

1. Agenda

Documents: [FEBRUARY 25, 2016 SPECIAL VILLAGE BOARD AGENDA.PDF](#)

2. Packet

Documents: [FEBRUARY 25, 2016 SPECIAL VILLAGE BOARD PACKET.PDF](#)



SPECIAL VILLAGE BOARD MEETING

MEETING NOTICE AND AGENDA VILLAGE OF WHITEFISH BAY 5300 North Marlborough Drive

**Thursday February 25, 2016
7:00 PM**

- I. Call to Order and Roll Call
- II. Report of Village Officers
 1. Village Attorney
 2. Village Manager
 3. Village President
 4. Miscellaneous Trustee Reports
- III. Petitions and Communications – This is an opportunity for anyone to address the Village Board on any issue NOT on the current agenda. While the Board encourages input from residents of the Village, it may not discuss or act on any issue that is not duly noticed on the agenda.
- IV. General Business
 1. Discussion/Action on Palisades/Lake Drive area sanitary sewer backup reduction project.
 2. Discussion/Action on Woodruff Avenue area sanitary sewer backup reduction project.
 3. Discussion/Action on engineering services work order authorization #7 with Clark Dietz for the design of the 2016 sanitary sewer improvements.
- V. Adjourn

Upon reasonable notice, efforts will be made to accommodate the needs of disabled individuals.



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Village of Whitefish Bay 2016 Sanitary Sewer System Improvements Project Summary

Project ID	Problem Description	Principal Causes of Problem	Proposed Improvements	Construction Locations	Estimated Costs
1	Residences at the southern half of Palisades Road have suffered persistent basement backups during moderate to heavy rainfall events.	<p>Surcharge conditions in the Fairmount Avenue sanitary sewer mains.</p> <p>Several basements have low tolerance for surcharge conditions in the Palisades sewer main.</p>	<p>A public sanitary sewer lift station is proposed at the Lake Drive – Palisades Road intersection.</p> <p>The public lift station will provide continuous discharge and prevent the Fairmount Avenue sewer surcharging to impact the Palisades Road sewer main and contribute to backups.</p>	<p>The public lift station will be constructed underground in the vicinity of the Lake Drive / Palisades Road intersection.</p> <p>Above ground, there will be a backup natural gas generator and an electrical control panel, all placed on public property.</p>	\$335,000
2	The residences on the east side of North Lake Drive between Henry Clay and Fairmount Avenues are prone to basement backups during moderate to heavy rainfall events	<p>Lake Drive is served by twin sanitary sewer mains – one on each side of the street. The sewer main on the east side receives all of the sewer flow from north of Henry Clay and therefore is overloaded during rainfall.</p> <p>The sanitary sewer on the east side does not have an emergency bypass to the storm sewer like the west side sanitary sewer does.</p>	<p>Reduction of sanitary sewer flows in the east sewer main keeping the east and west sewer mains independent of each other from Silver Spring to Fairmount.</p> <p>Allowing the east sewer main to overflow into the storm sewer in the vicinity of Fairmount Avenue under emergency conditions.</p> <p>Establishing more direct connections of both the east and west sanitary sewer mains to the Fairmount sanitary sewer main.</p>	<p>Installing a new sanitary sewer pipe on Lake Drive at Henry Clay extended to establish separated sanitary pipe flows on each side of Lake Drive.</p> <p>Installing an overflow from the east sanitary sewer main to the existing storm sewer bypass near Fairmount Avenue.</p> <p>Moving both Lake Drive sanitary sewer main connections to the Fairmount Avenue sewer main closer to the Lake Drive – Fairmount Ave – Newhall Ave intersection.</p>	\$310,000
3	The area surrounding the intersection of Fairmount Avenue and Woodruff Avenue is a known sanitary sewer basement backup risk area.	<p>High hydraulic pressures of the Fairmount Avenue sewer main affect Woodruff Avenue sewer mains to the north and south of Fairmount.</p> <p>In addition, sewer mains on Sheffield Avenue north of Fairmount, as well as Colfax Place are severely affected by the high hydraulic pressures of Fairmount Avenue sanitary sewer main.</p>	<p>The project reroutes sanitary sewer mains away from Fairmount Avenue.</p> <p>To the north of Fairmount, sewer mains on Woodruff, Sheffield and Colfax are rerouted to Diversey Boulevard through Lancaster Avenue.</p> <p>To the south of Fairmount, the sanitary sewer main on Woodruff is rerouted to Hampton Avenue.</p>	<p>New sanitary sewer mains will be installed on Lancaster, Woodruff, Colfax and Sheffield.</p> <p>Fairmount Avenue residences between Woodruff and Marlborough will be served by these new sewer mains.</p> <p>New sanitary sewer mains will be installed on Woodruff from Fairmount to Chateau, then to Hampton on Elkhart.</p>	\$1,700,000

