



DIRECTOR OF PUBLIC WORKS

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MEMO

TO: Mayor Speaker, Aldermen

FROM: Tom Grisa, Director of Public Works

DATE: May 24, 2004 (updated June 20, 2007 – updates shown in **Bold**)

SUBJECT: Update on sanitary sewer and storm water management improvements

I am providing the following update on the Department of Public Works' activities the past five years as they relate to the City-wide flood task force recommendations regarding flooding in Brookfield. This list includes projects from 1998 (the second flood to the present).

There are still many projects left to complete or even start. It will take continued commitment for the City to resolve all of the identified issues related to improving storm water drainage and reducing flooding and basement backups. We are grateful for the support of the elected officials to make this much progress. We will continue these efforts as part of our regular program in Public Works.

Over the past five years the City has been able to address many of the worst flooding and sanitary sewer concerns since we scheduled the worst problems first. We have made tremendous progress improving the City's infrastructure.

Sanitary Sewer Improvements - Hotspots

- Completed construction of sanitary sewer improvements in Imperial Estates subdivision. Total cost for this project was approximately \$484,500.
- Completed construction of sanitary sewer improvements in Rosedale subdivision. Total cost for this project was approximately \$1,150,000
- Completed construction of Robinwood, Imperial Estates, Rosedale and Greenfield Ave. sewer lining improvements to reduce inflow and infiltration into the sewer

system. Construction costs for these improvements exceeded \$500,000. Manhole rehabilitation work (\$100,000) completed in 2003.

- Completed construction of sanitary sewer relay for the Robinwood area. Total cost for this project was approximately \$772,000.
- Completed construction of sanitary sewer lining and manhole rehabilitation for the Burlawn area. Total cost for this project is approximately \$763,000.
- Applied for and received first \$4 million draw of Clean Water Funds for first set of sanitary sewer improvements in the Hotspot areas. Applied for and received an additional \$3.5 million in Clean Water Fund Loans to pay for additional sanitary sewer system improvements in the Hotspot areas of the City.
- Completed construction of the Burlawn Hotspot sanitary sewer system improvements. Construction cost was \$2.3 million.
- Completed construction of Robinwood, Imperial Estates, Rosedale and Greenfield Ave. manhole rehabilitation work to reduce inflow and infiltration into the sewer system. Construction costs for these improvements exceeded \$325,000.
- All Hotspot projects are now complete!

Sanitary Sewer Improvements – Design and Construction

- Completed construction of a sanitary sewer flow diversion and storm water drainage improvements to reduce inflow and infiltration into the sanitary sewer system and to reduce surcharge conditions in the sanitary sewer along Post Rd. Approximate construction costs were \$64,000.
- Completed flow diversion on Calhoun and Country Lane to use capacity in another sanitary sewer and pump station to relieve surcharging of sewers on Beverly Hills Dr. Work performed in house.
- Requested proposals from consultants to design the Underwood Creek interceptor for proposed development north of Bluemound Road, east of Pilgrim Parkway. Design scheduled for later this year with construction to follow in 2005. **This work was completed in late 2006. Project costs were approximately \$1.2 million. This project also included abandonment of a very old leaky sewer south of Tomahawk Trail.**
- Completed construction of Maple Ridge wastewater pump station improvements to increase capacity by over 80%. Construction costs were \$135,000. This is a joint project with the Town of Brookfield since the pump station serves both communities.

- Constructing improvements to the sanitary sewer system, north of Capitol Drive, near Stonewood Village to address capacity needs of two new developments in the area. Estimated construction cost is \$610,000. Developer has picked up a portion of these costs in proportion to their contributed flow. **This project was completed in 2005.**
- Completed construction of a sanitary sewer repair on Lilly Road, just north of North Avenue for approximately \$50,000.
- Designing improvements to the Indianwood sanitary sewer to improve flow characteristics and reduce leaking. Estimated construction cost is \$350,000. **This project was completed in 2006 for \$800,000.**
- **Completed improvements to the Beverly Hills Dr. sanitary sewer to improve capacity and reduce leaking for a construction cost of \$395,000.**

