TABLE OF CONTENTS

Appendices

Plans

SECTION 1
EXECUTIVE SUMMARY

The Sigma Group, Inc. and Arcint-Architecture Milwaukee, Wisconsin were retained by the Village of Shorewood Department of Public Works (DPW) to evaluate the existing DPW yard and provide recommendations for improvements at the yard that focus on maximizing and increasing efficiencies of operations at the yard.

The DPW yard is located at the western edge of the Village and is considered a first generation style yard, typically built within a first ring suburb of a metropolitan area. The buildings are of the 1920 and 30's era, with the exceptions of the upper garage, the annex building and salt shed.

The site operates at reasonable efficiency for daily operations, maintenance, trash transfer and storage while constrained within a long, narrow site bounded by a residential neighborhood and the adjacent bike path.

Previous studies of the DPW yard and operations have been conducted. A study of the DPW combined with other municipal buildings was prepared by Zimmerman Architectural Studios in 2007, in which the primary recommendation was to relocate operations to a satellite site, and convert the property to a "higher and better use as a tax generating parcel."

A study and evaluation of the existing retaining walls along the east edge of the site at the interface with neighboring residences was conducted by J.C. Zimmerman Engineering Corp. in 1999. To date, there have been no apparent permanent remediation efforts on the wall, and the wall continues to degrade. Site improvement recommendations contained in this master planning report are critically dependent upon a complete renovation of the retaining wall.

Master planning efforts included site visits to review existing site conditions, review of the reports referenced above, review of "wish lists" developed by DPW personnel, review of site utility plans and sewer televising reports and meetings with key DPW staff. The following site observations and deficiencies were noted.

- The primary site deficiency is a conflict of storing individual pieces of equipment within the Maintenance area, thereby reducing the daily efficiency of maintenance and repair operations. This conflict cascades into other storage and operations, and displaces functions from their optimal locations, including outdoor storage of plows and truck accessories.

- Insufficient area and height to perform maintenance on taller vehicles and insufficient area for washing vehicles.
- Insufficient yard area and organization for individual departments to claim primary use.
- Employees returning to locker rooms naturally progress through maintenance areas, which increase distractions amongst maintenance staff.
- Executive and Foreman office locations are not optimal, which creates disturbances and possible HIPPA and privacy conflicts.
- Natural site circulation bottle-necks at the south and west areas adjacent to depot warehouse building.
- Building maintenance shop located below grade often floods – causing damage to equipment, built and stored work
- Salt storage is limited by size of existing shed and contains approximately half of a typical year of salt use needs.
- Garbage transfer station, which is shared with the Village of Whitefish Bay, may be obsolete with future collection strategies and occupies a large site area within the yard.
- Site pavements are in generally poor shape and are in need of replacement.
- Based on sewer televising, many of the existing site sewers (storm and sanitary) are blocked and constructed of outdated materials (clay).
- There is a lack of storm water controls and best management practices on the site.
- Existing retaining wall along the east edge of the site is in poor condition and represents a potential health and safety issue. The east edge of the site needs to be retained to accommodate grade differences between the site and the residential parcels to the east either with new retaining wall or with new building wall. The critical areas of retainage include the area between the existing main office/mechanical garage and the existing upper garage and the area to the north of the existing upper garage to the annex building. It should be noted that the existing retaining wall not on Village property and is located on multiple residential properties to the east with multiple ownerships.

The following prioritized recommendations for building/site improvements are made to maximize operational efficiency at the yard, address safety and environmental issues and support long term on-going operations at the site.