2016 WHITEFISH BAY SANITARY SEWER IMPROVEMENTS



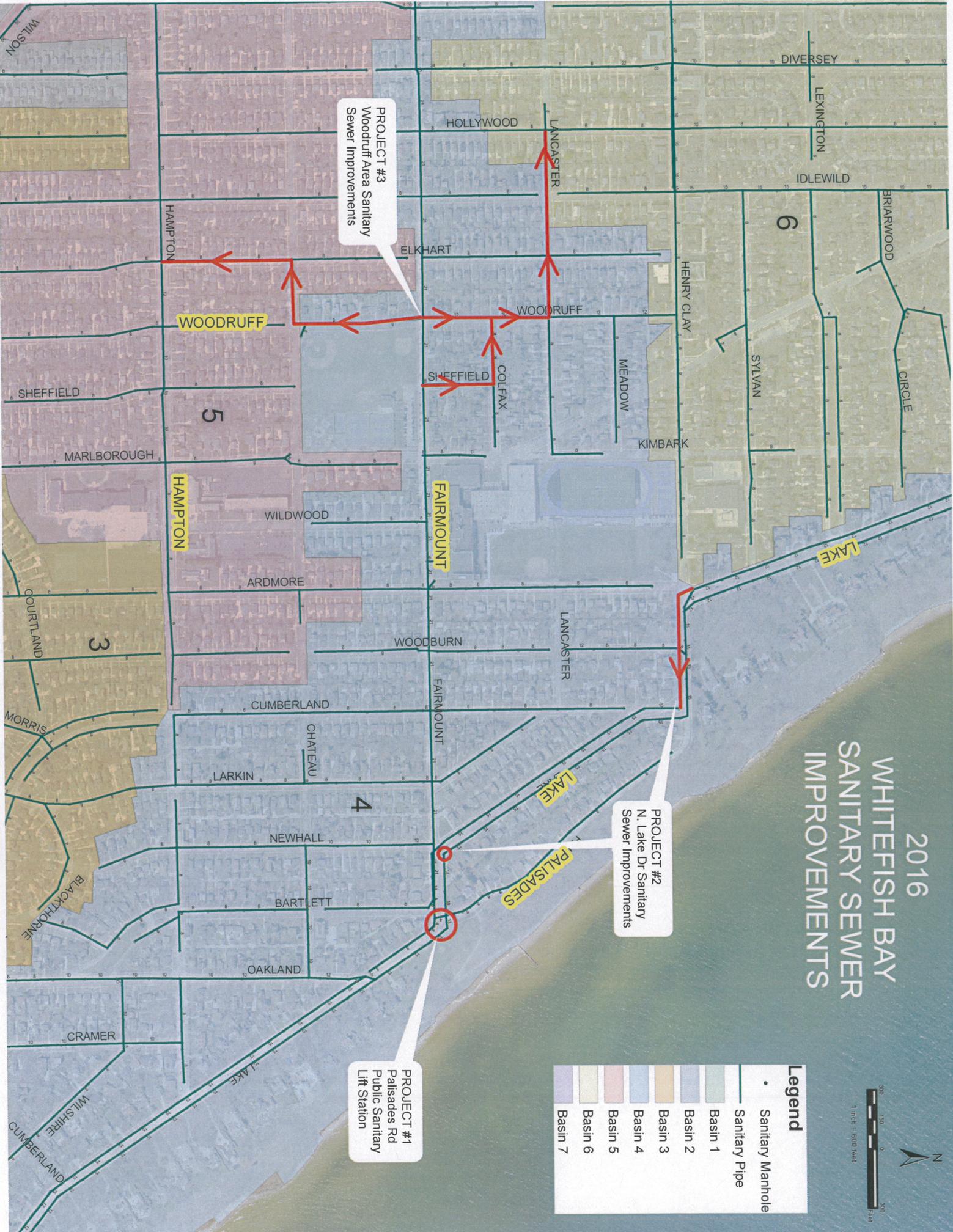
Legend

- Sanitary Manhole
- Sanitary Pipe
- Basin 1
- Basin 2
- Basin 3
- Basin 4
- Basin 5
- Basin 6
- Basin 7

PROJECT #3
Woodruff Area Sanitary
Sewer Improvements

PROJECT #2
N. Lake Dr Sanitary
Sewer Improvements

PROJECT #1
Palisades Rd
Public Sanitary
Lift Station

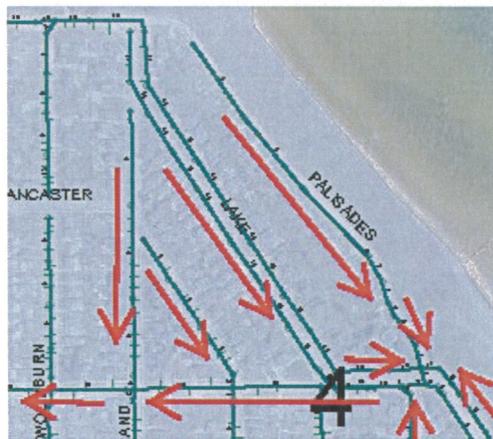


MEMORANDUM

To: John Edlebeck, P.E., Director of Public Works
From: Mustafa Emir, P.E., Clark Dietz
Date: February 4, 2016
Subject: Palisades Road Sanitary Sewer Backup Protection Strategy

Current Status

North Palisades Road is located along the Lake Michigan Bluff, parallel to North Lake Drive between East Fairmount Avenue and East Henry Clay Street. At about 1,650 feet, an 8 inch diameter sanitary sewer main serves the 18 residences located all on the west side of the street.