Sanitary Sewer Improvements – Reduction of Inflow and Infiltration

- Inspected over 3,000 manholes for leaks. Complete with inspection of manholes on MMSD side of the City. Began inspection of manholes on Fox River side of sewer system. **Nearly 100% complete with all manhole inspections.**
- Replaced thousands of sanitary sewer manhole covers with concealed pickhole manhole covers, reducing the inflow of water into the sanitary sewer system. Work performed with in-house labor. Material costs are approaching \$250,000.
- Videotaped more than 820,000 linear feet (155 miles) of sanitary sewers since 1998 to identify leaking sewers for repair. Contracted for another 150,000 feet of sewers in 2004. **Last 150,000 linear feet of sanitary sewers are under contract in 2007 (this includes major interceptor pipes and those in difficult areas to access (easements, etc.) This will complete TV inspection of all sewers in the City of Brookfield.**
- Constructed improvements to sanitary sewers that are found to be leaking using data collected during TV work. Completed construction of \$220,000 of improvements (mostly lining) in 2002. **Every year since we have performed sewer lining and grouting projects as the TV work identifies projects.**
- Continuing to repair manholes as roads are reconstructed and leaking manholes are discovered. Approximate cost of \$200,000 annually. **This amount has increased to at least \$350,000 annually over the last few years. This program continues throughout the City as roads are resurfaced throughout the City and as we find leaking manholes through our inspections.**

- Awarded construction contract to line leaking sewers and repair leaking manholes in 2004 for a total construction cost of approximately \$360,000.
- Completed emergency replacement of sanitary sewer with collapsed and missing pipe sections on Calhoun Road, south of Gebhardt Rd. Cost was approximately \$50,000. This was discovered through the aforementioned TV work.
- Purchased and installed 12 sanitary sewer flow meters and five rain gauges to provide information to the Engineering and Sewer Departments for immediate response and future analysis. Approximate cost of meters and rain gauges was \$20,000.
- MMSD installed 24 sanitary sewer flow meters in the sanitary sewer system tributary to the MMSD to help us understand where our flow is in the system.
- Completed inspection of sanitary sewer laterals and foundation drain connections to the sanitary sewer system in an older area of the City. Results of investigation indicate few leaks found.
- **Instituted a program in 2005 to enforce I/I controls over private sanitary sewer systems in the City. Have required all properties with private sanitary sewer systems to inspect their manholes and sewers for leaks and make repairs as required by the City. Most properties have complied with this requirement. The City actively pursues those who have not yet completed the work.**

In some cases, where power outages affect an entire neighborhood, we can experience water in the basement of some properties. This is a result of sump pumps overflowing their crocks, since there was no power. This water on the floor however also resulted in an overloading of the sanitary sewer system. Some residents experienced water in their basement from the sump crocks, and some had basement backups because of the overloaded sewer system.

All city sanitary sewer pump stations have backup power sources, so they are not affected by power outages and continue to operate as designed during loss of power to the rest of the area.

We are continuing to work with the WE Energies to increase reliability of electric power and reduce outages. To date they have:

- greatly improved/ heightened their levels of communication with Brookfield. City staff has access to WE Energies Response Line and are able to directly contact the WE Energies assigned service manager 24 hours per day to obtain information about an outage for a critical facility
- worked jointly with Brookfield's Forester to educate citizens on the benefits of tree trimming resulting in increased cooperation between property owners and the

forestation crews. This has allowed the utility to achieve appropriate clearances between power lines and trees.

- patrolled all feeders identified as needing upgrades and performed the appropriate corrective modifications such as secondary feeders, transformer replacement and/or forestry work as necessary.
- replaced existing lines or installed new lines where service was previously less than reliable.
- provided residents with information on what to do during a power outage via the City's newsletter. This should provide a quicker response by WE Energies to get the power back on and keep the sump pumps operational, reducing the potential for basement backups.

