Wauwatosa Grocery Redevelopment Stormwater Management Plan Report

7501 W North Ave
Wauwatosa, WI 53213

PREPARED FOR

Luther Group
780 Elm Grove Rd
Elm Grove, WI, 53122

PREPARED BY

Project Number – 25057

2026/05/20

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1. Introduction

This Storm Water Management memo presents the design calculations and considerations for the proposed redevelopment located at the northwest corner of N Wauwatosa Avenue and Watson Avenue in Wauwatosa, WI. The proposed redevelopment encompasses approximately 2.058 acres. The proposed project will disturb the entire 2.058 acre parcel and will also result in an increase of impervious area over the site by approximately 0.274 acres. This storm water management report serves as a summary of calculations showing the proposed development meets all applicable ordinances.

2. Design Criteria

Water Quality

- City of Wauwatosa – Municipal Code (Chapter 24.13.040)
    - For a redevelopment, BMPs shall be designed, installed, and maintained to control total suspended solids carried in runoff from the post-construction site as follows: Reduce to the maximum extent practicable, the total suspended solids load from exposed parking areas and roads by 40%, based on the average annual rainfall, as compared to no runoff management controls.

- WDNR – Technical Standards (NR151 and NR216)
    - Total Suspended Solids. BMPs shall be designed, installed, and maintained to control total suspended solids carried in runoff from the post-construction site as follows: Reduce to the maximum extent practicable, the total suspended solids load by 40% based on an average annual rainfall, as compared to no runoff management controls.

Water Quantity and Management of Peak Runoff

- City of Wauwatosa – Municipal Code (Chapter 24.13.040)
    - For the 1-year, 24-hr and 2-year, 24-hr design storm, BMPs shall be designed to either: maintain or reduce the peak runoff discharge rates, to the maximum extent practicable, as compared to pre-development conditions or achieve a maximum runoff release rate of 0.15 cubic feet per second per acre, whichever is more stringent.
    - Section D.2 (Applicability) states that water quantity management requirements apply to a development that increases impervious surface area by 1/2 or more acres. This project increases impervious surface by 0.288 acres, therefore the project is exempt from City of Wauwatosa's water quantity requirements, however MMSD still applies.

- Milwaukee Metropolitan Sewerage District (Chapter 13.302(b))
    - For a redevelopment disturbing between 2-3.5 acres but not adding 1/2 acre or more of impervious surface, the site development shall achieve a 10% reduction to the existing runoff release rate. This project disturbs a total of 2.058 acres and has an increase in 0.288 acres of impervious surface.

- WDNR – Technical Standards (NR151 and NR216)
    - For the 1-year, 24-hr and 2-year, 24-hr design storm, BMPs shall be designed to either maintain or reduce the peak runoff discharge rates

Green Infrastructure

- Milwaukee Metropolitan Sewerage District (Chapter 13.302(b))

- Whenever redevelopment will increase impervious surface by 5,000 square feet but less than 21,780 square feet (1/2 acre), on a net basis, then the redevelopment shall include green infrastructure with a detention volume equal to one-half inch multiplied by the area of the net new impervious surface.

Infiltration

- Wisconsin Legislature Code Infiltration Performance Standard NR 151.124
  - NR 151.124 (3)(b)(3) states that a redevelopment post-construction site is exempt from infiltration requirements

3. Design Analysis

- Rainfall data used in the hydrologic analysis were obtained from the NOAA Atlas 14 precipitation depths, and the appropriate NRCS Wisconsin MSE3 precipitation distribution for 24 hour duration (1-yr, 2-yr, 10-yr, and 100-yr storm events).

1 year	2 year	10 year	100 year
2.46”	2.79”	3.93”	6.19”

- Curve numbers for the soils within the analysis region were selected from the values published in Wauwatosa’s Municipal Code (24.13.040) Table 13.040-2. Native soil types were determined from geotechnical report and borings.
- Time of concentration values were calculated based on the standard TR-55 method.
- The hydraulic calculations and analysis presented in this report were performed using HydroCad Watershed Modeling software which utilizes the methodologies of TR-55 for a hydrograph based analysis of watershed conditions. Hydrographs were developed using a standard MSE-3 24 hour hydrograph for the various 24-hr storm events.
- Sediment reduction characteristics for the proposed water quality facilities were determined using WinSLAMM (Version 10.3.4) Source Loading and Management Model.

4. Existing Condition Analysis

The existing site is bounded by W North Avenue to the north, Watson Avenue to the south, and N Wauwatosa Avenue to the west. There are residential houses to the east of the property. The existing property consists of a bank building with an associated drive-thru and parking lot. The site generally drains away from the building in the northwest corner, with catch basins in the parking lots at the northeast and southwest of the lot. There is pervious grassland surrounding majority of the site as well.

A Geotech report by Gestra prepared in 2021 for a previously planned development has identified 6-8 inches of asphalt over approximately 5 inches of base course in pavement areas. Greenspace areas had approximately 4-6 inches of topsoil. Fill material consisted typically of lean clay with various amounts of sand and gravel. Native soil consisted of layered lean clay and sand soils. Refer to the geotechnical report in Appendix A.

Utilizing the information from the geotechnical report boring logs, the soil site classification 'D' soil was used in the hydroCAD modeling. Refer to Appendix B for the existing conditions HydroCAD modeling. Data used to model the site for existing conditions, including surface areas, flow paths, time of concentrations and runoff curve number are presented in Figure SW 1.0 located in Appendix G.

5. Proposed Developed Conditions Description

The proposed project involves the disturbance of approximately all the 2.058 acre parcel. Proposed activities of the site consist of grading, construction of stormwater biofiltration basin, a new grocery building, a new bank building and its associated drive thru, utilities, an up-flo structure, a parking lot and associated drives. The proposed grocery building footprint is approximately 13,000 square feet and the proposed bank building is approximately 5,000 square feet. The proposed impervious area within the disturbed area of the project site will be approximately 1.680 acres, which is an increase in approximately 0.274 acres from existing impervious.

The grocery roof storage will be piped to the biofiltration basin. Majority of the pavement on site will surface drain to proposed catch basins and into a private storm sewer system where it will be treated by up-flo filters before connecting to the public storm sewer. The grocery building roof storm water will be collected internally and piped to the biofiltration basin. The bank building roof storm water will be collected internally and piped to a catch basin which connects to the rest of the private storm sewer system on site. There is an outlet control structure in the proposed stormwater biofiltration basin to regulate the stormwater flow being piped to the public storm connection at the intersection of Wauwatosa Ave and W North Ave. A small area will surface drain offsite without capture or treatment along the west, south, and east perimeter of the site.

The proposed biofiltration basin is located in the northwest corner of the redevelopment. The top of bio is at an elevation of 189.32 with a surface area of 1,532 square feet. The bottom of the bio is at an elevation of 184.22 with a surface area of 1,200 square feet. The proposed outlet control structure for the bio has a 12-inch diameter outlet with an invert at 184.22, a 1.5-inch orifice at elevation 184.22, a 6-inch orifice at elevation 785.72, a weir at 186.52, and a 18'' horizontal grate at 188.57 that release flow into the existing manhole in the intersection of Wauwatosa Ave and W north Ave northwest of the bio.

In order to meet green infrastructure requirements of MMSD, the storage of the biofiltration basin must be 22,803 gallons, which is met by expanding the biofiltration basin's area of storage to 3,233 cubic feet. This equates to 24,185 gallons of storage. See Appendix E for Green Infrastructure calculations. The stormwater bio has been designed to meet the peak flow control for the City of Wauwatosa and WDNR for a redevelopment site. The stormwater treatment requirements will be met from an up-flo device with 6 modules in CB 1.0.
Data used to model the site for proposed development stormwater conditions are presented in Figure SW 2.0 located in Appendix G.

Refer to Appendix B for the proposed HydroCAD modeling and Appendix C for the WinSLAMM modeling.

6. Storm Water Quantity Modeling

A summary of results can be viewed in the tables below:

Storm Frequency (yr)	Existing Peak Runoff Discharge Rate on site (cfs)	10% Reduction of Existing Peak Runoff Discharge Rate (cfs)	Post-Development Peak Runoff Discharge Rate (cfs)
1	5.88	5.29	5.21
2	6.85	6.19	5.94
10	10.46	9.41	9.41
100	18.06	16.25	16.00

7. Storm Water Quality Modeling

NR 151 regulations require that the project employ BMPs to reduce sediment load leaving the site by 40% compared to no controls.

Quality Summary Table

Total Suspended Solids Loading	
Total TSS prior to controls/treatment	880.3 lbs
Total TSS After controls/treatment	311.8 lbs
Total Percent TSS Reduction	64.58%

8. Storm Sewer Sizing

All storm sewer sizing was designed to handle the 10 year storm event with no surface charge. Refer to storm sewer sizing table provided in Appendix E. The roof drain is sized for 100 year per plumbing plan. Proposed future pavement and future building expansion areas were accounted for in the storm sewer sizing.

9. Green Infrastructure

The project will create 0.274 square feet of additional impervious surface, prompting the development to include green infrastructure according to MMSD code Chapter 13.302. The storage of the biofiltration basin must be 22,803 gallons, which is met by expanding the biofiltration basin's area of storage to 3,233 cubic feet. This equates to 24,185 gallons of storage. See Appendix F for Green Infrastructure calculations.

10. Operation, Maintenance, and Inspection

The proposed operation, maintenance and inspection schedules and practices for the proposed biofiltration basin, storm catch basins, and upflo filters are presented in Stormwater agreement located in Appendix F.

The Owner will be responsible for the regular inspection and maintenance of the stormwater management facilities to ensure that they are functioning properly, in accordance with the stormwater management agreement with the Owner and the City of Wauwatosa.

11. Conclusion

The proposed stormwater management plan meets the requirements of The City of Wauwatosa, MMSD, and WDNR through the implementation of best management practices described within this report to the greatest extent practicable.

Appendix A

Geotechnical Report

GEOTECHNICAL ENGINEERING REPORT

Mixed Use Development
7501 W. North Avenue
Wauwatosa, Wisconsin

GESTRA Project No.: 21313-10
October 13, 2021

Prepared For:
Oxeland Group
10001 Innovation Drive, Suite 2
Wauwatosa , WI 53226

GESTRA

Geotechnical Engineering Report

Mixed Use Development
7501 W. North Avenue
Wauwatosa, Wisconsin

GESTRA Project No. 21313-10
October 13, 2021

Prepared For:

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Geotechnical Engineering Report
Mixed Use Development
7501 W. North Avenue
Wauwatosa, Wisconsin

1.0 INTRODUCTION

GESTRA Engineering, Inc. (GESTRA) was authorized by Oxeland Group to complete a subsurface exploration and geotechnical report for the Mixed Use Development project located at the southeast corner of N. Wauwatosa Avenue and W. North Avenue in Wauwatosa, Wisconsin. This report presents the results from the subsurface soil exploration and describes the field exploration, laboratory test results, and provides recommendations pertaining to the design and construction of the proposed project.

The engineering recommendations and analysis contained within this report are based on the following project information which is a projection of GESTRA's understanding of the project. If for any reason the actual project information differs from what is reported below, GESTRA should be contacted so that we can review our recommendations in light of any new information.

1.1 PROJECT INFORMATION

The project site is located at the southeast corner of N. Wauwatosa Avenue and W. North Avenue. Watson Avenue is located on the south side of the site. The proposed development will include a new building located along the north, west and south sides of the property. The building is planned as 5 levels above grade. The north and west wings of the building will have parking on the lower level; retail, parking and apartments on the first level; and apartments for the remainder. The south wing is planned for townhomes, will not have a below grade level and will have 4 levels above grade.

The lower level will be slab on grade and the 1st and 2nd levels will be precast concrete with the remainder of the structure wood framed. Column loads and wall loads are not known, but we assume they will be on the order of 250 kips and 5 kips per lineal foot, respectively.

The lower level is set at elevation 759.5 feet, approximately 3 feet below existing grades in the southwest portion of the site and 10 to 11 feet below grades on the north side. The first level is planned at elevation 770.0 feet. The south wing, without the below grade level, is planned with a first level slab at 770.0 feet that is approximately 3 to 5 feet above existing grades.

A banking drive-thru is planned east of the north wing of the building. The site entrance/exits are located at the northeast corner of the development from W. North Avenue and from Watson Avenue on the south side. Asphalt parking is planned in the center portion of the development.

2.0 SCOPE OF SERVICES

GESTRA has performed the following services for the project:

- Contacted Diggers Hotline to locate the public utilities at the site and subcontracted a private locator to mark the private utilities at the site.

- Staked borehole locations in the field by measuring from existing site features. Elevations and coordinates of the as-drilled boring locations were determined by using a Geomax Zenith 35 GNSS-INS (GPS) receiver and were referenced to the Wisconsin County Coordinate System (WCCS), Milwaukee County (NAVD88).
- Completed five (5) standard penetration test (SPT) soil borings, one (1) at 20 feet deep and four (4) at 30 feet. At the completion of drilling, boreholes were abandoned per WDNR requirements and surface patched using cold patch asphalt in pavement areas.
- Performed laboratory soil testing to assign classification and engineering properties to the soils encountered. The laboratory testing included hand penetrometer readings, moisture contents, Atterberg limit and unconfined compressive strength.
- Prepared this geotechnical engineering report presenting the results of the field testing as well as providing recommendations pertaining to shallow foundations, allowable bearing capacity, estimates of settlement, seismic site classification, anticipation and management of groundwater, subgrade modulus for design of slabs on grade, soil parameters (assumed from the building borings) for the pavement design consisting of an estimated CBR value, asphalt and base course thickness for the proposed parking lot and drives, and site preparation/soil correction.

3.0 EXPLORATION RESULTS

3.1 SITE CONDITIONS

The development includes 3 adjoining properties 7423, 7429, and 7501 W. North Avenue. The property at the southeast corner of N. Wauwatosa Avenue and W. North Avenue is developed and includes asphalt pavement, a one to two story building (bank) and a smaller single-story building with drive-thru canopy. 7429 W. North Avenue is currently asphalt pavement and 7423 is not developed. A significant amount of below grade utilities are present throughout the site.

The site has an overall downward slope from the north to the south with elevations that vary from approximately 770 or 771 feet to 758 feet. Ground surface elevations at our boring locations ranged from 764.3 feet (B-4) to 770.8 feet (B-2).

Based on review of the Milwaukee County GIS & Land Information website, the bank building has been present on the site since at least 1975. Prior to 1975, the site appeared to contain residential buildings. 7423 and 7429 W. North Avenue also appeared to be residential properties that were demolished sometime prior to 1985.

3.2 SUBSURFACE SOIL PROFILE

Borings B-1, B-4 and B-5 were performed within the existing pavement and encountered 6 to 8 inches of asphalt over approximately 5 inches of base course. Borings B-2 and B-3 were performed in a greenspace area and encountered 4 to 6 inches of topsoil.

Fill, or possible fill, was observed below the topsoil and pavement at each boring location extending to estimated depths between 2 and 6 feet. The fill material typically consisted of lean clay with varying amounts of sand and gravel. Trace brick pieces were encountered within the fill in B-4 and a possible thin topsoil layer was noted below the base course in B-1. Moisture contents of the clay fill ranged between 8.6% and 16.1%.

The native soil profile consisted of layered profile of lean clay and sand soils. The native clay was encountered with a stiff to hard consistency with hand penetrometer and unconfined compression strength tests ranging between 1.5 tons per square foot (tsf) to over 4.5 tsf, and moisture contents between 11% to 24.5%. The native granular soils included sand and silty sand with varying amounts of gravel in a medium dense to dense condition. B-2 was the only boring that did not encounter native granular soils.

Results of the field and laboratory tests and observations are depicted on the individual boring logs included in Appendix I of this report. Soils were grouped together based on similar observed properties. The stratification lines were estimated by the reviewing engineer based on available data and experience. The actual in-situ changes between layers may differ slightly and may be more gradual than depicted on the boring logs. Subsurface and groundwater conditions can vary between borehole locations and in areas not explored.

It is important to note that the soil observations, fill depths, topsoil, and pavement thickness estimates were made in small diameter boreholes. Therefore, it should be understood that thicker or thinner deposits of the individual strata are likely to be encountered within other portions of the project. Furthermore, the estimation of strata thickness at a particular location can differ from person to person due to a sometimes indistinct transition between the soils encountered. Additionally, it must be recognized that in the absence of foreign substances and/or debris within the soil samples obtained, it is sometimes difficult to distinguish between natural soils and clean soil fill.

3.3 GROUNDWATER OBSERVATIONS

Groundwater observations were made during and at the completion of drilling operations. Groundwater was only encountered in the following borings: B-1 at 25.5 feet after drilling, B-3 at 24.5 during drilling and 25 feet after drilling, and B-4 at 13 feet during drilling and 26 feet after drilling. The shallower water encountered in boring B-4 during drilling may be a trapped water seam within a sand layer embedded with the clay soils.

Groundwater level fluctuations may occur with time and seasonal changes due to variations in precipitation, evaporation, surface water runoff and local dewatering. Perched water pockets and a higher water table may also be encountered during wet weather periods, particularly in more permeable silt and sand seams within native clays or granular fill material overlying less permeable clays. Installation and monitoring of an observation well would be required to assess true groundwater elevation.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 GEOTECHNICAL CONSIDERATIONS

The native soils encountered appear suitable for the planned construction. However, a geotechnical concern for the site is the existing undocumented fill material, planned building demolition and existing utilities present. Variations in strength and soil type were encountered in samples of the existing fill and the backfill within existing utilities and around existing buildings may include soft or wet soil. Therefore, GESTRA recommends complete removal of the existing fill from below the zone of influence of the new building foundations due to the potential for excessive total or differential settlement. The townhomes section of the project is at a higher elevation and will require additional fill. The building is assumed to include relatively closely spaced foundations;

therefore, complete removal of the existing fill under the townhomes and placing new engineered fill may be the preferred course of action for earthwork to avoid excessive foundation over-excavation.

The building slab on grade is anticipated to be lightly loaded, on the order of 150 psf or less and the existing fill indicated moderate strength in the samples collected. However, estimating potential settlement of a slab on grade cannot be accurately determined because of the unknown nature of the fill, variations in depth of the existing fill and variations in new fill required for the planned site grades. To construct the building slab on grade and pavements over the existing fill, the contractor and owner must understand and accept the potential risks. These risks may include increased settlement, buried unsuitable material or inconsistent material that could result in additional site excavation, subgrade instability, or other unforeseen potential detrimental conditions. If the owner and contractor cannot accept these risks, then mass excavation to remove existing fill should be performed. Alternatively, additional subgrade preparation can be performed to help mitigate, but not eliminate the risk of leaving the existing fill below slab on grade and pavements.

The recommendations presented in this report include assumptions related to the project design because detailed design information has not been developed. When additional design information is known, the recommendations presented in this report should be reviewed as information such as structural loads and changes in design elevations could impact the recommendations in this report.

4.2 SITE PREPARATION

We understand the existing building and pavement will be completely razed and removed at the start of the project. General site preparation should start with removal of topsoil / surficial organic soils, debris, or other deleterious material. Material removed from the project site should be disposed in accordance with all applicable federal, state, and local regulations. Soil should not be stockpiled near or adjacent to the excavations.

Based on the existing site plan, below grade utilities are present within the new building footprint and will likely need to be moved or abandoned. We recommend all unused utilities should be properly removed from the new building footprint. Areas of loose backfill material may be encountered within existing utility trenches or adjacent to the existing structures and should also be removed from the building footprint area. Upon excavation adjacent to the existing building and utility trenches and prior to backfilling the resulting excavations, the area should be observed by a GESTRA field representative to evaluate the suitability for subsequent support of the new building, pavements, or other planned improvements, and to perform density testing during subsequent backfill placement.

Assuming the potential risks related to the existing fill is acceptable to the project, we recommend compacting the exposed material in the building slab on grade area and pavement areas after the initial site preparation described above. After compaction and before base material is placed, a proof roll is recommended with a minimum 20-ton tri-axle dump truck, or like machinery imparting similar static loading on the soil and moving at no more than walking speed. A geotechnical engineer or their designated representative should be present during the proof roll in order to identify soft or unstable areas, if any, and subsequently recommend remediation procedures.

The townhomes section of the project is at a higher elevation and will require additional fill. The building is assumed to include relatively closely spaced foundations; therefore, complete removal of the existing fill under the townhomes and placing new engineered fill may be the preferred course of action for earthwork to avoid excessive foundation over-excavation.

Based on the variations of the material and lower SPT N-values of the fill in some of the borings, it is likely that areas of the proposed site may show instability and may be disturbed when exposed to construction traffic. Where remediation is needed, the options for improvement include the methods described in the following paragraphs. The type of improvement and the depth of remediation needed should be determined at the time of construction based on drainage, weather, and soil conditions.

Recondition the subgrade through moisture/density control:

If this option is chosen, the upper 12-inches of subgrade should be aerated through disking and dried to within two (2) percent of its optimum moisture content. After which, the dried soils can be re-compacted in place to at least 95% of the maximum modified Proctor density (ASTM D1557). However, this method may not be effective if lower strength soils extend to depths greater than 1 foot below grade.

Removal and replacement:

The soft or unstable soils could be removed and replaced with suitable engineered fill. The new fill should be compacted to at least 95% of the maximum dry density as obtained by the maximum modified Proctor density (ASTM D1557). To potentially reduce the amount of subgrade excavation, the new fill could consist of a well graded granular fill or a geogrid could be used with the granular fill.

Site grading should direct runoff away from planned building and pavement areas and should be maintained throughout construction so that the potential for the softening of the subgrade soils is reduced. Equipment and working traffic should also be kept to a minimum on subgrade surfaces, especially during times of precipitation or following spring thaw. The contractor is responsible for maintaining completed earthwork areas. Consideration should be given to installing construction roads or utilizing the existing pavement for construction traffic to reduce disturbance to the subgrade soils.

Based on our understanding of the project, excavations of up to 11 feet and fills up to 8 feet may be required to attain subgrade elevation at portions of the site. As a general rule for new fill placement, the lift thickness should not exceed 12 inches for granular soils and 9 inches for cohesive soils and the maximum particle size should be limited to 25% of the lift thickness. Engineered fill placed within the building pad, below foundations or in the pavement subgrade/base course should be compacted to a minimum of 95% of the modified Proctor dry density value. If engineered fill depths below building foundations or slab will exceed 10 feet, the lower 5 feet of fill should be compacted to 100% of the modified Proctor dry density value or consist of granular fill.

Structural soil fill should be placed a minimum of five feet beyond the edges of the new building and pavement areas, and an additional foot horizontally for each vertical foot of new fill to be placed to provide adequate lateral confinement. The inorganic site soils free of any construction debris or unsuitable material that would be removed from excavations could be reused as structural

fill; however, moisture conditioning and/or sorting of the excavated soil to remove unsuitable material may be necessary.

The information presented in this report may be used to evaluate the site conditions for construction, but the contractor is responsible for determining site preparation means and methods required to complete the project. An aggressive construction schedule or construction during seasons with limited drying time may not allow for reconditioning of the subgrade and soil correction may require removal and replacement with imported granular fill or use of chemical stabilization.