Residences at the southern half of Palisades Road have suffered persistent basement backups during moderate to heavy rainfall events over the years. In response, several property owners have implemented in-home measures to protect against basement backups and achieved various levels of success. Backup prevention valves on sanitary sewer laterals, sump pumps and foundation drain disconnects, basement drain standpipes, and complete elimination of basement fixtures have been attempted. More recently, several property owners have installed hung-plumbing in their homes.

Our computer models of the sanitary sewer performance during rain events confirm that the sewer main segment on this street is vulnerable to surcharging at rain events as low as 1.2 to 1.4 inches in a one-hour period. We have identified three main causes for this vulnerability:

1. The Palisades Road sanitary sewer main is connected to the Fairmount Avenue sanitary sewer main, which serves a large portion of the southern third of Whitefish Bay. As such, the Fairmount sanitary sewer main is subject to early and severe surcharging in rains exceeding 1.2 to 1.4 inches in a one-hour period. When the Fairmount sanitary sewer main experiences these surcharge conditions, it is no longer able to accept flows from other mains such as the Palisades Road sanitary sewer main. Under these conditions, it is likely that the surcharging of the Fairmount sanitary sewer main pushes into connecting mains such as the Palisades sanitary sewer main.
2. The Palisades Road sanitary sewer main discharges into the Fairmount Avenue sanitary sewer collector main at the intersection of North Lake Drive, Palisades Road, and North Bartlett Avenue. The sanitary sewer main configuration and layout at this location is complex and has a low level of hydraulic efficiency because of the number of manholes, changing grades, and changing directions of flow over short distances. This complex configuration increases hydraulic losses and reduces

the flow capacity of the sanitary sewer main system and is a likely contributor to the high risk of basement backup risks at Palisades Road.

3. The elevation of the Palisades Road sanitary sewer main was field verified against the elevations of the basement floors in the southern half of the street. Our findings clearly indicate that there is almost no margin for any surcharging in that main and even the slightest surcharging in the mains create a risk of basement backups.

Improvement Alternatives

With the goal of reducing basement backup risks on Palisades Road, we have considered several approaches, including sanitary sewer replacement and rerouting options. We considered upsizing existing sewers, as well as providing new connections that reduce basement backup risks and increase the number of homes that benefit from these projects. We looked at the feasibility of constructing sanitary sewer overflows to Lake Michigan, or installing a public lift station at the Lake Drive intersection to eliminate the dependence of the Palisades Road sanitary sewer main on the frequently surcharging Fairmount Avenue sanitary sewer main.

Option 1: Sewer Main Capacity Increase on Palisades Road:

We performed computer modeling to evaluate the feasibility of upsizing the existing sanitary sewer pipes on Palisades Road. In general, capacity added by the concept of upsizing a pipe reduces surcharging and result in lower basement backup risks. However, our analysis revealed that the single most influential hydraulic impact on the Palisades Road sanitary sewer main is the flow condition of the Fairmount sewer main and that upsizing of the Palisades Road sanitary sewer mains will not result in basement backup risk reductions.

Option 2: Reconfiguration of the Sanitary Mains at Palisades and Lake Drive:

During our computer modeling, we also evaluated the feasibility of re-arranging the sewer main layout at the Palisades – Lake Drive intersection to gain a hydraulic advantage for the Palisades Sanitary sewer main. After analyzing a number of available options for reconfiguration, we determined that the hydraulic benefits achieved through extensive sewer construction at this intersection would not result in significant benefits in backup reduction risk for the residents of Palisades Road.

Option 3: Sanitary Sewer Overflow to Lake Michigan:

Over the last several years, and especially following episodes of basement backups in the area, the creation of a sanitary sewer overflow (SSO) that relieves the surcharging of the Palisades Road sanitary sewer main directly into Lake Michigan has been proposed by residents. While an SSO can sometimes be an effective way to protect against basement backups, not so in this case: since the sewer main elevations are so close to the basement floor elevations, the surcharge protection must start very early in a rain event (because even minimal surcharging will cause backups) and therefore will not meet the requirement that sanitary sewer overflows must be installed as a last resort emergency response to health and property damage threats. As a consequence, the frequent discharge of untreated sewer flows into Lake Michigan within the Village is not considered to be solution to the recurring sanitary sewer backups at Palisades Road.

