



Washtenaw County Water Resources Commissioner

Rules and Guidelines

*Procedures & Design Criteria
For Stormwater Management Systems*

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Evolution of Storm Water Management Rules



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Past History

- * Circa 40,000 – 10,000 BCE
 - * Water runs downhill
- * C. 1792 – 1750 BCE “First” Drain Commissioner
 - * Code of Hammurabi
 - * 55. If a man open his canal for irrigation and neglect it and the water carry away an adjacent field, he shall measure out grain on the basis of the adjacent fields.
 - * 56. If a man open up the water and the water carry away the improvements of an adjacent field, he shall measure out ten GUR of grain per GAN.

Recent History – Washtenaw County

- * Sept. 1979 rules
 - * 0.2 cfs/acre maximum discharge and less than 10-year storm undeveloped discharge rate
 - * Rational method ($Q=CIA$)
 - * Retention (which we now term as detention) based upon 100-year storm event

Recent History – Washtenaw County

- * May 1989 rules
 - * Added retention (no basin outlet) – capable of storing two 100-year storm volumes or one 500-year storm

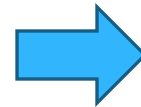
Recent History – Washtenaw County

- * April 1994 rules
 - * Multi-stage detention outlet based upon first flush, bankfull, and 100-year storm
 - * First flush defined as 0.5” of runoff, bankfull defined as 1.5 year storm
 - * Maximum discharge revised to 0.1 – 0.2 cfs/acre
 - * Infiltration is noted but not encouraged (infiltration basins not permitted at all)

Recent History – Washtenaw County

- * April 1996 rules
 - * Maximum discharge rate revised to 0.15 cfs/acre

Impressive looking statistics and illustration to spice up the presentation (completely unrelated to discussion)



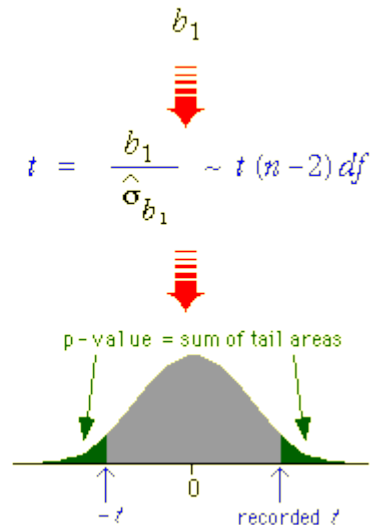
Summary statistic
(helps distinguish H_0 and H_A)



Test statistic
(standard distribution with no unknown parameters under H_0)



P-value
(probability of more 'extreme' test statistic)



Recent History – Washtenaw County

- * May 2000 rules
 - * Continue to use rational method on sites less than 120 acres
 - * Use National Resources Conservation Service (NRCS) method (TR-20 and TR-55), US EPA SWMM, or US Army Corp of Engineers HEC on larger sites
 - * Infiltration now allowed on A and B soils; can infiltrate up to 0.5” of runoff

Recent History – Washtenaw County

- * August 2014 rules
 - * Mandatory pre-application meeting
 - * First flush revised to 1.0” of runoff
 - * Infiltration now required
 - * Must infiltrate first flush or difference in pre- and post- developed bankfull volumes
 - * 20 percent volume penalty if infiltration not feasible (note it is not a choice to just take penalty, must prove you cannot infiltrate)
 - * First flush determined by rational method (unchanged from previous versions), bankfull and 100-year determined by NRCS curve number method
 - * rainfall data updated to reflect past 30 years of observations

Current Rules

- * Green infrastructure more than infiltration
 - * Water reuse – rain barrels and cisterns
 - * Conveyances – vegetated swales and open ditches (bio-swales)
 - * Vegetated filter strips (buffers)
 - * Ground surface /infiltration interface – rain gardens, pervious pavement, etc.

Washtenaw County Review Process

- * Pre-application meeting
- * On-site infiltration testing
- * Design plan submittal
- * Review (not just engineers)
- * Re-submittal
- * Review
- * Wash, rinse, REPEAT



Two years worth of data in Washtenaw County

- * Statistics provided for 59 project sites
 - * 32 sites (54 percent) provided some measure of infiltration
 - * 25 sites (42 percent) provided the minimum required infiltration
 - * 14 sites (24 percent) infiltrated the entire detention volume