

STORM WATER MANAGEMENT SYSTEMS

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OVERVIEW

Michigan's storm water management system provides flood protection, makes development possible, improves agricultural production, and extends the service life of roads, streets and highways. Storm water management affects the water quality of streams, rivers and the Great Lakes, bearing directly on the quality of the State's recreational experience. No inventory of the State's storm water management system exists. Although federally mandated storm water permits are helping to overcome the problem, there is no consistency in operation or maintenance. Funding for continued maintenance, repair and water quality improvement is inadequate or nonexistent.

BACKGROUND

Michigan has the distinction of being the only state in the nation virtually surrounded by fresh water. Parts of lakes Superior, Michigan, Huron and Erie make up forty percent of the State's almost 96,000 square mile surface area.

Clean water is one of our greatest natural resources. Rainwater that falls within our state will eventually make its way into our streams, rivers and lakes. As storm water passes over impervious surfaces, it collects pollutants that are deposited on those surfaces. From the land, storm water collects fertilizers and pesticides that degrade water quality.

The first state legislature enacted Chapter 80 of the Regular Session Acts of 1839 entitled "An Act to Provide for the Draining of Swamps, Marshes, and Low Lands." Although this was the first public works law in Michigan, the legislature probably never anticipated having to deal with the breadth of storm water management issues we face today.

The State's drainage system is vast. The Michigan Department of Agriculture and County Drain Commissioners oversee approximately 18,000 established county drains comprising about 40,000 miles of drainage system. Other systems are owned and maintained by cities, towns and villages and by other agencies such as Michigan Department of Transportation and county road commissions.

There are approximately 122,000 miles of roads, streets and highways in the State, most of which have roadside ditches or enclosed storm drainage systems of one form or another. Roadbed drainage is a key component in the service life of our roadways. Without proper drainage, potholes appear and vehicle repair costs increase.

The Michigan Department of Natural Resources estimates that there are about 54,000 miles of streams in Michigan, some of which are also established county or intercounty drains. Most are receiving waters from smaller storm drainage systems and/or outfalls from combined sanitary and storm sewers.

The USDA estimates that Michigan has ten million acres in agricultural production. Drain tiles have been installed in much of that land to enhance drainage and production. Although these tiles are private, most discharge into public drainage systems. The maintenance and upkeep of the public system directly impacts the function of the private system.

Countless private drainage systems underlie residential, commercial and industrial developments. In many cases local regulations require that these include detention, retention and pretreatment as a means of better managing storm water quantity and quality.

CURRENT CONDITIONS

Operation

No statewide system exists for managing Michigan's storm water. Nor is there a consolidated inventory of Michigan's many independent systems. At best there are only estimates of the overall size and extent of the combined systems. As a result, the entire drainage network is a hodge podge of interlaced jurisdictions, standards and responsibilities, with little coordination of the separate parts.

Because most drainage systems are gravity systems, active "operation" of these has not been a consideration except where pump stations, dams or other mechanical devices require operative effort. Detention and retention basins that are intended to help manage the quantity and quality of storm water also tend to be ignored. Consequently, in an operational sense, much of the storm drainage system is ignored until it fails.

Failure takes many forms: clogging by tree roots or debris, slow deterioration of the materials or collapse of the system. Collapse of a system is usually evident by structural failure or flooding and generally requires immediate repair. Immediate repairs with no opportunity for planning can lead to inefficient use of the already scarce funds dedicated to maintenance. Slow deterioration of storm water systems is not readily apparent unless regular inspections and maintenance are performed. If slow deterioration is not identified, it can eventually lead to failure.

Maintenance

Without proper control, design and maintenance, storm water runoff can damage roads, flood valuable property, and destroy crops. Maintenance occurs at many different levels and intensities. These range from no maintenance (somewhat attributable to the fact that some jurisdictions are unaware of the existence of their systems) to a regular and high degree of maintenance. Maintenance has improved in jurisdictions which fall under the NPDES Phase II requirements. Regular street and catch basin cleaning, pre-treatment



basins, CSO separation projects and improved outfalls have the potential to improve storm water quality.

Preventative maintenance of the conveyance system is not consistent across the State. Some jurisdictions have very proactive maintenance programs. Genesee County, which has about 1750 drainage districts and nearly as many miles of system, has an average maintenance interval of 10 to 15 years. Lenawee County, which has about 700 drainage districts and 1500 miles of system with an average age of 80 years, inspects and/or performs some maintenance on all drains on a 5 year cycle. Newago County's average maintenance interval is 3 years. But, there exist many established county and intercounty drains, both open and enclosed, that have not been maintained in more than 100 years.

As in county jurisdictions, maintenance in municipal jurisdictions varies from one to the next. Many jurisdictions do not pay much attention to their drainage systems until a failure occurs. Little or no maintenance occurs in most private systems.