Option 4: Installation of in-home Sewage Ejector/Sewage Lift Systems:

A private sewage ejector (or lift) system collects the household wastewater generated in the basement (i.e., toilets, washing machines etc.) and pumps it to the existing sanitary sewer lateral. In doing so, the ejector pump creates a hydraulic barrier against a surcharged sanitary sewer main and/or lateral. The sewer stack

in the house acts as a standpipe relieving the pressure of the surcharged sanitary sewer mains. In addition, the protection against surcharging does not depend on the ejector pump running.

Overall, a private sewage ejector system is the most effective means to prevent basement backups caused by surcharged sanitary sewer mains, especially where the surcharging cannot be reduced or eliminated.

Based on our field investigation, the selection of homes where the ejector sewer system would be effective is based on the elevation differential between the home's basement floor and the sanitary sewer main elevation. In order to provide the desired level of backup protection, if a minimum of 4 feet of separation does not exist between the basement floor and the sanitary sewer main invert, an private in-home ejector system installation is recommended. Based on currently available data, the southern 12 homes on Palisades Road meet this criterion.

Option 5: Construction of a Public Sanitary Sewer Lift Station at Lake Drive and Palisades Road:

One possible means of hydraulically separating the Palisades Road sanitary sewer main from the surcharging of the Fairmount sanitary sewer main is to construct a public lift station that will pump the Palisades Road sanitary sewer main flow into the Fairmount sewer main regardless of the surcharge conditions there. The public lift station will also prevent the surcharged flow in the Fairmount sanitary sewer main backing up into the Palisades Road sewer main.

Sanitary sewer main lining and private lateral lining on Palisades Road may also be used to minimize the wet weather flow in the Palisades Road sewer main, and therefore maintain the pump size at the proposed lift station.

Option 6: Inflow and Infiltration Reduction in Private Laterals and Public Sewer Mains on Palisades Road:

Wet weather flows that exceed pipe capacities are proof that the Palisades Road sewer mains (as many other sewer mains in the Village) exhibit a high potential of inflow and infiltration due to rainfall. Therefore, one way to help reduce basement backup risks is to reduce wet weather flows in the sanitary sewer mains.

Effective methods that reduce inflow and infiltration include the lining of sanitary sewer mains and private laterals, thereby minimizing cracks and offset joints that let groundwater into the sewer system. Also the elimination of foundation and roof drain connections. We recommend that the sanitary sewer main as well as all of the private laterals on Palisades Road be considered for lining so as to reduce the amount of flow that must be conveyed in the sanitary sewer main, and all roof and foundation drains be evaluated. This option alone however will not provide relief to the Palisades Road high basement backup risk in this area.

Option 7: "Duck Bill" at the most downstream Manhole of the Palisades Road Sewer Main:

A "Duck Bill" is a rubber device that is circular at one end and flattened at the other, thereby creating a duck bill like appearance. The device is placed at the end of a circular pipe with the duck bill facing the direction where surcharging is expected. When surcharging does occur, the water pressure presses the bill shut, thereby preventing the surcharge propagating through the bill.

Note that while the bill is pressed shut, no flow can pass in either direction, so this device is not suitable where long durations of surcharging are expected. No flow through the duck bill also means that reducing the inflow and infiltration upstream of the duck bill is important: we don't want the upstream pipe sections to fill up and create their own surcharging and creating basement backup risks locally.

Option 8: Wet Weather Flow Reduction in the Fairmount Sewer Main:

The surcharged conditions in the Fairmount Avenue sanitary sewer main are the prevailing cause of adverse hydraulic conditions in most or all sanitary sewer mains that discharge into this collector main. Accordingly, we recommend that an overall strategy to reduce wet weather flows in the Fairmount Sewer be implemented throughout Sewershed 4 by sanitary sewer main lining coupled with private sanitary sewer lateral lining as well as roof and foundation drain disconnections.

Recommendation for 2016: Option 5

- Options 1 and 2 involve local sewer main capacity increases. However, due to the hydraulic conditions of the Fairmount system that receives the local sewage flows, local improvements will not produce the desired level of basement backup risk reduction.
- Option 3 consists of a sanitary sewer overflow (a.k.a. bypass) to Lake Michigan. Notwithstanding the environmental pollution concerns associated with this approach, the relationship of basement floors and existing sewer main pipes are such that bypassing will be required at more frequently than can be described as “emergency conditions.”
- Option 4 involves in-home improvements to private properties, and therefore is an unconventional approach. Private maintenance of in-home improvements creates uncertainty to the long term viability of this approach.
- ***Option 5, the Palisades Road public sanitary lift station, with an estimated cost of \$335,000, compares favorably to the in-home installation of ejector pumps because it provides a permanent and publicly owned and maintained physical hydraulic barrier to the surcharged conditions of Fairmount Avenue sanitary sewer main and it's affects on the Palisades Road sanitary sewer main.***
- Option 6 and 8, the reduction of wet weather flows throughout the sewershed, is an important component of all solutions seeking basement backup reduction in the Village. To this end we recommend a sewershed wide effort to line public sanitary sewer mains and private sewer laterals and to remove foundation and roof drain connections to keep stormwater and groundwater inflow and infiltration out of the sanitary sewer system.
- Option 7 is a relatively straightforward installation of a simple hydraulic device that protects upstream pipes from surcharged conditions that may occur downstream. However, since the recommended approach is a public lift station, this device will not be needed.

