



HOMER GLEN

Request for Proposals

**SEEKING PROFESSIONAL ENGINEERING SERVICES FOR
PINE HILL DRAINAGE IMPROVEMENTS**

Proposals are due by 3:00 pm on Friday, April 19th, 2024.

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Section I: Overview

The Village of Homer Glen is requesting proposals from qualified and experienced engineering firms, that specialize in civil infrastructure and drainage design work to provide services related to the preparation of engineering plans, specifications and bid documents required for the Village's Drainage Improvement at in the Pine Hill Estates subdivision.

All questions related to this proposal must be submitted in writing, no later than 12:00pm local time on **April 11th** (4/11/2024) to:

Brett Westcott, PE
Village Engineer
Email: bwestcott@homerglenil.org

Prior to the submission deadline, the Village will make available to the public answers to questions or any modifications or additions to this RFP in the form of a written Addendum which will be posted on the Village website by **April 12th** (4/12/2024).

No verbal/oral comments will be made to any Proposer as to the meaning of the RFP, Specifications or other contract documents. Answers will be provided in writing to all potential Proposers. **Proposers are required to acknowledge receipt of any formal Addendum by signing the Addendum and including it with the submission.**

Proposals must be submitted no later than 3:00pm, local time, on **Friday, April 19th, 2024** (4/19/2024). Proposals received after this date and time will not be accepted; all proposals received after the submittal deadline will be rejected and returned unopened. Proposals must include all information and documents as requested in this Request for Proposal, failure to follow these instructions may result in rejection of the proposal.

The Village of Homer Glen reserves the right to reject any and all proposals and void any irregularities. Proposals will be opened and evaluated in private and proposal information will be kept confidential until an award is made.

Section II: Project Details

Community Profile

Homer Glen, Illinois, is a home-rule community of 24,664 residents located in northeastern Will County, approximately 25 miles southwest of Chicago. The Village was incorporated on April 17, 2001 and is home to a unique blend of open space, residential developments and vibrant commercial corridors. Homer Glen is one of Will County's largest municipalities encompassing more than 22 square miles.

Background

The Pine Hill Estates subdivision is located in Homer Glen, Illinois in Will County. The subdivision was built in the late 1980s and has been experiencing roadway overtopping and flooding issues for quite some time. The subdivisions existing drainage system consists of a combination of storm sewer, ditches, culverts, drain tiles and manmade stormwater basins. Both upstream residential areas and offsite forested areas contribute tributary flow into the subdivision. Tributary flows end up in the designed basins and eventually drain through an existing field tile and channel running to the east.

A drainage study has been completed for the subdivision to identify major issues and areas for improvement to help alleviate the long-standing flooding issues. The study has identified issues with the existing basins as well as culverts and ditches downstream of the basins. A section of culvert and ditches upstream of the basins, near Chelsea Court, was also identified as an impacted area. This study has been attached as Exhibit A; additional documents including the original engineering plans for Pine Hill Estates will be made available upon request from the Village.

Recommendations from the study suggest the following:

- 1) Upsize existing storm sewer pipes at the existing basins; remove existing pipe culverts under Kensington Drive and install a box culvert; regrade and shape downstream emergency overflow channels.
- 2) Clean out existing storm sewers near Chelsea Court; replace existing culverts with larger pipes; regrading existing ditches to provide additional capacity.

Scope of Services

The successful engineering firm shall prepare and provide detailed plans, specifications, bid documents, bid services and an estimate of probable cost for the project. The firm shall also identify and obtain any and all permits required for the construction of the project having jurisdiction over or within the project limits. Permitting with the Army Corps of Engineers may be required to complete this work.

Section III: Proposal Submission Requirements

Proposers shall complete and submit the requested forms included in Sections VII – X. The Village will only accept proposals in bound hard copy format and does not accept proposals submitted via fax, email, or other electronic means.

Proposals are to be submitted in a sealed Package to:

Village of Homer Glen
Attn: Brett Westcott P.E., Village Engineer
14240 W. 151st Street
Homer Glen, IL 60491
(630) 740-2447
bwestcott@homerghlenil.org

With the following on the outside of the envelope:

- Company Name
- RFP Title
- Due Date and Time

Package must include:

- One (1) Original Proposal, identified as “Original”
- Three (3) Copies of Proposal
- One Copy of Proposal on a Flash Drive – Include both original and public viewing versions, if applicable.

The final scope of work will be determined between the selected Proposer and the Village. All work shall be completed using the latest IDOT, Village of Homer Glen and Will County design and construction standards, guidelines, practices and procedures where applicable.

All material submitted regarding this RFP becomes the property of the Village of Homer Glen, unless otherwise noted in the RFP. The Village reserves the right to cancel this RFP at any time, without penalty. Once submitted, no proposal may be withdrawn without the Village’s consent.

Section IV: General Terms and Conditions

Award

Award of the contract is subject to Board Approval. The Village award will be made within ninety (90) days after the date of the proposal opening, or any mutually agreed extension thereof.

The following terms and conditions must be met in the Proposer's preparation of and the Village's consideration of each submittal:

1. Compliance with Laws:
 - a. All services of any qualifying Proposer shall comply with all Federal and State of Illinois laws, county and municipal codes, ordinances, rules and regulations that in any manner affect the services to be provided or the operations of the firm, including, but not limited to, the Prevailing Wage Act, the Illinois Procurement Code, and all laws governing employment.
 - b. A qualifying Proposer shall certify that it shall not discriminate against any worker, job applicant, employee, or member of the public, because of race, creed, color, sex, sexual orientation, age, handicap, or national origin, and shall not otherwise commit any unfair employment practice, and that it shall comply with all requirements of the Illinois Human Rights Act, as amended (775 ILCS 5/101, et. seq.), and all rules and regulations of the Illinois Department of Human Rights and the Equal Opportunity Commission.
 - c. A qualifying Proposer shall further certify that it has not been barred from being awarded a contract or subcontract under the Illinois Procurement Code (30 ILCS 500/1-1, et. seq.); and further certifies that it has not been barred from contracting with a unit of State or local government as a result of any violation of Sections 33E-3 or 33E-4 of the Illinois Criminal Code {720 ILCS 5/33E-3, 33E-4}.
 - d. A qualifying Proposer shall also certify that its workplace complies with the Drug Free Workplace Environment Act {30 ILCS 580/1, et. seq.}, and that it provides a written program for prevention of substance abuse among employees and testing of employees for substance abuse, in accordance with the Substance Abuse Prevention Act (820 ILCS 265/1, et. seq.).
 - e. A qualifying Proposer shall have the ability to obtain all necessary licenses, permits and approvals, whenever applicable.
 - f. A qualifying Proposer shall submit a completed and signed Certifications and Assurances form (Section VIII).

2. Insurance and Indemnification:

- a. A qualifying Proposer shall provide evidence of insurance coverage.
- b. To the fullest extent permitted by law, the qualifying Proposer shall, if awarded a contract with the Village, agree to indemnify and hold harmless the Village, its officers, employees, agents and volunteers from and against all claims, damages, losses and expenses, including but not limited to legal fees (attorneys' and paralegals' fees and court costs), arising out of or resulting from the performance of the services to be provided; provided that any such claim, damage, loss or expense (i) is attributable to bodily injury, sickness, disease or death, or injury to or destruction of tangible property, and including the loss of use resulting therefrom; and (ii) is caused in whole or in part by any wrongful or negligent act or omission of the firm or anyone directly or indirectly employed by the Proposer or anyone for whose acts it may be liable, except to the extent it is caused in whole or in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described herein. A qualifying Proposer shall similarly agree to protect, indemnify and hold and save harmless the Village, its officers, employees, agents and volunteers against and from any and all claims, costs, causes, actions, and expenses, including but not limited to legal fees incurred by reason of such Proposer's breach of any of its obligations under, or default of, any provision of any contract entered with the Village for such services.

c. Insurance Requirements

1) Commercial General and Umbrella Liability Insurance (CGL):

- A. \$1 million per occurrence
- B. \$2 million aggregate

2) Professional Liability Insurance

- A. \$1 million per occurrence
- B. \$1 million annual aggregate

3) Auto Liability

- A. \$1 million per occurrence Combined Single Limit or
- B. \$1 million bodily injury per occurrence
- C. \$500,000 property damage

All Certificates of Insurance shall include the Village of Homer Glen as additional named insured, as well as the Village's officers, agents, employees and volunteers.

- d. Worker's Compensation Insurance: Worker's compensation and employers' liability insurance shall be provided as statutorily required items.

Section V: Evaluation and Selection Process

All proposals submitted in response to this RFP will be evaluated by Village Staff with final selections presented to the Village Board for approval. Total scores will be tabulated, and the proposal that is deemed to be the most advantageous to the Village will be selected. In preparing responses, firms should describe in detail how they propose to meet the specifications as detailed in the previous sections. Specific factors will be applied to proposal information to assist the Village in selecting the most qualified firm for this contract. Evaluation criteria that will be used are as follows:

- Successful experience on projects of similar or larger scopes, value and quality.
- Successful past performance through reference of previous clients, including local governments.
- Organizational capacity and managerial capability to successfully execute and deliver projects of similar or larger scopes, value and quality.
- Credentials, experience and reputation of personnel identified to lead, execute, deliver and manage the project.
- Approach to scope of work. Firm's understanding of project goals.
- Aggressiveness of project schedule.

Section VI: Submittal Checklist

Please submit the following items:

- A technical proposal addressing the firms approach to the Scope of Services as found in Section II of this RFP. The technical proposal shall include the following:
 - a. Cover
 - b. Executive Summary
 - c. Company Information
 - d. Project Approach
 - e. Project Organization and Key Personnel
 - f. Experience
 - g. Rate Schedule/Fee
 - h. Forms
 - i. Proposal Summary Sheet
 - ii. Certifications and Assurances
 - iii. References
- Signed and completed required forms included in Sections VII - X.
- Three references.
- Insurance requirements.
- Acknowledgement of Addenda – Proposers are required to acknowledge receipt of any formal Addendum by signing the Addendum and including it with the proposal submission.
- Proposal – Proposer must submit one (1) flash drive containing the full proposal electronically and four (4) complete signed, sealed and attested copies of the proposal. (1 Original, 3 Copies)
 - a. Proposals are to be submitted in a sealed Package to:
Village of Homer Glen
Attn: Brett Westcott P.E., Village Engineer
14240 W. 151st Street
Homer Glen, IL 60491
(708) 301-0632 Ext. 117
bwestcott@homerglenil.org
 - b. With the following on the outside of the envelope:
 - i. Company Name
 - ii. RFP Title
 - iii. Due Date and Time

Section VII: Proposal Summary Sheet

_____ (Name of Organization) proposes to provide services for the Village of Homer Glen's Pine Hill Drainage Improvement, as outlined herein; for the total cost of \$_____. This includes all services, labor, material, equipment, supervision, and any other items considered a billable expense.

Signed:

Printed Name:

Title:

Address:

City/State/Zip:

Phone:

Email:

Dated:

Section VIII: Certifications and Assurances

I/we make the following certifications and assurances as a required element of the proposal to which it is attached, understanding that the truthfulness of the facts affirmed here and the continuing compliance with these requirements are conditions precedent to the award or continuation of the related contract(s):

1. The attached proposal is a firm offer for a period of 90 days following receipt, and it may be accepted by the Village without further negotiation at any time within the 90-day period.
2. In preparing this proposal, I/we have not been assisted by any current or former employee of the Village whose duties relate (or did relate) to this proposal or prospective contract, and who was assisting in other than his or her official public capacity. Neither does such a person nor any member of his or her immediate family have any financial interest in the outcome of this proposal. (Any exceptions to these assurances are described in full detail on a separate page and attached to this document.)
3. I understand that the Village will not reimburse me/us for any costs incurred in the preparation of this proposal. All proposals will become the property of the Village, and I/we claim no proprietary right to the ideas, writings, items, or samples.
4. I/we warrant that, in connection with this procurement:
 - a. The price and/or cost data have been arrived at independently, without consultation, communications, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any competition.
 - b. Unless otherwise required by law, the prices and/or cost data which have been submitted have not knowingly been disclosed by him/her prior to opening, in the case of a proposal directly or indirectly to any other competitor
 - c. No attempt has been made or will be made by the consultant to induce any other person or firm to submit or not to submit a proposal for the purpose of restricting competition.

Company _____

Signature _____ Date _____

Title _____

Section IX: References

Organization: _____
Address: _____
City, State, Zip: _____
Phone Number: _____
Contact Person: _____
Name of Project: _____
Date of Project: _____

Organization: _____
Address: _____
City, State, Zip: _____
Phone Number: _____
Contact Person: _____
Name of Project: _____
Date of Project: _____

Organization: _____
Address: _____
City, State, Zip: _____
Phone Number: _____
Contact Person: _____
Name of Project: _____
Date of Project: _____

Section X: Non-Collusion Certificate

The Undersigned Bidder is not barred from bidding for this Contract as a result of a violation of 720 ILCS 5/33E concerning bid rigging, rotating, kickbacks, bribery and interference with public contracts.

(Printed Name of Firm)

Address

City

State

Zip Code

Signature of Authorized Representative

Title

Date

Section XI: Contract

The Village reserves the right to make an award without further discussion of the proposal submitted or to not make any award. The proposal must be submitted initially on the most favorable terms which the firm can propose. The firm shall enter into a written contract, which shall be submitted to the Corporate Authorities of the Village for approval. Final acceptance of the proposal shall only be complete under Corporate Authorities acceptance of a contract executed by the Proposer.

The Proposer should be prepared to accept a contract resulting from this RFP. It is understood that the proposal will become a part of the official file on this matter, without obligation to the Village.

This RFP does not obligate the Village to contract for services specified herein.

Section XII: Notice

1. This RFP is not a contract or offer of employment.
2. The cost of preparation of proposals shall be the sole obligation of the Proposer.
3. All submitted proposals, whether accepted or rejected, are the property of the Village of Homer Glen.
4. The firm selected to perform the work must enter into a standard Village of Homer Glen contract, as written by the Village in consultation with the successful firm.

EXHIBIT A



Technical Memorandum

Pine Hill Drive Drainage Study

Village of Homer Glen

November 2023

HR Green Project No: 2302960

Prepared by:
Robert Yerushalmi, EIT

Reviewed by:
Logan Gilbertsen, PE, CFM



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Introduction

The Village hired HR Green, Inc. to complete a stormwater study of the Pine Hill Estates subdivision. HR Green completed a hydrologic and hydraulic study of the 160 acres watershed and identified two primary locations where flooding is a concern. These locations are at the intersection of Pine Hill Drive and Chelsea Court as well as at the subdivision's retention pond. The study identifies that there is insufficient conveyance capacity at these two locations. Improvements including ditch grading, storm sewers and culvert replacement are recommended. The total cost of the improvements is anticipated to be \$135,000 in the area surrounding the intersection and \$258,000 for improvements around the pond's outlet.