Water Quality

Before 1987, the quality of Michigan's storm water was deemed a low priority. With increased environmental awareness and the passage of the Clean Water Act, the paradigm has begun to change. The EPA NPDES Phase II requirements, which include development of storm water regulations, have heightened interest in water quality. This interest has prompted growing numbers of local strategies to improve storm water quality and reduce the threat of pollution. Communities like Grand Rapids, in conjunction with community action groups like the West Michigan Environmental Action Council, are developing proactive storm water management plans and promoting alternative storm water management strategies to reduce runoff and improve water quality. As



communities become more aware, the interest in “Green Roofs”, LEED certified buildings and low impact development (LID) is increasing. The recent increase in water quality projects in Kalamazoo, Lansing and Traverse City is evidence of this trend.

Still, there is no coherent state plan or funding method in Michigan for managing storm water runoff. The Michigan Department of Environmental Quality estimates that less than 40% of the State’s storm water infrastructure has ever been reviewed for its potential impact on water quality. Rehabilitation of the statewide infrastructure for water quality purposes is not in the foreseeable future.

FUNDING NEEDS AND OPTIONS

There are over 250 Michigan communities that need to implement mechanisms to pay for storm water management programs mandated by the Clean Water Act. Neither the State nor the Federal government will pay for pollution control or maintenance.

Mechanisms do exist at the local level. Adrian, Ann Arbor, Berkley, Chelsea, Harper Woods, Marquette, New Baltimore and Saint Clair Shores have enacted storm water fees to provide dedicated funding for storm water systems. Others have attempted to generate funding by setting user fees, but in the lawsuit, Bolt v. City of Lansing, the Michigan Supreme Court held that revenue collected by a local government for a storm water utility was a tax and not a fee. Legislation is needed that addresses concerns raised by the Court, thus enabling communities to fund operation.

Established county and intercounty drainage districts can maintain their systems by special assessment. However, maintenance assessments are limited by statute to \$5000 per mile of drain. In many cases proper maintenance requires greater funding.

Although funding by other jurisdictions may be done by special assessment, it is usually through general fund or operating budgets. General

funds are easily affected by the economy and can be cut during economic slowdowns. Restoration of funding is slow and rare.

For the most part, maintenance of private systems is unfunded and virtually non-existent. Mechanisms exist to convert private systems to public systems; however, private owners do not typically wish to incur assessments by converting systems.

GRADES

The storm water grades are based on information collected from personal interviews with representatives of a cross section of jurisdictions that own and operate storm water facilities or otherwise handle storm water. Each interviewee was asked to respond to the four category questions with an Excellent (A), Good (B), Fair (C), Mediocre (D) or Poor (F). The grades reflect a composite of the responses given.

CATEGORY & GRADE

Open Channel systems: C
Drains, Creeks, Streams, Rivers

Enclosed systems: C
Tiles, Storm Drains

Water Quality of Discharge: D

Availability of future funding for maintenance and repair D

CONCLUSIONS

Storm water issues are of immense importance to the State of Michigan. Until this is understood by citizens across the State, there is little hope for change. Due to the NPDES Phase II requirements, some jurisdictions have begun taking action and community action groups are also slowly raising awareness. The

Michigan Department of Environmental Quality hopes to change the paradigm for handling storm water runoff through the use of permits, economic pressures, and environmental understanding. MDEQ is promoting a model that uses on-site controls to keep and use the storm water at or near the point where it fell. However, no statewide standard exists. There is little consistency in operation or maintenance from one jurisdiction to the next. Funding for continued maintenance, repair and water quality improvement is inadequate or nonexistent.

RECOMMENDATIONS

As a state, Michigan needs to do a better job of managing storm water runoff to protect our greatest asset. The Michigan Chapter of the American Society of Civil Engineers makes the following recommendations concerning the management of storm water in Michigan.

1. Increase education about storm water management and its critical role in Michigan. Education is a key component in improving the storm water outlook. Town hall meetings, in-school presentations and community action groups have been successful in increasing awareness, but further work is needed.
2. Increase funding at the state level. Funding for education is possible through various grants and environmental funds but funding for asset management, maintenance, repair and water quality is sparse and may require statutory revision.
3. Establish statewide standards and practices for storm water management. The Southeast Michigan Council of Governments (SEMCOG) has developed a manual for low impact development (LID). The Michigan Department of Environmental Quality (MDEQ) has published its Storm Water Management Guidebook. Further efforts are needed, including asset management guidelines to help identify the extent of the statewide system.



SOURCES

Information was collected from personal interviews with representatives from many jurisdictions. Because of the large number of agencies that own and handle storm water and storm drainage facilities, only a cross section of jurisdictions were contacted. These included

- Michigan Department of Agriculture
- Michigan Department of Environmental Quality
- Michigan Department of Transportation
- County Drain Commissioners
- County Road Commissions
- Cities, Towns and Villages representing Rural and Urban Communities.

The interviews sought to collect similar information for each jurisdiction. This information included the following:

- Total length of drainage system
- Percentage of enclosed (tiled) system
- Average age of the system
- Maintenance interval in years
- Ideal maintenance dollars spent per year
- Actual maintenance dollar spent per year
- Estimated conveyance capacity of the system (storm return interval).

The grades were based specifically on answers to the following four questions.

1. Estimated condition of open channel storm drainage system.
2. Estimated condition of enclosed storm drainage system.
3. Estimate of water quality discharged from the system.
4. Estimate of future funding for maintenance and repair.