MEMORANDUM

To: John Edlebeck, P.E., Director of Public Works
From: Mustafa Emir, P.E., Clark Dietz
Date: February 4, 2016
Subject: Lake Drive Sanitary Sewer Backup Reduction Strategy
 Henry Clay Street to Fairmount Avenue

Current Status

North Lake Drive, from Silver Spring Drive to the southern border of the village, is served by two parallel sanitary sewer mains, each serving its own side to the roadway. Ultimately, these two parallel lines feed sanitary flows into the Fairmount sanitary sewer main.

The two existing parallel sanitary sewer main lines combine into a single sewer line at Henry Clay flowing to the south prior to joining the Fairmount sewer main. At this point, the sewer main on the east side of the street between Henry Clay and Fairmount really serves both the twin sewer lines flowing separately

between Silver Spring and Henry Clay.

Historic data shows that the residences on the east side of Lake Drive between Henry Clay and Fairmount Avenues are more prone to basement backups as compared to the residences on the west side of the street.

There are two main reasons for this:

1- The twin sewer mains of Lake Drive between Henry Clay and Silver Spring combine their flows in the **east sewer main** of Lake Drive between Henry Clay and Fairmount Avenue.

2- We also know that the **west sewer main** of Lake Drive between Henry Clay and Fairmount Avenue has an **overflow connection** (i.e., bypass) to the storm sewer system, which allows the west side sanitary sewer to relieve high



pressures and high sanitary sewer flows into the storm sewers (i.e., into Lake Michigan) and therefore offering backup protection to those homes on the west side of Lake Drive north of Fairmount Avenue.

Improvement Alternatives

The reduction of basement backup risks on Lake Drive between Henry Clay and Fairmount, and specifically on the east side of the street will rely on three points of improvement:

- 1- **Reduction of sanitary sewer flows in the east sewer main keeping the east and west sewer mains independent of each other from Silver Spring to Fairmount.**
- 2- **Allowing the east sewer main to be connected to the existing storm sewer overflow in the vicinity of Fairmount Avenue.**
- 3- **Establishing more direct connections of both the east and west sanitary sewer mains to the Fairmount sewer main.**

Option #1: Maintain the twin flows throughout Lake Drive Sanitary Sewer System:



By constructing approximately **525 feet** of 15 inch diameter sanitary sewer pipe on Lake Drive at Henry Clay extended, we can maintain the twin character of the Lake Drive sanitary sewer mains from Silver Spring to Fairmount and thereby allowing each side of the street to be served by an independent sewer main.

The main benefit of this approach is to balance sewer flows against pipe capacities, thereby reducing the potential for basement backups during rainfalls.

Keeping the twin sewer mains separate from Silver Spring Drive all the way to Fairmount Avenue will substantially reduce flows in the east sewer main segment between Henry Clay and Fairmount, the very segment that exhibits a high risk of basement backup risks.

Option #2: Providing a Bypass Option for the East Sewer Main near Fairmount Avenue

An existing connection between the west sewer main and the storm sewer pipes near Lake Drive – Fairmount Avenue area provides a significant degree of basement backup protection on that main. In order to provide a similar level of extreme weather protection to the east side of Lake Drive, we propose to install an overflow connection from the east sanitary sewer main to the west sanitary sewer main near the existing

bypass location. This overflow will then allow the relief of high pressures in the east sewer main to the west sewer main during extreme weather events and offer an increased level of basement backup protection to the residence on the east side of Lake Drive in this block.

Option #3: Rerouting of Lake Drive Sanitary Sewer Mains at Fairmount Avenue

Both of the twin sewer mains on Lake Drive connect and discharge into the Fairmount Avenue sanitary sewer main. In the current configuration, the sewer main on the east side of Lake Drive is connected to the Fairmount Avenue sewer main at or about the Lake Drive – Palisades Road intersection. The sewer main on the west side of Lake Drive connects to the Fairmount Avenue sanitary sewer main at or about the Lake Drive – Bartlett Avenue intersection.

Option 3 involves moving both of the Lake Drive sewer main connections to the Fairmount Avenue sewer main closer to the Lake Drive – Fairmount Avenue – Newhall Avenue intersection. This provides a more direct connection for the twin sewer mains and simplifies the hydraulics of the system, thereby providing increased capacity. In addition, the Fairmount Avenue sewer at Newhall is deeper and therefore allows for more protection against surcharged conditions.