The Pine Hill Estates subdivision, shown in Figure 1, is located within the Village of Homer Glen, Illinois in Will County. Within the subdivision, stormwater is managed using storm sewers, ditches, culverts, drain tiles and manmade stormwater management basins that have been experiencing ongoing flooding and maintenance issues. The basins receive flow from residential and forested areas. The basins then drain to the east via a low flow sewer which appears to be an existing field tile and high flow open channel running east towards South Kensington Drive. The current basin configuration has been causing issues related to maintenance, roadway flooding and private property damage. It appears that the basin is not operating as designed and that the outlet sewer may be partially failing. Issues with holding water and not fully draining down to the designed normal water level are the two main concerns. These issues have also contributed to overtopping of Pine Hill Drive adjacent of the basin.

The existing basins are connected under Pine Hill Drive via a 22" x 34" elliptical RCP equalization culvert with a further pipe extension on either side (18" PVC on the west and 24" x 38" elliptical RCP on the east). During larger storm events the basin encroaches on the nearest adjacent residence property (16561 Pine Hill Drive) and the basins can overtop the roadway, leading to potentially unsafe vehicle crossing conditions. Additionally, the ditches within the subdivision hold water creating saturated soil conditions and promotes the growth of nuisance vegetation.

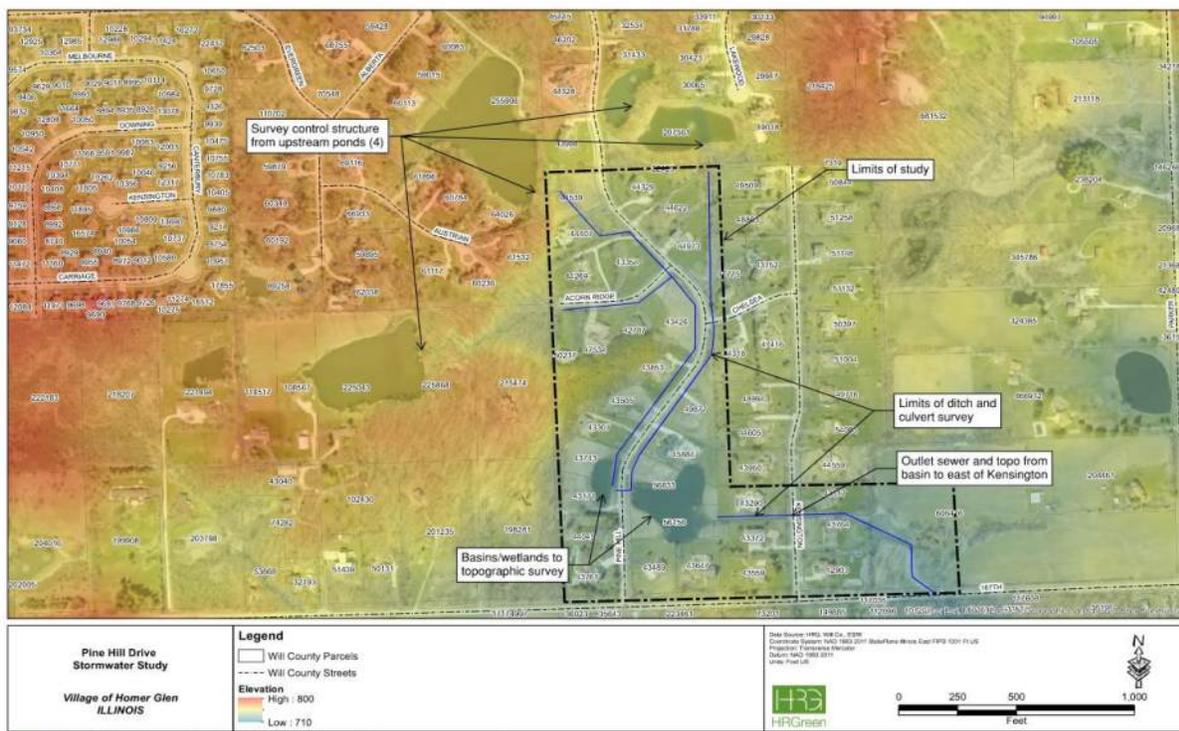


Figure 1: Aerial Imagery Pine Hill Drive Basin and both Upstream and Downstream Systems

In the late 1980's, construction documents for the Pine Hill Estates subdivision were completed along with drainage calculations and a long-term management plan. The basin drainage calculations for the subdivision were examined, and discrepancies were discovered between the calculations and the current site conditions, which formed uncertainties about the true available stormwater detention capacity of the basins. The design high water level (HWL) is designed to be 723 feet and provide 7.0 acre-feet of detention. This was verified via review of provided construction drawings and stage storage calculations using current topography. HR Green's survey revealed that a recently constructed residential structure has a low opening elevation of 723.94 feet (this represents a low entry window elevation and not the lowest adjacent grade). This home would then be at high risk in 1% chance storm events equating to approximately a 25% - 33% chance of flooding during the next 30 years with an increased risk of flooding if the pond's outlet were to become clogged or malfunction.

This stormwater study was broken down into two sections which address the main basins (referred to as Pine Hill Drive basins) and an upstream drainage system that experiences significant ponding (referred to as Chelsea Court). Since Chelsea Court is upstream of the Pine Hill drive basin, the conditions at this location influence downstream conditions.

Research

HR Green's engineers completed a site evaluation of the existing drainage conditions and a topographic survey was completed to collect data necessary for the study. Hydrologic and hydraulic modeling of the area were completed using XP SWMM software. An existing conditions model was developed based on the topographic survey and available design plans. Proposed improvements were then added to the model to simulate the impacts of modifications to the drainage system. The findings of this study include:

- The construction of the Pine Hill Drive basin was constructed based on engineering plans completed by Geotech Inc dated January 25, 1989.
- Final engineering plans show that the design high water level (HWL) for the basins to be 723 feet and an available storage volume of 7.0 ac-ft.
- Survey shows the normal water elevation at the Pine Hill Drive basin to be 718.72 feet which approximately matches the elevation of 718.50 indicated on the 1989 plans.
- The high-water level (HWL) of Pine Hill Drive basin produced by the 100-year, 24-hour storm as shown in the XP SWMM existing conditions modeling is nearly equivalent to the proposed HWL per the Geotech Inc, design calculations. Geotech Inc.'s design says 723 feet and the existing conditions model shows 723.29 feet. Note that this assumes that the HWL design was to a 100-year 24-hour duration storm as this is typical. It was expected that there would be a discrepancy between the design HWL and the modeled HWL as the original design would have been based on Bulletin 70 rainfall data and the modeling completed by HR Green incorporated the current Bulletin 75 distribution which includes higher rainfall amounts.
- A home adjacent to the basin (16561 Pine Hill Drive) was surveyed and determined to have a low opening elevation of 723.94 feet indicating that flooding via this entry point is unlikely during a critical duration 1% storm event (100-year storm event). However, the home is still at risk of flooding during larger storm events. Additionally, areas of the side yard and back yard of the residence will experience flooding encroachment during these events and would pose a flood threat to the property. The 100-year storms (1-, 2-, 3-, 6-, and 24-hour storms) do not reach elevations equivalent or greater than the low entry elevation, but modeled existing conditions highlight lack of available freeboard at this location in relation to the critical duration storm (100-year 24-hour). In existing conditions, freeboard is approximately 0.7 feet. According to the current Village Ordinance (§ 138-6K(10)(c)) the basin's HWL during an overflow event should be 2' below the top of foundation elevation of adjacent structures. Since the structure is already constructed, a goal of

this study is to provide as much freeboard as possible to this adjacent home while maintaining the existing volume in the basin.

- The existing XP SWMM modeling shows that Pine Hill Drive basin's emergency overflow channel crest overtopping in less than the 10-year 1-hour duration storm. For reference, the 10-year 1-hour storm is 2.42" of rain in a 1-hour period.
- The 1989 Geotech Inc. engineering design calculations say the design volume for the Pine Hill Drive basin is 7.0 ac-ft and Geotech Inc. basin as-built areas (2001) say 7.05 ac-ft. This is very close to the expected storage volume. HR Green calculated the apparent available volume using the Will County 2021 topographic data and determined that the volume does exceed the design volume.
- Flows from 10-year storm rainfalls begin to exceed the existing downstream emergency overflow channel crest capacity and utilize the overland flow route that eventually reaches four CMP culverts that run under Kensington Drive. These CMP pipes were observed to be partially obstructed by debris.
- The original final engineering plans utilized Bulletin 70 rainfall data which was the newest available data to use in 1989. The Illinois State Water Survey adopted new Bulletin 75 rainfall distribution data in 2020. The new rainfall data reflects increased rainfall that has been experienced since the publication of Bulletin 70. Overall, this memo uses Bulletin 75 data that reflects current standards and higher intensity storms.
- The northeast corner of Chelsea Ct. and Pine Hill Drive acts as a storm water storage location and creates flood risk conditions due to a lack of capacity in the 12" storm sewer draining this area and an overflow elevation that does not allow for flow to continue through the Pine Hill Drive ditch prior to impacting private property.
- Chelsea Court's flood risk has been assessed to affect the nearest residence at an assumed elevation of 728.0 feet established via 2021 1-ft Will County GIS contours. All 100-year storms encroach onto the property and appear to cause direct building flooding at peak flows.

This technical memorandum describes the drainage analysis completed and provides recommendations concerning the further development of the Pine Hill Estates subdivision at the Pine Hill Drive basin with associated downstream channel and Chelsea Court.

Floodplain

HR Green reviewed the Flood Insurance Rate Map (FIRM) and found that no FEMA flood study exists for the project location. Pine Hill Drive basin and the associated downstream channel going south from the 167th Street outfall is tributary to Spring Creek which is a Zone AE floodplain with floodway.

Survey

HR Green completed a topographic survey of relevant structures for rim and invert elevations, pipe sizes, and pipe material, select topography at the Pine Hill Drive basin control structures and emergency overflow open channel ditch, select channel cross-sections, and road centerline elevations. This information was necessary to build a representative computer model of the interactions between the storm sewer, open channels, and storage basins. The low entry elevation of the home adjacent north of the Pine Hill Drive basin was collected to evaluate the water surface levels produced by the basin during different rainfall events and by the downstream channel in existing conditions. These elevations were captured to serve as a target for the proposed conditions water surface elevations. In addition, normal water level (NWL) elevations of the Pine Hill Drive basins were captured.

Existing Conditions

The drainage system study area consists of storm sewer systems and overland flow which enters the Pine Hill Drive basin from approximately 162.4 acres of tributary area. The Chelsea Court area, which only has overland flow that enters it, has approximately 125.2 acres of tributary area. An additional 26.9 acres are tributary of the downstream 167th Street up to the South Kensington Drive culvert inflow. The general flow patterns are identified in the Figure 2 below:

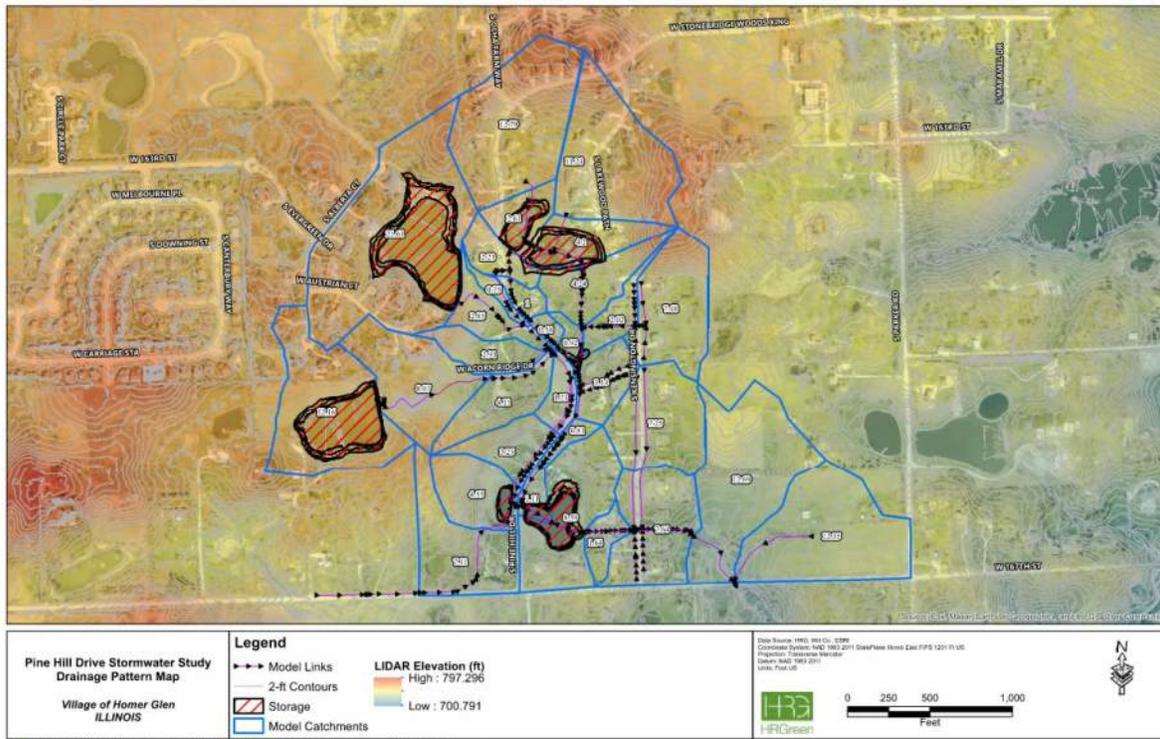


Figure 2: Local watershed drainage patterns

Flow is tributary to the basin from residential and wooded areas north of the Pine Hill Drive basin. Storm sewer survey, county atlases, and provided plans confirm that a majority of storm water is collected and conveyed via overland flow routes. With this understanding, storm sewer infrastructure, culverts, restrictors, etc. were still considered and modeled as tributary to identify local surcharge scenarios in areas where storm infrastructure is present.

Hydrologic and Hydraulic Analysis

HR Green completed a hydrologic and hydraulic analysis to determine the capacity of the existing Pine Hill Drive basin and to determine the effects of drainage improvements for the basin surrounding area.

HYDROLOGY

The tributary area to the storm sewer system was delineated utilizing 1-ft Will County contours generated from a LiDAR surface. The area was broken up into several sub-catchments based on locations of roads, culverts, basins, and land use. For the existing conditions model, the on-site tributary area consisted of the parcels of the Pine Hill Estates subdivision that were tributary to Pine Hill Drive basin based on the topography of the land with a curve number and percent impervious based on existing conditions land uses. The hydrology was analyzed in XP SWMM using the SCS Curve Number method, which is a hydrograph-based routing method. The times of concentration

(TC) for these catchments were calculated using a TR-55 spreadsheet method. The Curve Numbers (CN) used were based on the NRCS soils report and Tables 2.2a, 2.2b, and 2.2c from the TR-55 manual, Second Edition, June 1986. According to the NRCS soils report, the soils within the catchments are all type C and D. The land uses within the sub-catchments are residential, open space, streets/roads, woods, and water bodies (counted as impervious area).

The rainfall data used in the model was referenced from Illinois State Water Survey Bulletin 75. Multiple duration storms including 1, 2, 3, 6, 24-hour, and 48-hour storms were modeled to determine the critical duration storm to the detention basin. It should be noted that the existing drainage calculations were completed using Bulletin 70 which was effective at the time of design, while this study has adopted the State's current rainfall data. The critical duration for most storms at Pine Hill Drive basin is the 2-hour storm. Table 1 and Table 2 below summarize the existing condition's water surface elevations during critical duration storms.