Sanitary Sewer Improvements – Miscellaneous

- Completed upgrade for Brookfield's Fox River Water Pollution Control Center to provide additional hydraulic and treatment capacity during wet weather. Average daily treatment capacity was increased 25% from 10 MGD to 12.5 MGD, with wet weather treatment capacity increasing nearly 100% from 27 MGD to 50 MGD. The total cost of the treatment plant project is approximately \$40 million. In addition, constructed the Riverview interceptor eliminating a large pump station and force main in the City at a cost of \$2.6 million.
- Requested that the Metropolitan Milwaukee Sewerage District (MMSD) construct an emergency diversion at the Underwood Creek Sanitary Sewer Pump Station to reduce basement backups in Brookfield, Elm Grove and Wauwatosa since the pump station did not keep up with wet weather flow. This request would provide similar protection to these areas as the MMSD's emergency bypass station near Eaton Corp. in Milwaukee.
- **Participated in discussions with the MMSD on the improvements needed on the Interceptor along Fischer Parkway in Wauwatosa as the Underwood Interceptor in Brookfield is tributary to this interceptor. MMSD has developed a design for these improvements and I believe they are in process of implementing same.**
- Entered into an agreement with the Village of Menomonee Falls for the Northwest Interceptor which serves Menomonee Falls. Menomonee Falls will now participate in costs for improvements as needed in the future.
- Completed City-wide sanitary sewer inventory and sanitary sewer analysis including recommended improvements to the sewer system. Sewer Board accepted report. Flow monitoring will continue of sanitary sewers. Investigative and rehabilitative

activities will continue to reduce inflow and infiltration from the sanitary sewer system.

- Regularly clean the sanitary sewer system on a three-year cycle. When problems are detected, the sanitary sewer is scheduled for televising with the City's new television camera.
- Prioritized bypass pumping locations based on most recent data collection and sanitary sewer improvements. List of critical areas has been significantly reduced as the above projects have been completed.
- Input sanitary sewer system on Geographic Information System, providing for more accurate system maps easier location of facilities for maintenance and other purposes. Sewer crews field checked input data.
- Performed an analysis of the sanitary sewers along Beverly Hills Drive and Brookfield Roads to determine capacity to handle future development upstream. Performing flow monitoring of sanitary sewers in the Village area along Brookfield Road and Brookfield Road near Beverly Hills Drive. Analysis of actual flow data will be made to compare with theoretical capacity calculations from study.
- Replaced a failed influent pump to the wastewater treatment plant. Failure of influent pumps can result in sewer backups.
- Updated the City's Sewer Use Ordinance to comply with new DNR regulations.
- Participating in MMSD's 2020 Facilities plan process for the sanitary sewers, treatment plants and watercourse management within the District's jurisdiction.
- **Participated in the review of MMSD Chapter 3 rules as a member of the Technical Advisory Team. The City of Brookfield also submitted comments on these rules.**
- **Participated in the CMOM gap analysis program for the City of Brookfield with MMSD and their consultants. This will be used to implement a CMOM in Brookfield (actually to formally document much of what we have been doing for years) in the near future.**

Storm Water/Flood Control Improvements - Planning

- Received \$175,000 in grant funds from Waukesha County grant funds for storm water improvements.

- Awarded \$1.55 million in grant funds from Wisconsin Department of Natural Resources for storm water quality improvements.
- Completed storm water management study for Imperial and Honey Creek subdivisions.
- Completed storm water management study for Underwood Creek/Dousman Ditch Watersheds.
- Completed storm water management study for Weston Hills subdivision.
- Completed storm water management study for Lamplighter Park subdivision.
- Purchased nine properties (7 houses and two vacant lots) in Lilly and North area for future detention pond as part of implementing the Underwood Creek/Dousman Ditch plan. Total cost was \$1.3 million.
- Completed demolition of seven houses in the Lilly and North area for future pond.
- Received funds from several sources to offset costs for the above project, including \$157,000 in FEMA funding for a Repetitive Loss structure, \$75,000 in County grant funds for storm water improvements and \$257,000 in DNR grant funds for flood control improvements (purchasing 2 houses). We also received \$130,000 in grants from the MMSD for returning the property to a natural state or keeping existing undeveloped property in a conservancy.
- Completed a storm water management plan for the Fox River Watershed and its tributaries and the South branch of the Underwood Creek.
- Established a moratorium on development in the Butler Ditch Watershed until the storm water management plan in this watershed can be completed.
- Worked with the MMSD and their consultant to review the Butler Ditch and the South Branch of the Underwood Creek for streambank flooding concerns. Results of their study showed no stream bank flooding in these areas. (This does not mean there are not storm water problems from storm sewers or ditches or poorly graded properties, but flooding does not exceed the area of the mapped floodplain.)
- SEWRPC submitted draft copy of Butler Ditch storm water management plan to the City for review. Final plan to be completed upon receipt of comments from City of Brookfield and Village of Menomonee Falls. Included several projects in the City's five year capital improvement plan (attached) as they relate to road resurfacing projects. **This plan was completed and adopted in 2004.**

