INFRASTRUCTURE ENGINEERING | INCORPORATED

One South Wacker Drive
Suite 2650
Chicago, IL 60606

Integrity | Excellence | Innovation

DRAINAGE INVESTIGATION FINDINGS

To:	Adam James, P.E. Cook County Department of Transportation & Highways	**Date:**	August 29, 2023
Regarding:	Drainage Investigation Preliminary Findings		
Prepared by:	Jamere Clark, P.E.	**Proj. No.:**	16-3304 Task #17

Overview and General Summary

Infrastructure Engineering, Inc. (IEI) has been retained to investigate seasonal flooding along Donlea Road, a county route in the Village of Barrington Hills. This roadway has been inundated by floodwaters during the past few spring seasons due to extreme ponding within the depressional areas on both sides of the roadway.

Field Visit Summary – April 2021

On April 8, 2021 Anitha Dasappa (CCDOTH), Steve Cieslica (Trotter), and Jamere Clark (IEI) visited the area of Donlea Road and Lacey Lake in the Village of Barrington Hills. The field investigation began along Donlea Road near the north end of Lacey Lake. The first observation was the existence of a pump just east of Donlea Road with corrugated pipes leading to Lake Lacey (*Photo 1, see also Exhibit A – Overview Map*). A gauge was also located near the lake's edge, that appears to be powered from the same source as the pump *(Photo 2, see also Exhibit A – Overview Map*). The purpose of the pump and gauge is unclear. Trotter Engineering unsuccessfully attempted to contact the property owner to ascertain the function of the devices.

Photo 1 – Picture of pump, facing east towards Lake Lacey

Photo 2 – Unknown pressure gauge instrument at Lake Lacey

The field reconnaissance continued following the natural drainage path of overflow from Lake Lacey towards Donlea Road. A ditch conveys overflow out of Lacey Lake NW towards Donlea Road. This ditch then turns NNE to run parallel to Donlea Road until it reaches Cook County culvert V46-010 (*See Exhibit B – Contour Map)*. This concrete culvert is 15-inches in diameter. The below photos show the drainage ditch flow arriving at the upstream end (east side of Donlea Road).

Photo 3 – Looking south on east side of Donlea Road (upstream end)

Photo 4 – Looking south on east side of Donlea Road (upstream end)

The below photos show the same culvert at the downstream end (west side of Donlea Road). As shown, the culvert needs repair, as a pipe joint has fully separated, causing a void in the ditch.

Photo 5 – Looking north on west side of Donlea Road

Photo 6 – Looking towards the west in direction of depressional area

(Please note that the four photos on this page were taken December 2019 by IEI during a separate project. IEI verified on November 23, 2022 that the culvert condition remains unchanged.)

The field investigation team walked across Donlea Road from east to west at culvert V46-010 and proceeded to walk north in the depressional area, as defined from topography. Exhibit A shows this area under water. The team generally followed the property line that cuts through the depressional area as shown on the exhibit. This area was not under water during our visit. During the previous seven days, only 0.01 inches of cumulative precipitation was recorded at the Barrington weather station. The open area had healthy grass cover. However, it was observed that many trees along the property line and just south of County Line Road have died, likely due to recent flooding episodes.

IEI received record drawings from the Illinois Department of Transportation (IDOT) for County Line Road. Locations of the culverts along County Line Road were transposed onto the overview map exhibit. The first culvert, per the records adjacent to the depressional area was identified as culvert 'Station 150+30.' Both ends of this culvert were located in the field. Per survey, the culvert flows from north to south, towards the depressional area. Culvert 'STA 149+80' was not found. The record drawing from IDOT indicated that it was an E-W culvert located on the north side of County Line Road. It appears that the topography of the north side of County Line Road has changed since the road was constructed. A driveway exists presently where we expected to locate culvert 'STA 149+80.' Remnants of a fence along the north side of County Line Road near the driveway suggest the profile of the area was modified. The below picture shows the very top of a fence post circled in yellow. The vantage point is facing south with County Line Road in the background, the driveway where we expected to find culvert 'STA 149+80' to the right.

Photo 7 – Facing south on the north side County Line Road

Proceeding westward along the northside of County Line Road, the field investigation members located culvert 'STA 146+50' as shown on the exhibit crossing the roadway. However, only the north end of the culvert was found.

The property at 381 County Line Road has a pond adjacent to the roadway. Analyzing the topography, drainage runoff flows from the west into this pond. There is a control structure located at the NE corner of the pond, as pictured below (Photo 8). There was one pipe observed in the structure (Photo 9). The downstream end of this pipe was located on the east side of the driveway (Photo 10). The control

structure conveys flow east toward the depressional area. The National Wetlands Inventory defined this pond as *PUBGh*, a palustrine system with an unconsolidated bottom. The special modifier "*h*" stands for wetlands that are diked/impounded. By definition, a diked/impounded wetland is one created or modified by a man-made barrier or dam that obstructs the inflow or outflow of water. The below pictured control structure confirms the NWS special modifier, as the structure restricts outflows.

Photo 8 – Control Structure at NE corner of pond

Photo 9 – Inside CMP control structure, SE pipe outlet observed

Photo 10 – Outlet pipe from control structure east of driveway for 381 County Line Road

Site Characteristics

USGS topographic maps were obtained for this area. The small lake located on the property of 381 County Line Road appears to have formed in the 1970s (*See Figures 1 & 2, below*). Cook County assessor's records show that the home on the property was completed by 1976. Per *Exhibit G – Aerial Photography*, in 1972 no structures existed on the property. In 1974 aerial photo, a home and driveway outpost are both visible. Prior to the 1970's the topography indicates the presently existing pond was within the depressional area located to the east. It appears that the driveway to the home divided the depressional area and formed the pond.

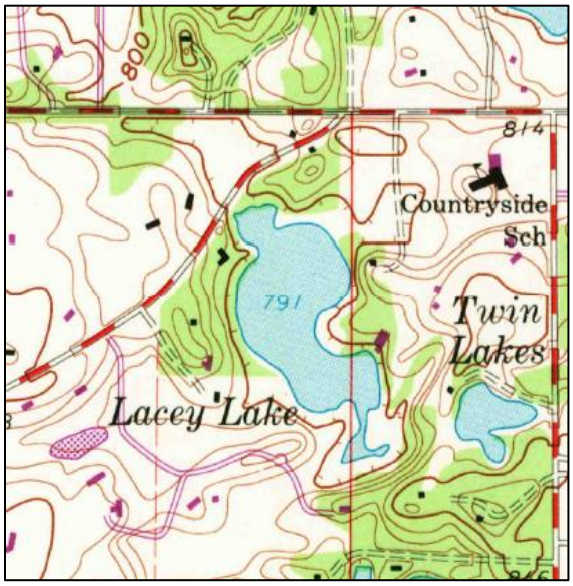


Figure 1 – USGS Topographic Map 1960 (revised in 1972)

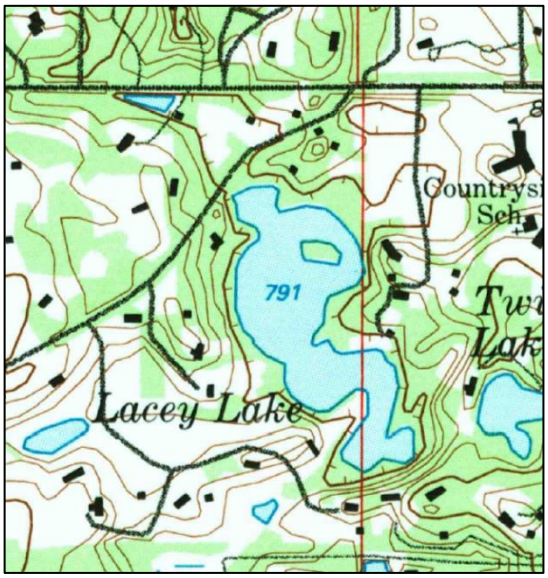


Figure 2 – USGS Topographic Map 1993

Past aerial photography suggests that the depressional area has existed as far back as 1938, the oldest aerial image obtained for this report. The project team elected to determine if drain tiles existed in this area and if existing provided drainage for this depressional area. Huddleston-McBride Land Drainage Services was commissioned to perform a site survey to identify if any drain tiles exist within the depressional area NW of Donlea Road and S of County Line Road. Huddleston-McBride's field investigation occurred on January 15, 2022. Huddleston-McBride trenched 5 investigative probes in the depressional area. None of the probes yielded any drain tiles. Thus, per Huddleston-McBride, "there are no existing drain tiles within the Lacey Lake outfall reach that have historically controlled normal water elevations within the Lacey Lake Basin." (See *Exhibit K – Existing Agricultural Drain Tile Investigation Plan*)

Daily precipitation data was obtained from the nearest weather station at Barrington. This data was compared with the 30 year monthly average precipitation from 1991-2020 (See *Exhibit C – Precipitation*). Years 2018, 2019, and 2020 all recorded above average annual precipitation. The month of May during these three years, for example experienced 3 to 7 inches of additional rainfall above the monthly average of 5.15 inches.