The existing lowest entry elevation surveyed on one of the nearest residences adjacent north of the Pine Hill Drive basin is 723.94 feet, and it was verified that structural flooding will not occur at this entry point in storm events up to the 100-year storm. The existing apparent lowest adjacent grade (LAG) at 13838 Chelsea Court is approximately 728.0 feet.

Table 1: Summary of existing conditions critical duration storm events and corresponding high-water levels at Pine Hill Drive Basin

Storm Recurrence (Year)	Critical Storm Duration (Hour)	High Water Level in Basin
2-year (50% chance)	24-hour	722.13
10-year (10% chance)	24-hour	722.68
50-year (2% chance)	2-hour	722.66
100-year (1% chance)	24-hour	723.29

* The flooding elevation at respective effected residence is 723.94

Table 2: Summary of existing conditions critical duration storm events and corresponding high-water levels at Chelsea Court

Storm Recurrence (Year)	Critical Storm Duration (Hour)	High Water Level
2-year (50% chance)	24-hour	726.69
10-year (10% chance)	12-hour	727.81
50-year (2% chance)	2-hour	728.36
100-year (1% chance)	2-hour	728.64

* The flooding elevation at the adjacent residence is 728. This property appears to be impacted in storms exceeding the 50-year event.

A summary of hydrology inputs and a map of the drainage areas and flow paths are included in the attachments of this memorandum.

HYDRAULICS

An XP SWMM model was developed utilizing the survey data and supplemented with available County data and engineering plans. Pipes were modeled as XP SWMM links, which use the pipe inverts, slope, length, size, and material to represent the pipe in the model. The model also utilized nodes to represent the upstream and downstream ends of links, which can be structures, basins, or outfalls. Storage nodes represent basins or depressional areas, where a stage-storage curve is input to the node for the model to utilize. Stage-storage curves were developed using 1-ft contours from the completed survey, Will County topography, and provided as-builts. These calculations are included in the attachments of this memorandum. The hydrology developed for the sub-catchments was input to the corresponding nodes, representing points where runoff flow enters the drainage system.

Figure 3 depicts the results from the XP SWMM model for the existing water surface elevations (WSE) within the Pine Hill Drive basin during various storm events and Figure 6 shows existing WSE's within the Chelsea Court area (approximately 1000 feet upstream of the Pine Hill Drive basin). Note that DA6 represents the Pine Hill Drive basin and DA8 represents the Chelsea Court area. As depicted in Figure 5, the low flow storm sewer draining the basin does not appear to be fully functional and was modeled as such. Therefore the hydrographs do not drain back to the normal water elevation within the duration of the model run.

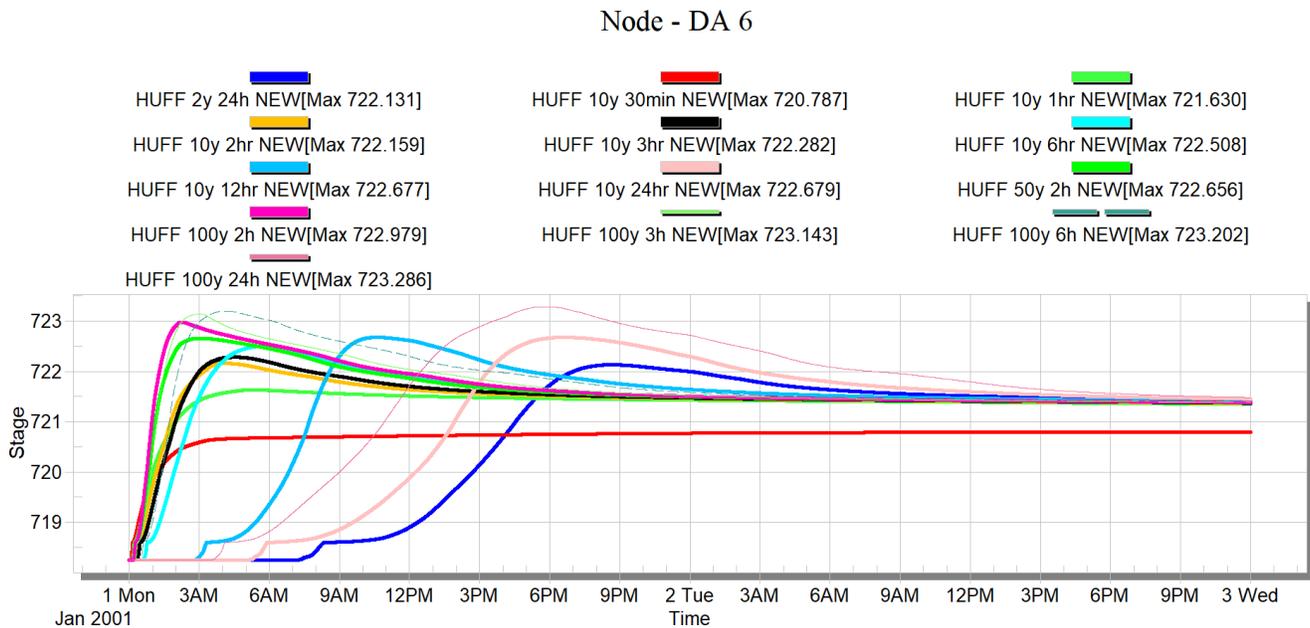


Figure 3: Existing conditions water surface elevation within the basin

The peak existing 100-year WSE at the Pine Hill drive basin is 723.29, which is nearly equivalent to the peak WSE from the original study proposed conditions. The peak existing 100-year flow occurs at the 24-hour duration via the overland flow route (emergency overflow ditch) and existing low flow pipe is 63.0cfs and 1.8cfs respectively.

The peak existing 100-year WSE at the Chelsea Court area is 728.64. The peak existing 100-year flow occurs at the 2-hour duration via the overland flow route (open channel ditch) immediately downstream of the Chelsea Court culvert is 53.2 cfs.

In the Pine Hill Drive basin, the existing conditions results also give information on the water surface elevations in the downstream channel. Storms exceeding the 10-year 1-hour storm begin to exceed the low flow pipe capacity and utilize overland flow paths in between residences heading towards South Kensington Drive. Any rainfall exceeding a 100-year 3- hour storm will begin to go past the existing designed high-water level which is 723 feet. 100-year storm elevations do not reach elevations equivalent to the low entry elevation surveyed at 16561 Pine Hill Drive. Proposed flows over the emergency overflow crest in the shorter duration 100-year storms should be maintained or reduced to avoid increasing risk to the residence.

Within the Chelsea Court area, the existing conditions results detail the flooding risk to the adjacent residence and provide a goal for proposed solutions. As depicted in Figure 4 below, storms exceeding a 50-year storm begin to see ponding conditions that result in encroachment upon a water surface elevation of 728, which is where water will begin to contact the residence's home.

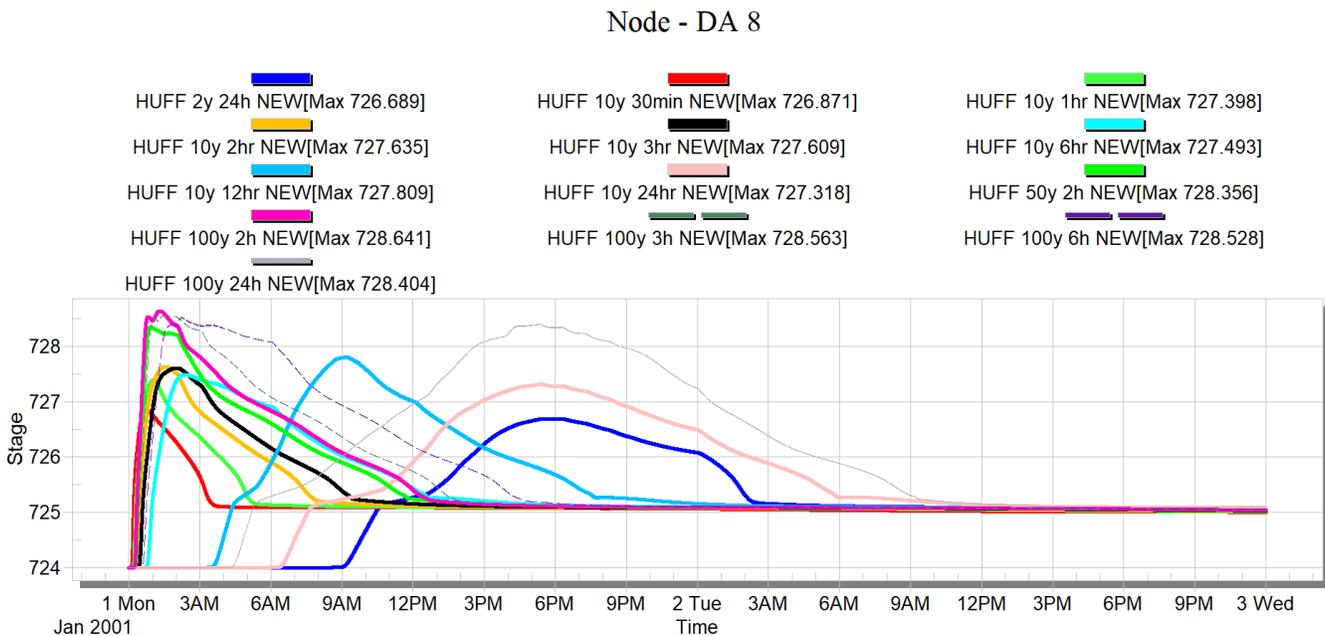


Figure 4: Existing conditions high water elevations at Chelsea Court

Recommendations

The following improvements are recommended:

Pine Hill Drive Basin:

1. Installing approximately 750 lineal feet of proposed 15" PVC storm water pipeline that will utilize one existing manhole and require the installation of additional structures.
2. Removing existing quad CMP culvert configuration and installing a 3' x 7' box culvert.
3. Grading and shaping emergency overflow channel. The proposed overflow elevation that will engage the channel is 721.25 which is approximately matching the existing conditions.

Table 3 shown below is a summary of the proposed high-water levels at the Pine Hill Drive basin after the proposed conditions modifications have been implemented. The Proposed Conditions column represents if all recommended improvements were implemented. It should be noted that critical duration events are exceedingly rare events. The statistical odds of any 100-year storm occurring in any given year are 1%. The odds of that 1% chance storm being a critical duration event are significantly less. It should be noted that stormwater basins are typically designed for the 100-year 24-hour storm event.

Table 3: Summary of Proposed conditions water surface elevations and overflow past crest for Pine Hill Drive Basin (Low-Entry = 723.94)

SUMMARY	Pine Hill Drive Basin Water Surface Elevations (ft)		Flow Over Emergency Overflow Crest (cfs)	
	Existing Conditions	Proposed Conditions	Existing Conditions	Proposed Conditions
Storm, Duration				
10-year, 2-hr	722.2	721.9	11.0	8.6
10-year, 12-hr	722.7	722.3	29.7	23.1
10-year, 24-hr*	722.7	722.4	29.7	25.7
50-year, 2-hr	722.7	722.5	28.7	31.4
100-year, 2-hr	723.0	722.8	45.0	50.9
100-year, 24-hr	723.3	722.9	63.1	58.0

*The 24-hour duration is the critical duration for the 10-year storm with proposed conditions

A water surface elevation reduction for the design 100-year 24-hour storm was 0.4 feet. A reduction in water surface elevations will be achieved for all storms and provide a route for more efficient draining of the basin with a reduced risk of clogging.

Implementing all recommendation options would yield a lower high water elevation than the design high water elevation of 723 feet. However, the as-built plans dated June 8th, 2001 show the pond high water level of 723.0 providing approximately 7.0 ac-ft of volume and the proposed volume at the 100-year high water level will remain as 7.0 ac-ft. with a proposed high water elevation of 722.9. Note that the elevation of Pine Hill Drive is approximately 723.0. The roadway may still be inundated during the 100-year storm however it is expected to recede quickly after the storm. Figure 5 shows a summary of the proposed improvements.



Figure 5: Proposed improvements at the basin

The basin and downstream channel drain into a tributary to Spring Creek which is a Waters of the United States (WOTUS). Since this project area is hydraulically connected to a WOTUS, the Army Corps of Engineers may regulate these improvements. It is recommended that a Jurisdictional Determination be submitted to the Army Corps to determine if they would be the permitting agency. Additionally, this project would require a Village Stormwater Permit. If the project results in more than one acre of disturbance then a Notice of Intent will need to be filed with the Illinois EPA for coverage under the ILR-10.

West Chelsea Court:

1. Storm sewer cleaning of the entire existing storm line heading west that runs under ditch.
2. Increase existing culvert capacity by replacing existing 18” pipe with a larger 30” pipe.
3. Add additional storage volume to the area via shaping and grading to go from a volume of 0.11 ac-ft to 0.34 ac-ft.
4. Regrade the ditch between the existing catch basin and the Chelsea Ct. culvert while widening the ditch bottom to about 6 feet and creating a more gradual side slope (3:1 to 4:1),
5. Flattening ditch slopes downstream of the existing West Chelsea Court culvert to approximately 0.5% grade, grading until about 40 lineal feet past first driveway residence culvert.
6. Install a new storm sewer and flared end section that ties into the existing catch basin and upgrade existing type 8 grate to provide greater flow capture and decrease ponding conditions.
7. Dredging out sediment and stabilization of banks to assist other major drainage modifications.
8. Restore desirable vegetation.