This geotechnical report identifies or recommends material that may be used as engineered fill, but the contractor is responsible for utilizing materials that meet the project requirements and determining means and methods required for placement and compaction. Typically, clay soils are easier to dry or rework when placed over large open areas during favorable weather conditions. Clay soils can be difficult to compact or moisture condition in trench backfill situations and may increase potential for consolidation and settlement of the backfill if it is not placed or compacted properly. Granular soils may be easier to place and compact in trench backfill situations but may increase construction costs if the material has to be imported.

4.3 FOUNDATION RECOMMENDATIONS

The proposed building can be supported on a typical shallow spread/strip footing system designed for a maximum net allowable soil bearing pressure of 4,000 pounds per square foot (psf) provided the recommendations in this report are followed. Spread foundations designed for a maximum net allowable soil bearing capacity of 4,000 psf should be supported by the native clay with a minimum unconfined compressive strength 2 tsf, native granular soils with a minimum SPT N-value of 15 blows per foot (bpf) or on new engineered fill place over the recommended native soils.

Table 4-1 provides the depths at each of the test boring locations to the soil recommended for an allowable bearing capacity of 4,000 psf and the anticipated soil type at the assumed foundation bearing elevation. The townhomes section of the project is planned with no below grade level and new fill is anticipated to raise the site grades to the design elevation. If engineered fill depths below building foundations or slab will exceed 10 feet, the lower 5 feet of fill should be compacted to 100% of the modified Proctor dry density value or consist of granular fill.

Table 4-1: Recommended Excavation Depths

Boring Location	Existing Surface Ground Elevation (ft)	Estimated Depth to 4,000 psf Allowable Bearing Capacity (ft)		Assumed Foundation Elev / Soil Type Encountered
		Depth (ft)	Elevation (ft)	
B-1	770.6	6	764.6	EL 759 feet Stiff, sandy lean clay
B-2	770.8	6	764.8	EL 759 feet Stiff to hard lean clay
B-3	766	10.5	755.5	EL 755.5 feet [1] Very stiff lean clay
B-4	764.3	4	760.3	EL 759 feet Hard lean clay
B-5	766.6	3.8	762.8	EL 769 New Fill [2]

1. *Potential foundation over-excavation*
2. *Townhomes area, existing site grades lower than assumed foundation elevation. Recommendations assume existing fill removed and new engineered fill placed.*

Where unsuitable soils are encountered at the foundation elevation, soil correction should consist of additional excavation to remove the unsuitable soils. If the over-excavation is being filled with engineered fill, we recommend the over-excavation be widened at a minimum 1H:1V ratio from the edge of the foundation. The over-excavation can then be filled to grade with suitable engineered fill consisting of a well graded granular material placed in lifts not exceeding 12 inches and compacted to at least 95% of maximum dry density as determined by the modified Proctor (ASTM D1557). Alternatively, lean concrete with a minimum compressive strength of 500 psi could be used to fill the over-excavation to grade and lateral over-excavation will not be required.

The depth of excavation required to expose suitable bearing material may vary in areas not explored by GESTRA; therefore, we recommend the foundation excavations be reviewed by a geotechnical engineer or their designated representative to determine when soils suitable to support the recommended bearing capacity are observed.

The shallow foundation design should incorporate a minimum strip footing width of 18 inches and column pad width of 24 inches, even if the allowable bearing capacity has not been fully utilized. All perimeter foundations should bear a minimum of 48 inches below grade for heated structures and 60 inches for unheated structures in order to protect the structure from frost heave. Interior foundations in heated buildings may bear at a shallower depth provided the bearing soils will not freeze. If the structure includes load bearing thickened slabs, subgrade preparation under the thickened slabs should follow the recommendations in this report for foundations. We recommend that foundations also be suitably reinforced in order to compensate for the effects of minor differential movements due to subsurface soil variations.

If the recommendations as stated in this report are used in the design and construction of the proposed buildings, it is our opinion that total settlements will be less than 1 inch.

4.4 FLOOR SLAB RECOMMENDATIONS

We recommend that a subgrade reaction modulus of 150 pounds per square inch per inch of deflection (pci) be used in the design of the floor slab at grade. The modulus value was assumed based on existing clay fill, the site is prepared following the recommendations of this report and assumes a 1-foot plate is used to determine the modulus and should be adjusted for the size of the foundation and confinement effect. We recommend that the floor slabs be suitably reinforced and designed to be separate from the foundation system in order to allow for separate movements. It is recommended the structural engineer specify the floor slab thickness, reinforcing, joint details and other parameters. At a minimum, the floor slabs are recommended to be reinforced or the concrete contain an appropriate fiber mesh additive to help control shrinkage cracking.

We recommend the installation of a capillary moisture break directly below the slab. A typical capillary moisture break may consist of at least 6 inches of sand or gravel with a maximum particle size of 1-1/2 inches, containing 15-55% passing the number 4 sieve and no more than 12% passing the number 200 sieve (fines) and should follow the recommendations of ACI 302.1R-15, Chapter 6. The structural engineer, architect, or manufacturer of a floor covering should determine the need of a vapor barrier, specify the vapor barrier location, and consider the concrete curing and the effects of moisture on future flooring materials or building end use. If a vapor retarder is used, we recommend it be placed in accordance with ACI 302.1 Section 3.2 and should meet the requirements of ASTM E1745. The vapor retarder should include proper sealing at penetrations, overlap at joints, and sealing at the interface of the wall and slab and may require an adequate cushion material to prevent damage.

4.5 BELOW GRADE WALLS

It is our understanding that portions of the proposed building will be designed below grade. Below grade walls will need to be designed to resist lateral earth pressures. The values presented in Table 4-2 assume that the walls are vertical; that a clean, free-draining granular fill is used as backfill within 2 feet behind the wall; the backfill condition at the ground surface is level; and that adequate drainage is provided to prevent the buildup of any hydrostatic pressure. In addition, the below grade walls will also be required to resist the surcharge of traffic that may occur during or after construction.

Table 4-2: Below-Grade Wall Design Parameters

Below-Grade Wall Design Parameters [1]	
Total Unit Weight of Backfill (γ)	125 pcf
Angle of Internal Friction (Φ)	26°
At-Rest Earth Pressure Coefficient, (K_o)	0.56
Active Earth Pressure Coefficient, (K_a)	0.39
Passive Earth Pressure Coefficient, (K_p)	2.56

Below-Grade Wall Design Parameters [1]	
Coefficient of sliding friction (ultimate)	0.35

1. *Based on clay soil encountered*

For walls that are free to rotate at least 0.001 times the height of the wall, such as a temporary earth retention system and retaining walls, then an active earth pressure condition will develop. Equivalent fluid densities can be calculated by multiplying unit weight by the listed pressure coefficients at different conditions. We also recommend using a minimum factor of safety of 2.0 in passive earth pressure calculations because of the large strains required to mobilize the full passive resistance, ignoring the upper 1 foot of soil in frost protected areas and ignoring the soil within the frost depth for other areas.

Drainage should be provided behind below-grade and retaining walls to prevent the buildup of hydrostatic pressures. We recommend that free-draining granular drainage aggregate be placed within 2 feet behind the back face of the below grade walls. Drainage pipes are recommended to be installed behind the walls and be drained by gravity or a sump pit and pump system. The drainage pipes should be surrounded by a minimum of 6 inches of drainage aggregate. Due to the existing fill and native soils containing a significant percentage of fine material, the drainage aggregate should be completely wrapped in a non-woven, high survivability, geotextile fabric with an apparent opening size (AOS) in the range of 70 to 100. The geotextile fabric should prevent migration of any adjacent soil into the drainage aggregate. We do not recommend using a drainage pipe that includes a geotextile sleeve in immediate contact with the pipe.

We recommend a relatively impermeable barrier that may consist of a minimum 2 foot thick clay cap or Bituminous or Portland cement concrete (i.e. walkways and drives) be placed around each of the below-grade structures to minimize surface water infiltration into the backfill against the walls. The clay material, if used, should be placed and compacted as recommended in this report and should extend from final grade to a depth of at least 2 feet. The clay cap or impermeable barrier should slope away from the structure at a minimum 2 percent grade. Surcharge loads, including those from adjacent (present and future) structures, as well as temporary construction equipment, within a zone defined by a plane extending at a 45 degree angle above the base of the wall should also be included in the design. The size of the compactor used behind the wall and requirements before backfilling should be confirmed by the structural engineer.

4.6 SEISMIC SITE CLASSIFICATION

Section 1613 of the International Building Code 2015 (IBC) was used to assign a soil site classification. Based on the native soil conditions observed and assuming these are consistent or better to a depth of 100 feet, the soil site classification **D** (stiff soil) should be used in the structural design of the proposed building. Based on site class D, and mapped spectral response acceleration S_s and S_1 for Wauwatosa, Wisconsin, the site coefficient F_a and F_v are 1.6 and 2.4, respectively.

4.7 PAVEMENT RECOMMENDATIONS

The pavement subgrade soils should be prepared following the recommendations in this report. Remnants of existing or former construction should be removed to a minimum depth of 2 feet below the proposed pavement subgrade. Our recommendations below assume the subgrade is thoroughly prepared for construction based on the recommendations developed in this report.

Additional corrective action may be determined at the time of construction for areas where it is necessary to provide a more consistent subgrade.

The Wisconsin Asphalt Pavement Association (WAPA) Asphalt Pavement Design Guide 2021, AASHTO (93/98), and the results of the geotechnical evaluation were used to provide the recommendations for the new asphalt pavement. Based on the existing clay fill and native clay soils as the subgrade material, GESTRA recommends that "poor soil" (estimated CBR value between 2 and 5, SSV = 2.5) conditions should be assumed as the subgrade soils. Table 4-3 below presents the recommended hot mix asphalt and base course thicknesses for the new pavement areas for 2 different Traffic Classes. Pavement sections may be modified if the traffic volumes are different than presented below.

Base course material should be placed at moisture content within 2% of optimum and compacted to a minimum of 95% of maximum dry density as determined by the modified Proctor. Hot Mix Asphalt (HMA) should be placed and compacted following the guidelines of WisDOT Standard Specifications for Highway and Structure Construction, section 460.3.

Table 4-3: Pavement Design Recommendations for Parking Lots

Traffic Class	Pavement Layer Type	Thickness (inches)	Material Type	WisDOT Specifications
Parking Lots (Max ADT 100, 100% Auto)	Hot Mix Asphalt	3.5	LT	Section 460
	Base Course (Dense Graded)	8.0	1-1/4 inch Crushed Stone	Section 305
Traffic Class I, (driveway and parking lots >50 stalls, 20 year ESALs < 1 million)[1]	Hot Mix Asphalt	4.0	LT	Section 460
	Base Course (Dense Graded)	10.0	1-1/4 inch Crushed Stone	Section 305

1. *Based on Table 7.2 of the WAPA Asphalt Pavement Design Guide 2021.*

One of the important considerations in designing a high quality and durable pavement is providing adequate drainage. Drainage design for the proposed pavement section is out of GESTRA's scope for this project. It is important that bird baths (leeching basins) and surface waves are not created during construction of the HMA layer. A proper slope should be allowed and drainage should be provided along the edges of pavements and catch basins to prevent the accumulation of free water within the base course, which otherwise may result in subgrade softening or swelling, and pavement deterioration under exposure and repeated traffic conditions.

Pavement sections presented in the above table should not be used for areas which experience repeated truck traffic, equipment or truck parking areas, entrances and exit aprons, or contain trash dumpster loading zones. In the areas listed above, a Portland Cement Concrete (PCC) pavement should be used. The PCC layer thickness is recommended to be 6.0 inches, with a minimum of 6.0 inch-thick crushed stone base course, but may be modified depending on the final design. The

reinforcement details for PCC layers should be designed by the project design engineer as the project conditions dictate.

All pavements require regular maintenance and repair in order to maintain the serviceability of the pavement. These repairs and maintenance are due to normal wear and tear of the pavement surface and are required in order to extend the serviceability life of the pavement. However, after 20 years of service, a normal pavement structure is likely to deteriorate to a point where pavement rehabilitation may be required to maintain the serviceability.

4.8 CONSTRUCTION CONSIDERATIONS

The detailed means and method of excavation and construction should be decided by the contractor and approved by the project design team. Based on the specific site information, geotechnical exploration results and requirements for the proposed project, the following issues should be taken in consideration during construction.

Dewatering

Based on the soil borings performed, substantial water is not anticipated to be encountered during excavation. If water is encountered during excavation, we anticipate the appropriate number of temporary sump pits and pumps should be sufficient to remove anticipated volume of water in the excavation. The contractor should be prepared to control groundwater and surface water and prevent it from accumulating in excavations or otherwise affecting construction.

Excavation Stability

Caving is a common issue for excavation side walls during construction, especially when fill material, granular soils, and/or water seepage are observed. An excavation plan should be developed and the length of excavation left open should be limited to prevent caving soil from covering the suitable bearing soils.

A temporary soil retention system may also be necessary in order to prevent caving or provide support of surrounding structures or utilities during construction. Providing recommendations or designing the retention system is out of the scope for GESTRA. The contractor must comply with the federal, state, local and updated OSHA regulations during excavation and in retention system design to ensure excavation safety.

Occupational Safety and Health Act (OSHA) has instituted strict standards for temporary construction excavations. These standards are outlined in 29 CFR Part 1926 Subpart P. Excavations within unstable soil conditions or extending five feet or more in depth should be adequately sloped or braced according to these standards. Excavation safety is the responsibility of the contractor. Material stockpiles or heavy equipment should not be placed near the edge of the excavation slopes. The actual stable slope angle should be determined during construction and will depend upon the loading, soil, and groundwater conditions encountered.

Weather Implications

The subgrade soil or the soil at foundation level might become unstable with exposure to adverse weather such as rain, snow and freezing temperatures. The unstable areas due to weather exposure may require an additional undercut or stabilization and the representative geotechnical engineer should assist with the determination of the depth of additional undercut or stabilization procedure based on observation of the field condition.

Soil Sensitivity

Soil at the construction site will be exposed to moisture and disturbance from construction traffic, construction equipment and human factors. Due to the disturbance, soil may become sensitive with contact of water. Contractor should try to lessen the exposure the soil at the construction site may encounter to moisture and disturbances. Therefore, the foundations, floor slabs and pavements should be constructed immediately after the review of the representative geotechnical engineer.

Existing Fill

Traces of foreign material was encountered within samples of the existing fill material collected. GESTRA has not evaluated the material with respect to environmental considerations. The depth and type of existing fill material varied between our borings. The planned excavation for the lower level portion of the building will likely extend through the existing fill, but the at grade section is planned higher than the existing grades. Consideration should be given to performing additional exploration through test pits prior to the start of construction in locations where new fill is required. The test pits will allow for cross sectional views of the existing fill to help define the condition of the fill, refine potential soil correction estimates, possibly identify buried former structures if present, and determine potential for reuse of the existing fill.

Existing Adjacent Structures

New construction near or adjacent to existing foundations and structures requires special consideration. Due to potential interaction between new and existing foundations and slab on grade pads and overlapping stresses from adjacent foundation, the existing building may experience some settlement. The effect of these stresses and potential settlement should be evaluated prior to finalizing the design.

If new slab on grade pads or foundations are planned adjacent to existing spread foundations, the effects of overlapping soil stresses must be considered and the maximum net allowable soil bearing pressure must not be exceeded. The excavation and new construction should also consider the potential impact on the existing deep foundations. A temporary soil retention system may also be necessary to avoid undermining the existing building or other adjacent structures. The contractor and design team should consider the impact of the planned construction on any adjacent structures or utilities and should develop a plan of construction to mitigate impact. Evaluation of any adjacent structures or utilities or the effect of the construction on adjacent structures or utilities is outside the scope of GESTRA's services for this project. The project may also want to consider a pre and post condition survey to identify pre-existing distress of the structures adjacent to the planned construction and a monitoring plan during construction.

5.0 EXPLORATION AND TESTING PROCEDURES

5.1 LAYOUT AND ELEVATION PROCEDURES

A total of five (5) soil borings were completed at the approximate locations shown on the attached Borehole Location Map in Appendix I. The location of the borings were selected by Oxeland Group and located in the field by GESTRA by measuring from existing site features. Elevations of the boreholes were obtained by GESTRA using a Geomax Zenith 35 GNSS-INS receiver. Elevations shown on the boring logs are referenced to the Wisconsin County Coordinate System

(WCCS), Milwaukee County (NAVD88). Coordinates and elevation were not obtained by a licensed surveyor.

5.2 FIELD TESTING PROCEDURES

The boreholes were drilled using a truck mounted drill rig. The boreholes were initiated and advanced by using hollow stem augers. In landscape areas, a 24-inch split spoon sample was typically collected at the surface. In pavement areas, the borings were drilled through the pavement sections and auger cutting samples were collected below the pavement. 18-inch split spoon samples were collected at 2-1/2 foot intervals starting at a depth of 2 feet to a depth of 16 feet. Below a depth of 16 feet, spilt spoon samples were collected at 5-foot intervals to the assigned termination depth.

All representative soil samples were taken in general accordance with the "Standard Method for Penetration Test and Split-Barrel Sampling of Soils" (ASTM D1586). After each sampling, a soil sample was retained and placed in a jar and recorded for type, color, consistency, and moisture, sealed and then transported to the laboratory for further review and testing, if required. The specific drilling method used including the depths, rig type, crew chief, are included on each of the individual boring logs as it may change for each borehole.

5.3 LABORATORY TESTING PROCEDURES

After completion of drilling operations, all of the retained soil samples were transported to GESTRA's laboratory and classified by a geotechnical engineer using the Unified Soil Classification System (USCS). A chart describing the classification system used is included in Appendix I of this report. The engineer assigned laboratory testing suited to extract important index properties of the soil layers. These tests included hand penetrometer readings, moisture contents, Atterberg limit and unconfined compressive strength

STANDARD OF CARE

Our exploration was limited to evaluating subsurface soil and groundwater conditions pertaining to the proposed project. GESTRA did not perform any environmental, chemical, or hydrogeologic testing as these were not part of our work scope.

This report should be made available in its entirety to bidding contractors for information purposes. The soil boring logs and borehole location map should not be detached from this report. Our report is not valid if used for purposes other than what is described in the report.

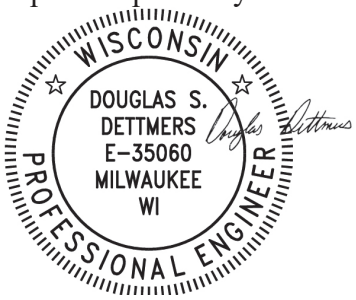
All OSHA regulations such as those regarding proper sloping and temporary shoring of excavations should be followed during the entire construction process.

GESTRA has presented our professional opinions in this report in the form of recommendations. Our opinions are based on our understanding of current project information and related accepted engineering practices at the time of this report. Other than this, no warranty is implied or intended.

Sincerely,

GESTRA Engineering, Inc.

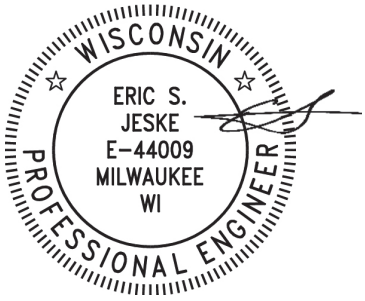
Report Prepared By:



Digitally signed by Douglas Dettmers
Date: 2021.10.13 11:42:39 -05'00'

Douglas Dettmers, P.E.
Senior Engineer

Report Reviewed By:



Digitally signed by Eric Jeske
Date: 2021.10.13 11:44:06 -05'00'

Eric Jeske, P.E.
Senior Engineer

APPENDIX I

SITE LOCATION MAP, SITE LAYOUT PLAN, BOREHOLE LOCATION MAP, TEST BORING LOGS, GENERAL NOTES AND SOILS CLASSIFICATION

NOTE:
Drawing prepared using aerial topographic map from Google Earth

Project Name & Location: Mixed Use Development Wauwatosa, Wisconsin	**Drawing Title:** Site Location Map	**Project Number:** 21313-10	**Drawn by:** R. Haque
	Scale: Not to Scale	**Date:** October 12, 2021	**Checked & Approved by:** D. Dettmers