Recommendation for 2016: Options 1, 2 and 3

- We recommend the implementation of Options 1, 2, and 3 simultaneously in order to provide significant improvements in the eastside sanitary sewer performance on Lake Drive between Silver Spring Drive and Fairmount Avenue, and especially in the block between Henry Clay Street and Fairmount Avenue.
- An added benefit of Options 2 and 3 is the reduction of hydraulic pressures and surcharging at Lake Drive – Bartlett Avenue – Palisades Road area during wet weather events.
- The total estimated cost of recommended improvements is **\$ 310,000.**



MEMORANDUM

To: John Edlebeck, P.E., Director of Public Works
From: Mustafa Emir, P.E., Clark Dietz
Date: February 4, 2016
Subject: Woodruff Avenue Area Sanitary Sewer Backup Reduction Strategy

Current Status

The area surrounding the intersection of Fairmount Avenue and Woodruff Avenue is a known sanitary sewer basement backup risk area. The extent of high basement backup risks includes Woodruff Avenue from Lancaster Avenue to Chateau Place, Colfax Place between Woodruff Avenue and Marlborough Drive, Sheffield Avenue between Fairmount Avenue and Colfax Place and Fairmount Avenue between Marlborough Drive and Woodruff Avenue.

The sanitary sewer system in this neighborhood has had a history of creating basement backups during heavy rains. Recent computer analysis of the hydraulic capacity of the sanitary sewers confirms that the system has a low threshold for basement backup risks, indicating that intense rainfalls of 1.4 inches per hour or more can start causing basement backups starting from Fairmount Avenue and propagating north and south of Fairmount Avenue as rainfall amounts increase.

High hydraulic pressures of the Fairmount Avenue sewer main affect Woodruff Avenue sewer mains to the north and south of Fairmount. In addition, sewer mains on Sheffield Avenue north of Fairmount, as well as Colfax Place are severely affected by the high hydraulic pressures of Fairmount Avenue sewer mains.



Each circle represents reported basement backups during a major storm in July 2010

In addition to hydraulic capacity deficiencies, field investigations have revealed that the average basement floor on Woodruff Avenue is within two feet of the sanitary sewer main elevation. This means that these basements are very susceptible to the effects of any surcharging in the sanitary sewer pipe, adding to the overall basement backup risk factors in the area.

Improvement Alternatives

With the goal of reducing basement backup risks in the Woodruff area, we have considered several approaches, including sanitary sewer replacement and rerouting options. We considered upsizing existing sewers, as well as providing new

connections that reduce basement backup risks and increase the number of homes that benefit from these projects.

Option #1: Capacity Increase on Woodruff Avenue and Nearby Sewer Mains:

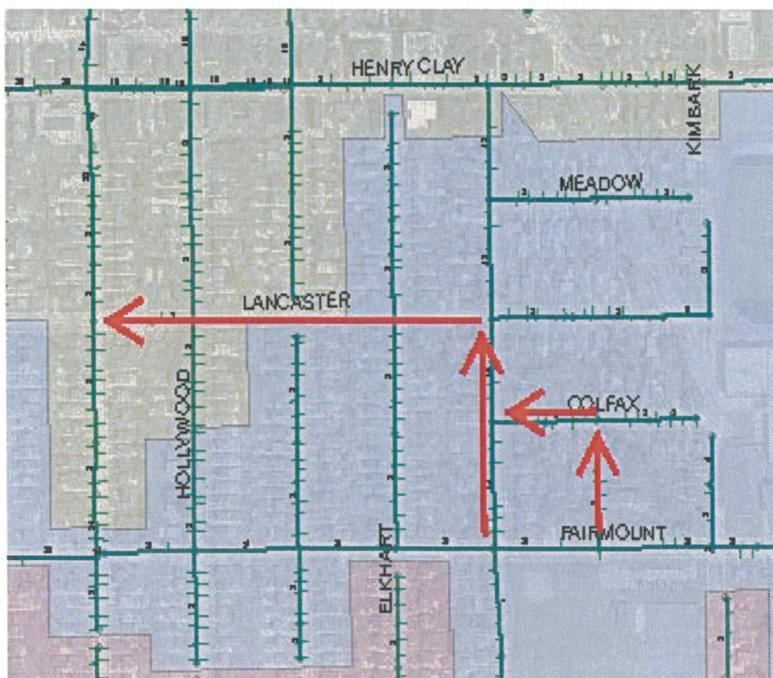
Capacity increase in the sanitary sewer mains will result in lower basement backup risks if the hydraulic conditions allow for a free discharge at the downstream end of the pipe, i.e., at Fairmount.

Our computer models show that conditions at the Fairmount sanitary sewer are such that adding additional capacity in the Woodruff sanitary sewer mains (either north or south of Fairmount) will not result in any basement backup risk reductions because the Fairmount sanitary mains operate under surcharged conditions during wet weather and have no capacity for additional incoming flows at the Woodruff Avenue location. Accordingly, Woodruff sewer mains north and south of Fairmount, as well as Sheffield Avenue north of Fairmount Avenue suffer from a lack of flow capacity.

Our computer analysis shows that the main cause of the Woodruff area basement backups is the high flows and pressures in the Fairmount sanitary sewer main and that capacity increases in the Woodruff Avenue or other nearby sanitary sewer mains will not reduce basement backup risks on Woodruff and surrounding areas.