The recommended improvements at the Chelsea Court intersection will provide flood relief from many storms. Table 4 shown below is a summary of the proposed high-water levels north of Chelsea Court due to the proposed conditions modifications. Note, the proposed conditions column represents if all recommendations were implemented. The proposed improvements are summarized in Figure 6 below:

Table 4: Summary of Proposed conditions water surface elevations and downstream flows for Chelsea Court Area (LAG = 728)

SUMMARY	Chelsea Court Area Water Surface Elevations (ft)		Flow Downstream of Chelsea Culvert (cfs)	
	Existing Conditions	Proposed Conditions	Existing Conditions	Proposed Conditions
Storm, Duration				
10-year, 2-hr*	727.6	726.3	12.9	13.1
10-year, 12-hr	727.8	726.3	13.8	12.2
10-year, 24-hr	727.3	726.2	10.3	10.0
50-year, 2-hr	728.4	727.1	33.4	28.7
100-year, 2-hr*	728.6	728.0	53.2	46.9
100-year, 24-hr	728.4	727.3	34.8	32.7

*The 2-hour duration is the critical duration for the 10-year storm and 100-year storm with proposed conditions

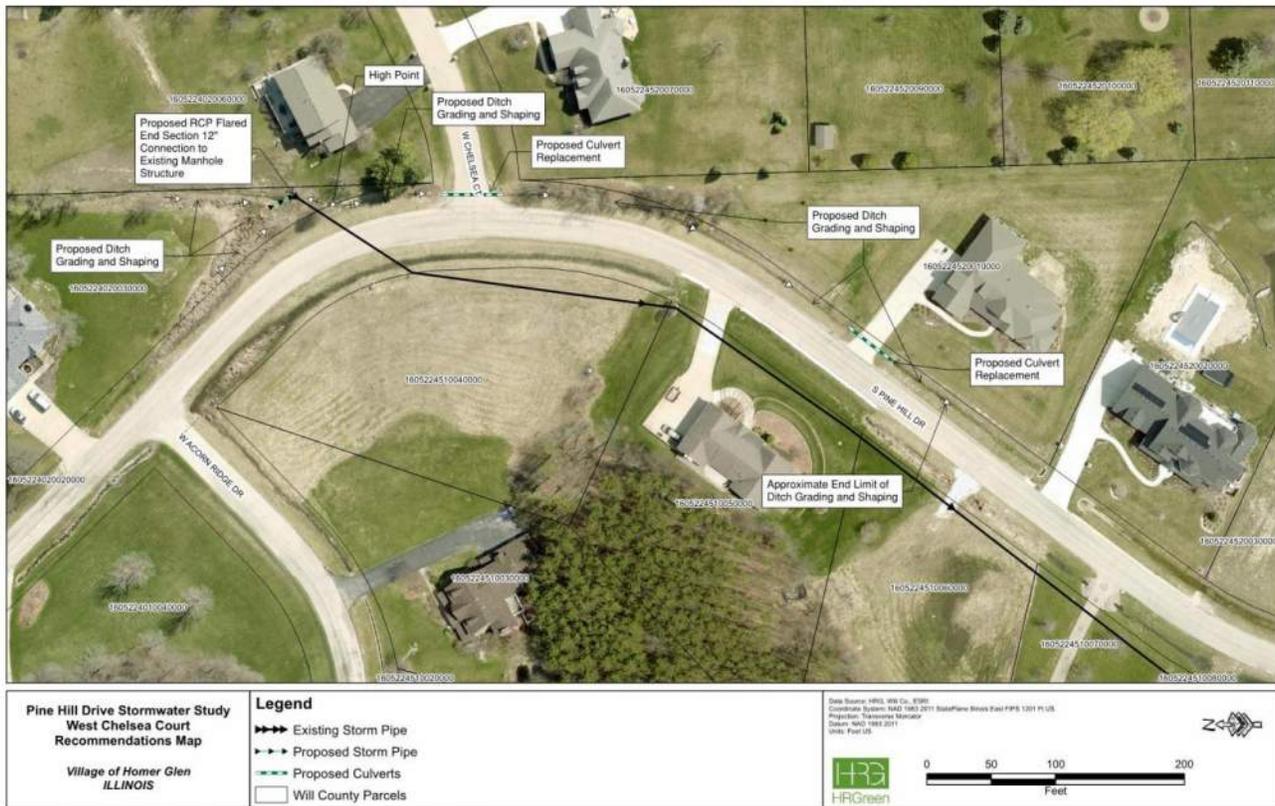


Figure 6: Proposed improvements at Chelsea Court

A reduction across all storms modeled were observed and as expected. The reduction in flow along the east Pine Hill Drive ditch is achieved through allowing more water to flow through the existing 12" storm sewer rather than routing it down the east ditch.

In existing conditions, the apparent lowest adjacent grade is reached in the 50-year or greater storms. The LAG is assumed to be at an elevation of 728 feet per LiDAR data. Implementation of all the recommended improvements at this location would reduce the risk of flooding at the adjacent home to less than 1%.

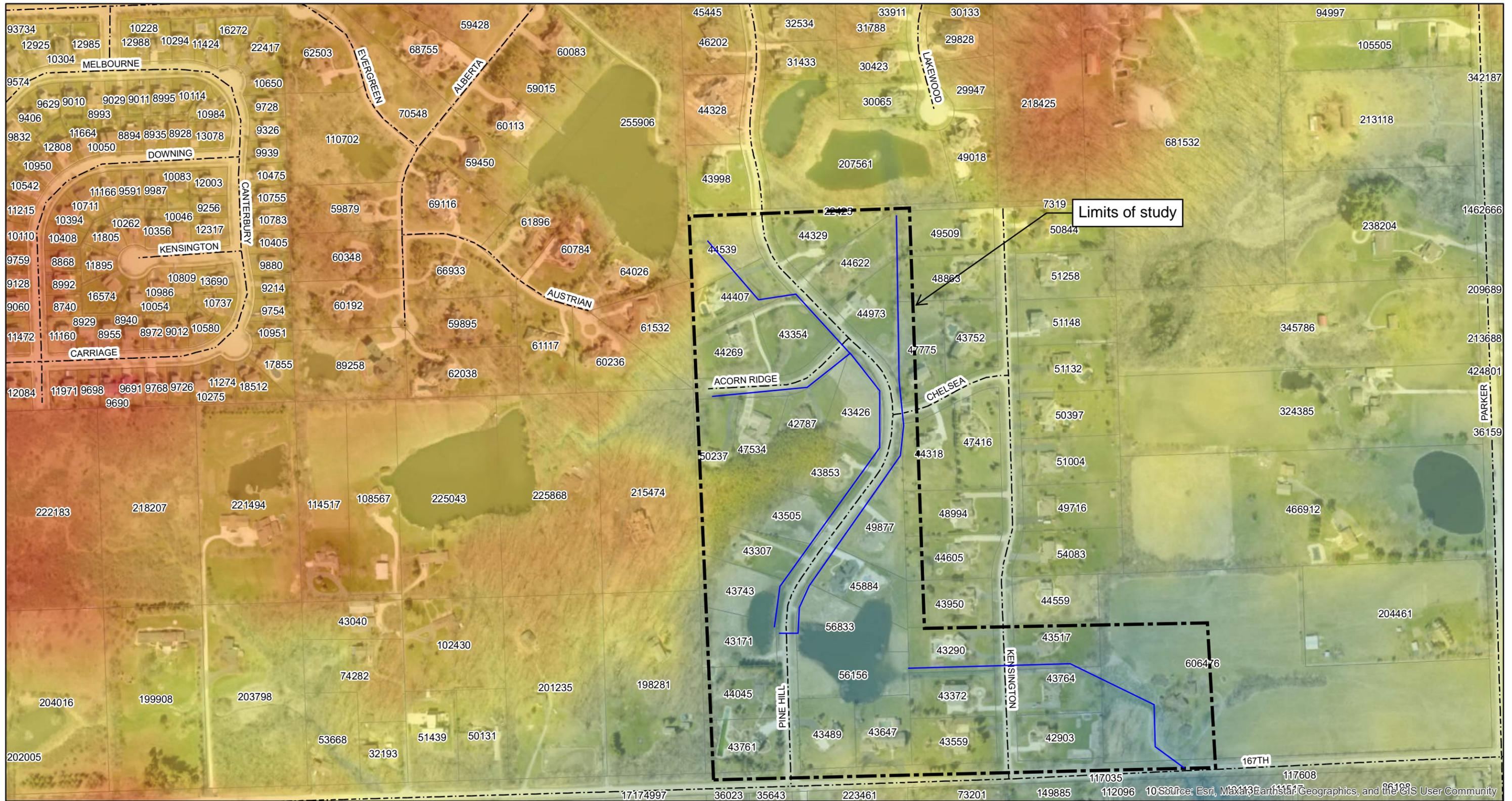
These proposed improvements will require a Village Stormwater Permit to construct.

Note: All options were implemented within proposed HR Green's proposed model. The proposed improvements can be phased if the Village desires. It is highly recommended that all improvements identified at a given location be constructed at the same time to achieve the desired results.

Conclusion

HR Green recommends several improvements be implemented to improve the Pine Hill Drive basin and the Chelsea Court area. The original engineering design for the Pine Hill Drive basin was at an elevation of 723 feet which poses a risk to residents and the roadway during 100-year storms or 1% events. Implementation of a proposed storm sewer, culvert replacement and regrading of the downstream channel and modifying the emergency overflow crest will provide improved performance. In the Chelsea Court area, the existing conditions model verifies that the nearest adjacent resident shows significant risk of flooding. Storm sewer, culvert and ditch improvements are recommended in this area to alleviate the issues experienced by the adjacent residents and reduce flood risks.

This study has reviewed the existing flow patterns and hydrology of the study area along with proposed conditions and solutions. Results of the existing conditions model reflect that the Pine Hill Drive basin is operating similarly to today's existing basin. Many solutions were considered prior to making the recommendations identified in this report. The projects identified will reduce the risk of flooding and damage to private property and infrastructure.



Limits of study

Source: Esri, Maxar, Earthstar, Geographics, and the GIS User Community

**Pine Hill Drive
Stormwater Study**

**Village of Homer Glen
ILLINOIS**

Legend

-  Will County Parcels
-  Will County Streets

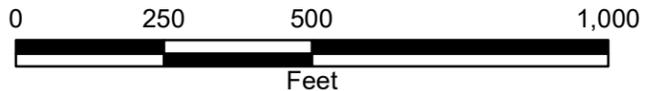
Elevation

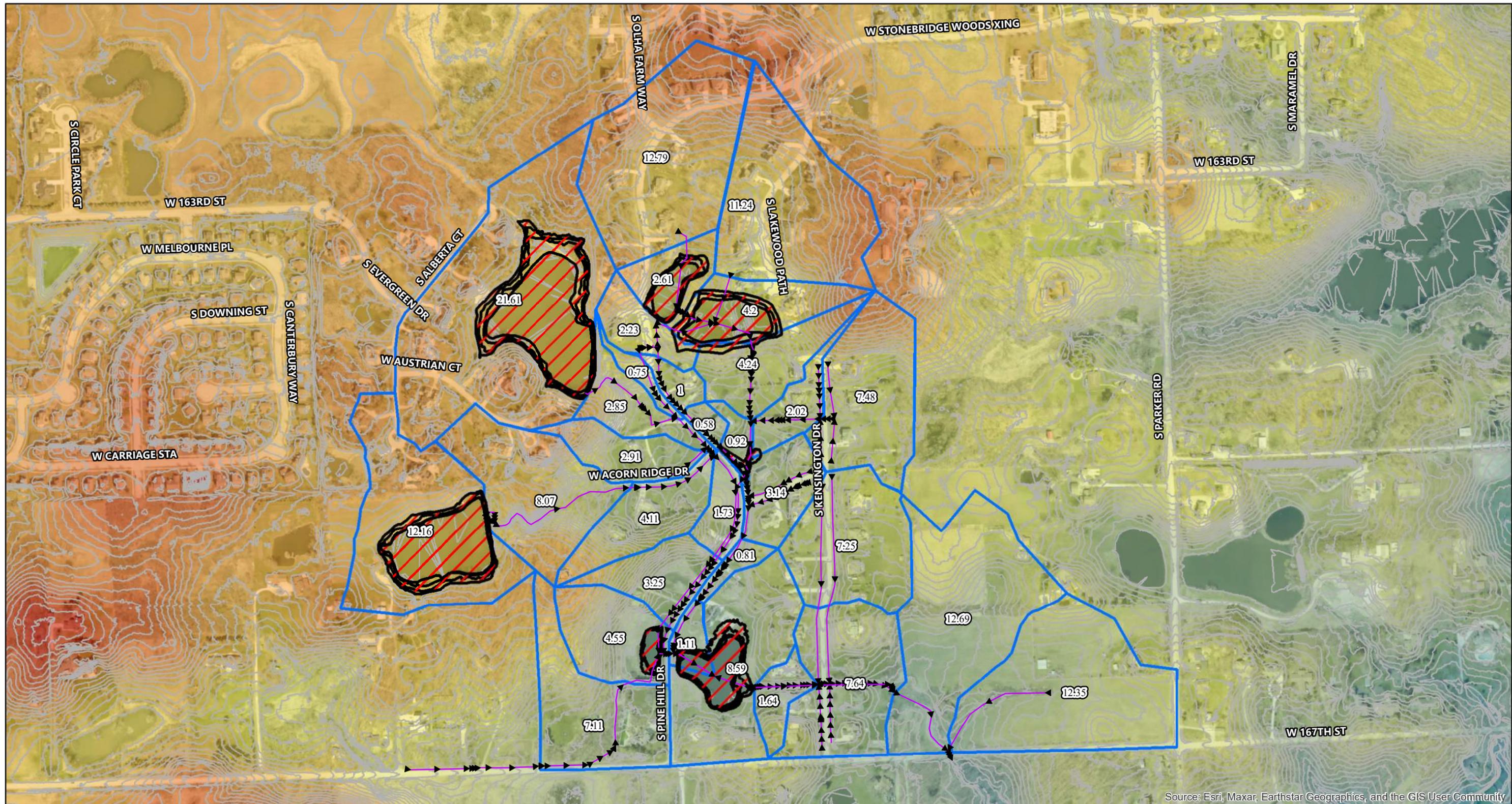


- High : 800
- Low : 710

Data Source: HRG, Will Co., ESRI
 Coordinate System: NAD 1983 2011 StatePlane Illinois East FIPS 1201 Ft US
 Projection: Transverse Mercator
 Datum: NAD 1983 2011
 Units: Foot US







**Pine Hill Drive Stormwater Study
Drainage Pattern Map**

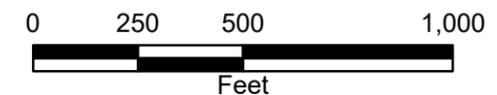
*Village of Homer Glen
ILLINOIS*

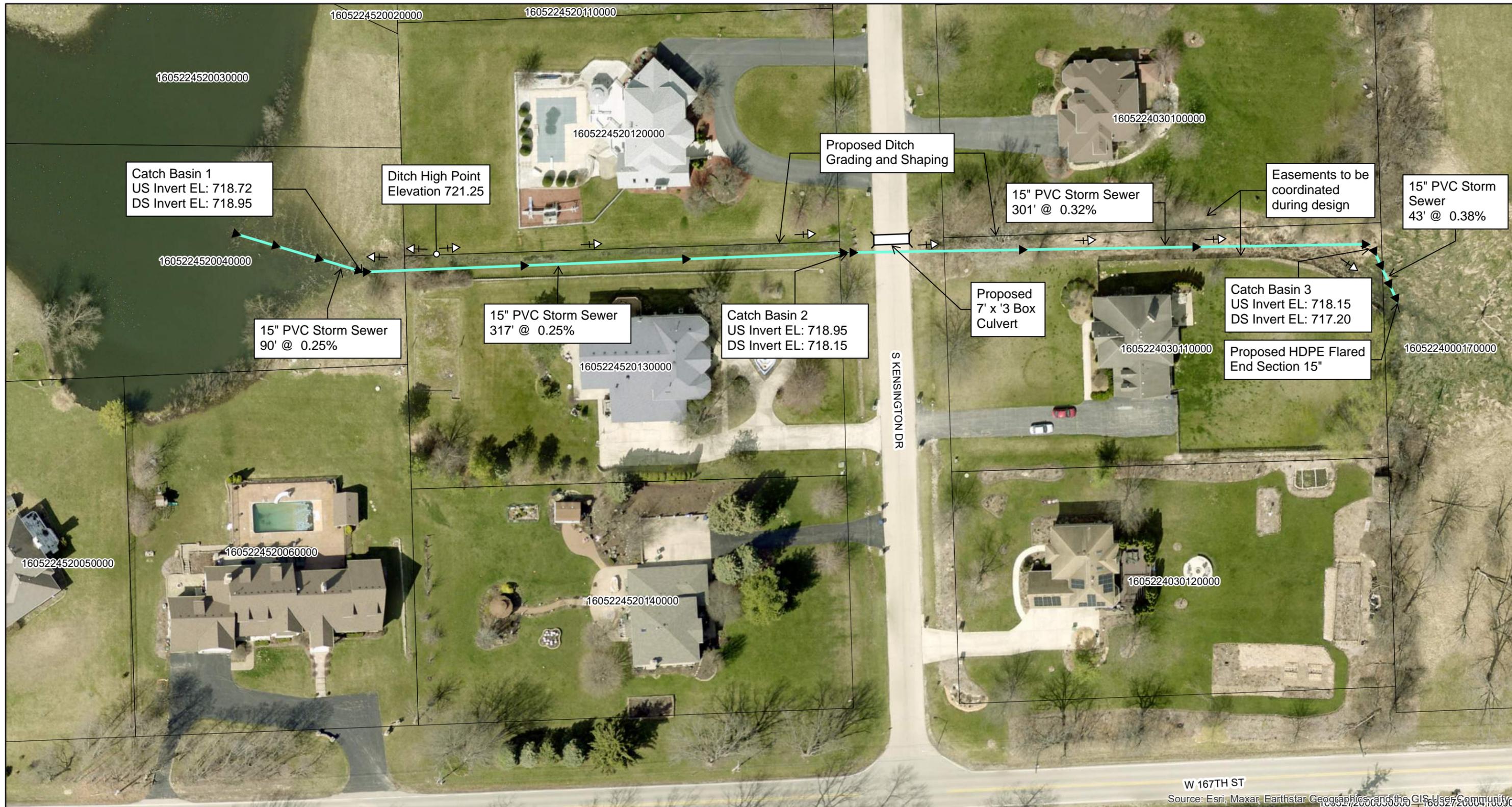
Legend

-  Model Links
-  2-ft Contours
-  Storage
-  Model Catchments



Data Source: HRG, Will Co., ESRI
Coordinate System: NAD 1983 2011 StatePlane Illinois East FIPS 1201 Ft US
Projection: Transverse Mercator
Datum: NAD 1983 2011
Units: Foot US