GESTRA
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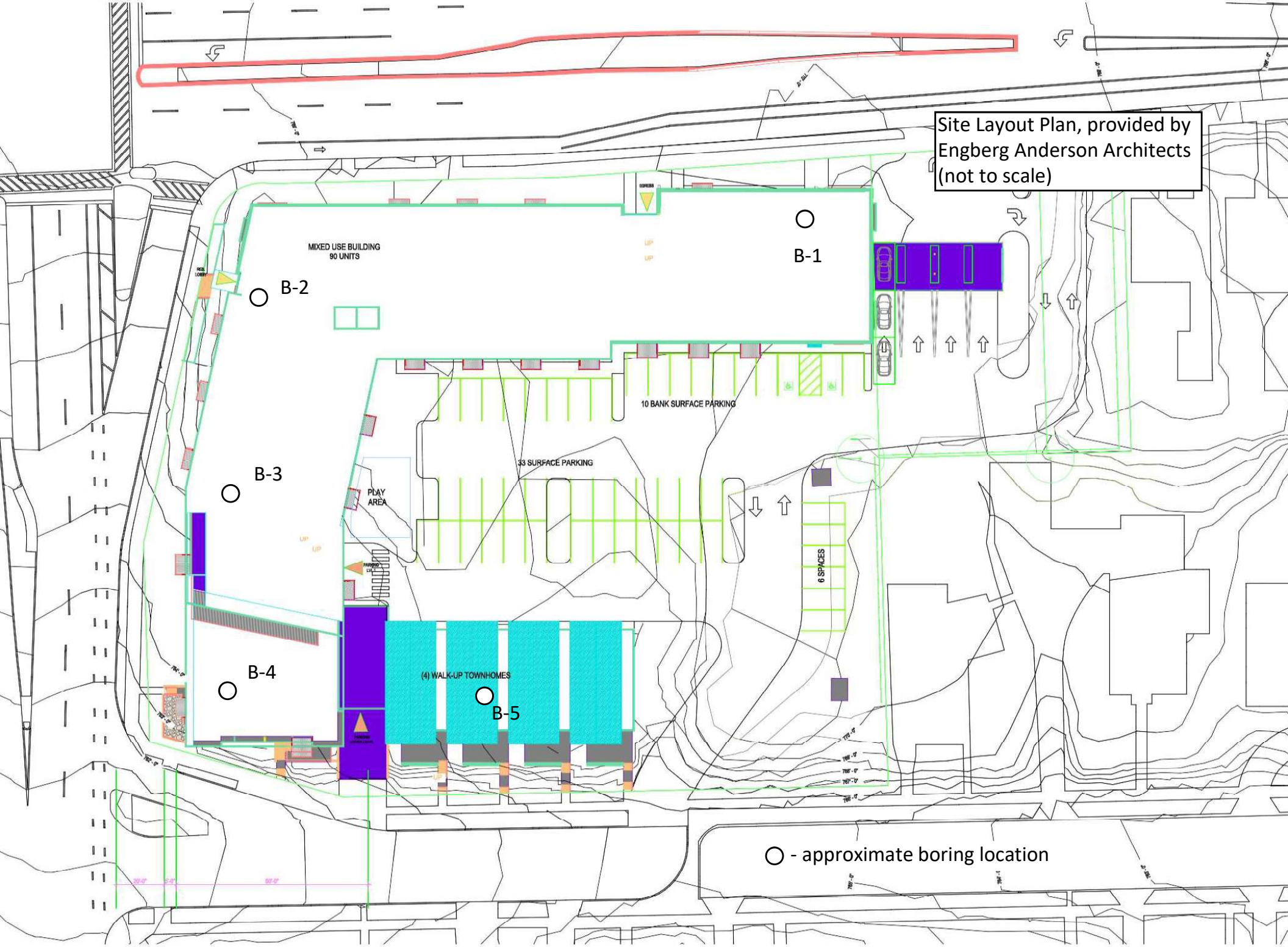
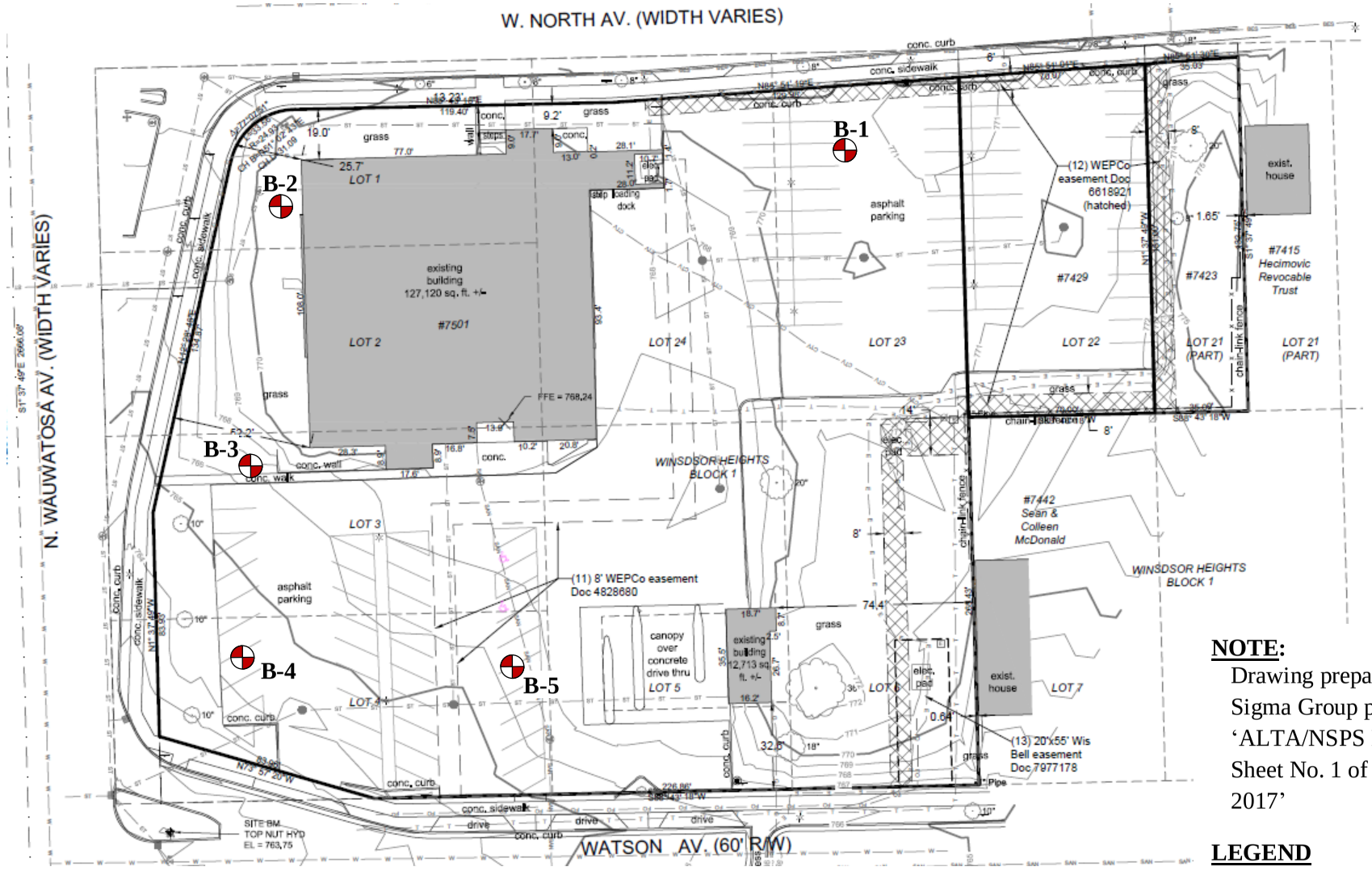

Site Layout Plan, provided by Engberg Anderson Architects (not to scale)
MIXED USE BUILDING
90 UNITS
B-1
B-2
B-3
B-4
B-5
10 BANK SURFACE PARKING
33 SURFACE PARKING
PLAY AREA
6 SPACES
(4) WALK-UP TOWNHOMES
○ - approximate boring location



NOTE:

Drawing prepared using The Sigma Group prepared drawing, 'ALTA/NSPS Land Title Survey, Sheet No. 1 of 1, dated 8-30-2017'

LEGEND

- Soil Boring Location

Project Name & Location: Mixed Use Development Wauwatosa, Wisconsin	**Drawing Title:** Borehole Layout Plan	**Project Number:** 21313-10	**Drawn by:** R. Haque
	Scale: 1 Inch = 60 Feet (±)	**Date:** October 12, 2021	**Checked & Approved by:** D. Dettmers

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SOIL BORING LOG

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191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/27/2021
DATE DRILLING ENDED	9/27/2021
BORING NUMBER	B-1
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (International)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: S. Gonyer
FIELD LOG	C. Dietz
LAB LOG / QC	D. Dettmers
NORTHING	307589
EASTING	580105
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	770.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
				770.0	ASPHALT (7-inches)								
AU - 1					0.6 (770) BASE COURSE (not measured) 1 (769.6) Possible buried topsoil layer below base course								
SS - 2	6	4 2 3	5		SANDY LEAN CLAY, brown and gray with trace black, moist, trace to with gravel, (FILL)							16.1	
SS - 3	6	2 2 3	5	5 765.0	6 (764.6) LEAN CLAY, brown, moist, very stiff, trace gravel							14.5	
SS - 4	12	3 3 5	8			CL			2.50			17.7	
SS - 5	16	4 4 5	9	10 760.0	With sand in sample SS-5				2.50			15.2	
SS - 6	5	5 8 8	16		11.4 (759.2) SANDY LEAN CLAY, brown, moist, stiff	CL						14.1	
SS - 7	18	2 4 5	9	15 755.0	13.4 (757.2) LEAN CLAY, brown, moist, hard, trace to with sand	CL			4.00			14.4	
SS - 8	18	4 6 6	12	20 750.0	17.7 (752.9) SAND WITH SILT AND GRAVEL, brown, moist, medium dense	SP-SM							
SS - 9	18	3 3 8	11	25 745.0	22.7 (747.9) SILTY SAND, brown, wet, medium dense With silty clay layer at 26 feet (driller observation)	SM							

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 25.5 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
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PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/27/2021
DATE DRILLING ENDED	9/27/2021
BORING NUMBER	B-1
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (International)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: S. Gonyer
FIELD LOG	C. Dietz
LAB LOG / QC	D. Dettmers
NORTHING	307589
EASTING	580105
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	770.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	5 7 8	15	30 / 740.0	SILTY SAND, brown, wet, medium dense 27.7 (742.9) SAND WITH GRAVEL, gray, wet, medium dense 31 (739.6) End of Boring at 31.0 ft.	SM SP							
				35 / 735.0									
				40 / 730.0									
				45 / 725.0									
				50 / 720.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 25.5 ft.		CAVE DEPTH AFTER 0 HOURS: NMR WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR		

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
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Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/24/2021
DATE DRILLING ENDED	9/24/2021
BORING NUMBER	B-2
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (HT)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: A. Woerpel
FIELD LOG	Z. Frye
LAB LOG / QC	D. Dettmers
NORTHING	307575
EASTING	579896
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	770.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	10	2 4 6 8	10	770.0	TOPSOIL (6-inches) 0.5 (770.3) LEAN CLAY, brown, moist, trace sand and gravel, (FILL)								
					1.4 (769.4)								
SS - 2	12	3 3 4	7		LEAN CLAY WITH SAND, brown, moist, trace to with gravel, (FILL)							10.9	
SS - 3	8	1 3 3	6	5 765.0	6 (764.8)							12.1	
					LEAN CLAY, brown, moist, hard, trace sand and gravel								
SS - 4	18	2 7 8	15						4.00 - 4.5+			12.6	
						CL							
SS - 5	16	2 7 9	16	10 760.0	With wet sand lens at 10.5 feet				4.5			11.3	
					12.5 (758.3)								
SS - 6	18	3 4 5	9		LEAN CLAY, gray, moist, stiff to very stiff, trace to with gravel				2.50			11.5	
SS - 7	16	1 3 6	9	15 755.0					3.00 - 3.50			11	
						CL							
SS - 8	14	1 4 4	8	20 750.0					1.75			11.4	
SS - 9	18	3 4 6	10	25 745.0					1.50			12.8	

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

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SOIL BORING LOG

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/24/2021
DATE DRILLING ENDED	9/24/2021
BORING NUMBER	B-2
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (HT)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: A. Woerpel
FIELD LOG	Z. Frye
LAB LOG / QC	D. Dettmers
NORTHING	307575
EASTING	579896
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	770.8 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	13	3 5 6	11	30 / 740.0	LEAN CLAY, gray, moist, stiff to very stiff, trace to with gravel With sandy lean clay layer in sample SS-10 31 (739.8) End of Boring at 31.0 ft.	CL			1.50			11.6	
				35 / 735.0									
				40 / 730.0									
				45 / 725.0									
				50 / 720.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

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Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/24/2021
DATE DRILLING ENDED	9/24/2021
BORING NUMBER	B-3
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (HT)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: D. Harris
FIELD LOG	Z. Frye
LAB LOG / QC	D. Dettmers
NORTHING	307472
EASTING	579880
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	766 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 1	8	2 6 9 9	15	765.0	TOPSOIL (4-inches) 0.3 (765.7) SANDY LEAN CLAY, brown, moist, trace gravel, (FILL) 1.3 (764.7)							8.6	
SS - 2	14	5 7 11	18		LEAN CLAY, brown, moist, very stiff to hard, with silty sand layers, (possible FILL)	CL			4.50			11.1	
SS - 3	10	3 8 9	17	5 760.0	6.1 (759.9)				2.00			17	
SS - 4	10	2 3 4	7		LEAN CLAY, gray, moist, stiff to very stiff, trace gravel	CL			2.00 **(1.7)**			11.7	γ_d = 127.7 pcf γ_T = 142.6 pcf
SS - 5	12	3 8 11	19	10 755.0	10.5 (755.5) SAND, brown, moist, medium dense to dense, with stiff to very stiff clay layers							12.6	
SS - 6	14	9 13 13	26			SP							
SS - 7	9	5 22 19	41	15 750.0	With gravel in sample SS-7 Rock chips from 15 to 15.2 feet due to possible boulder 17.3 (748.7)								
					LEAN CLAY, brown, moist, very stiff, trace gravel	CL							
SS - 8	14	5 6 10	16	20 745.0	20.7 (745.3) SAND, brown, moist, medium dense	SP			3.00			21.4	Sample SS-8A Sample SS-8B
					22.5 (743.5) SAND, orangish brown, wet, medium dense								
SS - 9	12	5 7 6	13	25 740.0		SP							

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 24.5 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 25 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/24/2021
DATE DRILLING ENDED	9/24/2021
BORING NUMBER	B-3
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (HT)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: D. Harris
FIELD LOG	Z. Frye
LAB LOG / QC	D. Dettmers
NORTHING	307472
EASTING	579880
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	766 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
					27.5 (738.5)	SP							
					LEAN CLAY, gray, moist, very stiff								
SS - 10	16	2 4 6	10	30 735.0		CL			3.00			16.9	
					31 (735)								
					End of Boring at 31.0 ft.								
				35 730.0									
				40 725.0									
				45 720.0									
				50 715.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 24.5 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 25 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING STARTED	9/27/2021
DATE DRILLING ENDED	9/27/2021
BORING NUMBER	B-4
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (International)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: S. Gonyer
FIELD LOG	C. Dietz
LAB LOG / QC	D. Dettmers
NORTHING	307400
EASTING	579880
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	764.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
					ASPHALT (8-inches)								
					0.7 (763.6)								
					BASE COURSE (5-inches)								
					1.1 (763.2)								
SS - 2 AU - 1	18	2 4 6	10		LEAN CLAY WITH SAND, moist, trace brick pieces, (FILL)				2.00			12.5	
					2 (762.3)								
				760.0	LEAN CLAY, brown, moist, very stiff to hard, trace sand, trace to with gravel With gray mottling in sample SS-2								
SS - 3	18	2 5 7	12	5					4.5+			12.1	
						CL							
SS - 4	18	2 4 6	10						3.50			13.8	Samples SS-4 and SS-5 partly ribboned
				755.0									
SS - 5	8	7 12 12	24	10					2.00			12.8	
					11 (753.3)								
					SAND, brown, wet, medium dense, trace silt and clay								
SS - 6	14	2 5 5	10	▽		SP							
					13.5 (750.8)								
				750.0	SILTY SAND, brown, moist, medium dense								
SS - 7	16	5 8 16	24	15		SM							
					15.5 (748.8)								
					LEAN CLAY, gray, moist, very stiff to hard, trace gravel				4.5+				
				745.0		CL							
SS - 8	18	2 4 6	10	20					2.50			24.5	
					22.7 (741.6)								
					SILTY SAND, brown, wet, medium dense								
				740.0									
SS - 9	18	6 5 7	12	25		SM							
				▼									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 26 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME	Mixed Use Development
DATE DRILLING STARTED	9/27/2021
BORING NUMBER	B-4
PROJECT LOCATION	Wauwatosa, WI
DATE DRILLING ENDED	9/27/2021
PROJECT NUMBER	21313-10
DRILLING RIG	CME 75 (International)
BORING DRILLED BY	FIRM: GESTRA CREW CHIEF: S. Gonyer
FIELD LOG	C. Dietz
LAB LOG / QC	D. Dettmers
NORTHING	307400
EASTING	579880
DRILLING METHOD	3¼" HSA
SURFACE ELEVATION	764.3 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft)	Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
SS - 10	18	3 4 8	12	30	735.0	SILTY SAND, brown, wet, medium dense	SM							
						31 (733.3)								
						End of Boring at 31.0 ft.								
				35	730.0									
				40	725.0									
				45	720.0									
				50	715.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: 13 ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: 26 ft.		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

SOIL BORING LOG

GESTRA Engineering Inc.
191 W Edgerton Avenue
Milwaukee, WI 53207
Phone: 414-933-7444, Fax: 414-933-7844

PROJECT NAME: Mixed Use Development		DATE DRILLING STARTED: 9/27/2021	PAGE NUMBER: 1 of 1
PROJECT LOCATION: Wauwatosa, WI		DATE DRILLING ENDED: 9/27/2021	BORING NUMBER: B-5
BORING DRILLED BY: FIRM: GESTRA CREW CHIEF: S. Gonyer	FIELD LOG: C. Dietz LAB LOG / QC: D. Dettmers	NORTHING: 307387 EASTING: 579985	PROJECT NUMBER: 21313-10 DRILLING RIG: CME 75 (International) DRILLING METHOD: 3¼" HSA SURFACE ELEVATION: 766.6 ft

Number and Type	Recovery (in)	Blow Counts	N - Value	Depth (ft) / Elevation	Soil Description and Geological Origin for Each Major Unit	USCS Classification	Graphic	Well Diagram	Unconfined Comp. Strength (Q_u or Q_p) (tsf)	Liquid Limit	Plasticity Index	Moisture Content (%)	Comments
					ASPHALT (6-inches)								
					0.5 (766.1)								
				765.0	BASE COURSE (5-inches)								
					0.9 (765.7)								
SS - 2 AU - 1	14	6 5 6	11		SILTY CLAY WITH SAND AND GRAVEL, brown, moist, (FILL)					19	7	11.5	
					3.8 (762.8)								
					LEAN CLAY, brown, moist, hard, trace sand and gravel								
SS - 3	18	7 11 14	25	5		CL			4.5+			12.1	
				760.0									
					7.5 (759.1)								
SS - 4	18	4 5 7	12		LEAN CLAY, gray, moist, stiff to very stiff, trace sand, trace to with gravel				2.00			12	
				10									
SS - 5	15	4 7 9	16						2.00			11.6	Samples SS-5 and SS-6 partly ribboned
				755.0									
SS - 6	3	6 7 9	16			CL			1.50			11.7	
				15									
SS - 7	18	9 9 9	18						2.00			12.2	
				750.0									
					17.7 (748.9)								
					SAND WITH SILT, brown, moist, medium dense	SP-SM							
SS - 8	14	7 8 8	16	20									
					21 (745.6)								
				745.0	End of Boring at 21.0 ft.								
				25									
				740.0									

WATER & CAVE-IN OBSERVATION DATA

▽	WATER ENCOUNTERED DURING DRILLING: NE ft.		CAVE DEPTH AT COMPLETION: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AT COMPLETION: NE		CAVE DEPTH AFTER 0 HOURS: NMR	WET ☐ DRY ☐
▼	WATER LEVEL AFTER 0 HOURS: NMR			

NOTE: Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected.

GENERAL NOTES

DRILLING AND SAMPLING SYMBOLS

SYMBOL	DEFINITION
HSA	Hollow Stem Auger
HSA w/ RW	Hollow Stem Auger converted to Rotary Wash Boring (initiated with Mudding Fluid)
SS	2" O.D. Split Spoon Sample – (ASTM D 1586)
SH	3" Thin-Walled Tube Sample (Shelby Tube) – (ASTM D 1587)
AU	Solid Stem Auger Sample
CA	Modified California Sample – (ASTM D 3550)
RC	Rock Core Sample – (ASTM D 2113)
HA	Hand Auger Sample
GB	Grab Bag Sample
R	SPT Refusal (N-value of 50 blows for less than 6 inches of penetration)
NMR	No Measurement Recorded
NE	Not Encountered

TEST SYMBOLS

SYMBOL	DEFINITION
MC	Moisture Content (%) – (ASTM D 2216)
LOI	Organic Content (Loss on Ignition) (%) – (ASTM D 2974)
Qp	Hand Penetrometer Reading (tsf)
Qu	Unconfined Comp. Strength (tsf) – (ASTM D 2166)
γ_d	Dry Density (pcf) – (ASTM D 7263)
γ_T	Total (Moist) Density (pcf)
LL, PL	Liquid and Plastic Limit (%) – (ASTM D 4318)
PI	Plasticity Index (%)
P200	Percent passing the #200 Sieve – (ASTM D 1140)
Ts	Hand Torvane Reading (tsf)
SG	Specific Gravity – (ASTM D854)
pH	Hydrogen Ion Content – (ASTM D4972)
RQD	Rock Quality Designation (%) – (ASTM D6032)

WATER LEVEL

Water levels shown on the boring logs are the levels measured in the borings at the time and under the conditions indicated. In some soils, it may not be possible to determine the groundwater level within the normal time required for test borings and an extended period of time may be necessary to reach equilibrium. Therefore, the position of the water level symbol may not indicate the true level of the groundwater table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the respective boring log sheet.

DESCRIPTIVE TERMINOLOGY

DENSITY TERM	SPT N-VALUE
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Over 50

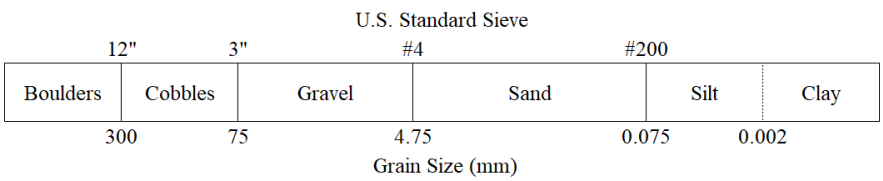
CONSISTENCY TERM	Unconfined Compressive Strength, (tsf)	SPT N-VALUE
Very Soft	<0.25	0 - 2
Soft	0.25 - 0.49	2 - 4
Medium Stiff	0.50 - 0.99	4 - 8
Stiff	1.00 - 1.99	8 - 16
Very Stiff	2.00 - 3.99	16 - 30
Hard	4.0+	Over 30

Lamination	Up to 1/2" thick horizontal stratum
Layer	1/2" thick or greater horizontal stratum
Lens	1/2" to 6" discontinuous horizontal stratum
Varved	Alternating laminations
Dry	Powdery, dusty
Moist	Damp, below saturation
Wet	Saturated, above liquid limit

Standard Penetration Test N-Value: Blows per Foot of a 140 Pound Hammer Falling 30 inches on a 2-inch OD Split Barrel Sampler

Note: If unconfined compressive strength data is not available, then N-value should be used to describe consistency term

RELATIVE SIZES



SOILS CLASSIFICATION FOR ENGINEERING PURPOSES

ASTM Designation: D 2487 - 83

(Based on Unified Soil Classification System)

SOIL ENGINEERING

			Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]		Soil Classification[B] Group Symbol	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu ≥ 4 and 1≤ Cc ≤ 3[E]		GW	Well-graded gravel[F]
			Cu < 4 and/or 1 > Cc > 3[E]		GP	Poorly-graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines Classify as ML or MH		GM	Silty gravel[F.G.]
			Fines classify as CL or CH		GC	Clayey gravel[F.G.]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean sands Less than 5% fines[D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3[E]		SW	Well-graded sand[H]
			Cu < 6 and/or 1 > Cc > 3[E]		SP	Poorly-graded sand[H]
		Sands with Fines more than 12% fines[D]	Fines Classify as ML or MH		SM	Silty sand[G.H]
			Fines classify as CL or CH		SC	Clayey sand[G.H]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	Inorganic	PI > 7 and plots on or above " A" line[I]		CL	Lean clay[J.K.L]
			PI < 4 or plots below " A " line[I]		ML	Silt[J.K.L]
		Organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[J.K.L.M] Organic Silt[J.K.L.N]
	Silts and Clays Liquid Limit 50 or more	Inorganic	PI plots on or above " A " line		CH	Fat clay[J.K.L]
			PI plots below " A " line		MH	Elastic silt[J.K.L]
		Organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[J.K.L.O] Organic Silt[J.K.L.P]
Highly organic soils			Primarily organic matter, dark in color, and organic odor		PT	Peat

[A] Based on the material passing the 3-in (75- mm) sieve

[B] If field sample contained cobbles or boulders, or both, add with cobbles and/or boulders after group name

[C] Gravels with 5 to 12 % fines require dual symbols:
GW - GM (well-graded gravel with silt)
GW - GC (well-graded gravel with clay)
GP - GM (poorly-graded gravel with silt)
GP - GC (poorly-graded gravel with clay)

[D] Sands with 5 to 12 % fines require dual symbols:
SW -SM (well-graded sand with silt)
SW - SC (well-graded sand with clay)
SP - SM (poorly-graded sand with silt)
SP - SC (poorly-graded sand with clay)

[E] $Cu = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" after group name

[G] If fines classify as CL-ML, use dual symbol GC-GM. or SC-SM

[H] If soil contains ≥ 15% gravel, add "with gravel" after group name.