Google Earth imagery taken on July 6, 2018 revealed significant ponding in the depressional area. This was likely due to over 11 inches of combined excess rainfall in the months of May and June 2018. The next year the Village of Barrington Hills received complaints of flooding on May 9, 2019. On that date, 2 inches of precipitation was recorded, with a cumulative rainfall total of 7.56 inches recorded from April 28th through May 9th, an 11-day period. Google Street View imagery confirmed ponding and water encroaching on Donlea Road during May 2019. Google Earth imagery on May 23, 2020 and June 7, 2020 also revealed extensive ponding and overtopping of Donlea Road. It is suspected that precipitation episodes in which several inches of precipitation occurred over several days, such as during the springs of 2018 though 2020, contributed to the recent overtopping of Donlea Road and ponding in the adjacent depressional area.

The NRCS soil map was reviewed for the area of concern. Per the USDA soil map, the depressional area's soil classification west of Donlea Road and south of County Line Road is categorized as *232A - Ashkum silty clay loam, 0 to 2 percent slopes* (*See Exhibit F – Soil Classifications Map*). The drainage class for this soil is poorly drained. This soil classification contributes to ponding in the depressional area after significant rainfall events, due to its low permeability.

On August 18, 2022 soil borings were performed at two locations within the depressional area under the direction of Material Service Testing (MST). The location of each boring is shown in Exhibit A and Exhibit J. The soil composition from each boring was similar and overall is clayey up to the topsoil layer. More specifically, results showed approximately 2 feet of topsoil on top of soft to medium sandy clay with trace gravel to a depth of 8 feet, on top of hard silty clay with trace sand to the boring depth of 20 feet. MST performed the AASTHO T88 (Determination of Grain Size Analysis of Soil), AASTHO T89 (Determining the Liquid Limit of Soils), and AASTHO T90 (Determining the Plastic Limit and Plasticity Index of Soils) tests on the soils obtained from each boring.

The summary report from MST stated the following: "The lab test results on each soil boring indicate a classification of soil consistent with a CL (Lean Clay) at depths of 10 and 20 linear feet. The estimated water infiltration rates for a CL type material in the hydrologic soil group C-D, range from 0.06 to 0.2 inches/hour. Typically, soil groups from the C-D range have the slowest/lowest value of infiltration by classification of material due to cohesive clays with minimal permeability." The soil boring logs, the liquid and plastic limits test report, and the particle size distribution report are provided in *Exhibit I*. Additionally, the seasonal high groundwater table is estimated to be 787', 3 feet below the ground elevation within the depressional area. The water level was initially encountered about 3 feet below grade while performing the soil borings. The borings found the presence of gray silty clay about 4 feet below grade. The gray color can indicate reduced conditions associated with a fluctuating water table. There are multiple factors that may contribute to a higher groundwater elevation. Lacey Lake maintains a normal water elevation of around 793 feet based on aerial imagery. There is the possibility of a subsurface gradient from Lacey Lake to Flint Creek to the north, passing through the depressional area. Due to the close proximity to Lacey Lake, sand or silt seams between the lake and depressional area could also allow for water to migrate to the depressional area. To confirm the seasonally high groundwater level with any greater level of certainty monitoring wells would have to be installed and readings collected over a long period for evaluation.

Conclusions

Drainage pickup survey was performed along Donlea Road, County Line Road, and Steeplechase Road (See *Exhibit J)*. Survey confirms that both the control structure located at the NE corner of the pond at 381 County Line Road and the culvert located at Station 150+30 along County Line Road contribute runoff into the depressional area on 210 Donlea Road. This flow is joined by overflows from Lacey Lake via Cook County culvert V46-010, crossing Donlea Road. Water either infiltrates into the soil or evaporates over time. The depressional area has no apparent outlet.

Dry wells within the area of the depressional area was entertained as a possible solution to reduce flooding in the immediate vicinity of the depressional area. However, the installation of dry wells would not be feasible due to the soil classification as lean clay. Lean clay has very low permeability and therefore little infiltration capacity. Ideal soils for dry wells are in hydraulic soil group A (sand or gravel) and have a permeability greater than 1.42 inches/hour.

Theoretically, a storm water conveyance system (storm sewer) could be constructed to relieve the depressional area of significant flooding. Waters could be directed towards the overland flow path near the NE corner of the intersection of Steeplechase Road and County Line Road. However, this would be a multi-jurisdiction project requiring approval from numerous agencies, and would likely have a benefit-cost ratio much less than 1.0.

Attachments:

1. Exhibit A: Overview Map
2. Exhibit B: Contour Map
3. Exhibit C: Precipitation
4. Exhibit D: Trotter Drainage Exhibit (For Reference Only)
5. Exhibit E: Hydrologic Investigations Atlas HA-150 (With Markup)
6. Exhibit F: Soil Classifications Map
7. Exhibit G: Aerial Photography
8. Exhibit H: IDOT 1922 Mylar of County Line Road
9. Exhibit I: Soil Borings, Liquid and Plastic Limits Test Report, & Particle Size Distribution Reports
10. Exhibit J: Field Survey & Aerial Imagery
11. Exhibit K: Existing Agricultural Drain Tile Investigation Plan