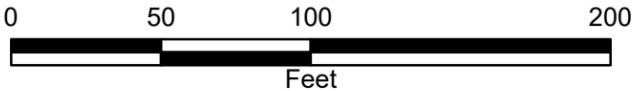


**Pine Hill Drive Stormwater Study
Pine Hill Drive Basin
Recommendations Map**

*Village of Homer Glen
ILLINOIS*

- Legend**
- ▶▶▶▶ Proposed Pipe
 - ▭ Will County Parcels

Data Source: HRG, Will Co., ESRI
 Coordinate System: NAD 1983 2011 StatePlane Illinois East FIPS 1201 Ft US
 Projection: Transverse Mercator
 Datum: NAD 1983 2011
 Units: Foot US




**VILLAGE OF HOMER GLEN
ENGINEER'S OPINION OF PROBABLE COSTS**

PINE HILL DRIVE BASIN CONCEPT					
	CODED PAY ITEMS	UNITS	QTY	UNIT COST	TOTAL COST
1	MOBILIZATION	LSUM	1	\$ 7,500.00	\$ 7,500.00
2	CONSTRUCTION LAYOUT	LSUM	1	\$ 4,500.00	\$ 4,500.00
3	TEMPORARY CONSTRUCTION ENTRANCE	EACH	1	\$ 5,000.00	\$ 5,000.00
6	CLEARING AND GRUBBING	ACRE	0.17	\$ 30,000.00	\$ 5,100.00
7	TREE CLEARING	ACRE	0.17	\$ 45,000.00	\$ 7,650.00
8	GRADING AND SHAPING DITCHES - SPECIAL	FOOT	475	\$ 60.00	\$ 28,500.00
10	PRECAST CONCRETE BOX CULVERTS 7' X 3'	FOOT	45	\$ 450.00	\$ 20,250.00
11	BOX CULVERT END SECTIONS	EACH	2	\$ 7,500.00	\$ 15,000.00
12	CATCH BASINS TO BE ADJUSTED	EACH	1	\$ 750.00	\$ 750.00
13	MANHOLES, TYPE A, 4'-DIAMETER, TYPE 8 GRATE	EACH	2	\$ 4,000.00	\$ 8,000.00
14	STORM SEWER CLASS B, TYPE 1, 15" PVC	FOOT	750	\$ 95.00	\$ 71,250.00
16	HDPE FLARED END SECTIONS, 15"	EACH	1	\$ 350.00	\$ 350.00
17	HMA ROADWAY PATCHING	SQ YD	56	\$ 90.00	\$ 5,040.00
				CONSTRUCTION EOPC	\$ 178,890.00
				TRAFFIC CONTROL COMPLETE (2% CONSTRUCTION)	\$ 3,578.00
				EROSION CONTROL COMPLETE (3% CONSTRUCTION)	\$ 5,367.00
				RESTORATION COMPLETE (6% CONSTRUCTION)	\$ 10,734.00
				TOTAL CONSTRUCTION EOPC	\$ 198,569.00
				CONTINGENCY (30%)	\$ 59,571.00
				TOTAL EOPCC	\$ 258,140.00

HR Green Inc. (HRG) is not a construction cost estimator or construction contractor, nor should HRG'S rendering an opinion of probable construction costs be considered equivalent to the nature and extent of service a construction cost estimator or construction contractor would provide. HRG'S opinion will be based solely upon his or her own experience with construction. This requires HRG to make a number of assumptions as to actual conditions that will be encountered on site; the specific decisions of other design professionals engaged; the means and methods of construction the contractor will employ; the cost and extent of labor, equipment and materials the contractor will employ; contractor's techniques in determining prices and market conditions at the time, and other factors over which HRG has no control. Given the assumptions which must be made, HRG cannot guarantee the accuracy of his or her opinions of cost, and in recognition of that fact, the CLIENT waives any claim against HRG relative to the accuracy of HRG'S opinion of probable construction cost. The current bidding environment and inflation have caused contractor pricing to vary drastically from month to month. Actual prices received during competitive bidding may vary.



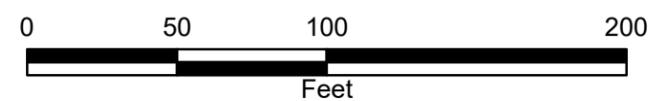
**Pine Hill Drive Stormwater Study
West Chelsea Court
Recommendations Map**

*Village of Homer Glen
ILLINOIS*

Legend

- ▶▶▶▶ Existing Storm Pipe
- ▶▶▶ Proposed Storm Pipe
- ▬▬▬ Proposed Culverts
- ▭ Will County Parcels

Data Source: HRG, Will Co., ESRI
 Coordinate System: NAD 1983 2011 StatePlane Illinois East FIPS 1201 Ft US
 Projection: Transverse Mercator
 Datum: NAD 1983 2011
 Units: Foot US





**VILLAGE OF HOMER GLEN
ENGINEER'S OPINION OF PROBABLE COSTS**

WEST CHELSEA COURT CONCEPT					
	CODED PAY ITEMS	UNITS	QTY	UNIT COST	TOTAL COST
1	MOBILIZATION	LSUM	1	\$ 5,000.00	\$ 5,000.00
2	CONSTRUCTION LAYOUT	LSUM	1	\$ 4,500.00	\$ 4,500.00
3	TEMPORARY CONSTRUCTION ENTRANCE	EACH	1	\$ 5,000.00	\$ 5,000.00
5	GRADING AND SHAPING DITCHES	FOOT	753	\$ 45.00	\$ 33,903.00
6	PIPE CULVERT CLASS A, TYPE 1, 24" RCP	FOOT	44	\$ 160.00	\$ 7,023.00
7	PIPE CULVERT CLASS A, TYPE 1, 30" RCP	FOOT	47	\$ 200.00	\$ 9,320.00
8	PIPE CULVERT REMOVAL	FOOT	90	\$ 30.00	\$ 2,715.00
10	STORM SEWER CLASS A, TYPE 1, 12" RCP	FOOT	15	\$ 120.00	\$ 1,800.00
11	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 12"	EACH	1	\$ 2,000.00	\$ 2,000.00
12	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 24"	EACH	2	\$ 2,750.00	\$ 5,500.00
13	PRECAST REINFORCED CONCRETE FLARED END SECTIONS 30"	EACH	2	\$ 3,000.00	\$ 6,000.00
14	HMA ROADWAY PATCHING	SQ YD	22	\$ 90.00	\$ 1,980.00
15	PCC DRIVEWAY PATCHING	SQ YD	53	\$ 150.00	\$ 7,950.00
				CONSTRUCTION EOPCC	\$ 93,591.00
				TRAFFIC CONTROL COMPLETE (2% CONSTRUCTION)	\$ 1,872.00
				EROSION CONTROL COMPLETE (3% CONSTRUCTION)	\$ 2,808.00
				RESTORATION COMPLETE (6% CONSTRUCTION)	\$ 5,616.00
				TOTAL CONSTRUCTION EOPC	\$ 103,887.00
				CONTINGENCY (30%)	\$ 31,167.00
				TOTAL EOPCC	\$ 135,054.00

HR Green Inc. (HRG) is not a construction cost estimator or construction contractor, nor should HRG'S rendering an opinion of probable construction costs be considered equivalent to the nature and extent of service a construction cost estimator or construction contractor would provide. HRG'S opinion will be based solely upon his or her own experience with construction. This requires HRG to make a number of assumptions as to actual conditions that will be encountered on site; the specific decisions of other design professionals engaged; the means and methods of construction the contractor will employ; the cost and extent of labor, equipment and materials the contractor will employ; contractor's techniques in determining prices and market conditions at the time, and other factors over which HRG has no control. Given the assumptions which must be made, HRG cannot guarantee the accuracy of his or her opinions of cost, and in recognition of that fact, the CLIENT waives any claim against HRG relative to the accuracy of HRG'S opinion of probable construction cost. The current bidding environment and inflation have caused contractor pricing to vary drastically from month to month. Actual prices received during competitive bidding may vary.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 1** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

1. Surface description (table 3-1)	Segment ID	U		
2. Mannings roughness coeff., (table 3-1)		0.15		
3. Flow Length, L (total L not >100 ft)	ft	100		
4. Two-yr 24-hr rainfall, P2	in	3.34		
5. Land Slope, s	ft/ft	0.024		
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$	hr	0.15	+	0.15 = 8.9

U/S. Elev. **744.29** U/S. Elev.
 D/S. Elev. **741.85** D/S. Elev.

Shallow Concentrated flow

7. Surface Description (paved, "P" or unpaved, "U")	U	P	U or P only
8. Flow length, L	ft	86	0
9. Watercourse slope, s	ft/ft	0.049	#VALUE!
10. Average velocity V (figure 3-1)	ft/s	3.57	
11. $Tt = L/3600V$	hr	0.01	0.01 = 0.4

U/S. Elev. **741.85** U/S. Elev.
 D/S. Elev. **737.63** D/S. Elev.

Channel Flow

12. Cross sectional flow area, a	ft^2	22	6	
13. Wetted perimeter, Pw	ft	19.5	9.3	
14. Hydraulic radius, R=a/Pw	ft	1.129	0.643462	
15. Channel Slope, s	ft/ft	0.01448	0.0159	
16. Mannings roughness coeff., n		0.035	0.035	
17. $V = (1.49 * R^{2/3} * s^{1/2}) / n$	ft/s	5.55	4.00	
18. Flow length, L	ft	290	1033	
19. $Tt = L/3600V$	hr	0.01	0.07	0.09 + 5.2 = 5.29
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr			0.24 14.43 min

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter
 Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Stream
 U/S. Elev. **721.20** U/S. Elev. **737.63**
 D/S. Elev. **717.00** D/S. Elev. **721.20**

Assumed Channel Q= 146.19

Table 3.1 - Roughness coefficients (Manning's n) for sheet flow

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 2** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

1. Surface description (table 3-1)	Segment ID				
2. Mannings roughness coeff., (table 3-1)		U			
3. Flow Length, L (total L not >100 ft)	ft	0.15			
4. Two-yr 24-hr rainfall, P2	in	100			
5. Land Slope, s	ft/ft	3.34			
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$	hr	0.062			
		0.10	+		= 0.10 6.1

U/S. Elev. **773.76** U/S. Elev.
 D/S. Elev. **767.57** D/S. Elev.

Shallow Concentrated flow

7. Surface Description (paved, "P" or unpaved, "U")	U	P	U or P only	
8. Flow length, L	ft	750	124	
9. Watercourse slope, s	ft/ft	0.032	0.035	
10. Average velocity V (figure 3-1)	ft/s	2.88	3.79	
11. $Tt = L/3600V$	hr	0.07	0.01	= 0.08 4.9

U/S. Elev. **767.57** U/S. Elev. **743.74**
 D/S. Elev. **743.74** D/S. Elev. **739.43**

Channel Flow

12. Cross sectional flow area, a	ft^2		6		
13. Wetted perimeter, Pw	ft		9.3		
14. Hydraulic radius. $R=a/Pw$	ft		0.643462		
15. Channel Slope, s	ft/ft		0.017		
16. Mannings roughness coeff., n			0.035		
17. $V=(1.49r^{2/3}s^{1/2})/n$	ft/s		4.19		
18. Flow length, L	ft		1220.43		
19. $Tt = L/3600V$	hr		0.08		4.9
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr		0.26	15.85	min

Stream
 3 Bottom Width U/S. Elev. **739.43**
 4 Side Slope D/S. Elev. **718.12**
 2 Depth
 22 Area
 19.5 Perimeter
 Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Assumed Channel Q= 25.16

Table 3.1 - Roughness coefficients (Manning's n) for sheet flow

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 3** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

Segment ID	U	P	
1. Surface description (table 3-1)	0.15	0.011	
2. Mannings roughness coeff., (table 3-1)	100	0	
3. Flow Length, L (total L not >100 ft)	3.34	3.34	
4. Two-yr 24-hr rainfall, P2	0.160		
5. Land Slope, s	0.07		
6. $Tt = (0.007(nL)^{0.8})(P2^{0.5}s^{0.4})$			4.2

U/S. Elev. **794.97** U/S. Elev.
 D/S. Elev. **778.99** D/S. Elev.

Shallow Concentrated flow

Segment ID	U	P	U or P only
7. Surface Description (paved, "P" or unpaved, "U")	917	0	
8. Flow length, L	0.024		
9. Watercourse slope, s	2.49		
10. Average velocity V (figure 3-1)	0.10		
11. $Tt = L/3600V$			6.1

U/S. Elev. **778.99** U/S. Elev.
 D/S. Elev. **757.18** D/S. Elev.