[I] If Atterberg limits plot in hatched area, soil is a CL-ML (silty clay)

[J] If soil contains 15 to 29% plus No. 200, add, "with sand" or " with gravel", whichever is predominant

[K] If soil contains ≥ 30% plus No.200, and predominantly sand, add "sandy" before the group name

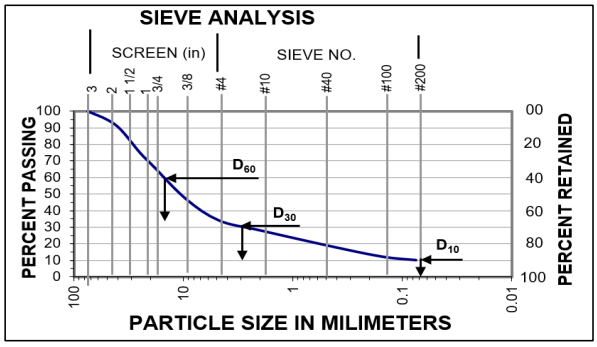
[L] If soil contains ≥ 30% plus No.200, and predominantly gravel, add "gravelly" before the group name

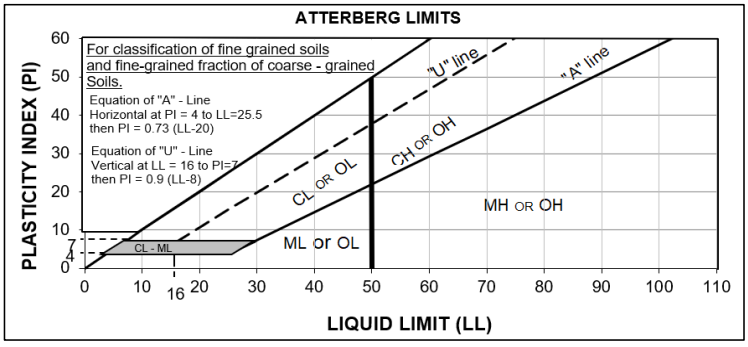
[M] PI ≥ 4 and plots on or above "A" Line

[N] PI < 4 or plots below "A" Line

[O] PI plots on or above "A" Line

[P] PI plots below "A" Line





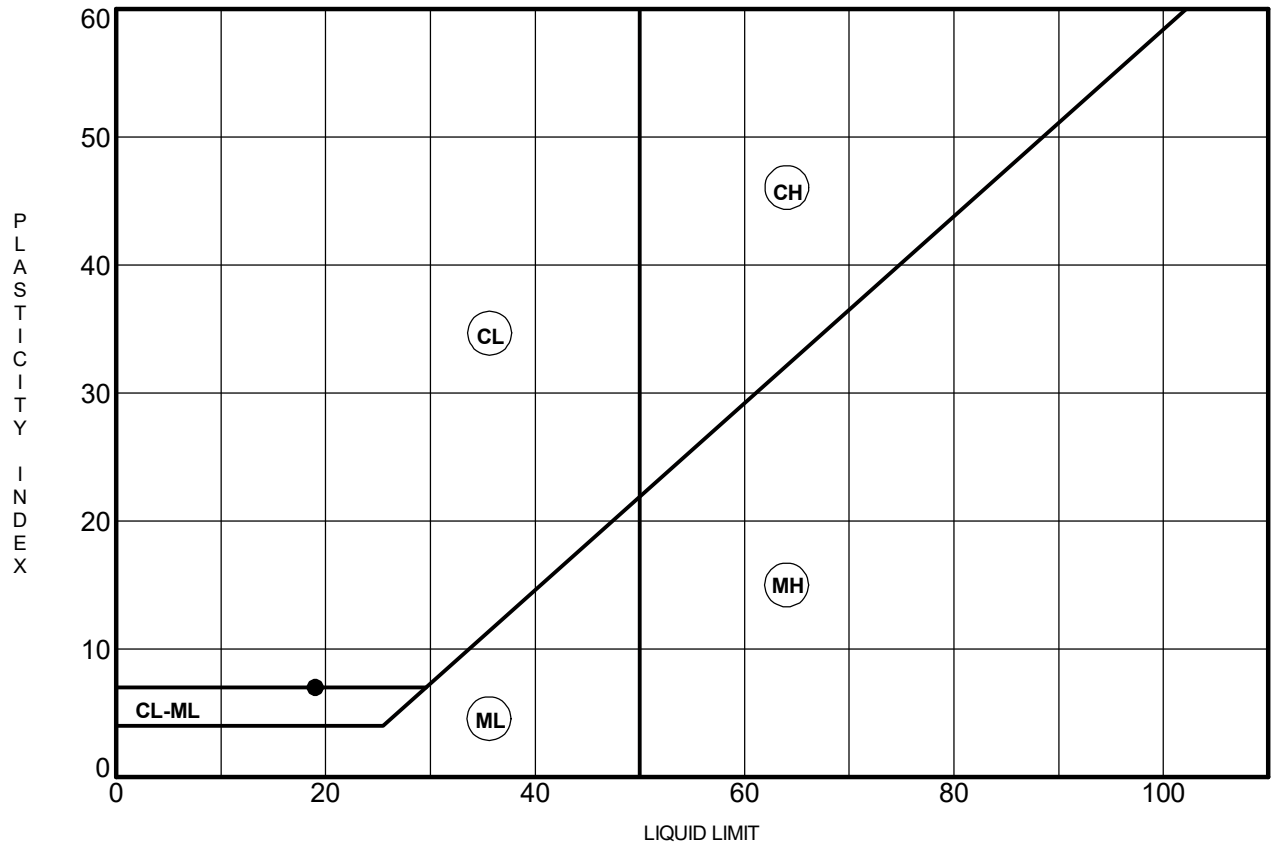
APPENDIX II

LABORATORY TEST RESULTS

GESTRA Engineering, Inc
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444, Fax: (414) 933-7844

LABORATORY TEST RESULTS
ATTERBERG LIMITS RESULTS (ASTM D4318)

Project Name: Mixed Use Development
Project Number: 21313-10
Project Location: Wauwatosa, WI



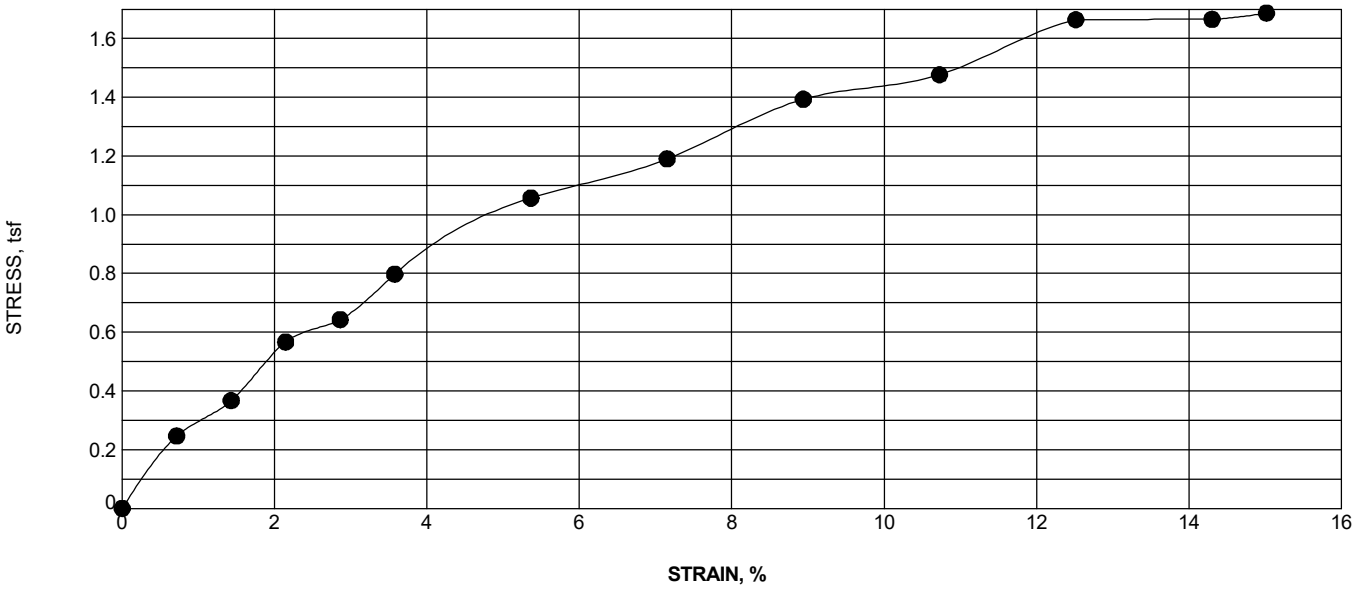
Unless otherwise noted, Atterberg limit sample was air-dried, Liquid limit was performed using mutiple points, and plastic limit test was hand rolled.

	Specimen Identification		LL	PL	PI	Fines	MC	Notes
●	**B-5, SS-2**	**2'-3.5'**	**19**	**12**	**7**		**11.5**	

GESTRA Engineering, Inc
191 W. Edgerton Avenue
Milwaukee, WI 53207
Phone: (414) 933-7444, Fax: (414) 933-7844

LABORATORY TEST RESULTS
UNCONFINED COMPRESSION TEST (ASTM D2166)

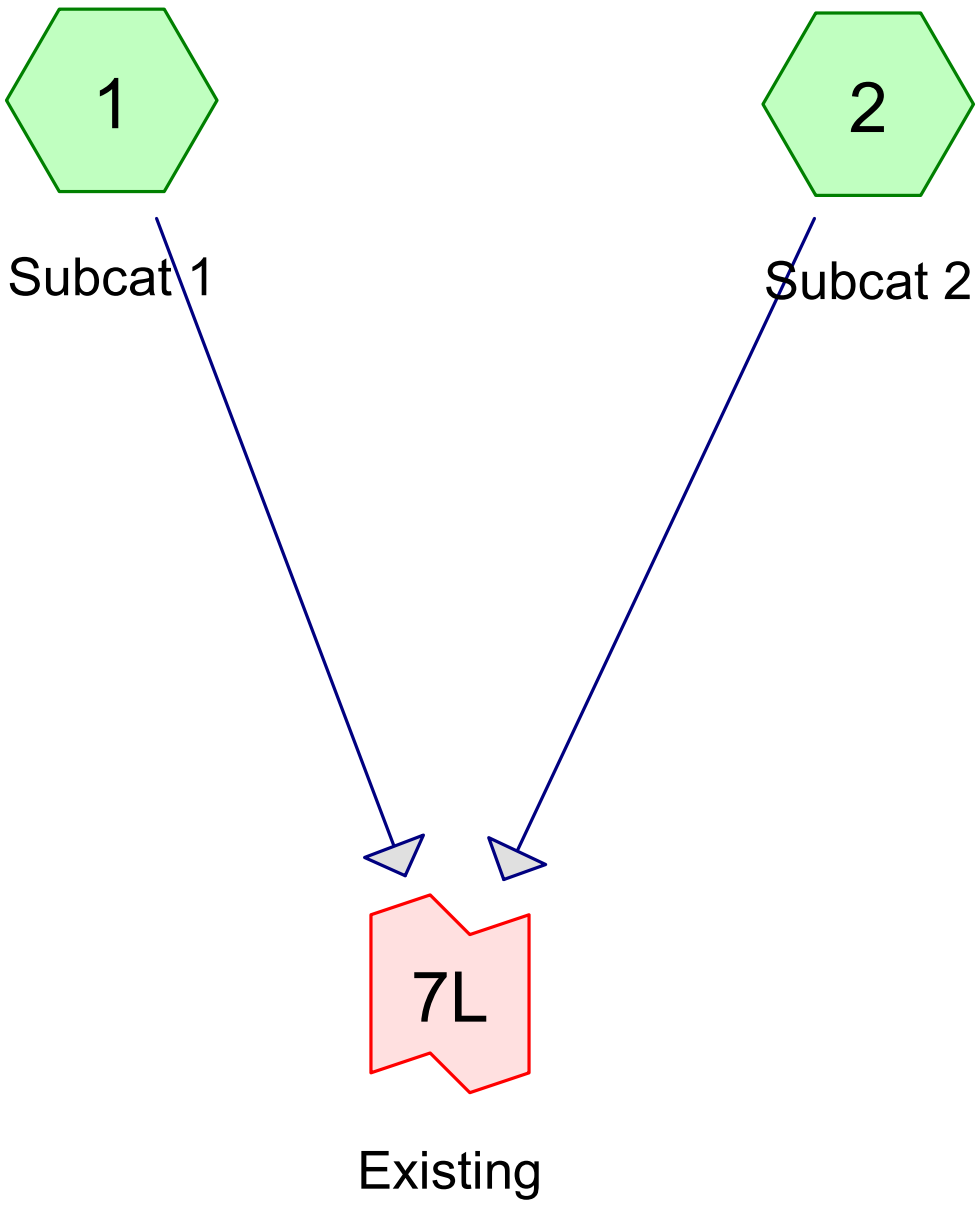
Project Name: Mixed Use Development
Project Number: 21313-10
Project Location: Wauwatosa, WI



Specimen Indentification	● B-3, SS-4		
Depth (feet)	7'-8.5'		
USCS Classification	LEAN CLAY (CL)		
Sample Height (in)	2.80		
Sample Diameter (in)	1.38		
Height:Diameter Ratio	2.03		
Q_u (tsf)	1.69		
MC (%)	11.7		
γ_d (pcf)	127.7		
γ_T (pcf)	142.6		

Appendix B

Calculations - Storm Water Quantity (HydroCAD Model)



Subcat Reach Pond Link

Routing Diagram for 25057 Existing
Prepared by The Sigma Group Inc, Printed 5/19/2026

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 9179 WI Milwaukee
Rainfall events imported from "NRCS2-Rain.txt" for 1254 WI Waukesha

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.652	78	>75% Grass cover, Good, HSG D (1, 2)
0.336	98	Roofs, HSG D (1)
1.070	98	Unconnected pavement, HSG D (1, 2)
2.058	**92**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.058	HSG D	1, 2
0.000	Other	
2.058		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.652	0.000	0.652	>75% Grass cover, Good	1, 2
0.000	0.000	0.000	0.336	0.000	0.336	Roofs	1
0.000	0.000	0.000	1.070	0.000	1.070	Unconnected pavement	1, 2
0.000	**0.000**	**0.000**	**2.058**	**0.000**	**2.058**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: Subcat 1 Runoff Area=57,461 sf 65.01% Impervious Runoff Depth>5.13"
Tc=6.0 min CN=91 Runoff=11.48 cfs 0.564 af

Subcatchment 2: Subcat 2 Runoff Area=32,170 sf 74.19% Impervious Runoff Depth>5.36"
Tc=6.0 min CN=93 Runoff=6.57 cfs 0.330 af

Link 7L: Existing after 11.75 hrs before 21.25 hrs Inflow=18.06 cfs 0.894 af
Primary=18.06 cfs 0.711 af Secondary=2.98 cfs 0.183 af

Total Runoff Area = 2.058 ac Runoff Volume = 0.894 af Average Runoff Depth = 5.21"
31.69% Pervious = 0.652 ac 68.31% Impervious = 1.406 ac

Summary for Subcatchment 1: Subcat 1

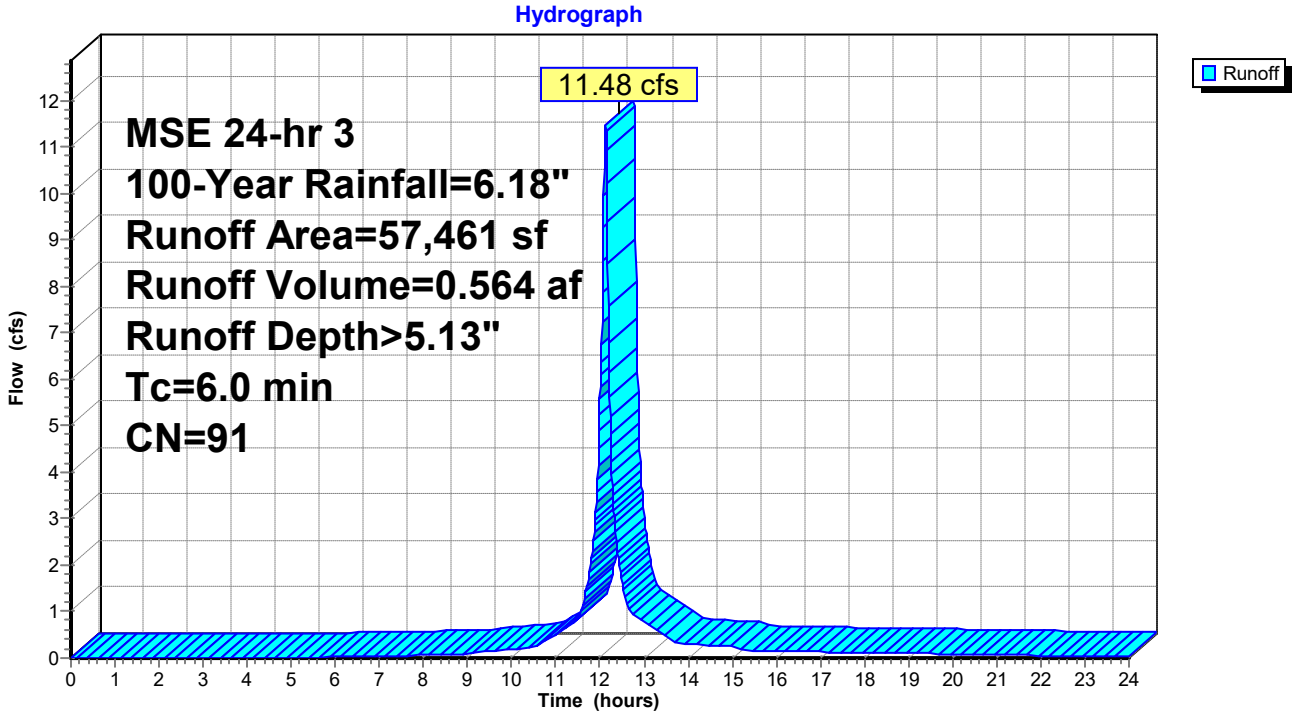
Runoff = 11.48 cfs @ 12.13 hrs, Volume= 0.564 af, Depth> 5.13"
Routed to Link 7L : Existing

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	20,104	78	>75% Grass cover, Good, HSG D
	14,633	98	Roofs, HSG D
	22,724	98	Unconnected pavement, HSG D
	57,461	91	Weighted Average
	20,104		34.99% Pervious Area
	37,357		65.01% Impervious Area
	22,724		60.83% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1: Subcat 1



Summary for Subcatchment 2: Subcat 2

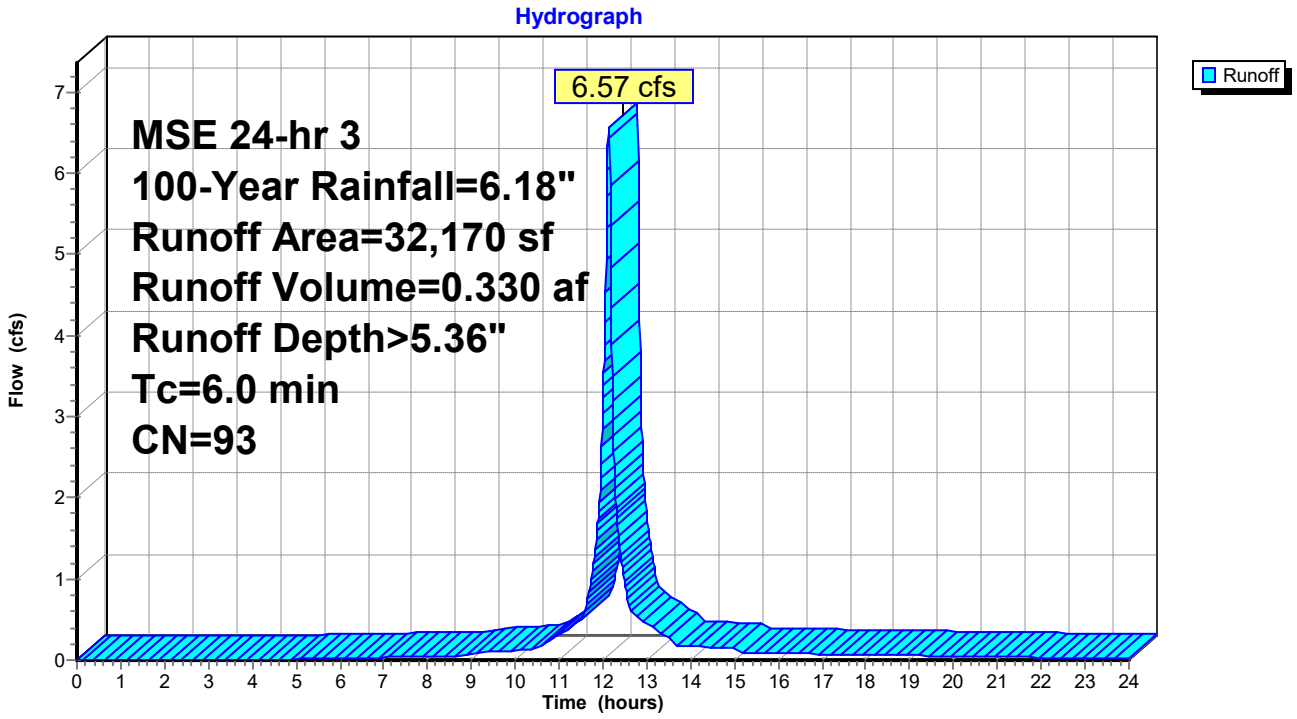
Runoff = 6.57 cfs @ 12.13 hrs, Volume= 0.330 af, Depth> 5.36"
Routed to Link 7L : Existing

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	8,303	78	>75% Grass cover, Good, HSG D
	0	98	Roofs, HSG D
	23,867	98	Unconnected pavement, HSG D
	32,170	93	Weighted Average
	8,303		25.81% Pervious Area
	23,867		74.19% Impervious Area
	23,867		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2: Subcat 2