1. Address earth retention along the east side of the property; earth retention could be addressed by either constructing new retaining wall or construction of new buildings along the east property line with the east wall of the buildings providing the required earth retention
2. Construct new vehicle storage garage and create a high-bay maintenance area; include sufficient area for individual snow plow and accessories storage

3. Build new Wash Bay and Garbage Truck vehicle storage
4. Build new salt storage shed and Calcium Chloride brining facility
5. Demolish annex building and prepare area for project storage
6. Renovate existing areas for department office, assignment and equipment storage areas
7. Replace existing site storm sewers
8. Implement storm water controls and best management practices
9. Replace site sanitary sewers
10. Repave site
11. Construct covered storage building and mezzanine with individual assigned areas for equipment and storage at Annex building location
12. Relocate building maintenance shop to depot warehouse building
13. Demolish old incinerator building and construct a new at grade addition to contain administrative offices, employee locker and break facilities; Include site entries from yard and parking to alleviate “walk through” disruptions in Maintenance Department
14. Relocate scale station
15. Relocate resident garbage and recycling to south property line
16. Relocate Garbage Transfer Station off site

SECTION 2
STUDY BACKGROUND AND METHODOLOGY

The Sigma Group, Inc. and Arcint-Architecture Milwaukee, Wisconsin were retained by the Village of Shorewood Department of Public Works (DPW) to evaluate the existing DPW yard and provide recommendations for improvements at the yard that focus on maximizing and increasing efficiencies of operations at the yard. The study included the following general tasks with specific activities as outlined below.

Review Existing Conditions/Information Gathering

- Attended a kickoff meeting with DPW Director, Leeann Butschlick, and DPW Assistant Director, Paul Wasemiller, to define study objectives, identify facility issue and facilitate information exchange
- Reviewed available building plans
- Reviewed available site utility plans
- Review of staff "wish list"
- Reviewed fleet inventory
- Reviewed previous retaining wall study by J.C. Zimmerman Engineering Group and related Village correspondence
- Reviewed 2007 Village of Shorewood Police Department and DPW Facility Study by Zimmerman Architectural Studios
- Reviewed sewer televising reports
- Toured site and buildings to observe operations, traffic flow, space utilization, staff circulation, yard functions, etc.
- Conducted limited field survey of DPW yard
- Conducted limited conditions evaluation of pavements, retaining wall, infrastructure, storm water drainage, buildings, etc.
- Meeting with DPW Director, Assistant DPW Director, and DPW Division foremen (Utilities Division, Fleet and Facilities Division and Services Division) to identify operational and site shortcomings and needs (meeting notes presented in Appendix A)

Facilities Analysis/Alternatives Development

- Prepared base plan of existing site
- Developed square footage analysis and functional condition assessment of interior and exterior spaces
- Developed conceptual site plan layout
- Developed conceptual functional space layout

- Evaluated storm water drainage and opportunities for storm water controls and best management practices

Prepare Conceptual Design/Report

- Develop final recommendations
- Prepare final recommended conceptual layout
- Develop conceptual cost estimates for recommended improvements
- Prepare report documenting findings and recommendations and presenting recommended conceptual master plan layout

SECTION 3
EXISTING FACILITY CONDITIONS

General

The DPW yard is located at 3801 N. Morris Blvd. in Shorewood, Wisconsin. The site is situated between residential parcels to the east and south, Milwaukee County bike path right-of-way to the west and a We Energies substation to the north. The site is comprised of three existing parcels with a total area of approximately 3.1 acres. The site is approximately 835 feet to 875 feet long in the north-south direction and approximately 110 feet wide in the east-west direction on the south side of the property and approximately 250 feet wide in the east-west direction at the north end of the site. The long-narrow shape of the site poses significant challenges in terms of efficient site operations and traffic flow. A site plan showing existing site conditions is included as an attachment to this report. It should be noted based on GIS mapping of the site, that the storage area behind the existing depot warehouse building is located on County owned property.

The main access to the site is off of Morris Blvd. through an approximate 30 foot wide drive at the south end of the site. This drive provides access to the facility scale, the employee and public parking area on the south end of the site, the public recycling drop off area at the south end of the site and the northern DPW operations yard. A security gate separates the parking area and the public drop-off area from the working yard. This area creates a bottle-neck for circulation through the site. There is secondary access to the site from the bike path on the west towards the middle of the site and on the far northern end of the property from E. Pinedale Court through the We Energies substation property.