Channel Flow

Segment ID	U	P	
12. Cross sectional flow area, a			
13. Wetted perimeter, Pw	0.000	0	
14. Hydraulic radius. $R=a/Pw$			
15. Channel Slope, s			
16. Mannings roughness coeff., n			
17. $V=(1.49r^{2/3}s^{1/2})/n$			
18. Flow length, L			
19. $Tt = L/3600V$			
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			0.00
Assumed Channel Q= 0.00			
			0.17 10.32 min

Stream
 3 Bottom Width U/S. Elev.
 4 Side Slope D/S. Elev.
 2 Depth

22 Area
 19.5 Perimeter
 Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Table 3.1 - Roughness coefficients (Manning's n) for sheet flow

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 4** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

Segment ID	U	P	
1. Surface description (table 3-1)	0.15	0.011	
2. Mannings roughness coeff., (table 3-1)	100	0	
3. Flow Length, L (total L not >100 ft)	3.34	3.34	
4. Two-yr 24-hr rainfall, P2	0.016		
5. Land Slope, s	0.17		
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$			0.17

10.5

U/S. Elev. **770.7** U/S. Elev.
 D/S. Elev. **769.10** D/S. Elev.

Shallow Concentrated flow

Segment ID	U	P	U or P only
7. Surface Description (paved,"P" or unpaved,"U")	679	0	
8. Flow length, L	0.018		
9. Watercourse slope, s	2.15		
10. Average velocity V (figure 3-1)	0.09		
11. $Tt = L/3600V$			0.09

5.3

U/S. Elev. **769.10** U/S. Elev.
 D/S. Elev. **757.05** D/S. Elev.

Channel Flow

Segment ID	U	P	
12. Cross sectional flow area, a			
13. Wetted perimeter, Pw	0.000	0	
14. Hydraulic radius. $R=a/Pw$			
15. Channel Slope, s			
16. Mannings roughness coeff., n			
17. $V=(1.49*r^{2/3})/n$			
18. Flow length, L			
19. $Tt = L/3600V$			0.00
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			0.26 15.75

min

Ditch
 3 Bottom Width U/S. Elev.
 3 Side Slope D/S. Elev.
 1 Depth
 6 Area
 9.3 Perimeter
 Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Assumed Channel Q= 0.00

Table 3.1 - Roughness coefficients (Manning's n) for sheet flow

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

SCENARIO 2

Sheet Flow (Applicable to Tc only)

Segment ID	U	P	
1. Surface description (table 3-1)	0.15		
2. Mannings roughness coeff., (table 3-1)	100		
3. Flow Length, L (total L not >100 ft)	3.34		
4. Two-yr 24-hr rainfall, P2	0.054		
5. Land Slope, s	0.11		
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$			0.11

6.4

U/S. Elev. **747.88** U/S. Elev.
 D/S. Elev. **742.47** D/S. Elev.

Shallow Concentrated flow

Segment ID	U	P	U or P only
7. Surface Description (paved,"P" or unpaved,"U")	700	43	
8. Flow length, L	0.038		
9. Watercourse slope, s	3.16		
10. Average velocity V (figure 3-1)	0.06		
11. $Tt = L/3600V$			0.06

3.7

U/S. Elev. **743.65** U/S. Elev.
 D/S. Elev. **716.80** D/S. Elev.

Channel Flow

Segment ID	U	P	
12. Cross sectional flow area, a	22	0	
13. Wetted perimeter, Pw	19.5	0	
14. Hydraulic radius. $R=a/Pw$	1.129	0	
15. Channel Slope, s	0.004	0.01	
16. Mannings roughness coeff., n	0.035	0.035	
17. $V=(1.49*r^{2/3})/n$	2.86	0.00	
18. Flow length, L	333	0	
19. $Tt = L/3600V$	0.03	0.00	0.03 1.94
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			0.20 12.07

min

Stream
 3 Bottom Width U/S. Elev. **716.80**
 4 Side Slope D/S. Elev. **715.52**
 2 Depth
 22 Area
 19.5 Perimeter
 Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Assumed Channel Q= 62.95

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 5** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

1. Surface description (table 3-1)
2. Mannings roughness coeff., (table 3-1)
3. Flow Length, L (total L not >100 ft)
4. Two-yr 24-hr rainfall, P2
5. Land Slope, s
6. $T_t = (0.007(nL)^{0.8})(P2^{0.5}s^{0.4})$

Segment ID			
	U		
	0.15		
ft	100		
in	3.34		
ft/ft	0.031		
hr	0.13	+	= 0.13

U/S. Elev. **783.71** U/S. Elev.
 D/S. Elev. **780.62** D/S. Elev.

Shallow Concentrated flow

7. Surface Description (paved, "P" or unpaved, "U")
8. Flow length, L
9. Watercourse slope, s
10. Average velocity V (figure 3-1)
11. $T_t = L/3600V$

Segment ID	U	P	U or P only
	650	32	
ft	0.040	0.056	
ft/s	3.21	4.81	
hr	0.06	0.00	= 0.06

U/S. Elev. **780.62** U/S. Elev. **771.69**
 D/S. Elev. **754.92** D/S. Elev. **769.93**

Channel Flow

12. Cross sectional flow area, a
13. Wetted perimeter, Pw
14. Hydraulic radius. $R=a/Pw$
15. Channel Slope, s
16. Mannings roughness coeff., n
17. $V=(1.49r^{49}r^{2/3})^{2/3}s^{1/2}/n$
18. Flow length, L
19. $T_t = L/3600V$
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

Segment ID			
ft ²			
ft			
ft	0.000	0	
ft/ft			
ft/s			
ft			
hr			= 0.00
hr	0.19	11.54	min

Ditch
 3 Bottom Width U/S. Elev.
 3 Side Slope D/S. Elev.
 1 Depth
 6 Area
 9.3 Perimeter

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Assumed Channel Q= 0.00

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 6** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

Segment ID	U	P	
1. Surface description (table 3-1)	0.15	0.011	
2. Mannings roughness coeff., (table 3-1)	100	0	
3. Flow Length, L (total L not >100 ft)	3.34	3.34	
4. Two-yr 24-hr rainfall, P2	0.051		
5. Land Slope, s	0.11		
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$			0.11

6.6

U/S. Elev. **730.26** U/S. Elev.
 D/S. Elev. **725.18** D/S. Elev.

Shallow Concentrated flow

Segment ID	U	P	U or P only
7. Surface Description (paved,"P" or unpaved,"U")	687	0	
8. Flow length, L	0.000		
9. Watercourse slope, s	0.00		
10. Average velocity V (figure 3-1)	0.00		
11. $Tt = L/3600V$	0.00		0.00

0.0

U/S. Elev. U/S. Elev.
 D/S. Elev. D/S. Elev.

Channel Flow

Segment ID	U	P	
12. Cross sectional flow area, a	6		
13. Wetted perimeter, Pw	9.3		
14. Hydraulic radius, R=a/Pw	0.643		
15. Channel Slope, s	0.041		
16. Mannings roughness coeff., n	0.035		
17. $V = (1.49 * r^{2/3} * s^{1/2}) / n$	6.45		
18. Flow length, L	555		
19. $Tt = L/3600V$	0.02		0.02
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			0.13 8.04

hr min

Ditch
 3 Bottom Width U/S. Elev. **744.08**
 3 Side Slope D/S. Elev. **721.14**
 1 Depth
 6 Area
 9.3 Perimeter

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Assumed Channel Q= 38.71

Table 3.1 - Roughness coefficients (Manning's n) for sheet flow

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover >20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

SCENARIO 2

Sheet Flow (Applicable to Tc only)

Segment ID	U	P	
1. Surface description (table 3-1)	0.15		
2. Mannings roughness coeff., (table 3-1)	100		
3. Flow Length, L (total L not >100 ft)	3.34		
4. Two-yr 24-hr rainfall, P2	0.014		
5. Land Slope, s	0.18		
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$			0.18

11.0

U/S. Elev. **736.62** U/S. Elev.
 D/S. Elev. **735.21** D/S. Elev.

Shallow Concentrated flow

Segment ID	U	P	U or P only
7. Surface Description (paved,"P" or unpaved,"U")	346		
8. Flow length, L	0.044		
9. Watercourse slope, s	3.37	0.00	
10. Average velocity V (figure 3-1)	0.03	0.00	
11. $Tt = L/3600V$			0.03

1.7

U/S. Elev. **735.21** U/S. Elev.
 D/S. Elev. **720.14** D/S. Elev.

Channel Flow

Segment ID	U	P	
12. Cross sectional flow area, a			
13. Wetted perimeter, Pw			
14. Hydraulic radius, R=a/Pw			
15. Channel Slope, s			
16. Mannings roughness coeff., n			
17. $V = (1.49 * r^{2/3} * s^{1/2}) / n$			
18. Flow length, L			
19. $Tt = L/3600V$			0.00
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)			0.21 12.74

hr min

Stream
 3 Bottom Width U/S. Elev.
 4 Side Slope D/S. Elev.
 2 Depth
 22 Area
 19.5 Perimeter

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Assumed Channel Q= 0.00

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 7** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

- Surface description (table 3-1)
- Mannings roughness coeff., (table 3-1)
- Flow Length, L (total L not >100 ft)
- Two-yr 24-hr rainfall, P2
- Land Slope, s
- $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$

Segment ID	U	P	
		0.011	
ft	0		
in	3.34		
ft/ft			
hr			0.00

U/S. Elev. **774.69** U/S. Elev. **774.69**
 D/S. Elev. **769.24** D/S. Elev. **769.24**

Shallow Concentrated flow

- Surface Description (paved, "P" or unpaved, "U")
- Flow length, L
- Watercourse slope, s
- Average velocity V (figure 3-1)
- $Tt = L/3600V$

Segment ID	U	P	U or P only
		234	
ft	691		
ft/ft	0.046	0.013	
ft/s	3.47	2.33	
hr	0.06	0.03	0.08

U/S. Elev. **766.15** U/S. Elev. **769.24**
 D/S. Elev. **734.24** D/S. Elev. **766.15**

Channel Flow

- Cross sectional flow area, a
- Wetted perimeter, Pw
- Hydraulic radius, R=a/Pw
- Channel Slope, s
- Mannings roughness coeff., n
- $V = (1.49 * r^{2/3} * s^{1/2}) / n$
- Flow length, L
- $Tt = L/3600V$
- Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

Segment ID	6	
ft^2		
ft	9.3	
ft	0.643462	
ft/ft	0.0159	
	0.035	
ft/s	4.00	
ft	506.08	
hr	0.04	0.04

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter
 Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Stream U/S. Elev. **734.24** U/S. Elev. **734.24**
 D/S. Elev. **726.20** D/S. Elev. **726.20**

Assumed Channel Q= 24.00

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

SCENARIO 2

Sheet Flow (Applicable to Tc only)

- Surface description (table 3-1)
- Mannings roughness coeff., (table 3-1)
- Flow Length, L (total L not >100 ft)
- Two-yr 24-hr rainfall, P2
- Land Slope, s
- $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$

Segment ID	U	P	
	0.15		
ft	100		
in	3.34		
ft/ft	0.050		
hr	0.11		0.11

U/S. Elev. **771.9** U/S. Elev. **771.9**
 D/S. Elev. **766.89** D/S. Elev. **766.89**

Shallow Concentrated flow

- Surface Description (paved, "P" or unpaved, "U")
- Flow length, L
- Watercourse slope, s
- Average velocity V (figure 3-1)
- $Tt = L/3600V$

Segment ID	U	P	U or P only
ft	428		
ft/ft	0.037		
ft/s	3.12		
hr	0.04		0.04

U/S. Elev. **766.89** U/S. Elev. **766.89**
 D/S. Elev. **750.92** D/S. Elev. **750.92**

Channel Flow

- Cross sectional flow area, a
- Wetted perimeter, Pw
- Hydraulic radius, R=a/Pw
- Channel Slope, s
- Mannings roughness coeff., n
- $V = (1.49 * r^{2/3} * s^{1/2}) / n$
- Flow length, L
- $Tt = L/3600V$
- Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

Segment ID	22	6	
ft^2			
ft	19.5	9.3	
ft	1.128644	0.643462	
ft/ft	0.0253	0.0159	
	0.035	0.035	
ft/s	7.34	4.00	
ft	658.54	506.08	
hr	0.02	0.04	0.06

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter
 Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Stream U/S. Elev. **734.24** U/S. Elev. **750.92**
 D/S. Elev. **726.20** D/S. Elev. **734.24**

Assumed Channel Q= 161.58

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Homer Glen, Pine Hill Drive, Drain 8** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

1. Surface description (table 3-1)	Segment ID	U			
2. Mannings roughness coeff., (table 3-1)		0.15			
3. Flow Length, L (total L not >100 ft)	ft	100			
4. Two-yr 24-hr rainfall, P2	in	3.34			
5. Land Slope, s	ft/ft	0.024			
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$	hr	0.15	+		= 0.15 8.8

U/S. Elev. **776.92** U/S. Elev.
 D/S. Elev. **774.47** D/S. Elev.

Shallow Concentrated flow

7. Surface Description (paved, "P" or unpaved, "U")	U			U or P only	
8. Flow length, L	ft	585			
9. Watercourse slope, s	ft/ft	0.064			
10. Average velocity V (figure 3-1)	ft/s	4.09			
11. $Tt = L/3600V$	hr	0.04	+		= 0.04 2.4

U/S. Elev. **774.47** U/S. Elev.
 D/S. Elev. **736.79** D/S. Elev.

Channel Flow

12. Cross sectional flow area, a	ft^2	6			
13. Wetted perimeter, Pw	ft	9.3			
14. Hydraulic radius, R=a/Pw	ft	0.643462			
15. Channel Slope, s	ft/ft	0.0125			
16. Mannings roughness coeff., n		0.035			
17. $V = (1.49 * r^{2/3} * s^{1/2}) / n$	ft/s	3.55			
18. Flow length, L	ft	543			
19. $Tt = L/3600V$	hr	0.04	+		= 0.04
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.23	+	13.77	= 13.77 min

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter
 Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

U/S. Elev. **736.79** U/S. Elev.
 D/S. Elev. **730.00** D/S. Elev.

Assumed Channel Q= 21.29

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

SCENARIO 2

Sheet Flow (Applicable to Tc only)

1. Surface description (table 3-1)	Segment ID	U			
2. Mannings roughness coeff., (table 3-1)		0.15			
3. Flow Length, L (total L not >100 ft)	ft	100			
4. Two-yr 24-hr rainfall, P2	in	3.34			
5. Land Slope, s	ft/ft	0.042			
6. $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$	hr	0.12	+		= 0.12 7.1

U/S. Elev. **747.88** U/S. Elev.
 D/S. Elev. **743.65** D/S. Elev.

Shallow Concentrated flow

7. Surface Description (paved, "P" or unpaved, "U")	U			U or P only	
8. Flow length, L	ft	1052			
9. Watercourse slope, s	ft/ft	0.026			
10. Average velocity V (figure 3-1)	ft/s	2.58			
11. $Tt = L/3600V$	hr	0.11	+		= 0.11 6.8

U/S. Elev. **743.65** U/S. Elev.
 D/S. Elev. **716.80** D/S. Elev.

Channel Flow

12. Cross sectional flow area, a	ft^2	22			
13. Wetted perimeter, Pw	ft	19.5			
14. Hydraulic radius, R=a/Pw	ft	1.129			
15. Channel Slope, s	ft/ft	0.004			
16. Mannings roughness coeff., n		0.035			
17. $V = (1.49 * r^{2/3} * s^{1/2}) / n$	ft/s	2.86			
18. Flow length, L	ft	333			
19. $Tt = L/3600V$	hr	0.03	+		= 0.03
20. Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)	hr	0.26	+	15.85	= 15.85 min

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter
 Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

U/S. Elev. **716.80** U/S. Elev.
 D/S. Elev. **715.52** D/S. Elev.