Exhibit A - Overview Map

Cook County CookViewer

June 21, 2021

FLOW ARROW

CULVERT

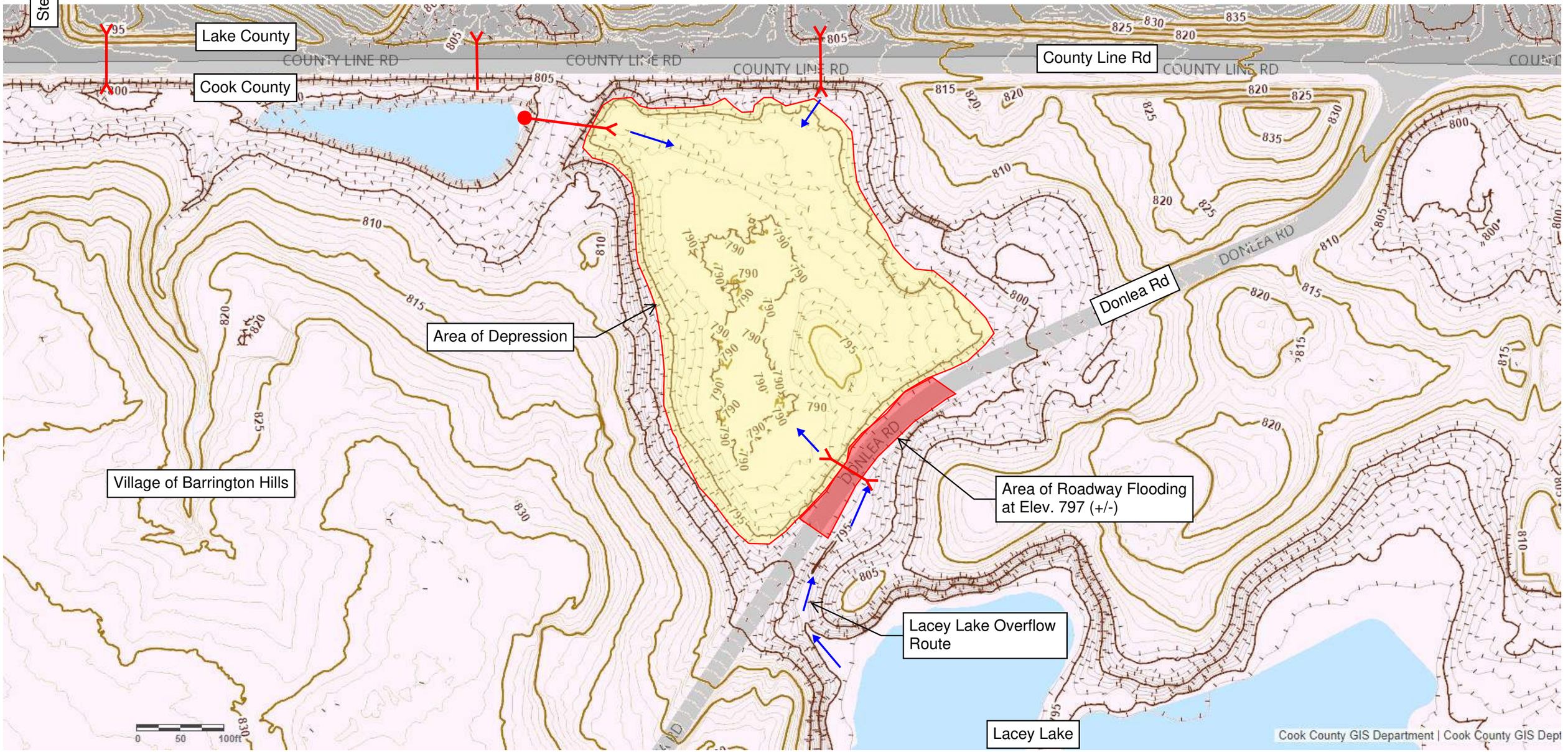
1 500

0 0.005 0.01 0.02 mi

0 0.0075 0.015 0.03 km

Cook County GIS Dept

Exhibit B - Contour Map



Monthly Precipitation Totals (inches)											
YEAR:		2010		2011		2012		2013		2014	
Month	30YR AVG	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference
January	2.07	1.06	-1.01	0.95	-1.12	1.52	-0.55	2.87	0.8	2.39	0.32
February	1.9	1.23	-0.67	2.83	0.93	1.57	-0.33	3.08	1.18	1.91	0.01
March	2.35	2.02	-0.33	2.61	0.26	1.55	-0.8	1.99	-0.36	1.35	-1
April	3.95	2.82	-1.13	5.08	1.13	3.27	-0.68	7.81	3.86	2.63	-1.32
May	5.15	8.21	3.06	6.31	1.16	2.26	-2.89	3.17	-1.98	6.51	1.36
June	4.6	5.38	0.78	3.65	-0.95	2.41	-2.19	7.01	2.41	7.11	2.51
July	4.02	7.18	3.16	8.69	4.67	2.58	-1.44	4.36	0.34	3.82	-0.2
August	4.58	3.1	-1.48	5.71	1.13	3.52	-1.06	2.04	-2.54	7.41	2.83
September	3.65	3.02	-0.63	3.69	0.04	1.73	-1.92	3.76	0.11	3.28	-0.37
October	3.39	1.19	-2.2	1.79	-1.6	3.78	0.39	1.58	-1.81	3.72	0.33
November	2.58	1.7	-0.88	3.41	0.83	0.67	-1.91	3.61	1.03	1.43	-1.15
December	2.19	1.64	-0.55	3.05	0.86	2.53	0.34	1.73	-0.46	0.83	-1.36
ANNUAL TOTAL:	40.43	38.55	-1.88	47.77	7.34	27.39	-13.04	43.01	2.58	42.39	1.96

Monthly Precipitation Totals (inches)																	
YEAR:		2015		2016		2017		2018		2019		2020		2021		2022	
Month	30YR AVG	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference	Actual	Difference
January	2.07	1.29	-0.78	1.04	-1.03	2.54	0.47	1.22	-0.85	6.16	4.09	2.41	0.34	2.09	0.02	0.42	-1.65
February	1.9	1.1	-0.8	0.97	-0.93	0.77	-1.13	3.83	1.93	2.58	0.68	0.62	-1.28	0.76	-1.14	2.16	0.26
March	2.35	1.2	-1.15	3.11	0.76	4.64	2.29	1.4	-0.95	2.24	-0.11	3.71	1.36	0.94	-1.41	2.5	0.15
April	3.95	2.91	-1.04	3.47	-0.48	4.63	0.68	2.05	-1.9	5.09	1.14	4.5	0.55	0.88	-3.07	5.28	1.33
May	5.15	5.75	0.6	5.86	0.71	5.17	0.02	12.74	7.59	8.38	3.23	9.48	4.33	1.25	-3.9	4.14	-1.01
June	4.6	6.99	2.39	3.57	-1.03	6.75	2.15	8.44	3.84	5.55	0.95	3.49	-1.11	7.49	2.89	2.89	-1.71
July	4.02	4.46	0.44	5.95	1.93	10.67	6.65	1.4	-2.62	4.33	0.31	5.12	1.1	1.97	-2.05	6.9	2.88
August	4.58	4.1	-0.48	3.88	-0.7	2.21	-2.37	7.55	2.97	3.44	-1.14	0.94	-3.64	3.62	-0.96	4.94	0.36
September	3.65	5.58	1.93	2.31	-1.34	0.75	-2.9	5.11	1.46	9.8	6.15	5.79	2.14	1.21	-2.44	3.61	-0.04
October	3.39	1.99	-1.4	3.66	0.27	8.06	4.67	4.97	1.58	5.55	2.16	2.78	-0.61	5.19	1.8	1.69	-1.7
November	2.58	4.55	1.97	2.13	-0.45	1.51	-1.07	2.93	0.35	1.59	-0.99	1.37	-1.21	0.87	-1.71		
December	2.19	5.9	3.71	1.78	-0.41	0.53	-1.66	2.69	0.5	2.22	0.03	2.12	-0.07	2.23	0.04		
ANNUAL TOTAL:	40.43	45.82	5.39	37.73	-2.7	48.23	7.8	54.33	13.9	56.93	16.5	42.33	1.9	28.5	-11.93	34.53	-5.9

Exhibit C - Precipitation

Source: NOAA - National Centers for Environmental Information

Exhibit D - Lacey Lake Exhibit - Trotter

TROTTER ASSOCIATES, INC.
ENGINEERS AND SURVEYORS
40W201 Wasco Road, Suite D St Charles, IL 60175
P:630-587-0470 F: 630-587-0475

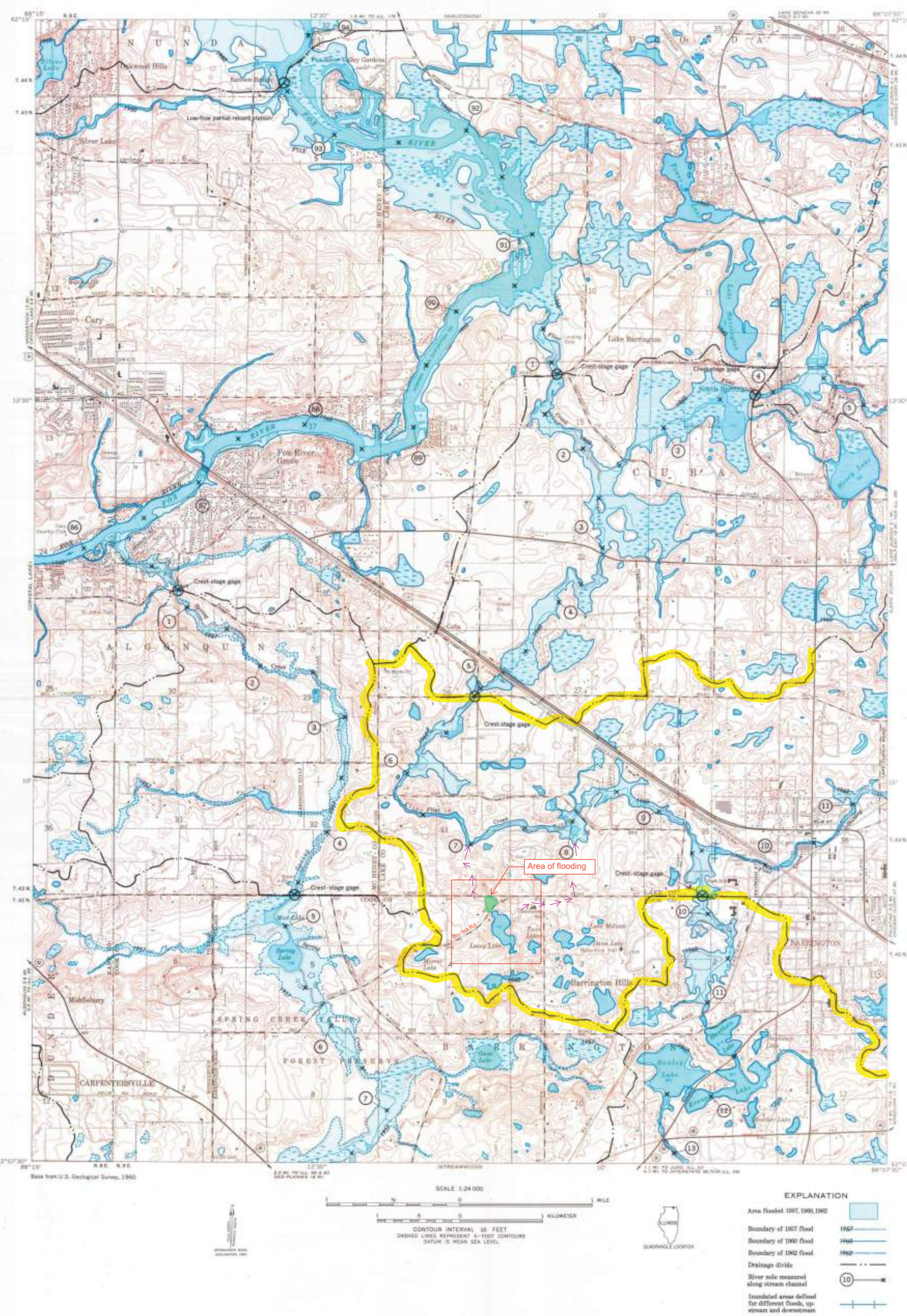
Lacey Lake

Village of Barrington Hills

Project No.:	
Base File:	
Sheet File:	
Issue Date:	
Scale: 1" = 500'	

Sheet Number 1

PREPARED IN COOPERATION WITH
THE NORTHEASTERN ILLINOIS METROPOLITAN
AREA PLANNING COMMISSION



FLOODS IN BARRINGTON QUADRANGLE NORTHEASTERN ILLINOIS

This report summarizes hydrologic data useful for evaluating the depth and frequency of flooding that affect the economic development of flood plains. The report is intended to be used as a planning tool and the data contained herein provide a technical basis for making sound decisions concerning the use of flood-plain lands. No recommendations or suggestions for land-use regulations are made and no solutions of existing flood problems are proposed.