A series of retaining walls run along the majority of the eastern border of the site adjacent to the residence parcels to the east. The height of the retaining wall varies from a few feet to approximately 12 feet with the DPW yard being on the low side of the wall. The walls are constructed of various materials: poured concrete, concrete block, wood and stone. In some areas, stone backfill is being retained by chain link fencing placed on top of the wall. In some cases, the detached garages of the residences to the east are being supported by the walls. Based on previous surveys prepared for the site, the retaining walls are located on adjacent residential properties; not on Village property. However, the walls directly affect the DPW yard. The walls appear to be structurally unsound and suspect and represent a safety issue and are aesthetically unpleasant. The critical areas of earth retention that need to be addressed include the length of existing wall between the existing main office/mechanical garage building and existing upper garage and the length of wall between the upper garage and the annex building. The walls are under the multiple ownerships of the residential parcels to the east, and any

replacement or renovation of the walls would need to be coordinated with the property owners to the east. Retention of the earth along the east property line is of critical importance and could be accomplished by either replacing existing walls or by retaining the earth with new building walls associated with the new vehicle storage building and new wash bay/garbage truck storage building recommended in this master plan. A more detailed evaluation of the wall system was conducted by J.C. Zimmerman Engineering Corp. in 1999. To date, there have been no apparent permanent remediation efforts on the wall, and the wall continues to degrade.

There are existing overhead utilities that run along the east side of the property immediately to the west of the existing retaining wall. The overhead utilities include phone, cable, and neutral and primary electrical cables. These utilities service the residences to the east as well as properties to the north and south of the DPW yard. Replacement of the existing retaining wall or construction of new buildings along the east edge of the site, as discussed in future section of this master plan would need to be accommodate these utility services.

There are five existing building structures located on the property: upper garage, depot warehouse building, salt shed, annex building and the main office/mechanical garage. Each of these building and their existing functions are described in more detail below. A refuse transfer station, which is utilized by both the Village of Shorewood and the Village of Whitefish Bay is located at the north end of the site. The transfer station is comprised of two trash compactors with associated refuse trailers. Above ground fuel tanks and associated fueling system utilized by the DPW, the school district, the Police Department and the North Shore Fire Department are also located onsite.

Outdoor storage is provided throughout the site in a somewhat haphazard fashion. Project based storage is typically between the upper garage and the annex building and is used for storage of tanks, recycling and garbage carts, sewer fittings, manhole sections/frames/castings, tires and bulk oil. Snow plow blades are stored along the west fence of the site to the west of the main office/mechanical garage building. Brine mixing and storage is along side the salt shed. Bulk landscape storage for decomposed granite, compost, and wood chips are typically stored adjacent to the transfer station at the north end of the site. Temporary storage of tree stock occurs in the yard adjacent to the annex building. Incidental storage of flowers and spoils are located at various locations around the site. Dirt bays are located along the west wall of the upper garage. A dirt bay is also located to the west of the salt shed building. Outdoor storage is also provided to the west of the depot warehouse building. As noted previously this storage area is located on County owned property based in GIS mapping.

Nearly 100% of the site is surfaced with impervious surface (buildings/pavements). The majority of pavements on the site are asphalt, show significant signs of deterioration and are generally in poor condition and in need of replacement.

Existing Buildings

Main Office/Mechanical Garage: "Distinguished by its decorative brickwork, turrets, and battlemented parapets, the Shorewood Department of Public Works Administration Building was constructed in 1936 with funding from the federal government's Works Progress Administration," reads a historic account of the building. It currently houses the administration offices and foremen offices, employee areas, Building Maintenance Shop, as well as the Vehicle Maintenance Shop. This structure has been fully utilized and adapted to function as best as possible. Constant maintenance is necessary to maintain the exterior masonry.