Assumed Channel Q= 62.95

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Home Glen, Pine Hill Drive, Drain 10** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

- Surface description (table 3-1)
- Mannings roughness coeff., (table 3-1)
- Flow Length, L (total L not >100 ft)
- Two-yr 24-hr rainfall, P2
- Land Slope, s
- $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$

Segment ID					
	U				
	0.15				
	100				
	3.34				
	0.123				
	0.08	+		=	0.08
					4.6

U/S. Elev. **744.09** U/S. Elev. **744.09**
 D/S. Elev. **731.82** D/S. Elev. **731.82**

Shallow Concentrated flow

- Surface Description (paved, "P" or unpaved, "U")
- Flow length, L
- Watercourse slope, s
- Average velocity V (figure 3-1)
- $Tt = L/3600V$

	U				
	250				
	0.043				
	3.34				
	0.02	+		=	0.02
					1.2

U/S. Elev. **731.82** U/S. Elev. **731.82**
 D/S. Elev. **721.08** D/S. Elev. **721.08**

Channel Flow

- Cross sectional flow area, a
- Wetted perimeter, Pw
- Hydraulic radius. $R=a/Pw$
- Channel Slope, s
- Mannings roughness coeff., n
- $V=(1.49*r^{2/3})/n$
- Flow length, L
- $Tt = L/3600V$
- Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

	22				
	19.5				
	1.129				
	0.01461				
	0.035				
	5.58				
	288				
	0.01	+		=	0.01
					0.9
					0.11
					6.75

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

Stream U/S. Elev. **719.72** U/S. Elev. **719.72**
 D/S. Elev. **715.52** D/S. Elev. **715.52**

Assumed Channel Q= 122.71

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.

Worksheet 1: Time of concentration (Tc) or travel time (Tt)

Project **Pine Hill Drive** By **RY** Date **7/20/2023**
 Location **Home Glen, Pine Hill Drive, Drain 11** Checked **LG** Date **11/15/2023**
 Circle one: Present Developed
 Circle one: Tc Tt through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
 Include a map, schematic, or description of flow segments.

SCENARIO 1

Sheet Flow (Applicable to Tc only)

- Surface description (table 3-1)
- Mannings roughness coeff., (table 3-1)
- Flow Length, L (total L not >100 ft)
- Two-yr 24-hr rainfall, P2
- Land Slope, s
- $Tt = (0.007(nL)^{0.8}) / (P2^{0.5} s^{0.4})$

Segment ID	U	P
1	0.15	0.011
2	100	0
3	3.34	3.34
4	0.038	
5	0.12	
+ = 0.12		

7.4

U/S. Elev. **747.88** U/S. Elev. **747.88**
 D/S. Elev. **744.08** D/S. Elev. **744.08**

Shallow Concentrated flow

- Surface Description (paved, "P" or unpaved, "U")
- Flow length, L
- Watercourse slope, s
- Average velocity V (figure 3-1)
- $Tt = L/3600V$

Segment ID	U	P
7	687	0
8	0.018	
9	2.16	
10	0.09	
+ = 0.09		

5.3

U/S. Elev. **744.08** U/S. Elev. **744.08**
 D/S. Elev. **731.82** D/S. Elev. **731.82**

Channel Flow

- Cross sectional flow area, a
- Wetted perimeter, Pw
- Hydraulic radius. $R=a/Pw$
- Channel Slope, s
- Mannings roughness coeff., n
- $V=(1.49r^{49}(2/3)^{49}s^{49}(1/2)) / n$
- Flow length, L
- $Tt = L/3600V$
- Watershed or subarea Tc or Tt (add Tt in steps 6, 11, and 19)

Segment ID	U	P
12	22	6
13	19.5	9.3
14	1.129	0.643462
15	0.00564	0.0204
16	0.035	0.035
17	3.46	4.53
18	745	593
19	0.06	0.04
+ = 0.10		

5.8

Ditch
 3 Bottom Width
 3 Side Slope
 1 Depth
 6 Area
 9.3 Perimeter

Stream
 3 Bottom Width
 4 Side Slope
 2 Depth
 22 Area
 19.5 Perimeter

U/S. Elev. **719.72** U/S. Elev. **731.82**
 D/S. Elev. **715.52** D/S. Elev. **719.72**

Assumed Channel Q= 103.42

Smooth surfaces (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover < 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short Grass Prairie	0.15
Dense Grasses (blue grass, native grass mixtures)	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods:	
Light underbrush	0.40
Dense underbrush	0.80

Note: when selecting n in woods consider cover to a height of about 0.1 ft.



JOB: PineHill Drive - Homer Glen
BY: RMY
Date: 9/20/23
Checked BY:
Print Date: 11/16/23

*** For Wet Ponds (ALL but DA8) bottom elevation is the normal water level

DA 2 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume	
719.00	0.26	0.00	0.00	Normal Water Elevation
720.00	0.32	0.29	0.29	
721.00	0.42	0.37	0.65	HWL

DA 3 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume	
756.00	2.87	0.00	0.00	Normal Water Elevation
757.00	3.11	2.99	2.99	
758.00	4.11	3.59	6.58	
759.00	5.11	4.60	11.18	HWL

DA 4 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume	
756.00	4.00	0.00	0.00	Normal Water Elevation
757.00	5.07	4.53	4.53	
758.00	5.77	5.42	9.94	
759.00	6.39	6.07	16.02	HWL

DA 6 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume
718.60	1.10	0.00	0.00
719.00	1.209761	0.46	0.46
720.00	1.358393	1.28	1.75
721.00	1.570762	1.46	3.21
722.00	1.897691	1.73	4.94
723.00	2.331314	2.11	7.05

Normal Water Elevation (Geotech Inc. as built 2001)

HWL

model node invert -->

	model depth (ft)	model area (ac)
718.25	0	
718.60	0.35	1.10
719.00	0.75	1.209761
720.00	1.75	1.358393
721.00	2.75	1.570762
722.00	3.75	1.897691
723.00	4.75	2.331314

DA 8 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume
724.00	0.004	0.00	0.00
725.00	0.02	0.01	0.01
726.00	0.22	0.10	0.11

Normal Water Elevation

HWL

DA 8 Storage Proposed

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume
724.00	0.10	0.00	0.00
725.00	0.18	0.14	0.14
726.00	0.22	0.20	0.34

Normal Water Elevation

HWL

DA 9 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume
741.00	1.39	0.00	0.00
744.00	1.66	4.56	4.56
746.00	1.83	3.49	8.05

Normal Water Elevation

HWL

DA 5 Storage

Elevation (ft)	Area (acres)	Volume (ac-ft)	Cumulative Volume
752.00	0.66	0.00	0.00
753.00	0.86	0.76	0.76
754.00	1.07	0.96	1.72

Normal Water Elevation

HWL

Inlet Capacities per IDOT Design Manual
Neenah 4340-B (Type 8 grate) - XP Node 895
EXISTING CONDITIONS

Node Critical Storm = 10yr 2hr

Flow = 2.965

1.1 = Free open area of grate (sq. ft.)
 6 = Weir Perimeter of grate (ft.)

---- Capacity Calculation ----

Ponding	Weir Equation	Orifice Equation	Net Capacity	Weir/Orifice ratio	Flow Type		
0.050	0.20	1.18	0.20	0.17	Weir Flow		
0.100	0.57	1.67	0.57	0.34	Weir Flow		
0.150	1.05	2.05	1.05	0.51	Weir Flow		
0.170	1.26	2.18	1.26	0.58	Weir Flow		
0.200	1.61	2.37	1.59	0.68	Transition Flow		
0.250	2.25	2.65	1.96	0.85	Transition Flow		
0.313	3.16	2.96	2.45	1.06	Transition Flow	weir = 0.300	orifice = 0.313
0.363	3.94	3.19	2.85	1.23	Transition Flow		
0.413	4.78	3.40	3.27	1.40	Transition Flow		
0.463	5.68	3.61	3.61	1.57	Orifice Flow		
0.513	6.62	3.79	3.79	1.74	Orifice Flow		
0.563	7.61	3.98	3.98	1.91	Orifice Flow		
0.613	8.64	4.15	4.15	2.08	Orifice Flow		
0.663	9.72	4.31	4.31	2.25	Orifice Flow		
0.713	10.84	4.47	4.47	2.42	Orifice Flow		
0.763	12.00	4.63	4.63	2.59	Orifice Flow		
1.013	18.36	5.33	5.33	3.44	Orifice Flow		
1.263	25.56	5.95	5.95	4.29	Orifice Flow		
1.513	33.51	6.52	6.52	5.14	Orifice Flow		
1.763	42.15	7.03	7.03	5.99	Orifice Flow		
2.013	51.42	7.52	7.52	6.84	Orifice Flow		
2.263	61.29	7.97	7.97	7.69	Orifice Flow		
2.513	71.72	8.40	8.40	8.54	Orifice Flow		
2.763	82.68	8.80	8.80	9.39	Orifice Flow		
3.013	94.15	9.19	9.19	10.24	Orifice Flow		

Notes:

Equations used

$Q=0.6A(2gh)^{0.5}$

$Q=3P(h)^{1.5}$

where:

A= free open area of grate

P= weir perimeter

h= feet of head (ponding depth)

g= 32.2 feet per sec/sec

Q=capacity of grate in CFS

Orifice equation

Weir equation

Net total flow is the lower of the two equations except where the ratio of the two solutions is between 0.667 and 1.5. In the latter case the net flow is 80% of the average of the two solutions as an approximation of transitional flow.

Table 1 - Area Weighted Runoff Curve Number Calculation

07/19/23

Existing Conditions per Aerial Photography

Sub-area Name	Total Area (ac)	SOURCE											Composite RCN	Pervious Area RCN	Area (sq.-mi.)				
		Imp RD-1ac-C RCN = 79	Imp SR-pcss-C RCN = 98	Woods-gc-C RCN = 70	Woods-fc-C RCN = 73	Woods-pc-C RCN = 77	OS-pc-C RCN = 86	OS-fc-C RCN = 79	OS-gc-C RCN = 74	RD-1ac-D RCN = 84	Imp Water RCN = 99	Imp RD-0.5ac-C RCN = 80				Woods-fc-D RCN = 79			
1	14.93	13.27	0.81				0.85										80.4	86.0	0.0233
2	29.40	6.50	1.00	1.15	1.50	10.00	2.90	3.50	2.00		0.35	0.50					78.9	77.6	0.0459
3	22.04	3.85		1.20	3.00	1.20		5.04	1.70		3.95	2.10					80.9	75.7	0.0344
4	30.35	16.00	2.20	5.35	1.15			1.15			4.50						81.5	71.8	0.0474
5	12.38	6.00			2.90					1.48		2.00					77.2	73.3	0.0193
6	10.76	7.30	0.75				0.60		0.61		1.50						83.2	80.0	0.0168
7	22.45	5.30	2.00	1.00	9.25	1.05	1.00	1.00	1.00	0.85							78.0	75.0	0.0351
8	14.60	7.00	0.75		4.50			1.30		0.80				0.25			78.4	75.6	0.0228
10	1.63	1.00							0.63								77.1	74.0	0.0025
9	18.41	7.75	1.30		4.97		1.00	1.39			2.00						81.3	75.9	0.0288
11	25.00	0.5		2.20			1.00	9.50	11.80								76.1	76.1	0.0391
12	3.15	2.5	0.2					0.45									80.2	79.0	0.0049
13	0.00																78.1		0.0000
14	0.00																77.8		0.0000

NOTES

actually 18.689 ac total
actually 7.174 ac total

7.48094 ac total
3.81563 ac total

Legend	
RD-1ac-C	Residential development for avg lot size of 1 acre
SR-pcss-C	Streets and road
Woods-gc-C	Woods good condition
Woods-fc-C	Woods fair condition
Woods-pc-C	Woods poor condition
OS-pc-C	Open space poor condition
OS-fc-C	Open space fair condition
OS-gc-C	Open space good condition
RD-1ac-D	Residential development for avg lot size of 1 acre wet detention basin
RD-0.5ac-C	Residential development for avg lot size of 0.5 acre
Woods-fc-D	Woods fair condition

*** Letter after dash defines soil group class



United States
Department of
Agriculture

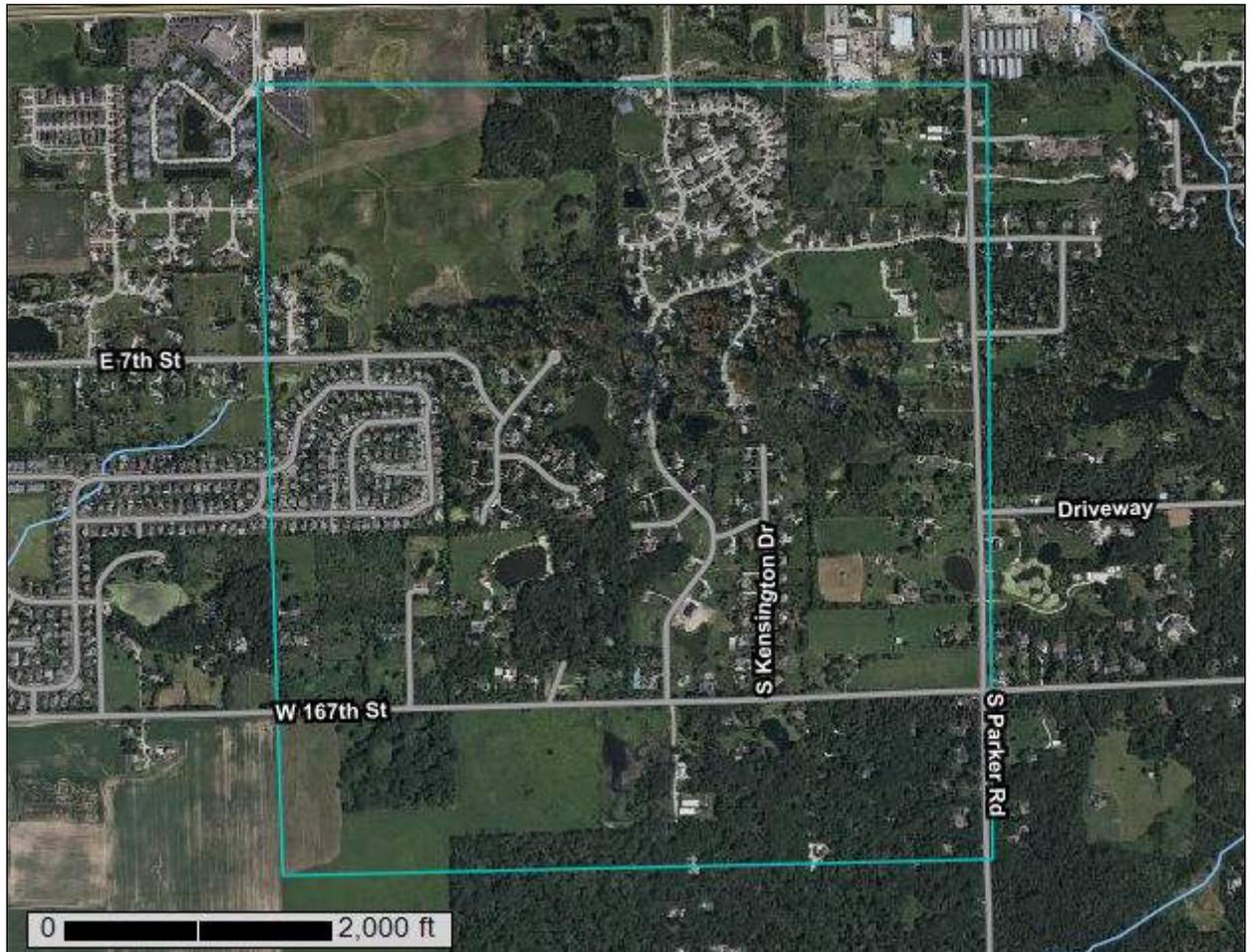
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Will County, Illinois**