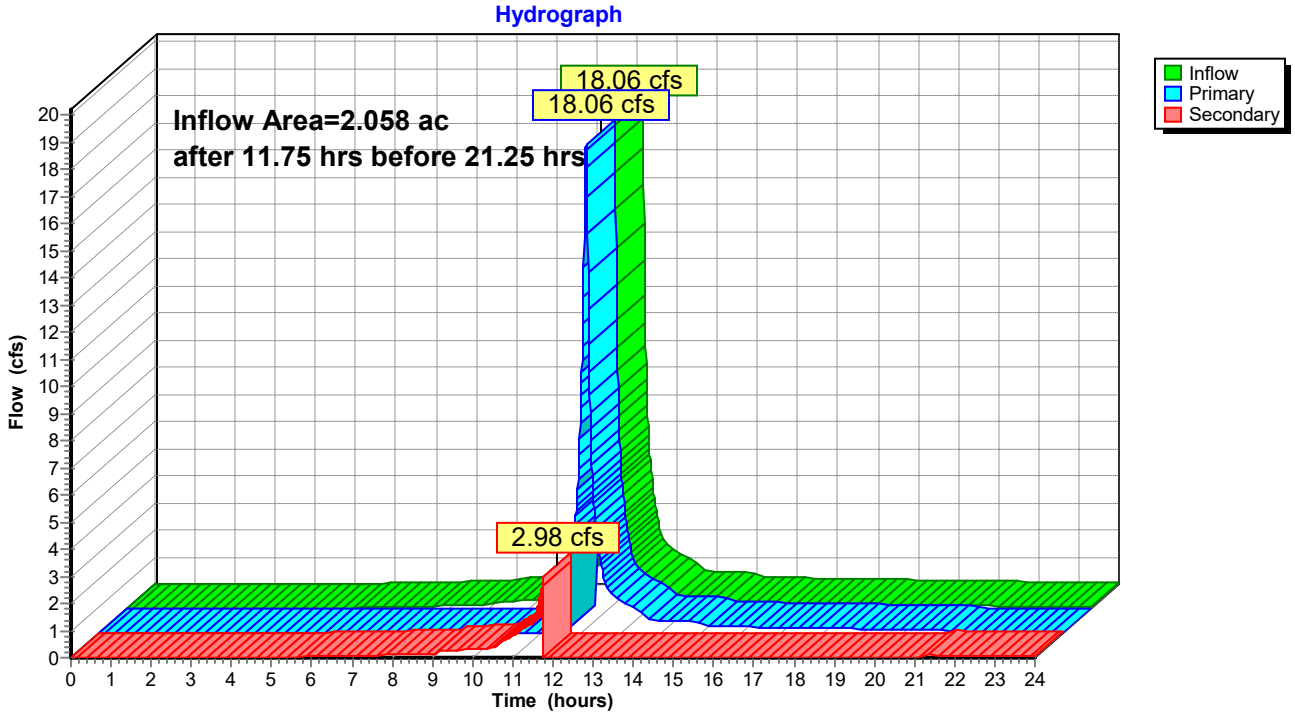


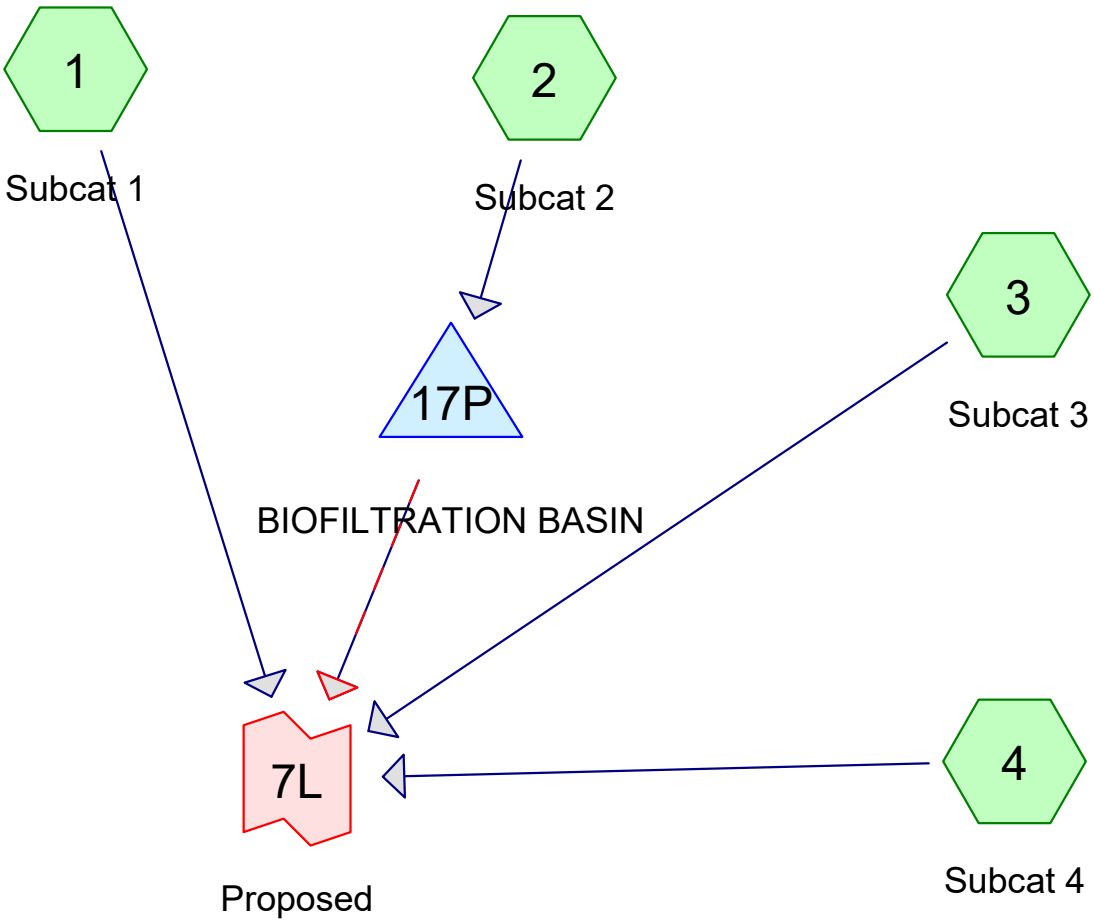
Summary for Link 7L: Existing

Inflow Area = 2.058 ac, 68.31% Impervious, Inflow Depth > 5.21" for 100-Year event
Inflow = 18.06 cfs @ 12.13 hrs, Volume= 0.894 af
Primary = 18.06 cfs @ 12.13 hrs, Volume= 0.711 af, Atten= 0%, Lag= 0.0 min
Secondary = 2.98 cfs @ 11.74 hrs, Volume= 0.183 af

Primary outflow = Inflow after 11.75 hrs before 21.25 hrs, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Existing





Subcat Reach Pond Link

Routing Diagram for 25057 Proposed
Prepared by The Sigma Group Inc, Printed 5/19/2026

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 9179 WI Milwaukee
Rainfall events imported from "NRCS2-Rain.txt" for 1227 WI Milwaukee
Rainfall events imported from "NRCS2-Rain.txt" for 1254 WI Waukesha

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.378	78	>75% Grass cover, Good, HSG D (1, 2, 4)
0.488	98	Roofs, HSG D (2, 3)
1.191	98	Unconnected pavement, HSG D (1, 3, 4)
2.058	**94**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.058	HSG D	1, 2, 3, 4
0.000	Other	
2.058		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.378	0.000	0.378	>75% Grass cover, Good	1, 2, 4
0.000	0.000	0.000	0.488	0.000	0.488	Roofs	2, 3
0.000	0.000	0.000	1.191	0.000	1.191	Unconnected pavement	1, 3, 4
0.000	**0.000**	**0.000**	**2.058**	**0.000**	**2.058**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	17P	184.22	183.93	38.4	0.0076	0.011	0.0	12.0	0.0	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: Subcat 1 Runoff Area=46,889 sf 98.42% Impervious Runoff Depth>5.94"
Tc=6.0 min CN=98 Runoff=9.93 cfs 0.533 af

Subcatchment 2: Subcat 2 Runoff Area=17,921 sf 84.75% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=95 Runoff=3.73 cfs 0.192 af

Subcatchment 3: Subcat 3 Runoff Area=11,068 sf 100.00% Impervious Runoff Depth>5.94"
Tc=6.0 min CN=98 Runoff=2.34 cfs 0.126 af

Subcatchment 4: Subcat 4 Runoff Area=13,753 sf 5.50% Impervious Runoff Depth>3.84"
Tc=6.0 min CN=79 Runoff=2.22 cfs 0.101 af

Pond 17P: BIOFILTRATION BASIN Peak Elev=188.75' Storage=2,511 cf Inflow=3.73 cfs 0.192 af
Primary=2.75 cfs 0.190 af Secondary=0.00 cfs 0.000 af Outflow=2.75 cfs 0.190 af

Link 7L: Proposed after 11.75 hrs before 21.25 hrs Inflow=16.00 cfs 0.950 af
Primary=16.00 cfs 0.735 af Secondary=2.31 cfs 0.215 af

Total Runoff Area = 2.058 ac Runoff Volume = 0.951 af Average Runoff Depth = 5.55"
18.38% Pervious = 0.378 ac 81.62% Impervious = 1.679 ac

Summary for Subcatchment 1: Subcat 1

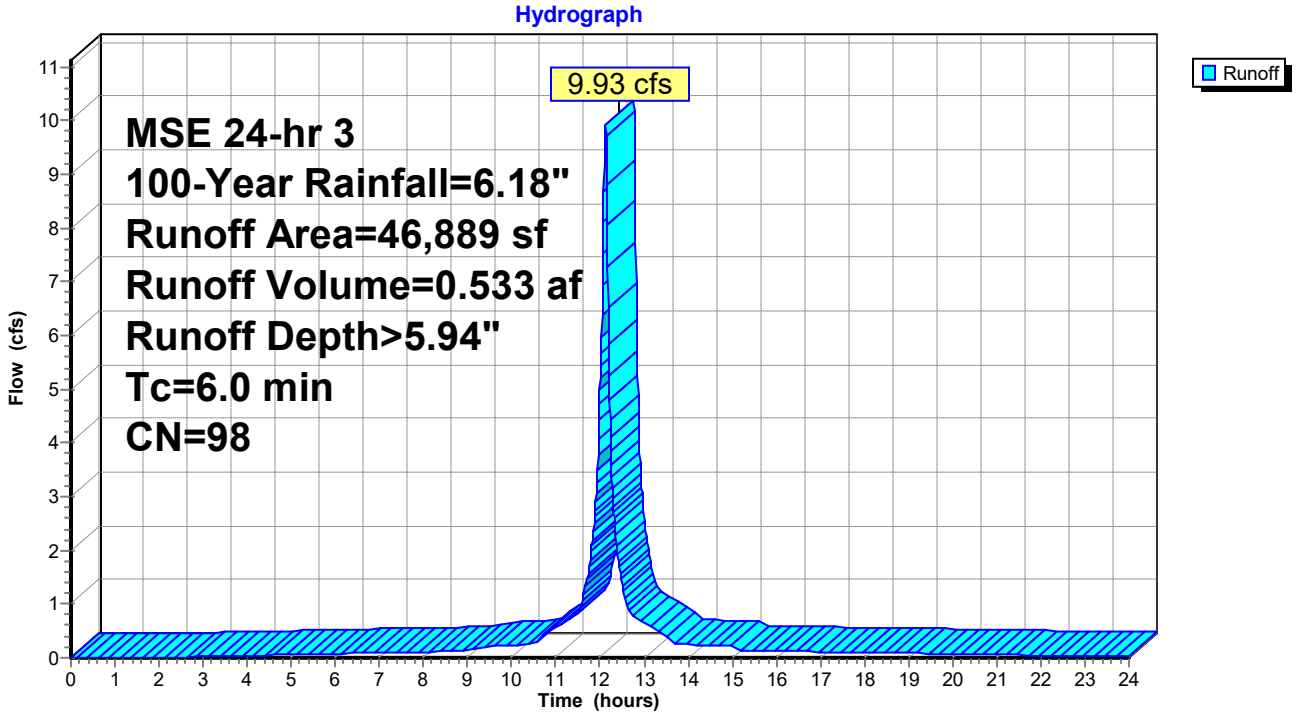
Runoff = 9.93 cfs @ 12.13 hrs, Volume= 0.533 af, Depth> 5.94"
Routed to Link 7L : Proposed

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	742	78	>75% Grass cover, Good, HSG D
	46,147	98	Unconnected pavement, HSG D
	46,889	98	Weighted Average
	742		1.58% Pervious Area
	46,147		98.42% Impervious Area
	46,147		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 1: Subcat 1



Summary for Subcatchment 2: Subcat 2

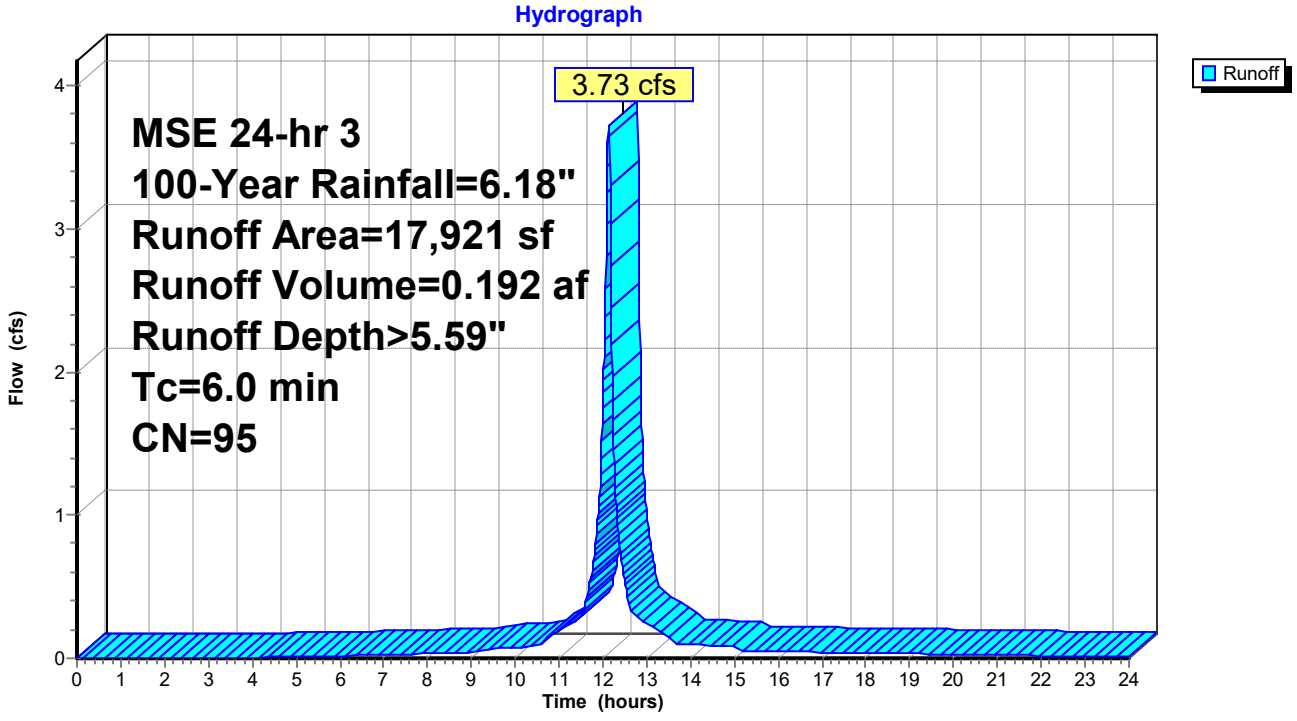
Runoff = 3.73 cfs @ 12.13 hrs, Volume= 0.192 af, Depth> 5.59"
Routed to Pond 17P : BIOFILTRATION BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	2,733	78	>75% Grass cover, Good, HSG D
	15,188	98	Roofs, HSG D
	17,921	95	Weighted Average
	2,733		15.25% Pervious Area
	15,188		84.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 2: Subcat 2



Summary for Subcatchment 3: Subcat 3

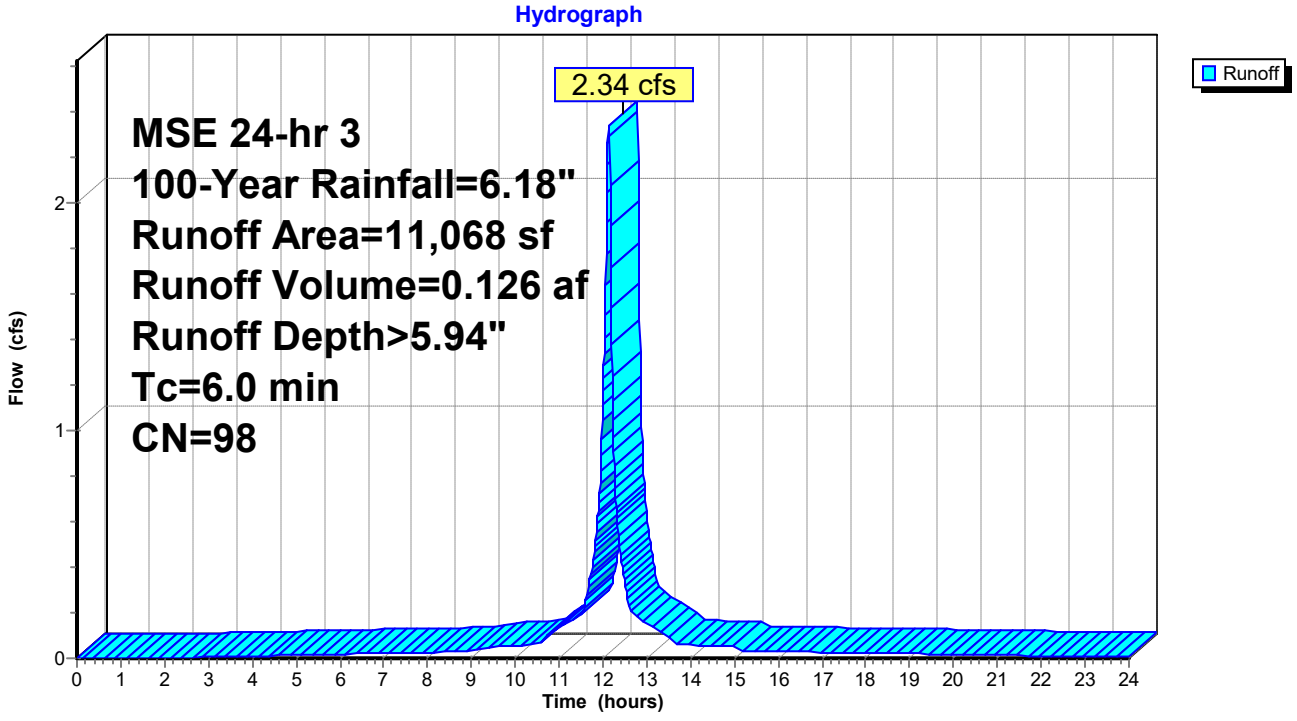
Runoff = 2.34 cfs @ 12.13 hrs, Volume= 0.126 af, Depth> 5.94"
Routed to Link 7L : Proposed

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

Area (sf)	CN	Description
6,076	98	Roofs, HSG D
4,992	98	Unconnected pavement, HSG D
11,068	98	Weighted Average
11,068		100.00% Impervious Area
4,992		45.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 3: Subcat 3



Summary for Subcatchment 4: Subcat 4

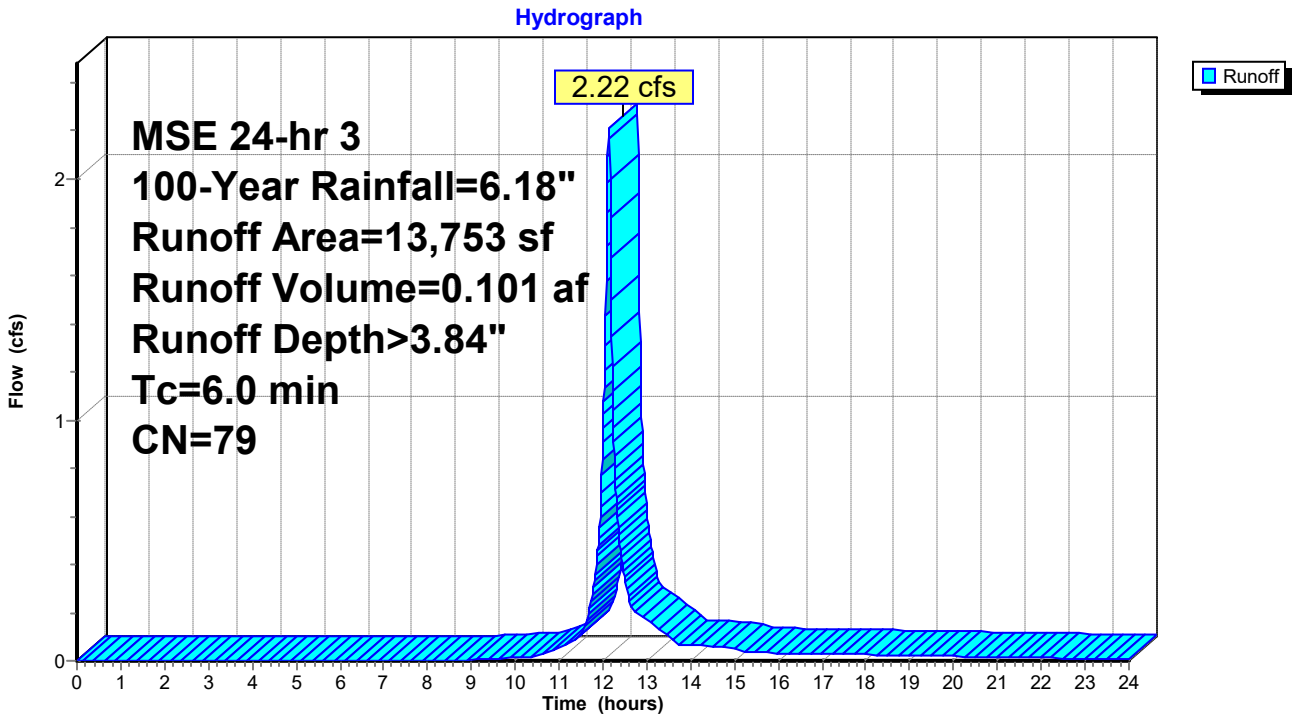
Runoff = 2.22 cfs @ 12.13 hrs, Volume= 0.101 af, Depth> 3.84"
Routed to Link 7L : Proposed

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	12,997	78	>75% Grass cover, Good, HSG D
	756	98	Unconnected pavement, HSG D
	13,753	79	Weighted Average
	12,997		94.50% Pervious Area
	756		5.50% Impervious Area
	756		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 4: Subcat 4



Summary for Pond 17P: BIOFILTRATION BASIN

Inflow Area = 0.411 ac, 84.75% Impervious, Inflow Depth > 5.59" for 100-Year event
Inflow = 3.73 cfs @ 12.13 hrs, Volume= 0.192 af
Outflow = 2.75 cfs @ 12.18 hrs, Volume= 0.190 af, Atten= 26%, Lag= 3.1 min
Primary = 2.75 cfs @ 12.18 hrs, Volume= 0.190 af
Routed to Link 7L : Proposed
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 7L : Proposed

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Peak Elev= 188.75' @ 12.18 hrs Surf.Area= 1,031 sf Storage= 2,511 cf

Plug-Flow detention time= 73.1 min calculated for 0.190 af (99% of inflow)
Center-of-Mass det. time= 69.0 min (825.7 - 756.7)

Volume	Invert	Avail.Storage	Storage Description
#1	184.21'	3,233 cf	**Custom Stage Data (Pyramidal)** Listed below (Recalc)