Upper Garage: Masonry storage garage is primarily used for overnight storage of department vehicles and a wash bay. West wall is utilized for outside bulk storage of materials. Currently a new roof is planned for this structure. East wall is adjacent to the retaining wall- and this area best exemplifies the deterioration and historical residential refuse buildup.

Depot Warehouse: Brick masonry building originally built as a storage depot adjacent to the interurban railway during WPA era, this building is one of the historic structures on site. Currently used as cold storage for various department needs, this building may be re-purposed to house the Building Maintenance Department, as well as be landscaped to be viewed as an iconic structure from the Oak Leaf bike trail.

Annex Building: This ordinary masonry building is currently being used as cold storage for random needs, was once a barn stable with a residence on the second floor. This building's usefulness has been exhausted and is a candidate for demolition providing options for the space and use.

Salt Shed: A wood framed pole building provides storage for approximately half of the necessary yearly salt used on the Village road infrastructure. While in reasonable condition- this structure is recommended for an addition or rebuilt to warehouse a yearly allotment of salt.

A breakdown of interior area square footage for the main office/mechanical garage, upper garage, depot warehouse building, salt shed and annex building is presented in Appendix B.

Fleet Makeup and Storage

The DPW operates and maintains approximately 60 vehicles ranging from trailers and ATVs to full sized dump trucks which are stored on-site. In addition, several vehicles including snow loaders, sport utility vehicles and trailer leaf loaders are stored off-site. A listing of vehicle operated and maintained by the DPW is presented in Appendix C. Vehicles are stored overnight throughout the site within the Mechanical Garage, the upper garage, the depot warehouse building and the annex building as well as outside. This arrangement affects daily and long term maintenance due to the limited amount of time available to complete task before vehicles are stored. Due to space limitations, snow plow blades are stored outside along the west fence to the south of the depot warehouse building. This complicates operations, as the plow blades must be mounted outside during the snow event. The ideal arrangement would be to store snow plowing vehicles in a separate facility with enough room for the plow blades to remain in each bay allowing for quick, dry mount and dismount.

Site Utilities

Water: Water service is provided by a 6-inch ductile iron water main which enters the site from the north. It runs through the yard with branches to several hydrants located throughout the yard. A segment of the water main was replaced in 2014.

Sanitary Sewer: An 8" sanitary sewer runs through the site from the connection to the MIS sewer in Morris Blvd. to the far north end of site and the transfer station. Based on site utility plans provided, it appears as though the main north-south leg of the sewer runs beneath the west edge of the depot warehouse building. The majority of the sewer is Vitrified Clay Pipe (VCP) with the exception of the more recently installed sanitary sewers which serve the drains beneath the transfer station compactors. The sewers serving the trash compactor drains discharge to a grit chamber which discharges into the main north-south leg of the sewer. Based on the sewer televising report provided, the VCP sewer pipe throughout most of the site generally appears to be in fairly poor condition with deposits, sagging and cracking observed throughout.

Storm Sewer: Based on review of site utility plans provided, there is an existing storm sewer that enters the site from the north and runs south west of the annex building and the upper garage to a storm manhole located at the northwest corner of the main office/mechanical garage building. Several storm inlets discharge into this sewer. From northwest corner of the main office/mechanical garage building, the storm sewer runs to the west and connects to a 12" storm sewer running in a north-south direction on Milwaukee County property. This 12" storm sewer outfalls to the Milwaukee River. There also storm sewers that runs through the south side of the site, adjacent to the main building and down the main access drive for the

facility which discharge into the 12" north-south sewer on County property. There is also a storm inlet with associated storm sewer which drains the area adjacent to the trash compactor. This storm sewer also ultimately discharges to the 12" north-south storm sewer on County land. Based on review of the storm sewer televising report provided by the Village, only very limited portions of the storm sewer system servicing the site were televised. Based on conversations with Utility Division personnel performing the televising, there were blockages of the sewers caused by debris which limited the ability to televise the sewer. Attempts were made to jet out the storm sewers before televising, but the jetting operations were limited in success.

