Douglas Report Notes

**Summary:**

* Focuses on the stormwater runoff into Boneyard Creek (more runoff from compact surfaces such as buildings, paved streets, etc. than where there is grass or plants)
	+ Stormwater runoff introduces chemicals and pollutants to the receiving waters
* Impervious surfaces
	+ Vehicular traffic introduces oil, antifreeze, and other chemicals
* Turf surfaces
	+ Turf areas introduce residual fertilizer, insecticides, and herbicides
	+ Soils are compacted over time from pedestrian use and being driven on by maintenance equipment, the compacted soils resist water infiltration
* Problem areas: turf, mulch beds, rooftops, parking lots and service drives, sidewalks
* Minimal amount of stormwater control features, so reaching the goal of 90%+ capture for reuse and infiltration will be a substantial and costly undertaking
* Across 10 universities, the most commonly suggested and implemented stormwater treatment methods include:
	+ Disconnecting downspouts from storm drain systems
	+ Bioretention areas/rain gardens/bioswales
	+ Turf conversion
	+ Green roof retrofits and required on new construction
	+ Cistern water storage (above and below grade)
	+ Porous pavers
* University should focus on the quantity, quality, and velocity of stormwater discharge
* Gaining control of stormwater will require changes in both the campus aesthetics and how the campus infrastructure operates
* These changes will allow the university grounds to become an example of research, engineering, and environmental awareness

**Potential Future Studies:**

* Stormwater capture goal needs to be clarified (the iCAP goal does not specifically state if this is a reduction of the total average runoff from the campus or a percentage of a certain average storm intensity)
* Parking Services to study parking lot utilization. Underutilized parking lots contribute to extra runoff and may be able to be decommissioned.
* F&S to take note of parking lot pavement conditions. Lots in need of resurfacing can be retrofitted with pervious pavement applications when they are resurfaced.
* Engineering Dept. and F&S to test campus soils for infiltration rates and compaction density. Infiltration rate will determine how well the stormwater management system will work in those areas. Areas with highly compacted soil should be identified for future soil restoration work.
* Engineering Dept. and F&S to inventory building water usage and irrigation water usage across campus - this will identify the demand volumes for reuse water. Look into retrofitting all existing buildings for clean wastewater (greywater) usage. The areas in high demand for clean wastewater will influence the location of the storage of reuse water.
* Landscape Architecture Dept. and F&S to analyze usage of turf areas by students, staff, and faculty on typical school days and on special events - could include grading scale similar to the one implemented by University of Michigan
* Engineering Dept. and F&S to look into alternatives for de-icing the sidewalks - the current chemicals used have high salt content, which can damage the landscape and end up in the waterways

**Optional Steps to be Taken:**

* Disconnect
	+ Disconnect downspouts and use water discharged from building rooftops (possible uses include toilet flushing and irrigation).
	+ Cut curbs just before the drain inlets to allow stormwater to flow into rain gardens for infiltration. Could include cuts in sidewalks too.
* Landscape
	+ Convert unused turf, in areas which are not required to be a certain aesthetic, to mulch beddings or native plantings or grasses
	+ Regrade large turf areas, like the main quad areas, to accept and store water for infiltration, resulting in less stormwater runoff
	+ Add understory planting to mulch beds to slow stormwater runoff and provide water absorption by their root systems
* Underground Storage
	+ Reuse stormwater indoors for toilet flushing or outdoors for irrigation
	+ Construct underground storage tanks to allow infiltration into the groundwater system
* Pavement Conversion
	+ Convert sidewalks to permeable materials to reduce stormwater discharge - phased replacement policy where damaged sidewalks are replaced with permeable materials
	+ Consolidate underused parking lots and replace some with green spaces to focus on stormwater infiltration - target parking lots in center of campus to decrease vehicles on campus for reduced emissions and increased cyclist safety
	+ Convert remaining parking lot surfaces to a porous paving system (examples include permeable asphalt, permeable concrete, and permeable pavers)
	+ Highlight new stormwater management treatments with informational signage
* Filtration
	+ Insert in-line stormwater filtration into the existing stormwater drainage network to reduce trash, suspended solids, and oils in the stormwater discharge

**Next Steps in Study Areas:**

* Study Area: Main Quad
	+ Convert underutilized turf areas that border quad to rain gardens/planted areas
	+ Water from rooftops can be directed to vegetated areas
	+ Consolidate sidewalks and convert to porous pavement
	+ Bioretention area(s) in front of Davenport Hall
	+ Underground water storage beneath main quad
* Study Area: Goodwin Ave & west side of Krannert Center for the Performing Arts
	+ Integrate curb cuts to direct water away from street and into rain gardens
	+ Convert parking lots to either porous paving or green space if underutilized
	+ Plant small turf areas with native vegetation