- Participated in the review of MMSD Chapter 13 Storm Water rules as a member of the Technical Advisory Committee Stormwater Subcommittee. The City of Brookfield also submitted comments at the Public Hearing and encouraged other communities to do so.
- Submitted comments on NR 151, proposed rules for Runoff Management by the DNR.
- Participated in the development of a model storm water management ordinance incorporating MMSD storm water management rules and NR 151.
- Updated existing storm water management ordinance by incorporating MMSD's Chapter 13 Storm Water Rules which are more stringent than the previous City standard requiring storm water management plans to maintain or reduce storm water runoff rates from new development or redevelopment.
- Reviewing all development projects for storm water management in accordance with our adopted storm water management ordinance.
- Received approval from the MMSD of the Underwood Creek Dousman Ditch storm water management and flood control plan.
- Awarded storm water management plan development to a consultant for the Lower Menomonee River subwatershed (northeast part of the City) to determine where storm water problems are and how to repair them. Cost for plan is approximately \$100,000. **This plan was completed in 2005.**

Storm Water/Flood Control Improvements – Design and Construction

- Completed storm sewer construction for the Congress St. area in the Northeast industrial park. Total cost was \$300,000.
- Completed construction of a regional retention pond to reduce flooding in the northeast industrial area of the City (126th Street and Congress Street). Cost for construction was \$365,000, with funding coming from local funds, developer contributions, DNR grants and the City of Wauwatosa.
- Completed design and construction of storm sewer improvements for the Greenfield Heights subdivision. Total cost was \$384,000.
- Completed design and construction of new culverts on Brookfield Road between Davidson Road and Baythorn Way in the Weston Hills Subdivision. Total cost was \$47,500.

- Completed design and construction of improvements to the secondary drainage from the Lamplighter Park pond. Work performed in house.
- Completed construction of Lamplighter Park pond improvements, lowering the pond, increasing detention and redesigning the Park. Total construction cost was \$400,000.
- Completed design and construction of the storm sewer from the Lamplighter Park pond to the Wisconsin Memorial Park pond. Total cost was \$101,000.
- Developed design of drainage improvements for Bluemound Park Estates subdivision (Bluemound Rd. and Elmridge area). Tried to obtain easements for improvements, but residents were unwilling to provide easements.
- Completed design and construction for replacement of six 36-inch diameter pipes in the area of 138th St. north of Capitol Dr. Total cost was \$25,000.
- Completed design and construction of bridge culvert replacement on Pilgrim Rd. over Underwood Creek. Total cost was \$22,000.
- Completed design and construction for an upgrade in the crossroad culvert on Calhoun Road between I-94 and Judith Lane. (work performed in-house).
- Completed construction of the Kinsey/Garvendale (Robinwood) storm sewer project. Construction cost was \$816,000.
- Completed improvements to the Hillsdale storm sewer system. Construction cost was \$188,000.
- Completed construction of storm sewer improvements along Burleigh Road, west of Calhoun Road for a cost of \$125,000.
- Completed construction of the Oak Hill Lane storm sewer improvements from Lilly Road to the west. Construction cost was approximately \$445,000.
- Completed construction of storm sewer improvements along Elm Terrace and through an eroded ditch area. Construction cost was approximately \$130,000.
- Completed construction of a detention pond for Lilly and North area. Construction cost was approximately \$300,000.
- Completed construction of two streambank stabilization projects. One project was the unnamed tributary to the Fox River along Calhoun Road from North Avenue to the CP Railroad tracks. The other project was for the Kinsey Park stream section to and including the Kinsey Park detention basin. Construction cost for both projects was approximately \$635,000. DNR funds picked up approximately 50% of the costs.