Storm Water Best Management Practices

There are currently no storm water management controls or Best Management Practices (BMPs) on the site to mitigate storm water flow rates and volumes or provide storm water treatment prior to discharge from the site. The storm inlets throughout the site receive site runoff that contains suspended solids and other potential pollutants from DPW operations such as oils from vehicle and equipment leaks. Of particular concern is the existing storm inlet directly to the south of the soil bin on the west side of the salt shed. This inlet receives direct runoff from the soil bin which is heavily laden with solids.

SECTION 4
FACILITY DEFICIENCIES

Based on review of existing site information, meetings and interviews with DPW administrative and operational staff and site inspections conducted as part of this study the following site and building deficiencies have been identified which should be addressed to maximize and increase operational efficiency at the facility, address safety and environmental issues at the site and to support long term ongoing operations at the site.

Existing Retaining Wall

As documented by previous studies, the existing retaining wall along the east edge of the site along the interface with the residences to the east of the site is in poor condition and represents a safety and long term liability concern.

Equipment Storage

There is a conflict of storing individual pieces of equipment within maintenance work areas, thereby reducing the efficiency of maintenance and repair operations. This conflict displaces work functions from their optimal locations. This includes the outside storage of plow blades and truck accessories. Vehicles are also "stacked" for overnight storage, often requiring several pieces of equipment be moved to access others.

Maintenance Area

There is insufficient area and height to perform maintenance on taller vehicles and insufficient area for washing of vehicles. This leads to inefficiencies including performing maintenance on vehicles in outside yard areas as weather permits.

Yard Area Utilization

Yard area is limited and yard area use is insufficiently organized for individual departments to claim designated areas for use. There appears to be a first come, first serve approach to utilization of yard space.

Work Day Sequencing/Employee Flow

Employees arrive at the main building, go upstairs to the lockers, come back down stairs, report to Division foremen for daily work orders and walk through the mechanical garage to pick up equipment and start work. At break time, lunch hour and at the end of the day employees also travel through the mechanical garage to the lockers and break room. This flow is disruptive and inefficient for mechanics and employees.

Office Locations

Executive and foremen office locations are not optimal. For instance, the DPW Director and Assistant Director share a common hallway and connect through to a common conference room. This layout is not ideal as it is disruptive to daily work and creates privacy and HIPPA conflicts.

Site Circulation

The long narrow shape of the site is not conducive to efficient traffic flow. Traffic is bottle-necked at the south end of the yard by the location of the public recycling drop off area and the truck scale. In addition, pick up and drop off of trash trailers at the transfer station at the north end of the site requires complex backing maneuvers for trailers.

Salt Storage

Salt storage is limited by the size of the existing salt shed and only provides storage for approximately half a year of typical salt use needs.

Garbage Transfer Station

The garbage transfer station may be outdated with future collection strategies and it occupies a large area of the site that could potentially be used for other uses. In addition, the location of the transfer station and the geometry of the site require complex backing maneuvers for trailer pick up and drop off which results in inefficient operation.

Site Pavements

Site pavements are deteriorating, are in generally poor shape and in need of replacement.

Site Sanitary Sewers

The majority of the sanitary sewers are constructed of outdated materials (VCP) and likely the original sewers installed to service the facility. Sewers are in generally poor condition with sagging, cracking, deposits.

Site Storm Sewers

Blockage of site storm sewers was encountered at several locations during sewer televising activities and the sewers could not be fully televised to assess the condition of the full storm sewer system at the facility. Blockage of the storm sewers could lead to localized on-site flooding.

Storm Water Management

There is a general lack of storm water best management practices at the site to mitigate peak storm water flows and volumes and provide treatment of storm water prior to discharge.