The approximate areas inundated by floods along streams in the Barrington 7 1/2-minute quadrangle are delineated on a topographic map. The quadrangle location is shown in figure 1. Inundated areas are shown along Fox River, Flint Creek, and Flint Creek tributary at mile 2.3 for the flood of April 1960; along Spring Creek for the flood of July 1957; and along Flint Creek tributary at mile 9.4 for the flood of March 1962.

FIGURE 1.—Index map of northeastern Illinois showing location of quadrangles in the flood-hazard mapping program.

The general procedure used in defining flood limits was to define flood profiles from elevations of floodmarks identified in the field. The extent of flooding delineated on the topographic map was derived from the profiles by interpolation between contours (lines of equal elevation) and by plotting overflow limits established by field investigations and surveys. The flood limits shown on the map are approximate because the map scale is small (1 inch = 2,000 feet), and the contour interval is relatively large (10 feet, supplemented by 5-foot-interval contours in some areas).

The flood limits shown on the map are not necessarily those for the highest floods expected. Greater floods are possible, but definition of their probable overflow limits is not within the scope of this report. The flood limits reflect channel conditions existing when the floods occurred. No appraisals are made of the effect of changes in channel conditions, waterway openings at highways and railroads, or possible changes in runoff characteristics of the streams caused by increased urbanization after the floods occurred. Protective works built after the floods of 1957, 1960, and 1962 may reduce the frequency of flooding in the area but will not necessarily eliminate all future flooding. The inundation pattern of future floods may be affected by new highways and bridges, relocation and improvement of stream channels, and other cultural changes.

There are numerous depressions or lowland areas in the Barrington quadrangle where surface water accumulates because of inadequate drainage to the streams. Frequency and depth of flooding in these areas is unrelated to the water-surface elevation along the streams. Some areas are flooded only briefly after periods of heavy rainfall or snowmelt, whereas others remain inundated continuously, depending, to some extent, upon the rates of evaporation and seepage into the ground. Flood limits are shown for many of these areas but there may have been other areas that were not detected during this investigation.

Flood limits are not defined for areas that were inundated as a result of backup in storm drains.

Cooperation and acknowledgment.—The preparation of this report is a part of an extensive flood-mapping program financed through a cooperative agreement between The Northeastern Illinois Metropolitan Area Planning Commission and the U.S. Geological Survey whereby flood maps will be prepared for the 7 1/2-minute quadrangles shown in figure 1. The program includes parts of Cook, Kane, McHenry, and Will Counties, and all of Du Page and Lake Counties. The six counties cooperate financially in the program through separate agreements with the Planning Commission. The Barrington quadrangle is in Lake, McHenry, and Cook Counties. Financial support for the preparation of this report was provided by Lake and McHenry Counties.

The cooperative program is administered on behalf of the Planning Commission by Matthew L. Rockwell, Executive Director, and is directly coordinated by John R. Sheaffer, Chief Planner.

The flood maps are prepared by the U.S. Geological Survey under the administrative direction of William D. Mitchell, district engineer, and under the immediate supervision of Davis W. Ellis, engineer-in-charge of the project.

Acknowledgment is made to the following agencies that supplied some of the flood data on which this report is based: the State of Illinois, Department of Public Works and Buildings, Division of Waterways; and the Department of Highways of Cook and Lake Counties.

Additional data were obtained from officials of municipalities in the area and from field investigations.

Flood height.—The height of a flood at a gaging station usually is stated in terms of gage height or stage, which is the elevation of the water surface above a selected datum plane. Elevations shown on the map are in feet above mean sea level. Gage heights for crest-stage gages in the Barrington quadrangle can be converted to elevations above mean sea level by adding the gage height to the appropriate datum of gage listed in the following table. Size of drainage area for each station also is shown in the table. The subbasin divides from which the areas were determined are shown on the flood map.

Gaging station	Datum of gage above mean sea level (feet)	Drainage area (square miles)
Fox River near Cary (Hawson Bridge)[1]	744.84[2]	1201*
Flint Creek:		
At Barrington (Lake-Cook Road)	785.61	3.84*
At Cuba (Cuba Road)	763.81	19.7*
Near Fox River Grove (Kelsey Road)	741.48	36.4*
Flint Creek tributary at North Barrington (State Highway 59)	836.08	8.81
Spring Creek:		
Near Barrington (Lake-Cook Road)	789.12	20.8*
At Fox River Grove (Plum Tree Road)	742.85	25.5*

[1] Low-flow partial-record station.
[2] Elevation of reference point on top of downstream guardrail.
* Revised.

Gage height and year of occurrence of each annual flood (in each calendar year) above 733-foot elevation at the gaging station on Fox River at Algonquin during the period 1916-63 are shown in figure 2. The Algonquin gaging station is at Algonquin, Ill., about 3 miles southwest of the Barrington quadrangle, and at mile 82.6. Stages after 1946 are not comparable with prior stages because of a new dam construction.

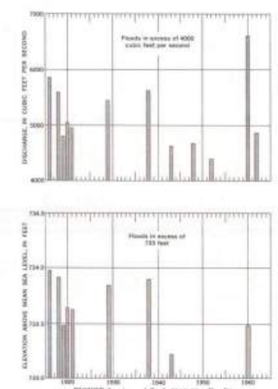


FIGURE 2.—Annual floods 1916-63, Fox River at Algonquin, Ill. (Chicago Street).

Flood discharge.—The rate of discharge of a stream is the volume of flow that passes a particular location in a given period of time. Usually discharge rates are expressed in cubic feet per second (cfs). Peak discharge is the maximum discharge attained by a flood. The peak discharge during a flood generally occurs at the time of the maximum height (stage) of the flood, but if a stream is affected by variable backwater, the peak discharge may not coincide with the maximum stage. For example, backwater from an ice jam may cause a high stage during a period of relatively low discharge.

Figure 2 includes a graph of the annual maximum discharges in excess of 4,000 cfs for the period of record at the Algonquin gaging station. This graph portrays the relative magnitudes of the flood discharges which are independent of changes resulting from the dam constructed in 1946.

Flood frequency.—Frequency of floods at the Geological Survey gaging station on Fox River at Algonquin was derived from streamflow records of this station combined with records of nearby stations and with regional flood-frequency relation for streams in northern Illinois (Mitchell, 1954). The Algonquin gage is at Chicago Street in Algonquin, about 3 miles southwest of the Barrington quadrangle, and at mile 82.6. The general relation between frequency and discharge is shown in figure 3, and the general relation between frequency and stage is shown in figure 4. The relation between flood stage and frequency is dependent on the relation of flood stage to discharge which is affected by changes in physical conditions of channels and constrictions. The frequency curve shown in figure 4 is based on channel conditions existing in 1963. Longer records and future changes in channel conditions may define somewhat different flood-frequency curves. Extrapolation of the curves beyond the limits shown is not recommended.

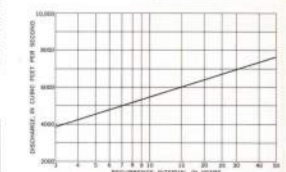


FIGURE 3.—Frequency of flood discharges on Fox River at Algonquin, Ill. (Chicago street).

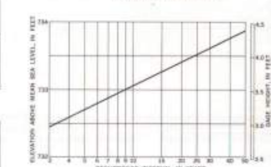


FIGURE 4.—Frequency of flood stages on Fox River at Algonquin, Ill. (Chicago street).

Recurrence intervals.—As applied to flood events, recurrence interval is the average interval of time within which a given flood will be equaled or exceeded once. Frequencies of floods can be stated in terms of their probabilities of occurrence (virtually reciprocals of their recurrence intervals for floods larger than the 10-year flood). For example, a flood with a 25-year recurrence interval would have a 4-percent chance of being equaled or exceeded in any given year, or a flood with a 50-year recurrence interval would have a 2-percent chance of being equaled or exceeded in any given year.