Option #2: Rerouting of the North Side of the Woodruff Sanitary Sewer Main Away from Fairmount

To the north of Fairmount Avenue, the hydraulic separation of the Woodruff, Colfax and Sheffield Avenue sanitary sewer mains from the Fairmount sewer main will provide the most return for the investment and isolate the Woodruff/Colfax/Sheffield system from the hydraulic behavior of the Fairmount sewer.



We can accomplish this by reversing the flow in the Woodruff sewer between Colfax and Fairmount, then routing the Woodruff Avenue flows to Diversey Boulevard along Lancaster Avenue. With this approach, the entire area would be connected to the Diversey Boulevard sanitary sewer main where hydraulic conditions are welcoming of additional flows without creating basement backups due to this rerouting. Sanitary sewer system modeling does not show any basement backup consequences in the Diversey Boulevard area caused by this proposed rerouting.

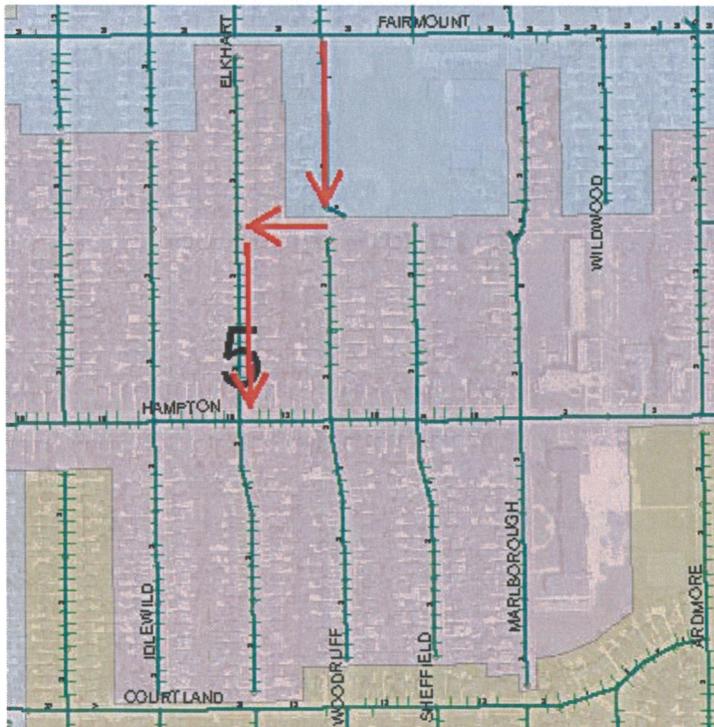
With this configuration, the entire area bound by Henry Clay, Woodruff, Fairmount, and Kimbark would be routed directly to a large sanitary sewer pipe with adequate hydraulic capacity at Diversey Boulevard. The benefits of basement backup protection would extend to each street and to each property, totaling approximately 120 homes.

The total length of anticipated sanitary sewer construction is **3,000 feet**. The preliminary cost estimate for this improvement is **approximately \$1,000,000**, including engineering and construction management.

Option #3: Rerouting of the South Side of the Woodruff Sewer Main Away from Fairmount

To the south of Fairmount Avenue, Woodruff Avenue homes across the street from the Cahill stormwater detention area have suffered from high basement backup risks during heavy rains. Computer simulations clearly show that, just like Woodruff and Sheffield Avenue sewer mains to the north, this area suffers from the high flows and pressures of the Fairmount Avenue sanitary sewer main.

Therefore, the most effective means to reduce basement backup risks for this street is to disconnect it from the Fairmount Avenue sewer main service area completely. Accomplishing this feat means that the block of Woodruff between Fairmount Avenue and Chateau Place needs to be diverted away from Fairmount towards the south, to the Hampton Avenue sanitary sewer main service area.



Sanitary sewers on Woodruff south of Fairmount would be replaced so they flow south toward Chateau Place (i.e., would flow in the reverse direction as they do today). Then, a new sanitary sewer would be constructed from Woodruff and Chateau Place to Elkhart Avenue. Finally, the existing sanitary sewer on Elkhart would be replaced between Chateau Place and Hampton because it would need to be slightly deeper than existing sewer mains.

This reroute and capacity increase provides significant basement backup risk reduction to the entire block of Woodruff south of Fairmount, and area that has suffered from chronic backup risk areas.

The total length of anticipated sanitary sewer construction is **2,000 feet**. The preliminary cost estimate for this improvement is **approximately \$700,000**, including engineering and construction management.