SECTION 5
RECOMMENDATIONS

The following recommendations are made to maximize and increase operational efficiency of the facility, to address safety and environmental concerns and facilitate continued long term use of the facility. These recommended improvements are depicted conceptually in the Concept Site Master Plan included with this report.

Building Construction/Alterations

New Vehicle Storage/High-Bay Maintenance Garage

A new vehicle storage/high-bay maintenance garage constructed between the existing upper garage and the main office/mechanical garage building would address vehicle/equipment storage and maintenance area issues. The structure would have a footprint of approximately 5,140 square feet and would be provided with a high clearance maintenance bay on one end. This would eliminate the need to perform maintenance of high clearance trucks in the outside yard area. The building would accommodate overnight storage of up to six full-size dump trucks including snow plow blade attachments and other vehicle accessories. This would eliminate the need for outside snow plow blade storage and the associated inefficiencies associated with mounting and dismounting the snow plow blades. The building could be connected to the existing upper garage to allow vehicle drive through from the upper garage through the new vehicle storage building. In addition, the building could be connected to existing mechanical garage building and a man-door provided to provide for walk through access between the two buildings.

It should be noted that construction of a new vehicle storage/high-bay maintenance garage along the east edge of the site would need to be coordinated with the existing utility lines and the existing utility lines may require relocation or burying.

New Wash Bay/Garbage Truck Vehicle Storage Garage

A new wash bay/garbage truck vehicle storage garage would be constructed north of the existing upper garage. The new building would have a footprint of approximately 4,000 square feet. The building would help address vehicle/equipment storage issues associated with the existing site. The building would accommodate parking of the four garbage trucks currently either parked outside or in the upper garage. The building could be connected to the existing upper garage and a mandoor provided to provide for walk through access between the two buildings.

It should be noted that construction of a new vehicle storage/high-bay maintenance garage along the east edge of the site would need to be coordinated with the existing utility lines and the existing utility lines may require relocation or burying.

New Salt Shed

The existing salt shed would be demolished and new salt shed with a footprint of approximately 3,000 square feet would be constructed in its place. This would include a new calcium chloride brining facility. The new shed more than doubles the footprint of the existing shed and should provide adequate capacity to provide for a full season of salt usage.

Demolition of Incinerator and Associated Building; Construct New Offices and Employee Areas; Renovate Existing Office/Mechanical Garage Building

This recommendation involves the relocation of the existing building maintenance shop to the depot warehouse building; demolition of the existing incinerator building, and construction of a new, at grade building addition to contain administrative offices, conference room and employee locker and break facilities. Existing building areas would be renovated for department offices and assigned equipment storage areas. Entries would be provided from the yard and from the employee parking area to alleviate “walk through” disruptions and address work day sequencing and employee flow issues. It is also recommended that the existing scale be relocated adjacent to the new office space.

New Covered Storage Building

A new open-sided covered storage building (pole barn) with a footprint of approximately 8,200 square feet is recommended in the northeast corner of the site. The existing annex building would be demolished to accommodate the new storage building. The storage building could be provided with a mezzanine to provide additional storage. The building would be used for project storage and dedicated areas for storage of equipment and materials would be assigned to each division. The building would alleviate issues associated with yard area utilization and storage.

A summary of proposed building space is presented in Appendix D.

Site Alterations/Improvements

Retaining Wall

The existing retaining wall system should be renovated and/or replaced. This is primary to recommendations for future improvements. A previous study of the retaining wall has been

conducted. The study evaluated several options for replacement of the retaining walls including replacement with block walls on the residential properties, replacement with block walls on Village property, replacement with poured concrete walls on residential properties and replacement with poured concrete walls on Village property. Given the potential need for tie-back systems associated with block walls, which would require a setback, and the fact the construction of the replacement retaining wall on the residential properties may require reconstruction of existing garage structures, Sigma recommends that the walls be replaced with poured concrete walls on Village property immediately adjacent to the property line. The critical areas of replacement would include the length of wall between the existing main office building/mechanical garage and the existing upper garage and between the upper garage and the annex building. In lieu of replacing the existing retaining walls, earth retention could be provided by new building walls associated with the recommended new vehicle storage building and new wash bay/garbage truck storage building. Replacement of walls or construction of new buildings to provide earth retention would need to be coordinated with the existing overhead utilities along the east edge of the property.