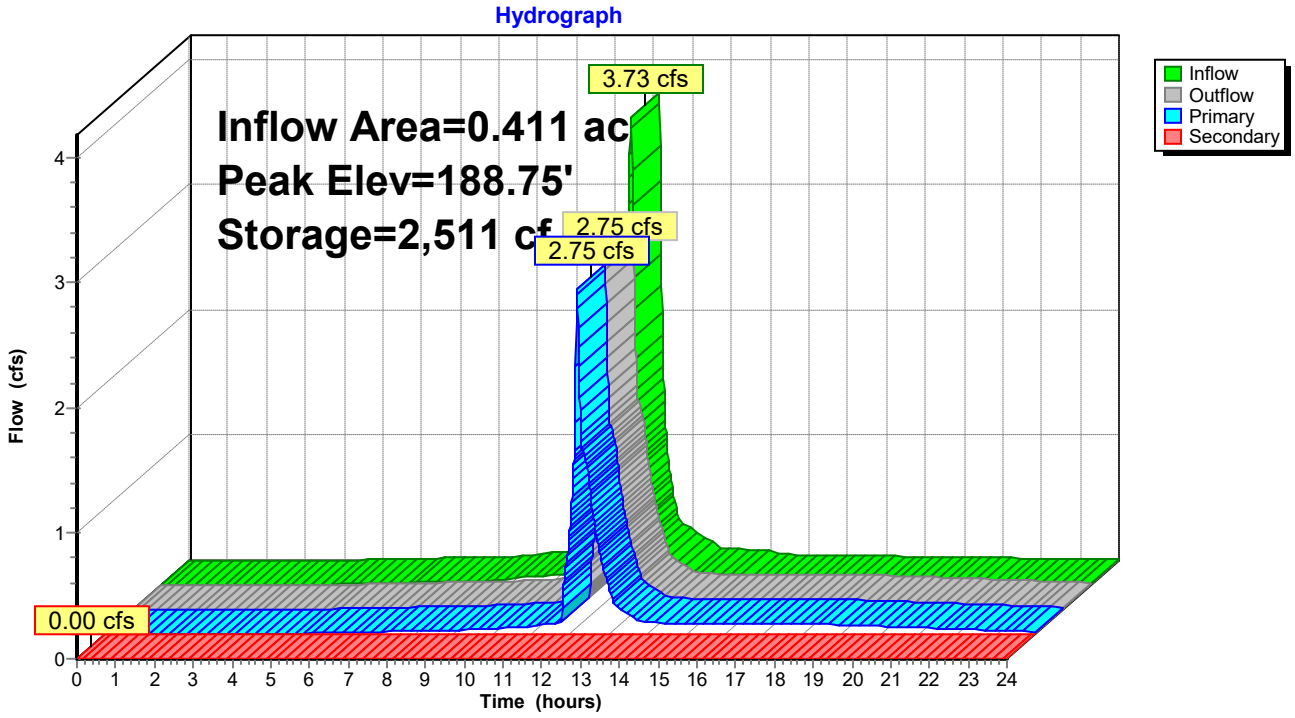
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
184.21	1,200	0.0	0	0	1,200
184.22	1,200	33.0	4	4	1,201
186.02	1,200	27.0	583	587	1,451
187.82	328	100.0	1,293	1,880	2,343
188.32	715	100.0	255	2,135	2,733
189.32	1,532	100.0	1,098	3,233	3,560

Device	Routing	Invert	Outlet Devices
#1	Primary	184.22'	**12.0" Round Culvert** L= 38.4' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.22' / 183.93' S= 0.0076 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	186.52'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#3	Device 4	184.22'	**6.0" Vert. Draintile** C= 0.600 Limited to weir flow at low heads
#4	Device 1	184.22'	**1.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	185.72'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Device 1	188.57'	**18.0" Horiz. Overflow Rim** C= 0.600 Limited to weir flow at low heads
#7	Secondary	188.82'	**10.0' long x 1.5' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.62 2.64 2.64 2.68 2.75 2.86 2.92 3.07 3.07 3.03 3.28 3.32

Primary OutFlow Max=2.74 cfs @ 12.18 hrs HW=188.75' (Free Discharge)
└─**1=Culvert** (Passes 2.74 cfs of 6.00 cfs potential flow)
  ├─**2=Sharp-Crested Rectangular Weir** (Passes 1.41 cfs of 38.77 cfs potential flow)
  │ └─**5=Orifice/Grate** (Orifice Controls 1.41 cfs @ 7.19 fps)
  ├─**4=Orifice/Grate** (Orifice Controls 0.12 cfs @ 10.18 fps)
  │ └─**3=Draintile** (Passes 0.12 cfs of 1.96 cfs potential flow)
  └─**6=Overflow Rim** (Weir Controls 1.20 cfs @ 1.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.21' (Free Discharge)
└─**7=Emergency Spillway** (Controls 0.00 cfs)

Pond 17P: BIOFILTRATION BASIN

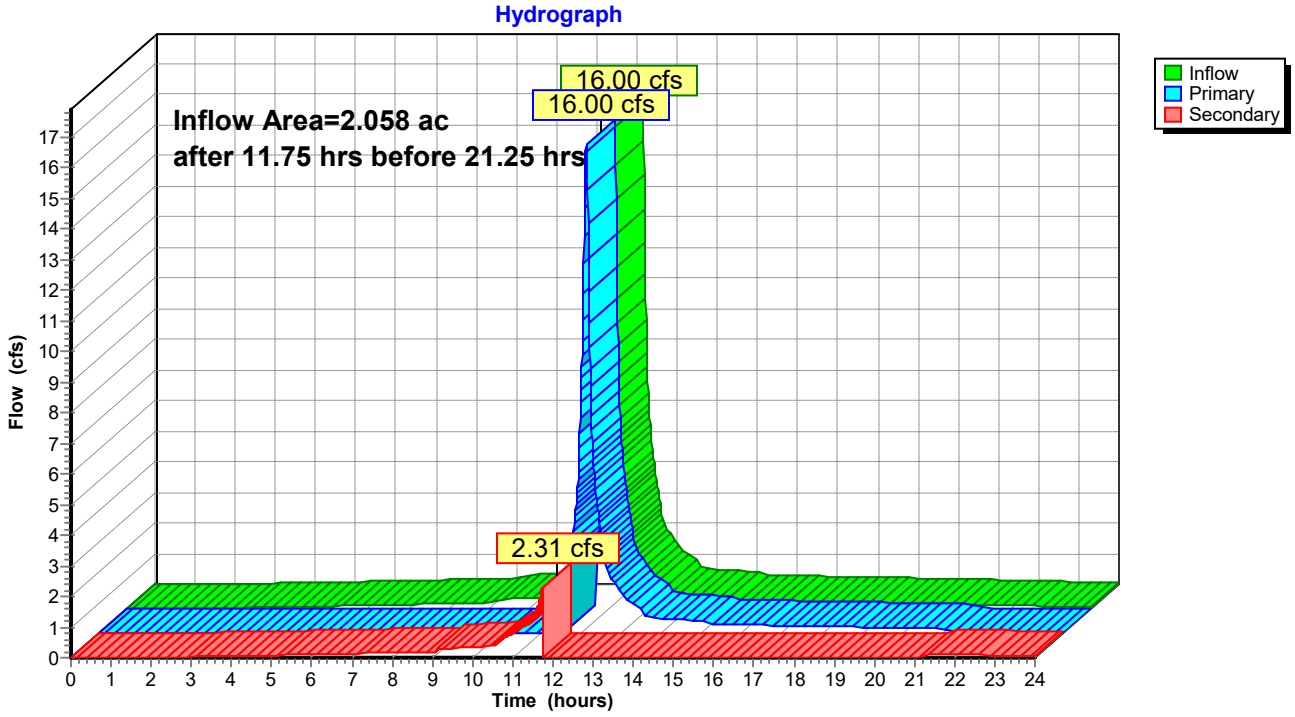


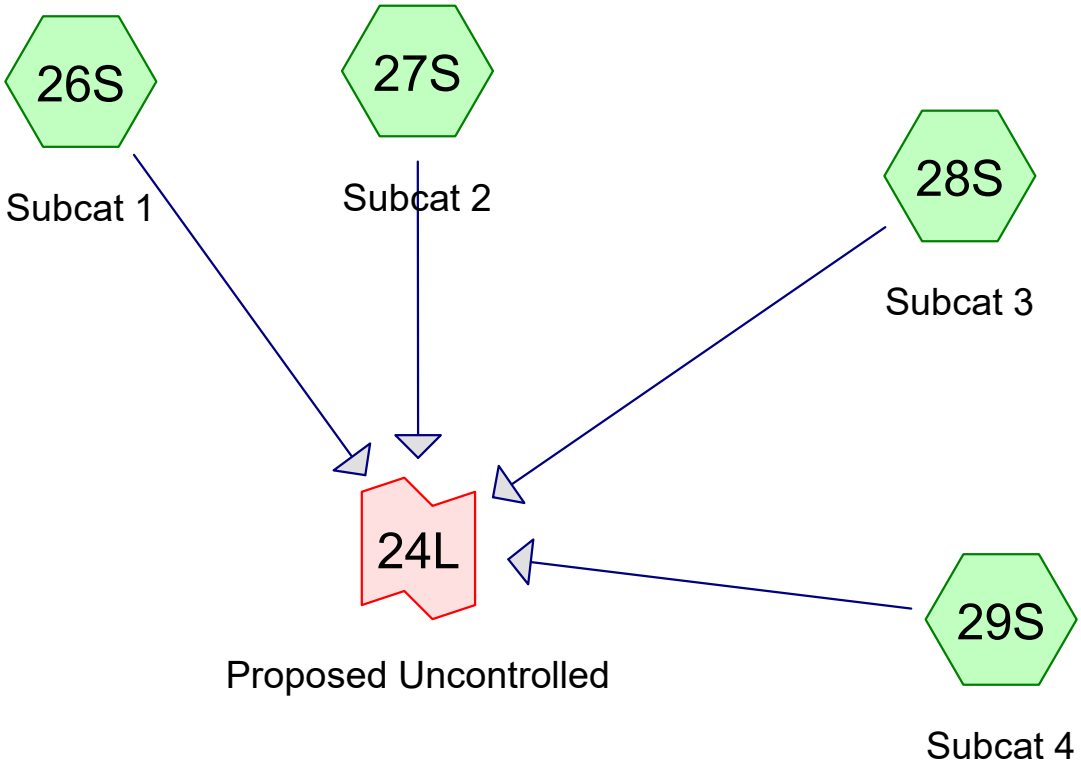
Summary for Link 7L: Proposed

Inflow Area = 2.058 ac, 81.62% Impervious, Inflow Depth > 5.54" for 100-Year event
Inflow = 16.00 cfs @ 12.14 hrs, Volume= 0.950 af
Primary = 16.00 cfs @ 12.14 hrs, Volume= 0.735 af, Atten= 0%, Lag= 0.0 min
Secondary = 2.31 cfs @ 11.74 hrs, Volume= 0.215 af

Primary outflow = Inflow after 11.75 hrs before 21.25 hrs, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 7L: Proposed





Subcat Reach Pond Link

Routing Diagram for 25057 Proposed
Prepared by The Sigma Group Inc, Printed 5/19/2026

Project Notes

Rainfall events imported from "NRCS-Rain.txt" for 9179 WI Milwaukee
Rainfall events imported from "NRCS2-Rain.txt" for 1227 WI Milwaukee
Rainfall events imported from "NRCS2-Rain.txt" for 1254 WI Waukesha

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.378	78	>75% Grass cover, Good, HSG D (26S, 27S, 29S)
0.488	98	Roofs, HSG D (27S, 28S)
1.191	98	Unconnected pavement, HSG D (26S, 28S, 29S)
2.058	**94**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
2.058	HSG D	26S, 27S, 28S, 29S
0.000	Other	
2.058		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.378	0.000	0.378	>75% Grass cover, Good	26S, 27S, 29S
0.000	0.000	0.000	0.488	0.000	0.488	Roofs	27S, 28S
0.000	0.000	0.000	1.191	0.000	1.191	Unconnected pavement	26S, 28S, 29S
0.000	**0.000**	**0.000**	**2.058**	**0.000**	**2.058**	**TOTAL AREA**	

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 26S: Subcat 1 Runoff Area=46,889 sf 98.42% Impervious Runoff Depth>5.94"
Tc=6.0 min CN=98 Runoff=9.93 cfs 0.533 af

Subcatchment 27S: Subcat 2 Runoff Area=17,921 sf 84.75% Impervious Runoff Depth>5.59"
Tc=6.0 min CN=95 Runoff=3.73 cfs 0.192 af

Subcatchment 28S: Subcat 3 Runoff Area=11,068 sf 100.00% Impervious Runoff Depth>5.94"
Tc=6.0 min CN=98 Runoff=2.34 cfs 0.126 af

Subcatchment 29S: Subcat 4 Runoff Area=13,753 sf 5.50% Impervious Runoff Depth>3.84"
Tc=6.0 min CN=79 Runoff=2.22 cfs 0.101 af

Link 24L: Proposed Uncontrolled after 11.75 hrs before 21.25 hrs Inflow=18.21 cfs 0.951 af
Primary=18.21 cfs 0.717 af Secondary=2.81 cfs 0.234 af

Total Runoff Area = 2.058 ac Runoff Volume = 0.951 af Average Runoff Depth = 5.55"
18.38% Pervious = 0.378 ac 81.62% Impervious = 1.679 ac

Summary for Subcatchment 26S: Subcat 1

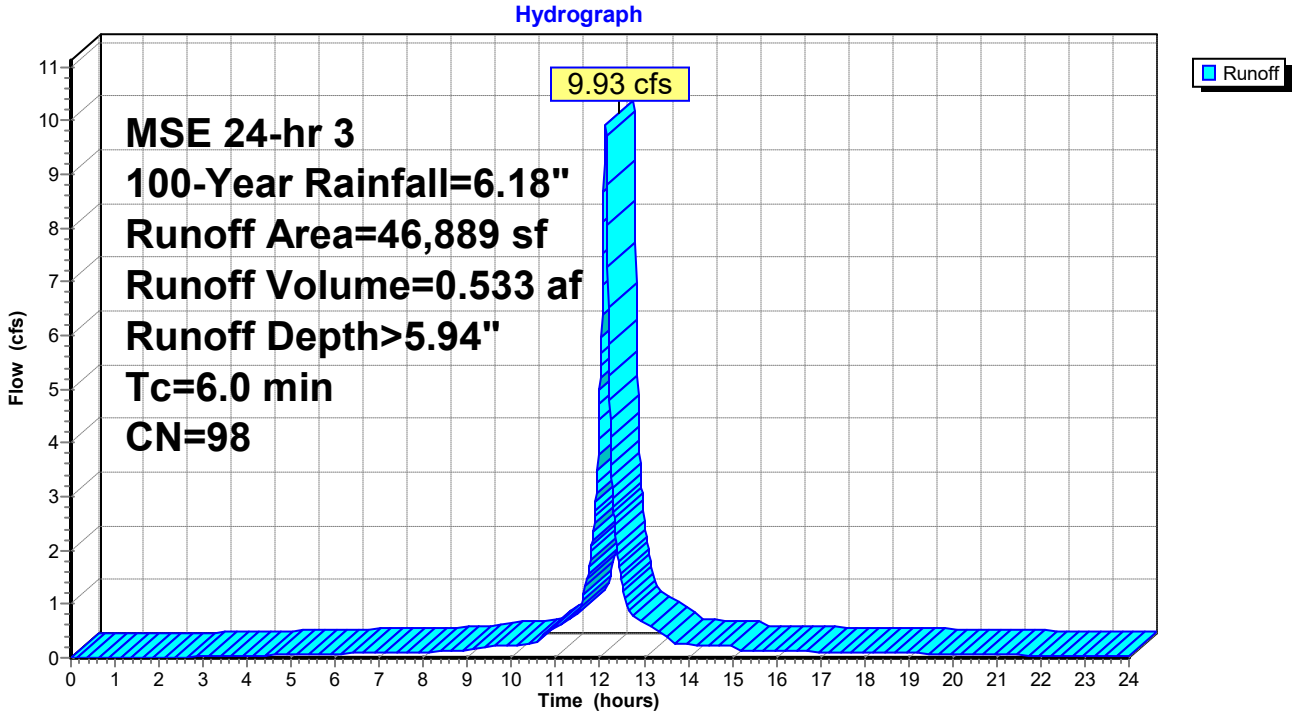
Runoff = 9.93 cfs @ 12.13 hrs, Volume= 0.533 af, Depth> 5.94"
Routed to Link 24L : Proposed Uncontrolled

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	742	78	>75% Grass cover, Good, HSG D
	46,147	98	Unconnected pavement, HSG D
	46,889	98	Weighted Average
	742		1.58% Pervious Area
	46,147		98.42% Impervious Area
	46,147		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 26S: Subcat 1



Summary for Subcatchment 27S: Subcat 2

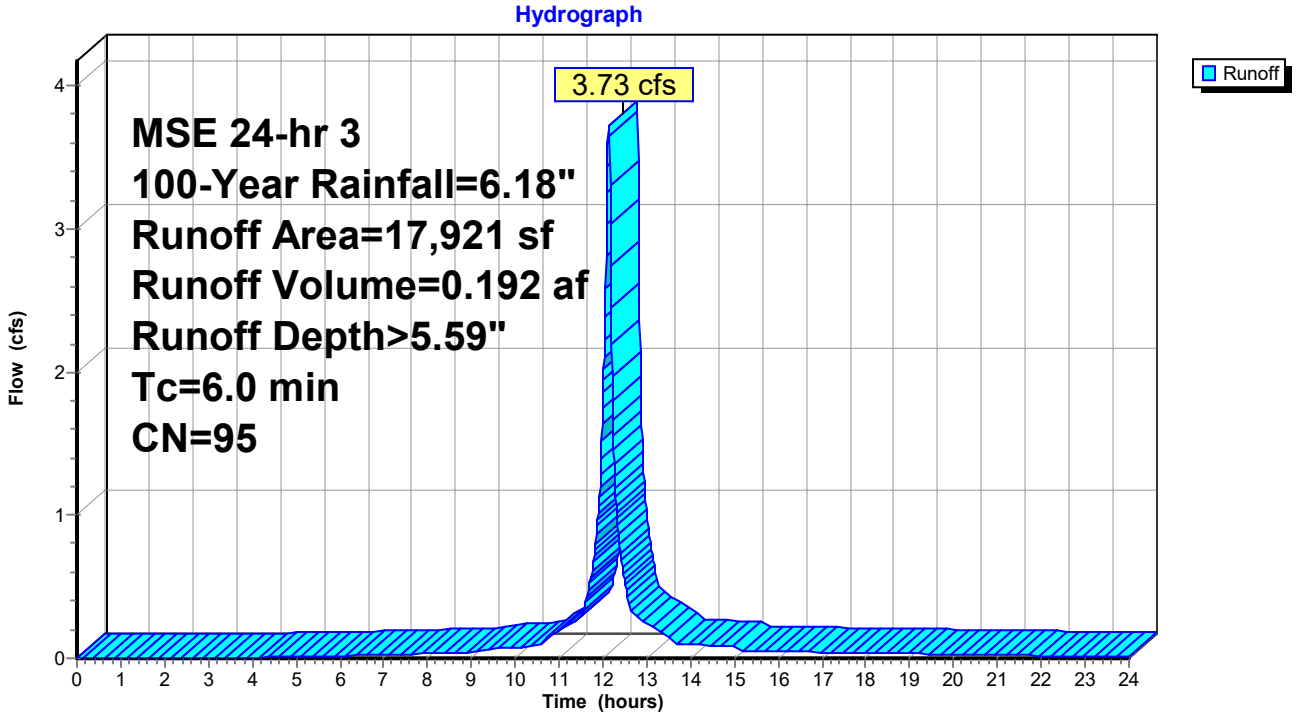
Runoff = 3.73 cfs @ 12.13 hrs, Volume= 0.192 af, Depth> 5.59"
Routed to Link 24L : Proposed Uncontrolled

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	2,733	78	>75% Grass cover, Good, HSG D
	15,188	98	Roofs, HSG D
	17,921	95	Weighted Average
	2,733		15.25% Pervious Area
	15,188		84.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 27S: Subcat 2



Summary for Subcatchment 28S: Subcat 3

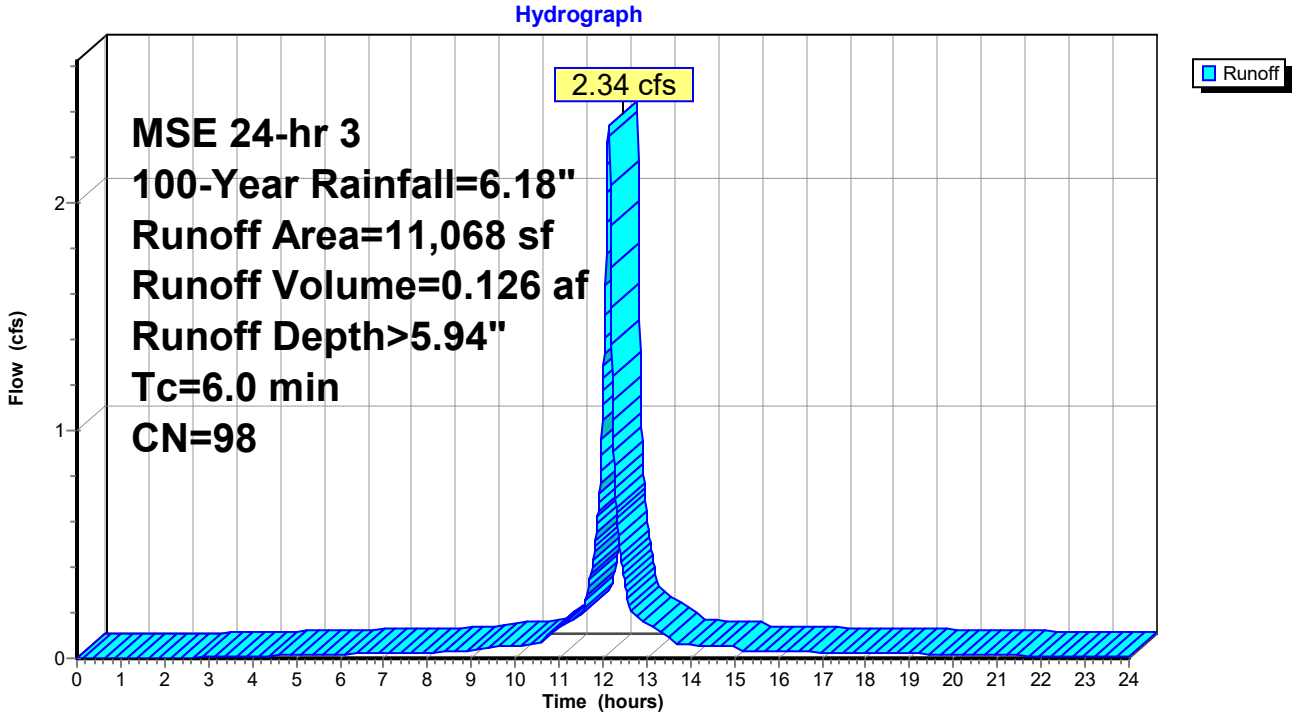
Runoff = 2.34 cfs @ 12.13 hrs, Volume= 0.126 af, Depth> 5.94"
Routed to Link 24L : Proposed Uncontrolled