The general relation between recurrence interval and flood height at the gaging station on Fox River at Algonquin (fig. 4) is tabulated below.

Recurrence interval (years)	Elevation above mean sea level (feet)
50	733.9
30	733.6
20	733.4
10	733.1
5	732.7
2	732.5

It is emphasized that recurrence intervals are average figures--the average number of years that will elapse between occurrences of floods that equal or exceed a given magnitude. The fact that a major flood is experienced in one year does not reduce the probability of that flood being exceeded in the next year or in the next week.

Flood profiles.—Profiles of the water surface, based primarily on elevations of marks left by floods of July 1957, April 1960, and March 1962, are shown in figures 5-7. Where floodmarks could not be identified, the profiles were constructed on the basis of elevations of lower floods and streambeds, and of flood crests determined from photographs and from reports of local residents. River miles used for the profiles correspond to those marked along the streams on the flood map.

The abrupt changes in the profiles, shown at some road crossings, indicate the difference in water-surface elevations at the upstream and downstream sides of bridges that produce channel constrictions. The drop in water surface through bridge openings during future floods may be different from that shown on the profiles. An increase in channel capacity through a bridge opening would reduce the flood height on the upstream side. An accumulation of debris at a bridge would reduce the channel capacity and tend to increase the upstream flood height. Channel changes through bridge openings may also change the overflow pattern of future floods.

Flood depths.—Depth of flooding at any point can be estimated by subtracting the ground elevation from the water-surface elevation indicated by the profiles in figures 5-7. The approximate ground elevation can be determined from contours on the map, although more nearly accurate elevations can be obtained by leveling to nearby bench marks.

Additional data.—Other information pertaining to floods in the Barrington quadrangle can be obtained at the office of the U.S. Geological Survey, Oak Park, Ill., and from the following published reports:

Daniels, W. S., and Hale, M. D., 1958, Floods of October 1954 in the Chicago area, Illinois and Indiana: U.S. Geol. Survey Water-Supply Paper 1370-B, p. 107-200.
Illinois Department of Public Works and Buildings, Division of Waterways, 1962, Survey report for development of Fox River for recreational navigation, 204 p.
Mitchell, W. D., 1954, Floods in Illinois, magnitude and frequency: Illinois Dept. Public Works and Bldgs., Div. of Waterways, 386 p.

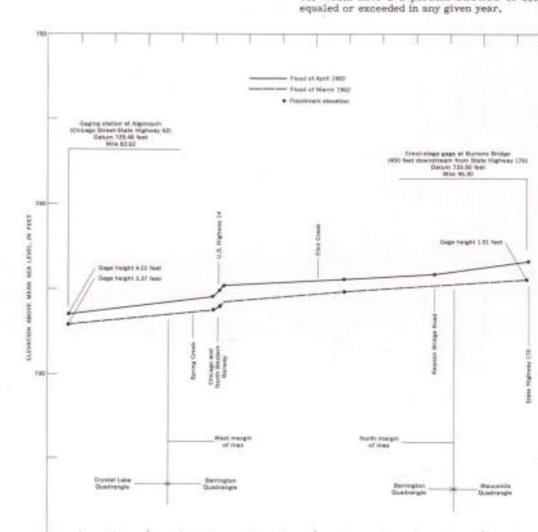


FIGURE 5.—Profiles of floods on Fox River.

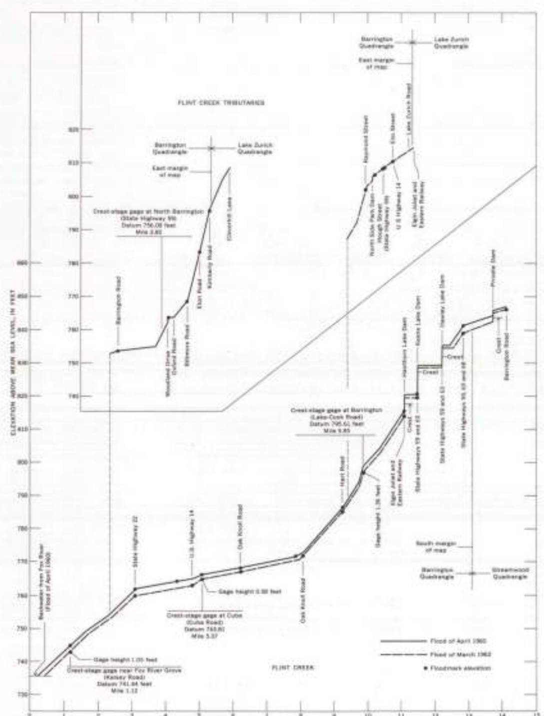


FIGURE 6.—Profiles of floods on Flint Creek and Flint Creek tributaries.

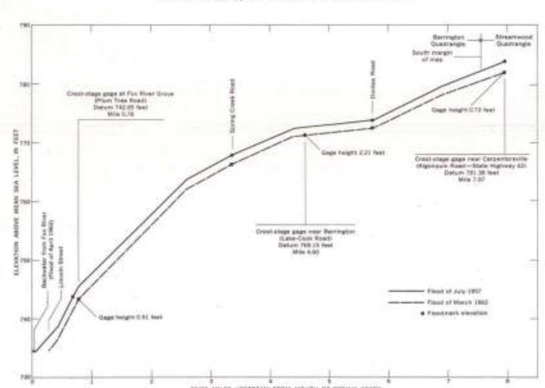


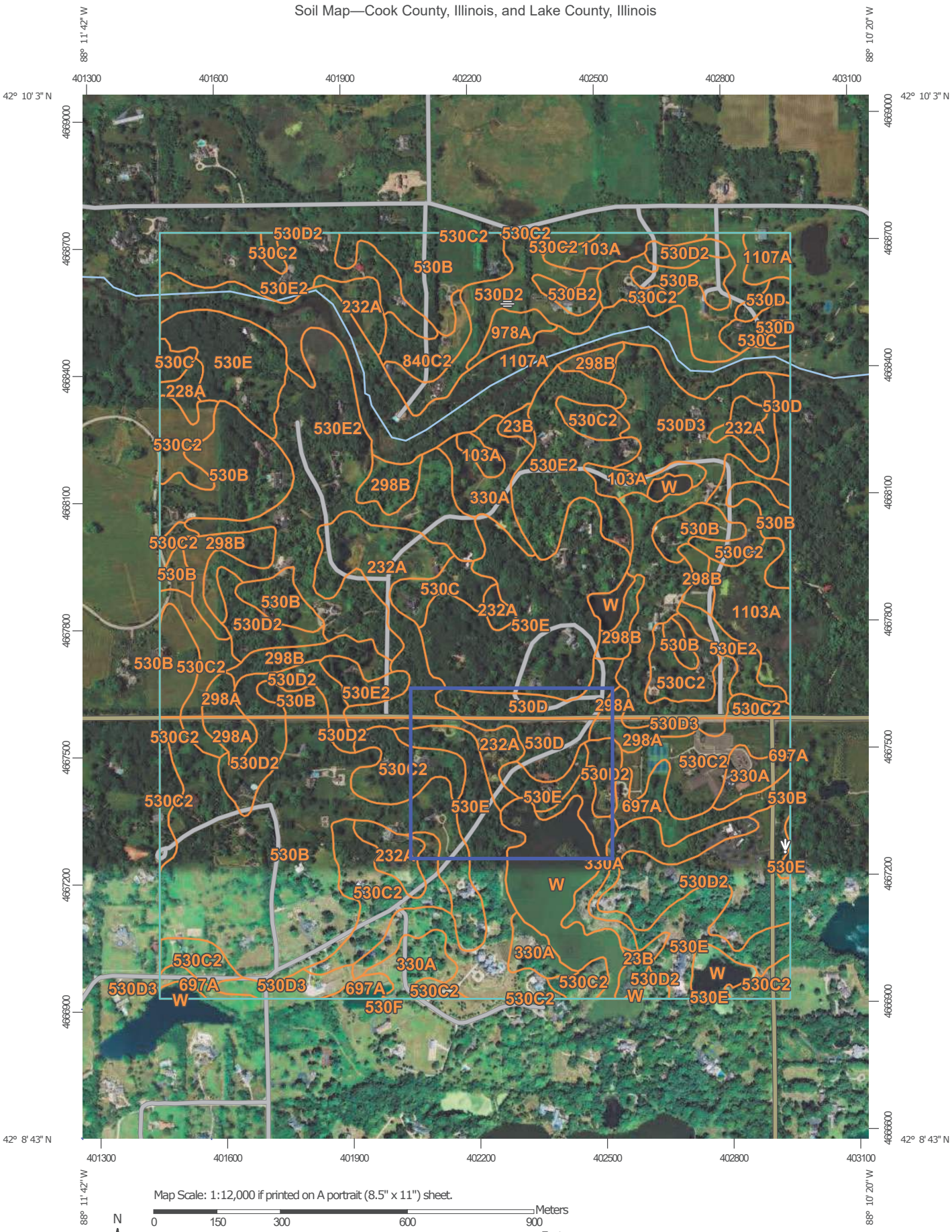
FIGURE 7.—Profiles of floods on Spring Creek.