Overhead Utility Line Relocation

Relocation or burying of the existing overhead utility lines along the east edge of the property will potentially be required to implement recommendations made in this master plan including bay/garbage truck storage building along the east edge of the property. Based on information received from We Energies, the minimum horizontal clearance from building walls, projections and guarded windows is 7.5 feet from primary conductors and 4.5 feet from neutral conductors. The minimum vertical clearance over roofs readily accessible to pedestrians is 13.5 feet (12.5 feet for roofs not readily accessible to pedestrians) for primary conductors and 10.5 feet for secondary conductors. It should be noted that the minimum horizontal clearance only applies if the building is as tall as the conductors.

Demolish Existing Annex Building/Prepare Area for Open Storage

Demolition of the existing annex building in the northeast corner of the site is recommended. This area could then be prepared for use as an open storage area by grading and surfacing with gravel or asphalt surface. This area could ultimately be used for a covered storage building as described above.

Remediate/Replace Site Storm Sewers

The full extent of the existing storm sewers onsite could not be televised due to blockage by debris. As such, it is not known what condition the majority of the storm sewers are in. At a minimum, all storm sewers onsite should be thoroughly cleaned of all debris so that televising the sewers can be performed to determine sewer condition. Storm sewers found to be in poor

shape after cleaning and televising should be replaced. If blockage of storm sewers cannot be cleared sufficiently to allow full televising, consideration should be given to replacing the site storm sewers.

Implement Storm Water Best Management Practices

In conjunction with replacement of existing storm sewers, it is recommended that the Village implement storm water best management practices to address storm water runoff volume/peak flow and storm water quality. Potential best management practices that could be implemented at the site include the following:

- Install biofiltration basins adjacent to the existing access from the County bike path. This area is an existing low point and a logical location to install biofiltration basins. Construction of the biofiltration basins would require some regrading of the adjacent area. The basins would be located on County property and as such, would require proper easements from the County for construction and maintenance. The basins would consist of two to three feet of engineered soil which the storm water would infiltrate through over an open graded stone storage layer. A perforated underdrain pipe would be installed within the stone storage layer to collect filtrated storm water from the bottom the basin. The underdrain would be discharge to the existing 12" storm sewer that outfalls to the river. An overflow riser structure would be provided within the basin and would set 6 to 12 inches above the surface of the basin to provide overflow of storm water during heavy rainfall events. The biofiltration basin would provide treatment of storm water runoff to the basin by filtering the soil through the engineered soil and would also provide mitigation of storm water runoff rates by provided storm water storage on the surface of the basin and within the stone storage layer beneath the engineered soils mix. A typical biofiltration basin detail is presented in Appendix E.
- Installation of above ground rainwater cisterns. Above ground rain water cisterns could be installed at select locations to collect storm water runoff from building roofs. The collected storm water could be beneficially reused for irrigation or other non-potable water uses. Piping to the cisterns would be provided with appropriate valving to direct the roof runoff to the cistern or to bypass the cistern depending upon the season. The cisterns would also be provided with overflow piping. We understand that the Village is currently pursuing the installation of an above ground rainwater cistern to collect runoff from the upper garage roof.
- Installation of inline grit chambers/oil water separator structures. Given the potential for storm water runoff from the facility to contain solids from stockpiled material and oil from equipment and vehicle leaks, it is recommended that the Village investigate the installation of in-line structures to provide treatment/removal of suspended solids and floatable oils. The units could be installed at key locations on the site storm sewer system prior to discharge from the site. Several proprietary treatment devices, such as Stormceptor units, are available on the market that can provide varying degrees of solids and oil removal. The units should be sized and selected based contributing areas

of storm water runoff and anticipated flow rates. Design and installation of the units should be coordinated with any storm sewer replacements that are discussed above.