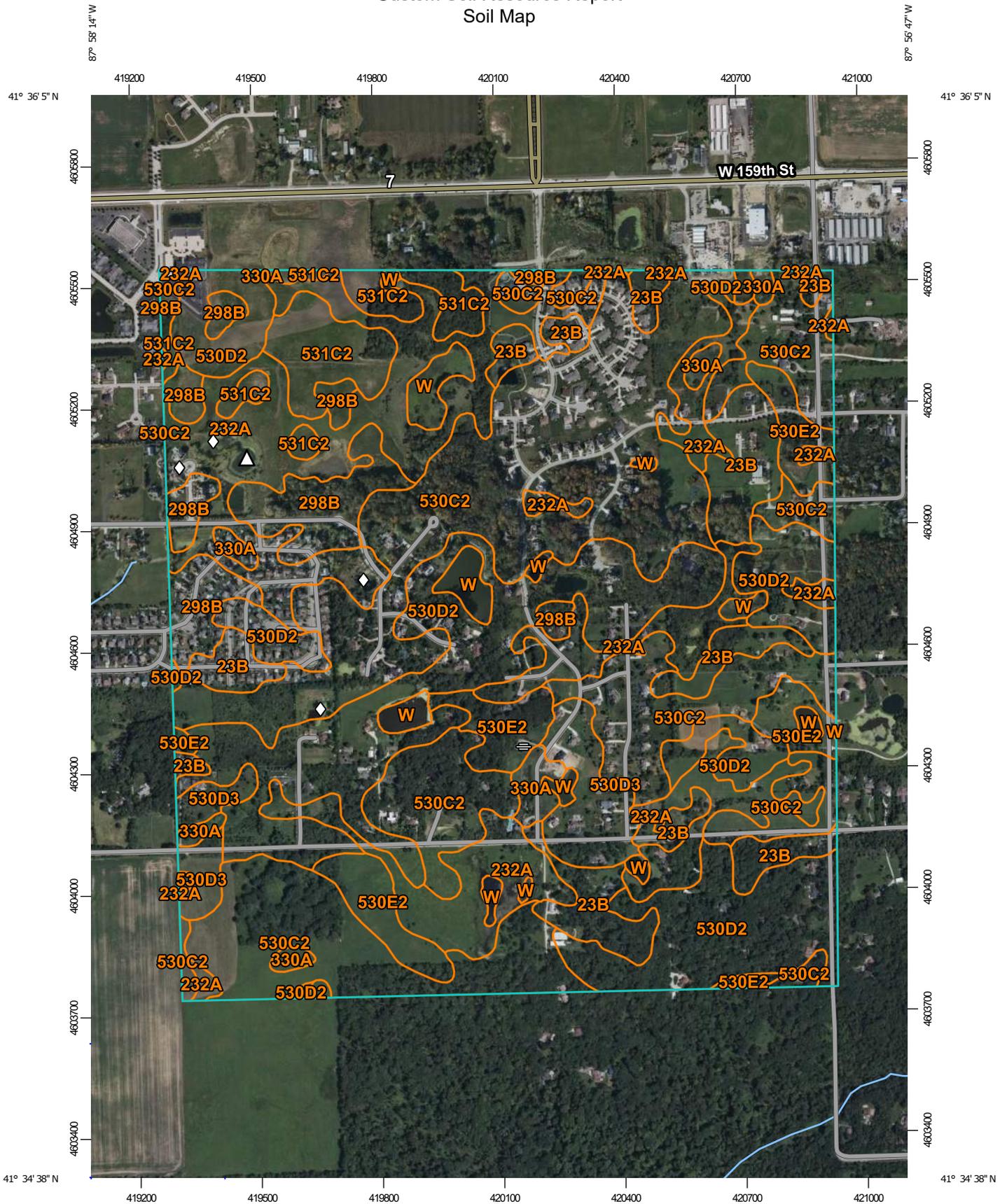
Pine Hill Drive Stormwater Study, Homer Glen, IL



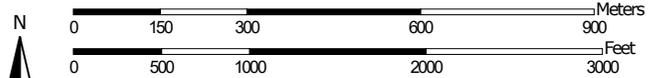
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:13,000 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Will County, Illinois
 Survey Area Data: Version 17, Aug 31, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 7, 2020—Oct 13, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
23B	Blount silt loam, Lake Michigan Lobe, 2 to 4 percent slopes	53.6	7.4%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	129.3	17.7%
298B	Beecher silt loam, 2 to 4 percent slopes	37.7	5.2%
330A	Peotone silty clay loam, 0 to 2 percent slopes	10.9	1.5%
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	242.6	33.3%
530D2	Ozaukee silt loam, 6 to 12 percent slopes, eroded	152.3	20.9%
530D3	Ozaukee silty clay loam, 6 to 12 percent slopes, severely eroded	23.9	3.3%
530E2	Ozaukee silt loam, 12 to 20 percent slopes, eroded	32.9	4.5%
531C2	Markham silt loam, 4 to 6 percent slopes, eroded	28.1	3.9%
W	Water	17.2	2.4%
Totals for Area of Interest		728.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties

Custom Soil Resource Report

and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Custom Soil Resource Report

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Will County, Illinois

23B—Blount silt loam, Lake Michigan Lobe, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2x887
Elevation: 540 to 930 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 156 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Blount, lake michigan lobe, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blount, Lake Michigan Lobe

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over clayey till

Typical profile

Ap - 0 to 6 inches: silt loam
E - 6 to 10 inches: silt loam
2Bt1 - 10 to 28 inches: silty clay
2Bt2 - 28 to 34 inches: silty clay loam
2Cd - 34 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 7 to 16 inches to abrupt textural change; 28 to 48 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 4 percent

Landform: End moraines, ground moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Concave

Ecological site: R110XY024IL - Poned Depressional Sedge Meadow

Hydric soil rating: Yes

Urban land

Percent of map unit: 3 percent

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

Orthents, clayey

Percent of map unit: 3 percent

Landform: Lake plains, ground moraines

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: F095XB010WI - Loamy and Clayey Upland

Hydric soil rating: No

232A—Ashkum silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2ssrw

Elevation: 520 to 930 feet

Mean annual precipitation: 33 to 41 inches

Mean annual air temperature: 46 to 54 degrees F

Frost-free period: 160 to 190 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Ashkum, drained, and similar soils: 92 percent

Minor components: 8 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ashkum, Drained

Setting

Landform: End moraines, ground moraines

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Concave
Parent material: Clayey colluvium over till

Typical profile

Ap - 0 to 12 inches: silty clay loam
Bg1 - 12 to 29 inches: silty clay
2Bg2 - 29 to 54 inches: silty clay loam
2Cg - 54 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 25 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Minor Components

Peotone, drained

Percent of map unit: 5 percent
Landform: Depressions on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines, lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F095XB010WI - Loamy and Clayey Upland
Hydric soil rating: No

Urban land

Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

298B—Beecher silt loam, 2 to 4 percent slopes

Map Unit Setting

National map unit symbol: 2ytq1
Elevation: 520 to 960 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Beecher and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Beecher

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over silty clay loam or clay loam till

Typical profile

Ap - 0 to 13 inches: silt loam
2Bt1 - 13 to 21 inches: silty clay loam
2Bt2 - 21 to 37 inches: silty clay loam
2Cd - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 4 percent
Depth to restrictive feature: 24 to 45 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F095XB010WI - Loamy and Clayey Upland
Hydric soil rating: No

330A—Peotone silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2sn05
Elevation: 500 to 1,020 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 46 to 55 degrees F
Frost-free period: 140 to 195 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Peotone, drained, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Peotone, Drained

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Silty and clayey colluvium

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bg1 - 7 to 27 inches: silty clay loam
Bg2 - 27 to 50 inches: silty clay
Cg - 50 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 20 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Minor Components

Peotone, long duration ponding

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

530C2—Ozaukee silt loam, 4 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2sn07
Elevation: 540 to 980 feet
Mean annual precipitation: 35 to 42 inches
Mean annual air temperature: 47 to 53 degrees F
Frost-free period: 140 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Ozaukee, eroded, and similar soils: 96 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Eroded

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin mantle of loess over silty and clayey till

Typical profile

Ap - 0 to 7 inches: silt loam
2Bt1 - 7 to 26 inches: silty clay
2Bt2 - 26 to 37 inches: silty clay loam
2Cd - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 4 to 6 percent
Depth to restrictive feature: 22 to 45 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest

Custom Soil Resource Report

Hydric soil rating: No

Minor Components

Orthents, clayey

Percent of map unit: 2 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit, backslope

Landform position (three-dimensional): Interfluve

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: F095XB010WI - Loamy and Clayey Upland

Hydric soil rating: No

Urban land

Percent of map unit: 2 percent

Landform: Ground moraines

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: No

530D2—Ozaukee silt loam, 6 to 12 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2sn0j

Elevation: 520 to 1,000 feet

Mean annual precipitation: 31 to 42 inches

Mean annual air temperature: 46 to 53 degrees F

Frost-free period: 135 to 195 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Ozaukee, eroded, and similar soils: 93 percent

Minor components: 7 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Eroded

Setting

Landform: Ground moraines, end moraines

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loess over wisconsinan age silty and clayey till

Typical profile

Ap - 0 to 7 inches: silt loam

Bt1 - 7 to 11 inches: silty clay loam

Custom Soil Resource Report

2Bt2 - 11 to 27 inches: silty clay
2BCt - 27 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 22 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest
Forage suitability group: Mod AWC, adequately drained with limitations (G095BY006WI)
Other vegetative classification: Trees/Timber (Woody Vegetation), Mod AWC, adequately drained with limitations (G095BY006WI)
Hydric soil rating: No

Minor Components

Blount, lake michigan lobe

Percent of map unit: 3 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ozaukee, severely eroded

Percent of map unit: 2 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

Custom Soil Resource Report

Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

530D3—Ozaukee silty clay loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2sn0k
Elevation: 540 to 1,000 feet
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 46 to 53 degrees F
Frost-free period: 135 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Ozaukee, severely eroded, and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Severely Eroded

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wisconsinan age silty and clayey till

Typical profile

Ap - 0 to 7 inches: silty clay loam
Bt1 - 7 to 20 inches: silty clay
Bt2 - 20 to 25 inches: silty clay loam
Cd - 25 to 60 inches: silty clay loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Forage suitability group: Mod AWC, adequately drained with limitations (G095BY006WI)
Other vegetative classification: Trees/Timber (Woody Vegetation), Mod AWC, adequately drained with limitations (G095BY006WI)
Hydric soil rating: No

Minor Components

Blount, lake michigan lobe

Percent of map unit: 4 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Chatsworth, severely eroded

Percent of map unit: 2 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

530E2—Ozaukee silt loam, 12 to 20 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2sn0n
Elevation: 520 to 890 feet
Mean annual precipitation: 31 to 42 inches

Custom Soil Resource Report

Mean annual air temperature: 46 to 53 degrees F
Frost-free period: 135 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Ozaukee, eroded, and similar soils: 93 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ozaukee, Eroded

Setting

Landform: Ground moraines, end moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over wisconsinan age silty and clayey till

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1 - 6 to 11 inches: silty clay loam
2Bt2 - 11 to 27 inches: silty clay
2BCt - 27 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 22 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F110XY011IL - Dry Glacial Drift Upland Forest
Forage suitability group: Mod AWC, adequately drained with limitations (G095BY006WI)
Other vegetative classification: Trees/Timber (Woody Vegetation), Mod AWC, adequately drained with limitations (G095BY006WI)
Hydric soil rating: No

Minor Components

Blount, lake michigan lobe

Percent of map unit: 3 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Summit, footslope

Custom Soil Resource Report

Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Hydric soil rating: No

Ozaukee, severely eroded

Percent of map unit: 2 percent
Landform: Ground moraines, end moraines
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F110XY012IL - Moist Glacial Drift Upland Forest
Hydric soil rating: No

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

531C2—Markham silt loam, 4 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2ytps
Elevation: 620 to 920 feet
Mean annual precipitation: 34 to 41 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 160 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Markham, eroded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Markham, Eroded

Setting

Landform: End moraines, ground moraines
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess over silty clay loam till

Custom Soil Resource Report

Typical profile

Ap - 0 to 8 inches: silt loam
2Bt1 - 8 to 21 inches: silty clay loam
2Bt2 - 21 to 32 inches: silty clay loam
2Cd - 32 to 60 inches: silty clay loam

Properties and qualities

Slope: 4 to 6 percent
Depth to restrictive feature: 20 to 55 inches to densic material
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R110XY010IL - Moist Glacial Drift Upland Savanna
Hydric soil rating: No

Minor Components

Ashkum, drained

Percent of map unit: 6 percent
Landform: End moraines, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Poned Depressional Sedge Meadow
Hydric soil rating: Yes

Urban land

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluvium
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Orthents, clayey

Percent of map unit: 2 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluvium
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F095XB010WI - Loamy and Clayey Upland

Custom Soil Resource Report

Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform: Rivers, oxbows, lakes, drainageways, perennial streams, channels

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8w

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff (Pine Hill Drive Stormwater Study)

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Custom Soil Resource Report

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff (Pine Hill Drive Stormwater Study)

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff—Will County, Illinois			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
23B—Blount silt loam, Lake Michigan Lobe, 2 to 4 percent slopes			
Blount, lake michigan lobe	90	Medium	C/D
232A—Ashkum silty clay loam, 0 to 2 percent slopes			
Ashkum, drained	92	Negligible	C/D
298B—Beecher silt loam, 2 to 4 percent slopes			
Beecher	90	Medium	D
330A—Peotone silty clay loam, 0 to 2 percent slopes			
Peotone, drained	95	Negligible	C/D
530C2—Ozaukee silt loam, 4 to 6 percent slopes, eroded			
Ozaukee, eroded	96	High	C
530D2—Ozaukee silt loam, 6 to 12 percent slopes, eroded			
Ozaukee, eroded	93	High	C
530D3—Ozaukee silty clay loam, 6 to 12 percent slopes, severely eroded			
Ozaukee, severely eroded	92	High	C

Custom Soil Resource Report

Hydrologic Soil Group and Surface Runoff—Will County, Illinois			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
530E2—Ozaukee silt loam, 12 to 20 percent slopes, eroded			
Ozaukee, eroded	93	High	C
531C2—Markham silt loam, 4 to 6 percent slopes, eroded			
Markham, eroded	90	High	C
W—Water			
Water	100	—	—

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