FLOODS IN BARRINGTON QUADRANGLE, NORTHEASTERN ILLINOIS

By
Allen W. Noehre, Gerald L. Walter, and Howard E. Allen

1965

Exhibit F - Soil Classifications Map



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: Cook County, Illinois
Survey Area Data: Version 14, May 29, 2020

Soil Survey Area: Lake County, Illinois
Survey Area Data: Version 15, May 29, 2020

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Jun 13, 2020—Sep 19, 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	2.0	0.3%
232A	Ashkum silt_ cla_ loam, 0 to 2 percent slopes	8.7	1.3%
298A	Beecher silt loam, 0 to 2 percent slopes	4.7	0.7%
330A	Peotone silty clay loam, 0 to 2 percent slopes	16.5	2.5%
530B	Ozaukee silt loam, 2 to 4 percent slopes	61.8	9.2%
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	42.6	6.4%
530D	Ozaukee silt loam, 6 to 12 percent slopes	5.7	0.9%
530D2	Ozaukee silt loam, 6 to 12 percent slopes, eroded	27.4	4.1%
530D3	Ozaukee silty clay loam, 6 to 12 percent slopes, severely eroded	5.2	0.8%
530E	Ozaukee silt loam, 12 to 20 percent slopes	40.9	6.1%
530F	Ozaukee silt loam, 20 to 30 percent slopes	0.0	0.0%
697A	Wauconda silt loam, 0 to 2 percent slopes	9.5	1.4%
W	Water	20.6	3.1%
Subtotals for Soil Survey Area		**245.6**	**36.7%**
Totals for Area of Interest		**669.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
23B	Blount silt loam, Lake Michigan Lobe, 2 to 4 percent slopes	1.2	0.2%
103A	Houghton muck, 0 to 2 percent slopes	8.8	1.3%
228A	Nappanee silt loam, 0 to 2 percent slopes	1.9	0.3%
232A	Ashkum silty clay loam, 0 to 2 percent slopes	23.3	3.5%
298A	Beecher silt loam, 0 to 2 percent slopes	2.6	0.4%
298B	Beecher silt loam, 2 to 4 percent slopes	19.3	2.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
330A	Peotone silty clay loam, 0 to 2 percent slopes	7.4	1.1%
530B	Ozaukee silt loam, 2 to 4 percent slopes	51.0	7.6%
530B2	Ozaukee silt loam, 2 to 4 percent slopes, eroded	2.3	0.3%
530C	Ozaukee silt loam, 4 to 6 percent slopes	8.9	1.3%
530C2	Ozaukee silt loam, 4 to 6 percent slopes, eroded	37.3	5.6%
530D	Ozaukee silt loam, 6 to 12 percent slopes	11.0	1.6%
530D2	Ozaukee silt loam, 6 to 12 percent slopes, eroded	23.9	3.6%
530D3	Ozaukee silty clay loam, 6 to 12 percent slopes, severely eroded	32.4	4.8%
530E	Ozaukee silt loam, 12 to 20 percent slopes	46.2	6.9%
530E2	Ozaukee silt loam, 12 to 20 percent slopes, eroded	81.7	12.2%
840B	Zurich and Ozaukee silt loams, 2 to 4 percent slopes	0.0	0.0%
840C2	Zurich and Ozaukee silt loams, 4 to 6 percent slopes, eroded	5.3	0.8%
978A	Wauconda and Beecher silt loams, 0 to 2 percent slopes	3.1	0.5%
1103A	Houghton muck, undrained, 0 to 2 percent slopes	10.4	1.6%
1107A	Sawmill silty clay loam, undrained, cool, 0 to 2 percent slopes, frequently flooded	43.3	6.5%
W	Water	2.9	0.4%
Subtotals for Soil Survey Area		**424.1**	**63.3%**
Totals for Area of Interest		**669.7**	**100.0%**

Cook County, Illinois

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: Ground moraines, end moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
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 capacity: 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: Lake plains, ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

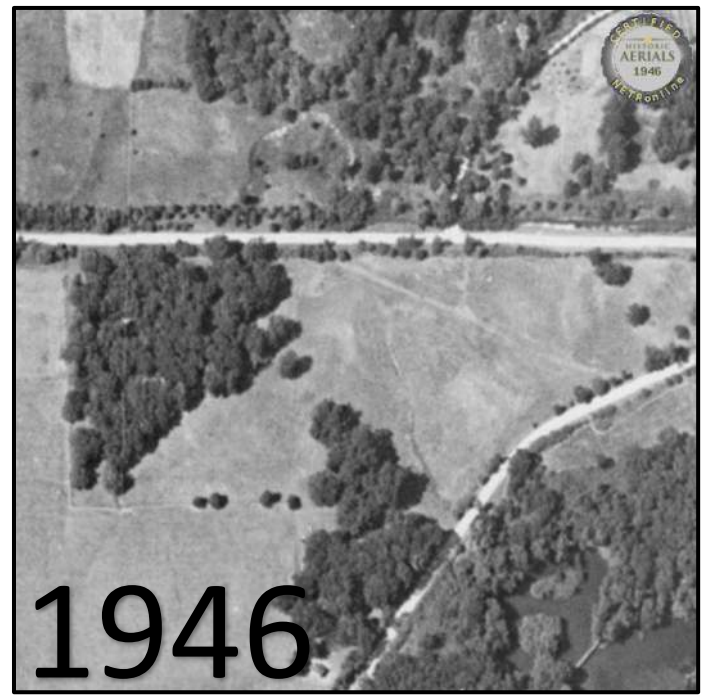
Urban land
Percent of map unit: 1 percent
Landform: Ground moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Cook County, Illinois
Survey Area Data: Version 14, May 29, 2020

Soil Survey Area: Lake County, Illinois
Survey Area Data: Version 15, May 29, 2020

Exhibit G - Aerial Photography




1981


1988


1998


2010


2014


2017

Exhibit H - IDOT 1922 Mylar of County Line Road

INDEX OF SHEETS

STATE OF ILLINOIS
COUNTY OF COOK
DEPARTMENT OF HIGHWAYS

PLAN AND PROFILE OF PROPOSED
STATE AID HIGHWAY

SCALES: PLAN 1 INCH = 100 FEET; PROFILE HORIZONTAL 1 INCH = 100 FEET; PROFILE VERTICAL 1 INCH = 10 FEET; CROSS SECTION 1 INCH = 5 FEET

LAKE COOK ROAD
ROUTE 52 SEC. 3017—15D.

PAVED HIGHWAY S
OF
COOK COUNT
ILLINOIS
1922
George A. Quin

LAYOUT

SCALE 1" = 1000 FT.

TOTAL NET LENGTH OF LAYOUT = 26360 FT. = 4.99 MILES.

CONVENTIONAL SIGNS

STATE AND NATIONAL LINE
COUNTY LINE
CITY VILLAGE OR BOROUGH
TOWNSHIP LINE
GRANT LINE
SECTION LINE
FENCE LINE
GUARD RAIL
UNFENCED PROPERTY
RIGHT OF WAY LINE
TRAVELED WAY
RAILROADS
RETAINING WALL
BASE OR SURVEY LINE

LEVEE
CULVERTS
DROP INLET
TROLLEY POLE
POWER POLE
TELEPHONE OR TELEGRAPH POLES
MARSH
HEDGE
GROUND ELEVATION
GRADE ELEVATION

STATION TO STATION		LENGTH OF IMPROVEMENT	GROSS LENGTH ALONG TRANS. LINE	CORRECTIONS FOR CURVES	CORRECTIONS FOR RECONSTRUCTIONS	NET LENGTH OF LAYOUT ALONG FINAL	OMISSIONS		NET LENGTH TO BE IMPROVED IN FEET		PAVEMENT OVER BRIDGES		ADDITIONAL YARDAGE		SQUARE YARDS OF PAVEMENT		
		Feet	Feet	Sta. + Feet	Feet	Sta. + Feet	Feet	Sta. to Sta.	Feet	Feet	Sq. Feet	Total	Sta. + Feet	Sta. to Sta.	Sq. Yds.	Feet	20 Feet	Total
0+00	264+05.8	20	26405.8			26405.8	253+44	257+89	45.0	26360.8	52614.8			264+05.8	58.6		58578.6	
												26360.8						58615.8

APPROVED 19
COUNTY SUPERINTENDENT OF HIGHWAYS

THE DEPARTMENT OF
Public Works and Buildings
DIVISION OF HIGHWAYS

PASSED 19
ROAD ENGINEER

APPROVED 19
COOK COUNTY ENGINEER

APPROVED 19
SUPERINTENDENT OF HIGHWAYS

APPROVED 19
DIRECTOR

RECOMMENDED FOR APPROVAL
CHIEF ENGINEER
APPROVED
DIRECTOR

LAKE

CUBA

COUNTY

TWP.