- Installation of pervious pavement systems. Pervious pavement systems could potentially be installed at key locations at the site to collect and store storm water runoff. Pervious pavement systems would be underlain by open graded stone storage layers to provide storm water storage and mitigate storm water runoff rates. Perforated underdrain pipes would be installed in the stone storage layer to collect and convey the storm water to the site storm water system. Recommended pervious pavement systems include the PaveDrain system and concrete brick pavers. Pervious concrete and asphalt systems would not be recommended based on incidental evidence that indicates that they do not hold up well and start to deteriorate within short time frames. The PaveDrain system consists of full strength interlocking concrete blocks approximately 12" wide by 12" long and 5.6" deep. The individual blocks are cabled together to form an articulating concrete block mat that can efficiently be placed. The City of Milwaukee has recently installed a PaveDrain system at their Central Repair DPW Yard on West Canal Street. The Village should consider contacting the City of Milwaukee DPW in regards to the system and their application.

We also recommend that the Village investigate potential grants that could be applied to the design and implementation of storm water best management practices at the site such as the MMSD Green Infrastructure Grant Program.

Replace Existing Sanitary Sewer

If the Village's intent is to continue to utilize the existing DPW yard for long term, ongoing operations, the existing sanitary sewers at the site should be replaced. The majority of the existing sewers are constructed of outdated material (VCP) and are in generally poor condition.

Replace Site Pavements

Existing site pavements are deteriorating and are in poor condition. If the Village's intent is to continue to utilize the existing DPW yard for long term, ongoing operations, the existing pavements should be replaced. It is recommended that pavements be replaced after upgrades/replacement of storm and sanitary sewers. Pavements should be replaced with a heavy duty pavement structure. It is recommended that a geotechnical investigation of the site be performed to develop criteria and recommendations for pavement structure. A minimum asphalt pavement structure of 5" of asphalt pavement over 10" of compacted, dense grade base coarse material is recommended dependent upon geotechnical recommendations. Consideration should be given to the use of concrete pavement in areas of high traffic volume and in truck turning areas.

Offsite Relocation of Existing Garbage Transfer Station

Depending upon future trash collection strategies, consideration should be given to moving the garbage transfer station, which is shared by the Village of Whitefish Bay, offsite. Given the location of the existing transfer station and the geometry of the site, transfer operations are inefficient and require complex turning and backup movements. Moving the transfer station off-site would open up a large area of the site that could be used for outside project storage. Specifically, landscape storage and spoils storage could be moved to this location.

Relocate Existing Public Recycling Drop Off Area

Consideration should be given to relocating the existing public drop off area; potentially to the south property line. The location of the existing facility creates bottle-necks at the entrance to the yard and relocation of the facility to the south would help alleviate site circulation issues.

SECTION 6
COST ESTIMATES

The total estimated cost for the proposed building construction/alterations and site alterations/improvements is presented below.

Building Construction/Alterations:	$2,794,000
Site Alterations/Improvements:	$1,114,000
Total:	$3,908,000

Breakdowns of our cost estimate by building components and site components are presented in Appendix F. Note that costs associated with relocation of the transfer station are not included in our cost estimates.

APPENDIX A
SEPTEMBER 25, 2014 MEETING MINUTES

APPENDIX B
EXISTING BUILDING SPACE SUMMARY

APPENDIX C
FLEET LIST/LOCATION

APPENDIX D
PROPOSED BUILDING SPACE SUMMARY

APPENDIX E
BIOFILTRATION BASIN DETAIL

APPENDIX F
COST ESTIMATES