- Awarded construction project to stabilize a portion of the Underwood Creek from Pilgrim Road to Pomona Road. Estimated construction costs are \$170,000 with DNR sharing in 50% of these costs. **This project was completed in 2005.**
- Designed improvements to the Brookfield Road storm sewer system at Estate Circle and at Beverly Hills Drive to reduce flooding in the area. Estimated construction cost is \$575,000.
- Designing improvements to the Rosedale area to reduce storm water problems. Estimated construction cost is \$470,000. **This project was completed in 2005.**
- Re-graded numerous ditches and replaced culverts to improve drainage throughout the City, concentrating on areas of known problems or where street construction is scheduled.
- **Completed design and construction of storm sewer improvements on Fiebrantz Drive for approximately \$120,000.**
- **Completed design and construction of storm sewer improvements on Luella Drive with in-house labor.**
- **Completed design and construction of storm sewer improvements on Brookfield Road at I-94 with in-house labor.**
- **Completed design and construction of storm sewer improvements on Honey Creek Dr. and Verna Dr. for approximately \$670,000.**
- **Completed design and construction of storm sewer improvements on Macauley Drive with in-house labor.**
- **Completed design and construction of storm sewer improvements on Lilly Road/Ranch Dr./ Capitol Drive for approximately \$80,000.**
- **Completed design and construction of storm sewer improvements on San Juan Trail for approximately \$260,000.**
- **Completed design and construction of storm sewer improvements on Westwood/Lindsey Drive for approximately \$150,000.**

Storm Water/Flood Control Improvements - Miscellaneous

- Purchased three severely damaged homes in floodplains using FEMA and City funds.

- Applied for a storm water discharge permit in accordance with DNR regulations NR216. **This permit was received in 2007.**
- Completed a Hazard (Flood) Mitigation Plan for the City of Brookfield as prepared by SEWRPC.
- Discussed merits of a storm water utility for Brookfield through a presentation and proposal from an internationally recognized consulting firm, who has performed nearly 25% of all the storm water utility projects in the United States. Advantages of a storm water utility did not warrant a change at that time.
- Met with and suggested possible flood relief strategies for individual property owners. If problems were caused by City runoff from right-of-way or area drainage, we considered this a “project” for improvement to be designed and constructed by the City as some point in the future.
- Cooperated with Department of Community Development to establish building grade elevations on hundreds of new homes in Brookfield to prevent new residential flooding. Developed a more clearly defined process for the review and approval of grading plans through construction and final grading of properties.
- Purchased numerous storm water easements for maintenance improvements.
- Worked with SEWRPC to update all floodplain mapping in the City. These are currently submitted to FEMA for their approval.
- Adopted a revision to the floodplain zoning ordinance for modification to allow the City more discretion on requests to fill the floodplain.
- Purchased 118 acres of wetland/floodplain property in the City since 1998 as part of the City’s wetland conservation program and participated with the County in acquisition of 50 acres of wetland/floodplain along the Fox River. The City continues to acquire 20 to 25 acres per year of open space and wetlands as part of the City’s Open Space and Park plan.
- Adopted the City’s Greenway Corridor Plan which will provide for additional land preservation and possible storm water detention. In addition, access to these open spaces and floodplains/wetlands will provide educational opportunities for the public to better appreciate the need for these spaces for environmental reasons and protection of floodplain.
- Purchased an additional 3-acre parcel at the southeast corner of Barker Rd. and North Ave. to prevent this wetland and floodplain property from developing.

Results of Completed Projects

Those projects that are complete as indicated above have performed as expected. Over the past two years, the City of Brookfield has experienced numerous heavy rain events including rain events approaching 25-year frequency storms. In those areas where we have completed improvements, we did not experience basement backups or overland flooding causing structure damage because of heavy rain events. While these events were not as severe as the 1997 and 1998 rain events, they were significant and a good test of the improvements.

A rain storm in August of 2002 dropped more than 3.5 inches in 24 hours and the systems that had been improved performed well with no flooding and no reported basement backups. Dry ground conditions did offer some opportunity for the water to soak in, which helped to some extent.

The most recent rain events in May 2004 have provided a strain on the system similar to all sanitary sewer systems in southeast Wisconsin. We bypassed at only two locations and blended at the wastewater treatment plant. This is significant improvement over where we would have been five years ago if we had experienced this same type of rain events over the two week period in May 2004.

We are proud of our progress and the success we have had. That being said, there is still more to do, and we are working toward that end.