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

Area (sf)	CN	Description
6,076	98	Roofs, HSG D
4,992	98	Unconnected pavement, HSG D
11,068	98	Weighted Average
11,068		100.00% Impervious Area
4,992		45.11% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 28S: Subcat 3



Summary for Subcatchment 29S: Subcat 4

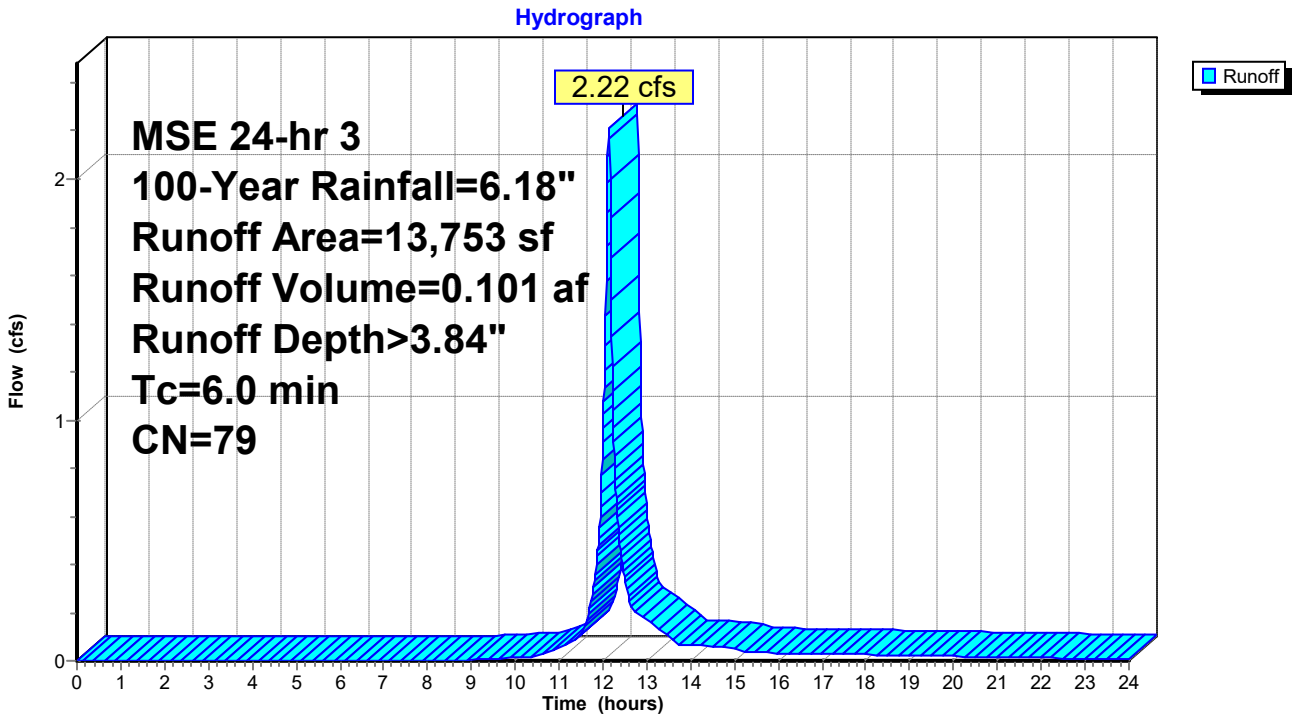
Runoff = 2.22 cfs @ 12.13 hrs, Volume= 0.101 af, Depth> 3.84"
Routed to Link 24L : Proposed Uncontrolled

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
MSE 24-hr 3 100-Year Rainfall=6.18"

	Area (sf)	CN	Description
*	12,997	78	>75% Grass cover, Good, HSG D
	756	98	Unconnected pavement, HSG D
	13,753	79	Weighted Average
	12,997		94.50% Pervious Area
	756		5.50% Impervious Area
	756		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Subcatchment 29S: Subcat 4

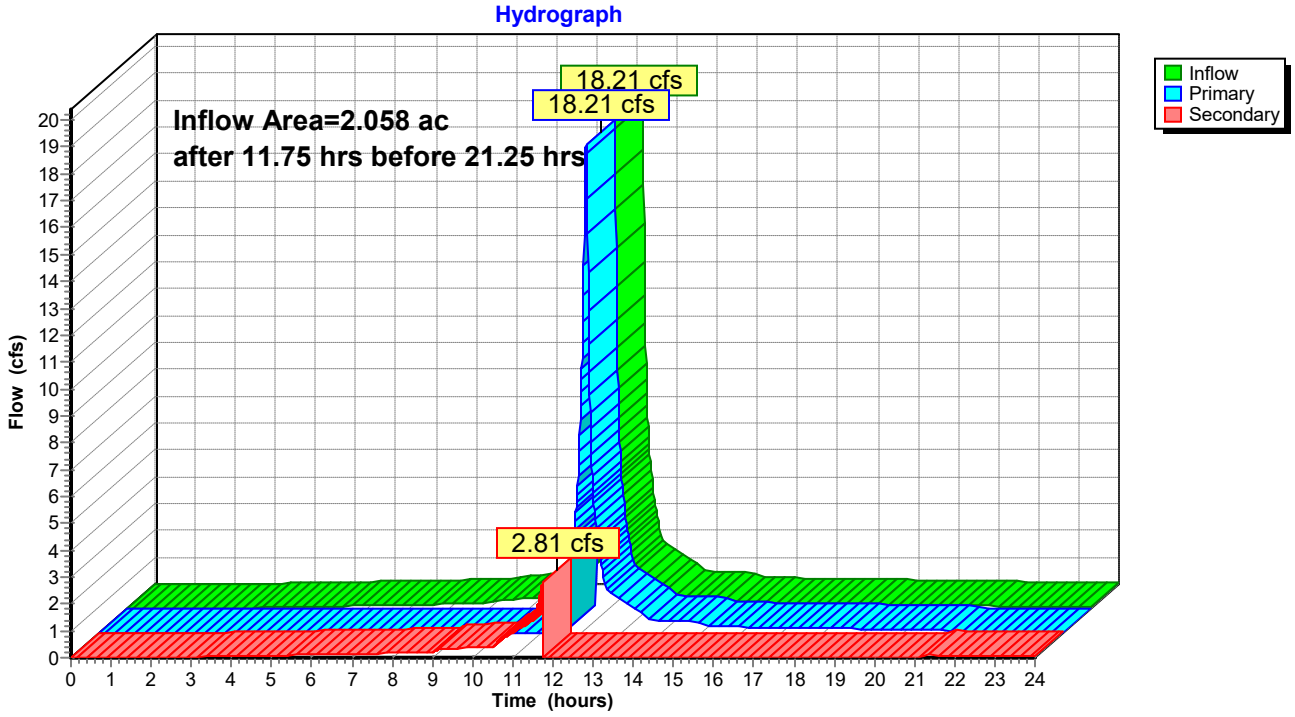


Summary for Link 24L: Proposed Uncontrolled

Inflow Area = 2.058 ac, 81.62% Impervious, Inflow Depth > 5.55" for 100-Year event
Inflow = 18.21 cfs @ 12.13 hrs, Volume= 0.951 af
Primary = 18.21 cfs @ 12.13 hrs, Volume= 0.717 af, Atten= 0%, Lag= 0.0 min
Secondary = 2.81 cfs @ 11.74 hrs, Volume= 0.234 af

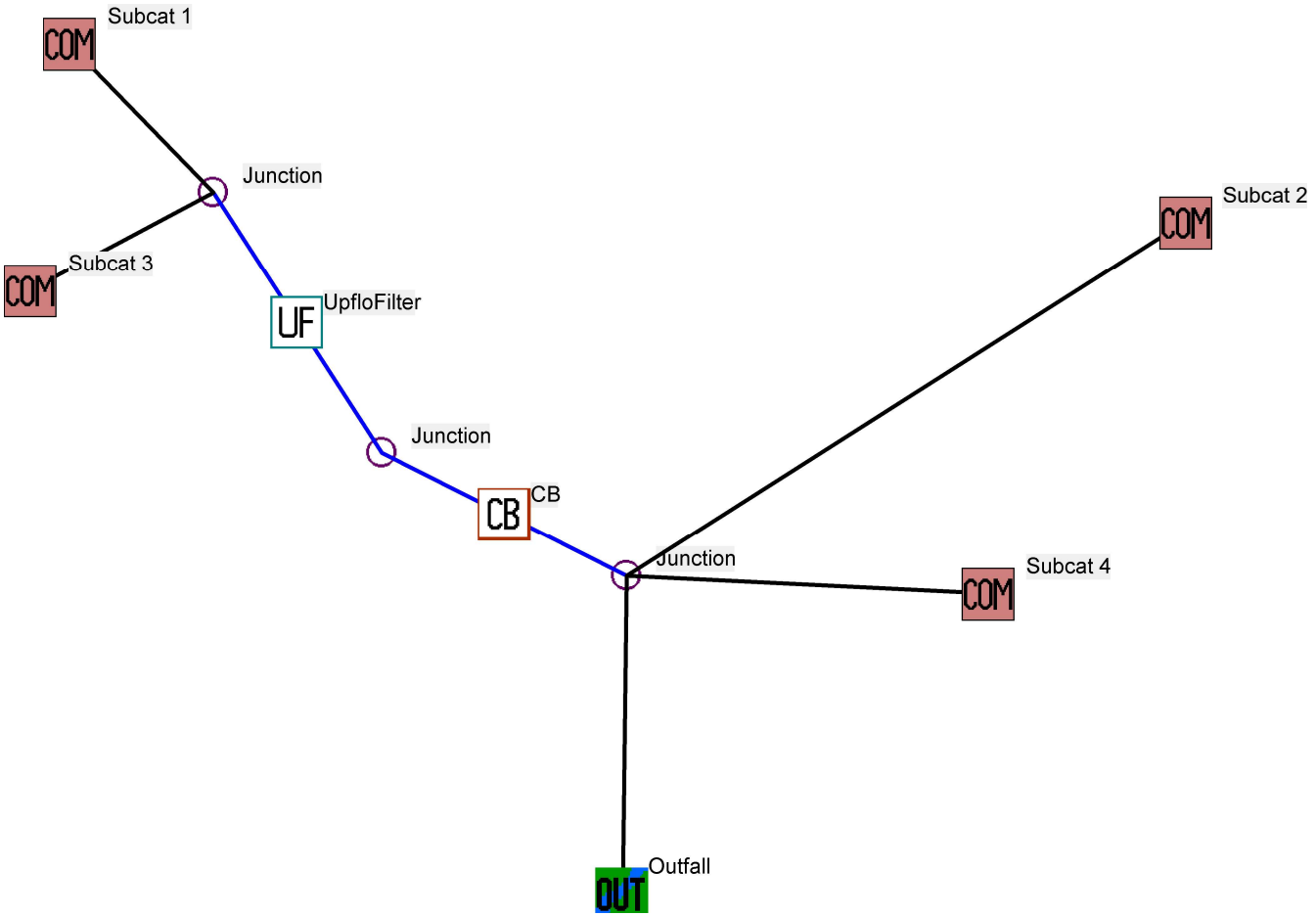
Primary outflow = Inflow after 11.75 hrs before 21.25 hrs, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Link 24L: Proposed Uncontrolled



Appendix C

Calculations - Storm Water Quality (WinSLAMM)


Subcat 1
COM
Junction
Subcat 3
COM
UF
UpfloFilter
Junction
CB
CB
Junction
Subcat 2
COM
Subcat 4
COM
Outfall
OUT

Data file name: I:\Luther Group\25057 - Wauwatosa Grocery\060 CAD\800_SWMP\040_WinSLAMM\225057 WinSLAMM.mdb
WinSLAMM Version 10.5.0
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Study period starting date: 01/05/69 Study period ending date: 12/31/69
Start of Winter Season: 12/06 End of Winter Season: 03/28
Date: 05-19-2026 Time: 20:56:40
Site information:

LU# 1 - Commercial: Subcat 1 Total area (ac): 1.076
  13 - Paved Parking 1: 1.059 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  45 - Large Landscaped Areas 1: 0.017 ac. Normal Clayey Medium/High Density No Alleys Source Area PSD File: C:\WinSLAMM Files\NURP.cpz OD-CP#2

LU# 2 - Commercial: Subcat 2 Total area (ac): 0.412
  1 - Roofs 1: 0.349 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz OD-CP#4
  45 - Large Landscaped Areas 1: 0.063 ac. Normal Clayey Medium/High Density No Alleys Source Area PSD File: C:\WinSLAMM Files\NURP.cpz OD-CP#3

LU# 3 - Commercial: Subcat 3 Total area (ac): 0.254
  1 - Roofs 1: 0.139 ac. Pitched Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
  13 - Paved Parking 1: 0.115 ac. Connected Source Area PSD File: C:\WinSLAMM Files\NURP.cpz

LU# 4 - Commercial: Subcat 4   Total area (ac): 0.315
     13 - Paved Parking 1: 0.017 ac.   Connected   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz
     45 - Large Landscaped Areas 1: 0.298 ac.   Normal Clayey   Medium/High Density   No Alleys   Source Area PSD File: C:\WinSLAMM Files\NURP.cpz   OD-CP#6

Control Practice 1: Catchbasin Cleaning CP# 1 (DS) - CB
1. Fraction of area served by catchbasins = 1.00
2. Number of catchbasins = 2
3. Average sump depth below catchbasin outlet invert (feet) = 2
4. Depth of sediment in catchbasin sump at beginning of study period (ft) = 0
5. Typical outlet pipe diameter (ft) = 1
6. Typical outlet pipe Mannings n = 0.013
7. Typical outlet pipe slope (ft/ft) = 0.004
8. Typical catchbasin sump surface area (square feet) = 12.6
9. Total catchbasin depth (feet) = 8.7
10. Inflow hydrograph peak to average flow ratio = 3.8
11. Leakage rate through sump bottom (in/hr) = 0
12. Catchbasin Critical Particle Size File Name: Not needed - calculated by program

Control Practice 2: Other Device CP# 1 (SA) - SA Device, LU# 1 ,SA# 45
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 0.00
Runoff volume reduction fraction = 0

Control Practice 3: Other Device CP# 2 (SA) - SA Device, LU# 2 ,SA# 45
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 0.00
Runoff volume reduction fraction = 0

Control Practice 4: Other Device CP# 3 (SA) - SA Device, LU# 2 ,SA# 1
Fraction of drainage area served by device (ac) = 1.00
Particulate Concentration reduction fraction = 1.00
Filterable Concentration reduction fraction = 0.00

```
   Runoff volume reduction fraction = 0

Control Practice 5:  Upflo Filter CP# 1 (DS) - UpfloFilter
   Media Type:  CPZ
   Fraction of Area Served by Upflo Filters (0-1):  1.0
   Height from Outlet Invert to Structure Top (ft):  4.0
   Sump Depth (ft):  3.00
   Sump Cleaning/Filter Replacement is not considered during the model run
   Solve for Given Conditions
   Number of filters:  6
Control Practice 6:  Other Device CP# 4 (SA) - SA Device, LU# 4 ,SA# 45
   Fraction of drainage area served by device (ac) = 1.00
   Particulate Concentration reduction fraction = 1.00
   Filterable Concentration reduction fraction = 0.00
   Runoff volume reduction fraction = 0
```

SLAMM for Windows Version 10.5.0

Data file name: I:\Luther Group\25057 - Wauwatosa Grocery\060 CAD\800_SWMP\040_WinSLAMM\225057 WinSLAMM.mdb
Data file description:
Rain file name: C:\WinSLAMM Files\Rain Files\WisReg - Milwaukee WI 1969.RAN
Particulate Solids Concentration file name: C:\WinSLAMM Files\v10.1 WI_AVG01.pscx
Runoff Coefficient file name: C:\WinSLAMM Files\WI_SL06 Dec06.rsvx
Pollutant Relative Concentration file name: C:\WinSLAMM Files\WI_GEO03.ppdx
Residential Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Institutional Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Commercial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Industrial Street Delivery file name: C:\WinSLAMM Files\WI_Com Inst Indust Dec06.std
Other Urban Street Delivery file name: C:\WinSLAMM Files\WI_Res and Other Urban Dec06.std
Freeway Street Delivery file name: C:\WinSLAMM Files\Freeway Dec06.std
Apply Street Delivery Files to Adjust the After Event Load Street Dirt Mass Balance: False
Source Area PSD and Peak to Average Flow Ratio File: C:\WinSLAMM Files\NURP Source Area PSD Files.csv
Cost Data file name:
Seed for random number generator: -42
Start of Winter Season: 12/06 End of Winter Season: 03/28
Model Run Start Date: 01/05/69 Model Run End Date: 12/31/69
Date of run: 05-19-2026 Time of run: 16:55:12
Total Area Modeled (acres): 2.057
Years in Model Run: 0.99

	Runoff Volume (cu ft)	Percent Runoff Volume Reduction	Particulate Solids Conc. (mg/L)	Particulate Solids Yield (lbs)	Percent Particulate Solids Reduction
Total of all Land Uses without Controls:	141620	-	99.57	880.3	-
Outfall Total with Controls:	141736	-0.08%	35.24	311.8	64.58%
Annualized Total After Outfall Controls:	143704			316.2	

Appendix D

Storm Sizing

2026.05.19

W NORTH AVENUE

N WAUWATOSA AVENUE

WATSON AVENUE

PROPERTY TAX KEY: 3441001000

CB 1.0
GRASS:374 SF
PVMT:28661 SF
TOTAL:29009 SF

CB 1.2
GRASS:409 SF
PVMT:11758 SF
TOTAL:12167 SF

CB 1.3
ROOF:5012 SF
PVMT:4161 SF
TOTAL:9173 SF

CB 1.4
PVMT:2020 SF
TOTAL:2020 SF

CB 1.1
PVMT:6064 SF
TOTAL:6064 SF

TRENCH DRAIN
PVMT:1900 SF
TOTAL:1900 SF

STORM TRENCH DRAIN
RIM:185.31
6" S INV:182.80

50.0 L.F. of 6" STORM @ 0.70%

STORM CB 1.2
RIM:187.93
10" E INV:182.44
6" N INV:182.45
12" S INV:182.34

194.5 L.F. of 10" STORM @ 1.00%

STORM CB 1.3
RIM:189.28
6" S INV:184.49
6" NW INV:184.39

STORM CB 1.4
RIM:189.63
6" S INV:185.61

112.1 L.F. of 6" STORM @ 1.00%

155.5 L.F. of 12" STORM @ 1.02%

STORM CB 1.1
RIM:186.11
12" N INV:180.76
12" W INV:180.66

123.7 L.F. of 12" STORM @ 1.42%

STORM CB 1.0
RIM:182.92
12" E INV:178.90
12" SW INV:178.60

78.7 L.F. of 12" STORM @ 3.26%

STORM CONNECT TO EX CB
RIM:177.38
12" NE INV:176.31

(12) WEPCO easement Doc 6618921 (Matched)

(11) 8' WEPCO easement Doc 1829[illegible]

(13) 20'x55' Wis Bell easement Doc 7977178

STORM MAP

THE SIGMA GROUP
Single Source. Sound Solutions.
www.thesigmagroup.com
1300 West Canal Street
Milwaukee, WI 53233
Phone: 414-643-4200
Fax: 414-643-4210

GRAPHIC SCALE
0 20 40

7501 W. NORTH AVENUE
WAUWATOSA, WI

WAUWATOSA GROCERY

PRELIMINARY NOT FOR CONSTRUCTION

NO.	REVISION	DATE	BY

PROJECT NO:	25057
DESIGN DATE:	----
PLOT DATE:	2026.05.19
DRAWN BY:	JMJ
CHECKED BY:	PJI
APPROVED BY:	----
SHEET NO:	EXHIBIT

AKUSKE
EXHIBIT
25057

I:\Luther Group\25057 - Wauwatosa Grocery\060 CAD\100_Civil\020_CAD Modeling (Data Shortcut)\EXHIBIT STORM MAP.dwg

STORM SEWER CALCULATIONS

PROJECT: Tosa Grocery
LOCATION: Wauwatosa
DATE: 5/18/2026

RUN		LENGTH	INVERT	INVERT	SLOPE	REQ'S MIN. SLOPE PER DSPS 382.36	AREA (S.F.)			PEAK FLOW (GPM) PER DSPS 382.36			RUN FLOW	TOTAL FLOW	SIZE	PIPE MATERIAL
FROM	TO	(FT)	DOWN	UP	%	%	ROOF	PAVE/GRAVEL	LAWN	ROOF	PAVE/GRAVEL	LAWN	(GPM)	(GPM)	(IN)	
OCS	EX MH 1	38.40	183.93	184.22	0.76	0.26							480	480	12	PVC
													FROM HYDROCAD			
CB 1.4	CB 1.3	112.10	184.49	185.61	1.00	0.26		2020		0	62	0	62	62	6	PVC
CB 1.3	CB 1.2	194.20	182.44	184.38	1.00	0.26	5012	4161		193	128	0	321	383	10	PVC
TRENCH DRAIN	CB 1.2	50.00	182.45	182.80	0.70	0.26		1900		0	58	0	58	58	6	PVC
CB 1.2	CB 1.1	155.50	180.76	182.35	1.02	0.26		11758	409	0	362	4	366	807	12	PVC
CB 1.1	CB 1.0	123.70	178.90	180.66	1.42	0.26		6064		0	187	0	187	994	12	PVC
CB 1.0	EX CB	76.70	176.31	178.80	3.25	0.26		28661	374	0	882	4	885	1879	12	PVC

Appendix E

Green Infrastructure

Green Infrastructure Detention Volume Calculations

[1] New and Redeveloped Impervious Area

Land Type	Area *acres*	Area *sq.ft.*
Building	0.49	21262
Greenspace	0.38	16472
Impervious	1.19	51899
	2.058	89633

SWMP Total	2.058	89633
New and redeveloped impervious area	1.680	73161
New pervious area	0.378	16472

((0.5/12)*(73161))*7.48052

[2]	**Required Detention Volume**	**22803 gallons**

[3] Green Infrastructure Unit Detention Volume

Green Infrastructure	Unit Detention Volume
Bioswale	7.5 gal. per sq.ft.
Cistern	Capacity of cistern
Constructed wetlands	8.3 gal. per sq.ft.
Green roof	1 gal. per sq.ft.
Native landscaping	0.4 gal. per sq.ft.
Porous pavement	3 gal. per sq.ft.
Rain garden	4.4 gal. per sq.ft.
Rain barrel	Capacity of barrel
Tree	25 gal. per tree

per MMSD's Chapter 13: Surface Water and Stormwater

[4] Proposed Green Infrastructure

Proposed Green Infrastructure	Area	
Volume Invert Avail.Storage Storage Description #1 184.21' 3,233 cf **Custom Stage Data (Pyramidal)** Listed below (Recalc)		
Total Green Infrasture Area	**24185**	**gallons**

[5]	**Proposed Detention Volume**	**24185 gallons**
	Required Detention Volume	**22803 gallons**

[6]	**Does it meet requirements?**	**Yes**

Comments

Actual volume detained at the 100 year storm based on HydroCAD modeling:

GI	Storage (cf)	Storage (gal)
Biofiltration Basin 1	3233	24185
Total		24185

Per HydroCAD modeling

Appendix F

Stormwater Management Maintenance

Document Number

Storm Water Management Practice Maintenance Agreement

Luther Group, as "Titleholder(s)" of the property described below, in accordance with the City of Wauwatosa's Municipal Code Chapter 24.13.040 Storm Water Management and Erosion Control, agrees to install and maintain storm water management practice(s) on the subject property in accordance with approved plans and Storm Water Management Plan conditions. The Titleholder(s) further agrees to the terms stated in this document to ensure that the storm water management practice(s) continues serving the intended functions in perpetuity. This Agreement includes the following exhibits:

Exhibit A: Legal Description of the real estate for which this Agreement applies ("Property").
Exhibit B: Location Map(s) – shows an accurate location of each storm water management practice affected by this Agreement.
Exhibit C: Maintenance Plan – prescribes those activities that must be carried out to maintain compliance with this Agreement.