Recommendation for 2016: Options 2 and 3

- Option 1, capacity increase in Woodruff sanitary sewers north or south of Fairmount Avenue will not provide the desired level of basement backup risk reduction and is not recommended. This is because of the high level of surcharging on the Fairmount Avenue sewer and how this surcharging overwhelms the contributing sewer mains on Woodruff and Sheffield.
- Option 2 fulfills the desired level of basement backup risk reduction in the basement backup risk area centered on Woodruff Avenue area ***north*** of Fairmount Avenue. Recall that the shallow sanitary sewers on Woodruff contribute to basement backup risks. Option 2 includes reconstruction of the Woodruff sewer north of Fairmount and offers the opportunity to deepen that sanitary sewer main, thereby increasing backup protection for these vulnerable homes.
- Option 3 fulfills the desired level of basement backup risk reduction in the high backup risk area centered on Woodruff Avenue ***south*** of Fairmount Avenue.
- It has been established that the surcharging of the Fairmount sanitary sewer is a big contributor to increased backup risks along the sewers connected to this sewer. Options 2 and 3 offer the opportunity to completely disconnect this area from the Fairmount Avenue sewer main.



February 12, 2016

Mr. John Edlebeck, PE
Director of Public Works
Village of Whitefish Bay
5300 N. Marlborough Drive
Whitefish Bay, WI 53217

Re: Work Order Authorization No. 7
2016 Sanitary Sewer Improvements

Dear John:

The work elements presented herein will be provided according to the stipulations of the Professional Services Agreement dated January 18, 2015 between Clark Dietz and the Village of Whitefish Bay.

A. Description of Proposed Work

The work consist of the final hydraulic analysis, field survey, engineering design, MMSD and WDNR permitting, and the production of plans and specifications for the public bidding of three projects as follows:

- 1- Palisades Road Sanitary Lift Station
- 2- Lake Drive Sanitary Sewer Improvements
- 3- Woodruff Area Sanitary Sewer Improvements

Detailed preliminary feasibility memos have been prepared and presented for your consideration. In all cases, we used the existing hydraulic model of the sanitary and storm sewer system in Whitefish Bay. This model has been shown to represent hydraulic problem spots and give us the ability to evaluate the effect of various system modifications on problem spots. Modifications to the system that can be evaluated include pipe size changes, location and presence of sewer bypasses, and sewer rerouting.

In preparation to final design of selected pipe size and rerouting within the sewer system, the model will be updated with actual field measured information regarding manhole, pipe, and ground elevations along the proposed routes. The field measurements will then be transferred to the model and final sewer main elevations, slopes, and inverts can be determined. For all three projects, the results of the updated model will then be used in our construction drawings for the improvements.

B. Scope of Services for Project 1 – Palisades Road Lift Station

- 1- Hydraulic computations and establishing performance parameters
- 2- Field Survey and Base map preparation
- 3- Coordination with County Parks Department
- 4- Inlet and force main horizontal and vertical alignment and design
- 5- Utility coordination (Gas and Electric)
- 6- Controls and Communications design assistance
- 7- MMSD and WDNR submittals
- 8- Final plans and specifications
- 9- Public bidding

C. Scope of Services for Project 2 – Lake Drive Sanitary Sewer Improvements

- 1- Field Survey and Base map preparation
- 2- Revision of hydraulic model with field verified elevations
- 3- Hydraulic analysis of proposed sewer main improvements
- 4- Hydraulic analysis of storm sewers and existing bypass operation
- 5- Design of proposed bypass
- 6- Utility Coordination
- 7- MMSD and WDNR submittals
- 8- Final plans and specifications
- 9- Public bidding

An allowance of 60 to 70 hours is proposed for preparation of calculation, criteria, and submittals for permitting the new bypass to Lake Michigan. This allowance is intended to cover MMSD and WDNR coordination, meetings, reviews, and plan revisions regarding the establishment of this bypass. We will account for this amount specifically and provide full transparency regarding its use for the intended task.

D. Scope of Services for Project 3 – Woodruff Area Sanitary Sewer Improvements

- 1- Field Survey and Base map preparation
- 2- Revision of hydraulic model with field verified elevations
- 3- Hydraulic analysis of proposed sewer main improvements
- 4- Hydraulic analysis of storm sewers and existing bypass operation
- 5- Design of proposed bypass
- 6- Utility Coordination
- 7- MMSD and WDNR submittals
- 8- Final plans and specifications
- 9- Public bidding

An allowance of 40 to 50 hours is proposed for preparation of calculations, criteria, and submittals for permitting the upsized pipes and the redrawing of the sewershed boundaries based on the proposed Woodruff rerouting to Hampton Avenue. This allowance is intended to cover MMSD and WDNR coordination, meetings, reviews, and plan revisions regarding the use of upsized pipes and the redrawing of sewershed boundaries. We will account for this amount specifically and provide full transparency regarding its use for the intended task.

E. Work Order 7 Summary

Each project will be run as a completely separate process and each not-to-exceed fee amount will be individually and strictly observed.

The professional NOT TO EXCEED FEE proposals are summarized as follows:

Hydraulic Modeling and Hydraulic Design:	\$ 28,000
Construction Documents and Bidding – 8% of total cost:	\$188,600
MMSD and WDNR Permitting:	\$ 20,800
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TOTAL NOT TO EXCEED FEE:	\$237,400

Sincerely,

Clark Dietz, Inc.



Mustafa Emir, PhD, PE
Vice President

WORK ORDER APPROVAL

Steve Sheiffer
Village Manager

Date