LAKE - COOK RD.

¼ Section Corner

SEC. 4-41-9

CUT 5972 CU YDS.
FILL 4600 CU YDS.

CUT 7917 CU YDS.
FILL 3700 CU YDS.

CUT 10872 CU YDS.
FILL 8367 CU YDS.

CUT 9637 CU YDS.
FILL 7393 CU YDS.

PRESENT GROUND LINE
FINISHED PAVEMENT

LAKE

COUNTY

CUBA

TWP.

Section Corner

LAKE - COOK RD.

COOK COUNTY

BARRINGTON TWP.

CUT 7084 CU YDS.
FILL 5496 CU YDS.

CUT 5248 CU YDS.
FILL 4106 CU YDS.

PRESENT GROUND LINE
FINISHED PAVEMENT

Exhibit I - Soil Borings, Liquid and Plastic Limits Test Report, & Particle Size Distribution Reports

MATERIAL SERVICE TESTING LABORATORIES

Lacey Lake, Donlea Road Drainage Investigation

Boring No.	B-1
Project ID:	INF2001
Drafter:	F. Granville
Page:	1 of 1

Driller:	Strata Earth Services, LLC	Drill Date:	8/18/2022	Water Level During:	3.25'
Drill Rig:	DH103	Boring Elevation:	Existing	Water Level After:	17.0'

Sample	Recovery, in	Blow Count	Depth, ft	Graphic Log	Material Description	Q_p, tsf	W_c, %	γ_d, pcf	MS	Remarks
1	10	2	1–2		Topsoil	0.5	N/A	--	SS	
			2–3		Soft Brown & Black Sandy Clay (trace gravel) (ML)					
2	12	3	3–4		Soft Brown Sandy Silty Clay (trace gravel)(saturated) (CL)	0.5	N/A	--	SS	
3	34	3	4–7		Soft - Medium Brown/Gray Slty Clay (trace sand) (CL)	1.50	N/A	--	SS	
			7					--		
4	24	6	8–9		Stiff - Hard Gray Silty Clay (trace sand) (CL)	2.5	N/A	--	SS	
			10				N/A	--		
5	24	3	11–13			1.25	N/A	--	SS	
6	23	11	14–15			3.25	N/A	--	SS	
7	20	12	16–17			3	N/A	--	SS	
8	24	25	18–19			4.5	N/A	--	SS	
			20							

(20' **EOB**

Legend:

- Water Level While Sampling
- Water Level After Drilling
- **Qp** Estimated Unconfined Compressive Strength Based Upon Calibrated Penetrometer Reading, tons/ft^2
- **Wc** Moisture Content, %
- γ_d Dry Density, pounds/ft^3
- **WS** While Sampling
- **WD** While Drilling
- **MS** Method of Sampling
- **SS** Split Spoon
- **ST** Shelby Tube
- **HA** Hand Auger

OFC 921 W. Van Buren St., Suite 210, Chicago, IL 60607 LAB 2462 Delta Lane, Elk Grove Village, IL 60007
P 847.787.0320 **F** 847.787.0321 **W** www.materialservicetesting.com

MATERIAL SERVICE TESTING LABORATORIES			**Lacey Lake, Donlea Road Drainage Investigation**			Boring No.	B-2				
						Project ID:	INF2001				
						Drafter:	F. Granville				
						Page:	1 of 1				
Driller:	Strata Earth Services, LLC		Drill Date:	8/18/2022		Water Level During:	3.0'				
Drill Rig:	DH103		Boring Elevation:	Existing		Water Level After:	15.5'				

Sample	Recovery, in	Blow Count	Depth, ft	Graphic Log	Material Description	Q_p, tsf	W_c %	γ_d, pcf	MS	Remarks
			1		Topsoil					
1	16	8	2		Medium Brown & Black Sandy Clay (trace gravel) (ML)	1.0	N/A	--	SS	
			3		Soft Brown Sandy Silty Clay (trace gravel)(saturated) (CL)					
2	12	4	4			0.5	N/A	--	SS	
3	20	5	5		Medium B**rown &** Gray Slty Clay (trace sand) (CL)	1.00	N/A	--	SS	
			6							
			7					--		
			8		Stiff - Hard Gray Slty Clay (trace sand) (CL)					
4	23	9	9			1.5	N/A	--	SS	
			10				N/A	--		
			11							
			12							
5	19	25	13			1.00	N/A	--	SS	
			14							
6	24	19	15			4	N/A	--	SS	
			16							
7	24	21	17			4.5	N/A	--	SS	
			18							
8	24	26	19			4.5	N/A	--	SS	
			20							

(20' **EOB**

Legend:

Water Level While Sampling

Water Level After Drilling

Qp Estimated Unconfined Compressive Strength Based Upon Calibrated Penetrometer Reading, tons/ft^2

Wc Moisture Content, %

γ_d Dry Density, pounds/ft^3

WS While Sampling

WD While Drilling

MS Method of Sampling

SS Split Spoon

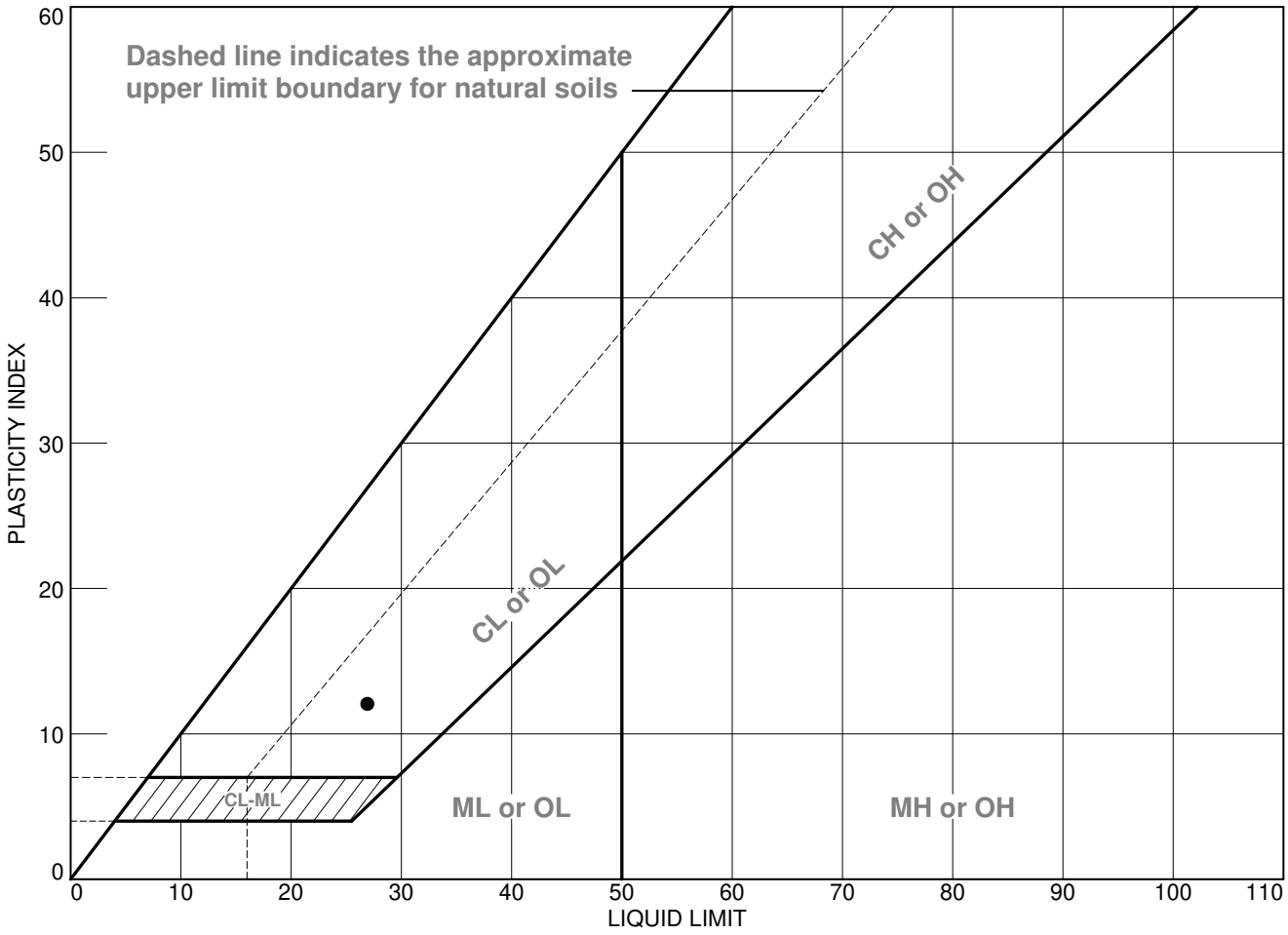
ST Shelby Tube

HA Hand Auger

OFC 921 W. Van Buren St., Suite 210, Chicago, IL 60607 LAB 2462 Delta Lane, Elk Grove Village, IL 60007