Note: After construction verification has been accepted by the City of Wauwatosa for all planned storm water management practices, an addendum(s) to this agreement shall be recorded by the Titleholder(s) showing design and construction details. The addendum(s) may contain several additional exhibits, including certification by City of Wauwatosa of Storm Water Permit termination, as described below.

Name and Return Address

City of Wauwatosa
7725 W North Ave
Wauwatosa, WI 53213

Parcel Number(s)

Through this Agreement, the Titleholder(s) hereby subjects the Property to the following covenants, conditions and restrictions:

1. The Titleholder(s) shall be responsible for the routine and extraordinary maintenance and repair of the storm water management practice(s) and drainage easements identified in Exhibit B until Storm Water Permit termination by the Wisconsin Department of Natural Resources and by the City of Wauwatosa pursuant to the City's Municipal Code Chapter 24.13.040, Stormwater Management and Erosion Control Ordinance.
2. After Storm Water Permit termination under 1., the current Titleholder(s) shall be solely responsible for maintenance and repair of the storm water management practices and drainage easements in accordance with the maintenance plan contained in Exhibit C.
3. The City of Wauwatosa, or its designee, upon 48 hours prior to written notice to Titleholder, is authorized to access the property as necessary to conduct inspections of the storm water management practices or drainage easements to ascertain compliance with this Agreement and the activities prescribed in Exhibit C. Upon written notification by City of Wauwatosa or their designee, the Titleholder(s) shall, at their own cost and within a reasonable time period determined by the City of Wauwatosa and specified in the notification, have an inspection of the storm sewer management practice conducted by a qualified professional, file a report with the City of Wauwatosa and complete any maintenance or repair work recommended in the report. The Titleholder(s) shall ne liable for the failure to undertake any maintenance or repairs.
4. Upon notification by the City of Wauwatosa of required maintenance or repairs, the Titleholder(s) shall complete the specified maintenance or repairs within a reasonable time frame determined by the City of Wauwatosa and specified in the notification.
5. If the Titleholder(s) do not complete an inspection under 3. above or required maintenance or repairs under 4 above within the specified time period, the City of Wauwatosa is authorized, but not required, to perform the specified inspections, maintenance or repairs. In the case of an emergency situation, as determined by the City of Wauwatosa, no notice shall be required prior to the City of Wauwatosa performing emergency maintenance or repairs. The City of Wauwatosa may levy the costs and expenses of such inspections, maintenance or repair related actions as a special charge against the Property and collected as such in accordance with the procedures under s. 66.0627 Wis. Stats. or subch. VII of ch. 66 Wis. Stats.

6. This Agreement shall run with the Property and be binding upon all heirs, successors and assigns. After the Titleholder(s) records this maintenance agreement and addendum, the agreement and the addendum may be amended or modified by agreement between the City of Wauwatosa and the current Titleholder(s).
7. Titleholder may, at any time after obtaining approval from the City, relocate any or all of the storm water management facilities described in this Agreement to another portion of the Property provided that any such relocated storm water management facilities shall remain subject to this Agreement. Further, Titleholder acknowledges that, based on the scope of work for any such relocation of storm water management facilities, permitting may be required as part of the City's approval.

Dated this ___ day of _____, 2026.

Titleholder(s):
Luther Group
By: _____

Name/Title:

Acknowledgements

State of Wisconsin:
County of Milwaukee

Personally came before me this ____ day of _____, 2026, the above named_____ to be known to be the person who executed the foregoing instrument and acknowledged the same.

_____.
Notary Public, Milwaukee County, WI
My commission expires:_____.

This document was drafted by:

The Sigma Group, Inc.
1300 W. Canal Street
Milwaukee, WI 53233

For Certification Stamp

Exhibit A – Legal Description

The following description and reduced copy map identifies the land parcel(s) affected by this Agreement. For a larger scale view of the referenced document, contact the Wauwatosa County Register of Deeds office.

Project Identifier: Wauwatosa Grocery Redevelopment **Acres:** 2.058
Date of Recording:
Map Produced By: The Sigma Group, Inc
Legal Description:

Legal description per Chicago Title Insurance Company Commitment No. CO-6203, with an effective date of April 17, 2017:

PARCEL A:
Lots 1, 2, 3, 4, 5, 6, 23 and 24, in Block 1, in Windsor Heights, in the Northwest 1/4 of Section 22, Town 7 North, Range 21 East, in the City of Wauwatosa, County of Milwaukee, State of Wisconsin.

EXCEPTING THEREFROM those parcels conveyed to the City of Wauwatosa by Deeds recorded as Document No's. 4166988, 4240321, 4754624 and 4754625.

Tax Key No: 344-0444-02
Address: 7501 W. North Avenue

PARCEL B:
The West 35 feet of Lot 21, in Block 1, in Windsor Heights, being a Subdivision of a part of the Northwest 1/4 of Section 22, Town 7 North, Range 21 East, in the City of Wauwatosa, County of Milwaukee, State of Wisconsin.
EXCEPTING THEREFROM that parcel conveyed to the City of Wauwatosa by Warranty Deed recorded as Document No. 4244293.

Tax Key No: 344-0469-00
Address: 7423 W. North Avenue

PARCEL C:
That part of Lot 22, in Block 1, in Windsor Heights, being a Subdivision of a part of the Northwest 1/4 of Section 22, Town 7 North, Range 21 East, in the City of Wauwatosa, County of Milwaukee, State of Wisconsin.
EXCEPT that part bounded and described as follows:
Beginning at the Northwest corner of said Lot 22; thence East along the North line of said Lot 22, 70.00 feet to the Northeast corner of said Lot 22; thence South along the East line of said Lot 22, 7.00 feet to a point; thence Westerly to a point on the West line of said Lot 22, said point being 10.51 feet South of the Northwest corner of said Lot 22; thence North along the West line of said Lot 22, to the place of beginning.

Tax Key No: 344-0470-00
Address: 7429 W. North Avenue

Exhibit B - Location Map
Storm Water Management Practices Covered by this Agreement

The stormwater management practices covered by this Agreement are depicted in the reduced copy of a portion of the construction plans, as shown below. The practices include porous pavement and all associated pipes.

Development Name: Wauwatosa Grocery Redevelopment
Stormwater Practices: Biofiltration Basin, Up-flo filters, Catch Basins
Location of Practices: 7501 W North Ave
Owner: Luther Group
Drafter Name: The Sigma Group

Figure B1
Plan View of Storm Water Practices

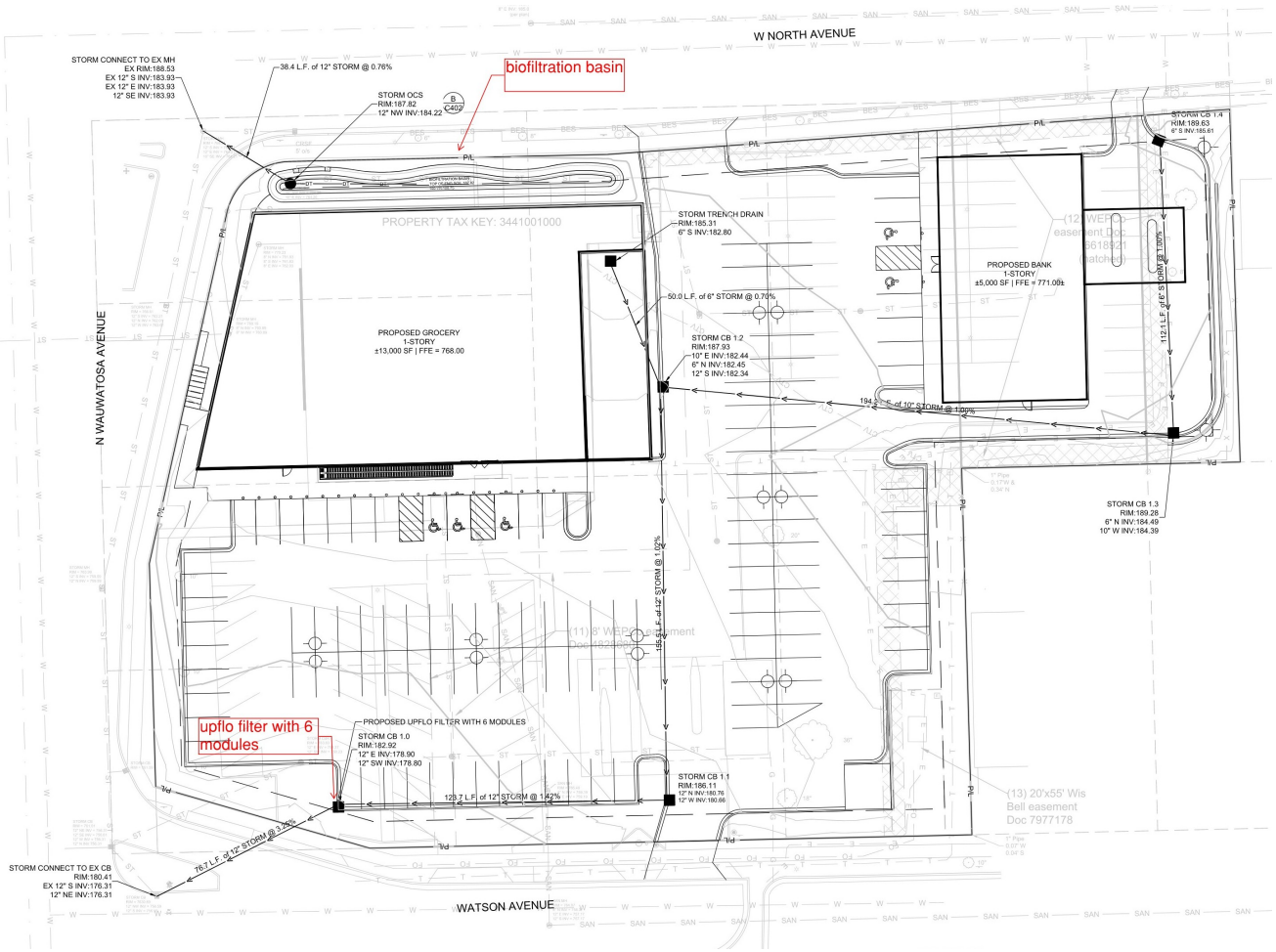


Exhibit C
Storm Water Practice Maintenance Plan

This exhibit explains the basic function of each of the storm water practices listed in Exhibit B and prescribes the minimum maintenance requirements to remain compliant with this Agreement. The maintenance activities listed below are aimed to ensure these practices continue serving their intended functions in perpetuity. The list of activities is not all inclusive, but rather indicates the minimum type of maintenance that can be expected for this particular site. Access to the stormwater practices for maintenance vehicles is shown in Exhibit B. Any failure of a storm water practice that is caused by a lack of maintenance will subject the Owner(s) to enforcement of the provisions listed on page 1 of this Agreement by the City of Wauwatosa.

Up-Flo Filter Description

The Up-Flo filter system provides supplement treatment to the underground system. The system is designed to capture trash, oil, sediment and remove fine pollutants.

Maintenance:

To ensure the proper long-term function of the storm water management practices described above, the following activities must be completed by the Facility Manager:

1. A minimum of two inspections are required a year (May and October) to monitor sediment and pollutant accumulation:
    a. Inspect the Up-Flo system for sediment building up within the sump. When sediment depth in the sump is found to be greater than 16 inches, sediment removal is required. There should always be a minimum of 8 inches separation between outlet pipe invert and the sediment built up within the sump.
    b. Inspect the Up-Flo system for sediment building up within the sump. Whenever sediment depth in the sump is found to be greater than 16 inches, sediment removal is required. There should always be a minimum of 8 inches separation between outlet pipe invert and the sediment built up within the sump.
    c. Media filter bags shall be replaced at least once a year and properly disposed of media filter bags accordance with the Up-Flo manufacture's operation and maintenance manual.
    d. The Up-Flo filtration system shall be inspected for outlet pipe clogging/blockage of debris or ice within the basins. Any blockage must be removed immediately.
    e. Inspect the structural integrity of the structure/pipe connections. If any structural damage to the inlet/ catch basin structure/ pipe connections is identified the damage shall be repaired.
    f. For detailed inspection and maintenance requirements refer to manufactures operation and maintenance manual.
    g. Any other repair or maintenance needed to insure the continued function of the storm water practices or as ordered by the Village of Pewaukee under the provisions listed on Page 1 of this Declaration of Covenant.

Biofiltration Basin

Inspection:

To ensure the proper function of the biofiltration basin, the following activities must be completed on a monthly during the growing season (March – November):

1. Inspect basin for erosion damage.
2. Inspect for litter
3. Inspect the basin inlets and outlet riser for blockage and structural integrity on an annual basis.
4. Inspect the basin for the presence of weeds.
5. Inspect condition of plants in basin for plants that appear to be dead or dying
6. Inspect basin for visible indication of engineered soil clogging or overtopping of the basin.

Maintenance:

1. Remove litter on a regular basis
2. Repair any noted erosion damage. Apply topsoil/seed/much/geotextile as necessary to stabilize repaired areas.
3. Water plants as regularly during first growing season; plants should only need watering during periods of drought after establishment.
4. Water plants as needed during drought periods.
5. Remove weeds regularly during the establishment period (first two years) and as needed thereafter; hand weed to prevent compaction of and minimize disturbance of plants; weed after watering or after rain event to minimize disturbance and aid in removal.
6. Remove invasive weeds (Canada thistle, garlic mustard, tree seedlings) immediately; hand weed to prevent compaction of and minimize disturbance of plants; weed after watering or after rain event to minimize disturbance and aid in removal.
7. Remove/replace diseased, dying, or dead plantings as needed
8. When standing water is observed in 50% of the basin floor 3 days after rainfall event it is an indication that the engineered soils have clogged and lost their infiltration capacity and soil maintenance is required; soil maintenance shall consist of remove sediment and replacement top 2 to 3 inches of engineered soil and deep tilling and replacement/re-establishment of plants damaged during soil maintenance activities.
9. Remove any blockage from outlet structure/overflow riser
10. Repair any structural damage to outlet structure/overflow riser

Storm Inlets/Catch Basins

Inspection:

1. Inspect inlets/catch basin on a semi-annual basis.
2. Inspect for level of debris/sediment build up in sump
3. Inspect for blockage of outlet
4. Inspect for structural integrity of structure/pipe connections

Maintenance:

To ensure the proper function of the storm inlets/catch basins described above, the following activities must be completed on a semi-annual basis (April and October):

1. Remove sediment/debris when it reaches a level within six inches of the discharge pipe invert
2. Remove blockage of discharge pipe as required
3. Repair any structural damage observed to inlet/catch basin structure/pipe connections, etc.

Signatures
The undersigned agree to the provision set forth in this agreement.
For the Owner:

_____
Name

_____
Title

_____
Signature

_____
Date

STATE OF WISCONSIN)
) S.S.
MILWAUKEE COUNTY)

Personally came before me this _____ day of _____, 20__, the above named _____ to me known to be the person who executed the foregoing instrument and acknowledged the same.

_____
Notary Public
State of Wisconsin
My Commission expires _____

This document was drafted by:

The Sigma Group, Inc.
1300 W. Canal Street
Milwaukee, WI 53233
414-643-4200

Appendix G

Figures

2026.04.22

WATERSHED AREA 1			
Tc = 6.0 min.	SF	ACRE	CN
EXISTING			
GREENSPACE	20104	0.46	78
PAVEMENT	22724	0.52	98
ROOF	14633	0.34	98
TOTAL	57461	1.32	91

WATERSHED AREA 2			
Tc = 6.0 min.	SF	ACRE	CN
EXISTING			
GREENSPACE	8303	0.19	78
PAVEMENT	23867	0.55	98
TOTAL	32170	0.74	93

LEGEND:

- SUBCATCHMENT AREA
- GRASS
- ROOFS

THE SIGMA GROUP
Single Source. Sound Solutions.
www.thesigmagroup.com
1300 West Canal Street
Milwaukee, WI 53233
Phone: 414-643-4200
Fax: 414-643-4210

N

GRAPHIC SCALE
0 20 40

WAUWATOSA GROCERY
7501 W. NORTH AVENUE
WAUWATOSA, WI

EXISTING CONDITIONS

PRELIMINARY NOT FOR CONSTRUCTION

ISSUANCE	DATE

NO.	REVISION	DATE

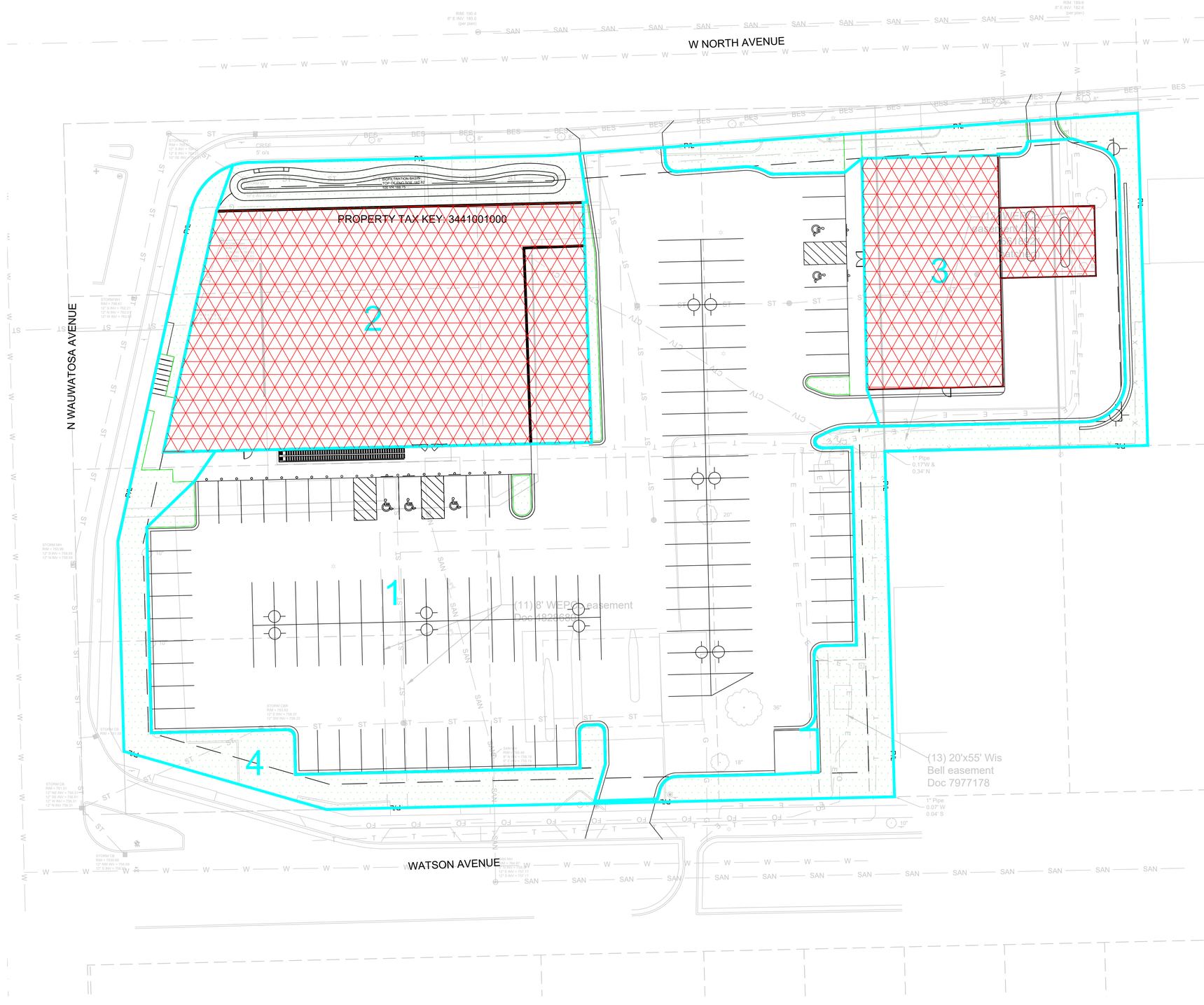
PROJECT NO:	25057
DESIGN DATE:	----
PLOT DATE:	2026.04.22
DRAWN BY:	JMJ
CHECKED BY:	PJI
APPROVED BY:	----

SHEET NO:
SW 1.0

AKUSKE
SW 1.0
25057

I:\Luther Group\25057 - Wauwatosa Grocery\060 CAD\030_Production Sheets\800_SWMP\SW 1.0 Existing Conditions.dwg

2026.05.19



WATERSHED AREA 1			
Tc = 6.0 min.	SF	ACRE	CN
PROPOSED			
GREENSPACE	742	0.02	78
PAVEMENT	16147	0.37	98
TOTAL	16889	0.39	97

WATERSHED AREA 2			
Tc = 6.0 min.	SF	ACRE	CN
PROPOSED			
GREENSPACE	2733	0.06	78
ROOF	15188	0.35	98
TOTAL	17921	0.41	95

WATERSHED AREA 3			
Tc = 6.0 min.	SF	ACRE	CN
PROPOSED			
PAVEMENT	4992	0.11	98
ROOF	6076	0.14	98
TOTAL	11068	0.25	98

WATERSHED AREA 4			
Tc = 6.0 min.	SF	ACRE	CN
PROPOSED			
GREENSPACE	12997	0.30	78
PAVEMENT	756	0.02	98
TOTAL	13753	0.32	79

LEGEND:

- SUBCATCHMENT AREA
- GRASS
- ROOFS

N

GRAPHIC SCALE
0 20 40

THE SIGMA GROUP
Single Source. Sound Solutions.
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WAUWATOSA GROCERY
7501 W. NORTH AVENUE
WAUWATOSA, WI

PROPOSED CONDITIONS

PRELIMINARY NOT FOR CONSTRUCTION

ISSUANCE	DATE

NO. REVISION	DATE

PROJECT NO:	25057
DESIGN DATE:	----
PLOT DATE:	2026.05.19
DRAWN BY:	JMJ
CHECKED BY:	PJI
APPROVED BY:	----

SHEET NO:
SW 2.0

AKUSKE
SW 2.0
25057

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