 | 0.8 | 480 | Roadside channel |
|  | | | | |
| After Development | 1 | 1 | 50 | Overland (Short grass/grain pasture) |
| 2 | 1 | 50 | Paved (sheet flow) |
| 3 | 0.8 | 300 | Grassed waterway |
| 4 | 0.9 | 420 | Concrete pipe (15-in diameter) |

Overland flow velocities for various land cover are given below.

*Hint: Use the Manning Equation or the overland flow equations to determine velocity of travel for each flow segment. Based on the velocity and the travel distance, the travel time can be determined.*

Overland Flow Velocity for Various Land Uses

|  |  |
| --- | --- |
| **Velocity (ft/min) = K x (Percent Slope)0.5** | |
| **GROUND COVER** | **K** |
| Forest With heavy Ground Litter  Hay Meadow | 15.6 |
| Trash Fallow  Minimum Tillage Cultivation  Woodland; Contour & Strip | 29.5 |
| Shortgrass Pasture | 40.9 |
| Cultivated Straight Rows | 54.1 |
| Nearly Bare & Untilled | 63.7 |
| Grassed Waterways | 91.9 |
| Paved Areas  Small Gullies | 121.3 |