P 847.787.0320 **F** 847.787.0321 **W** www.materialservicetesting.com

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		22-357	10'		15	27	12	CL

MATERIAL SERVICE TESTING

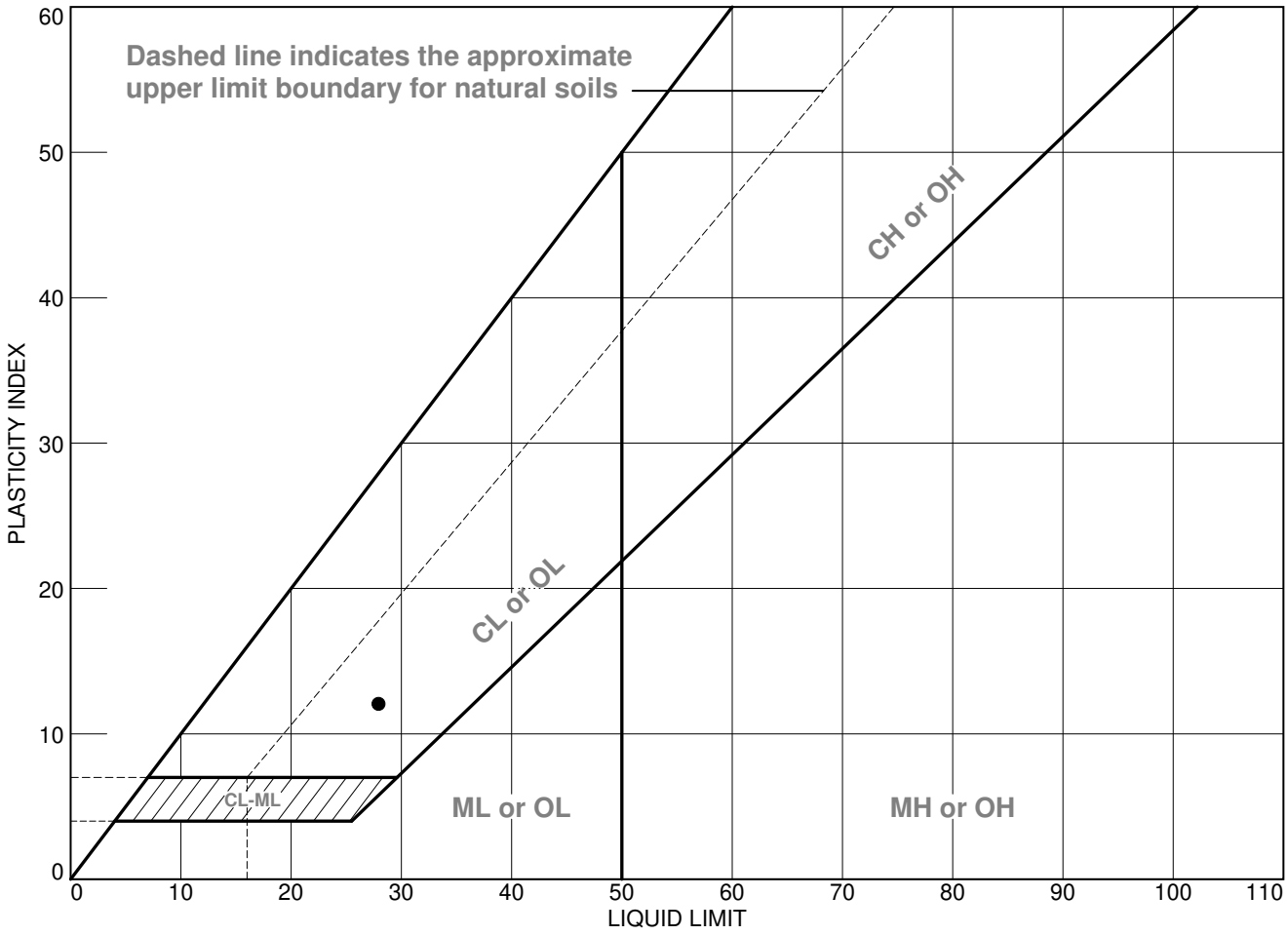
Client: Infrastructure Engineering, Inc.

Project: Lacey Lake, Donlea Road Drainage Investigation

Project No.: INF2001 **Figure**

Tested By: J. Patel **Checked By:** F. Granville

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		22-357	20'		16	28	12	CL

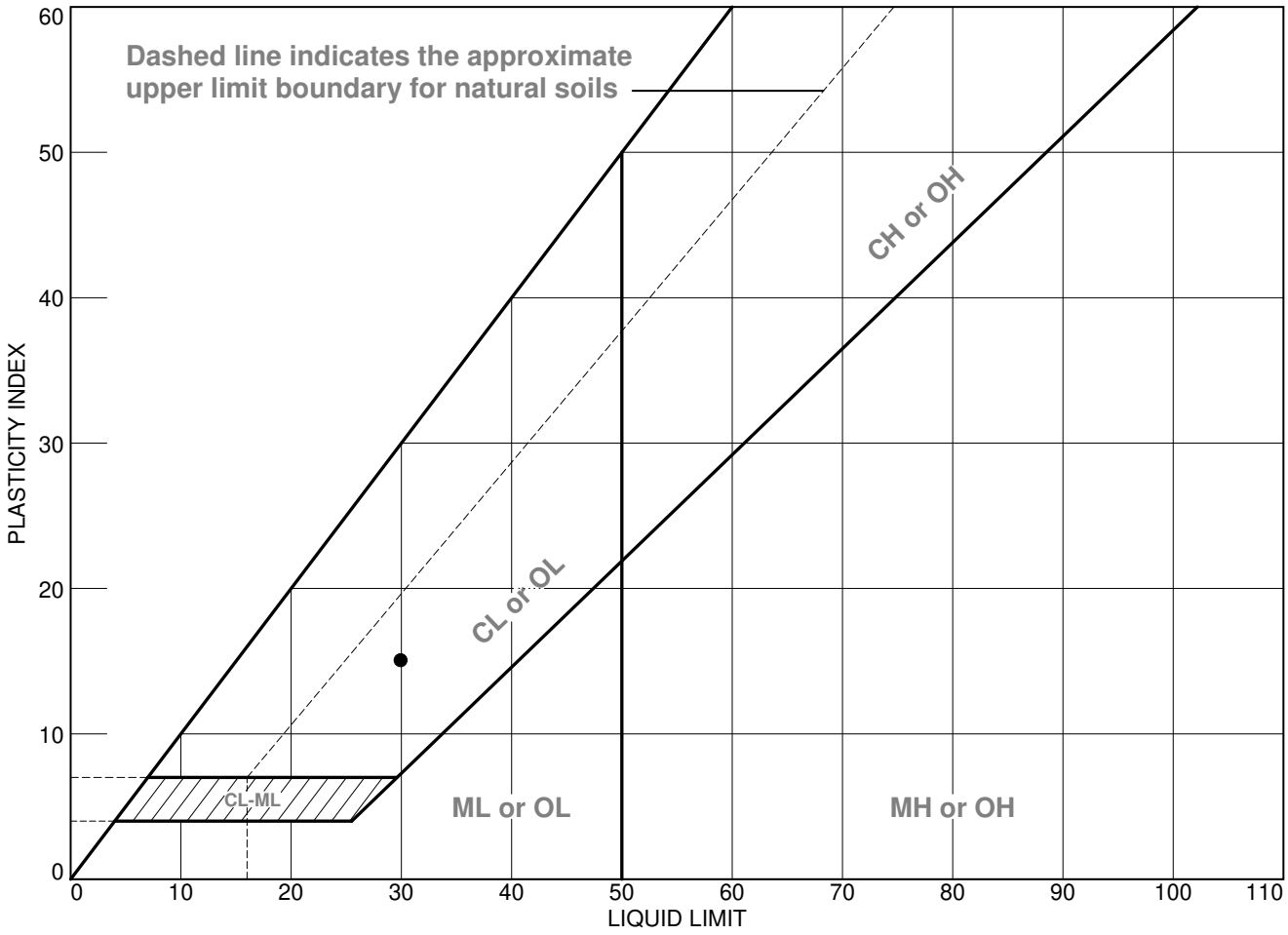
MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No.: INF2001 **Figure**

Tested By: J. Patel **Checked By:** f. Granville

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		22-358	10'		15	30	15	CL

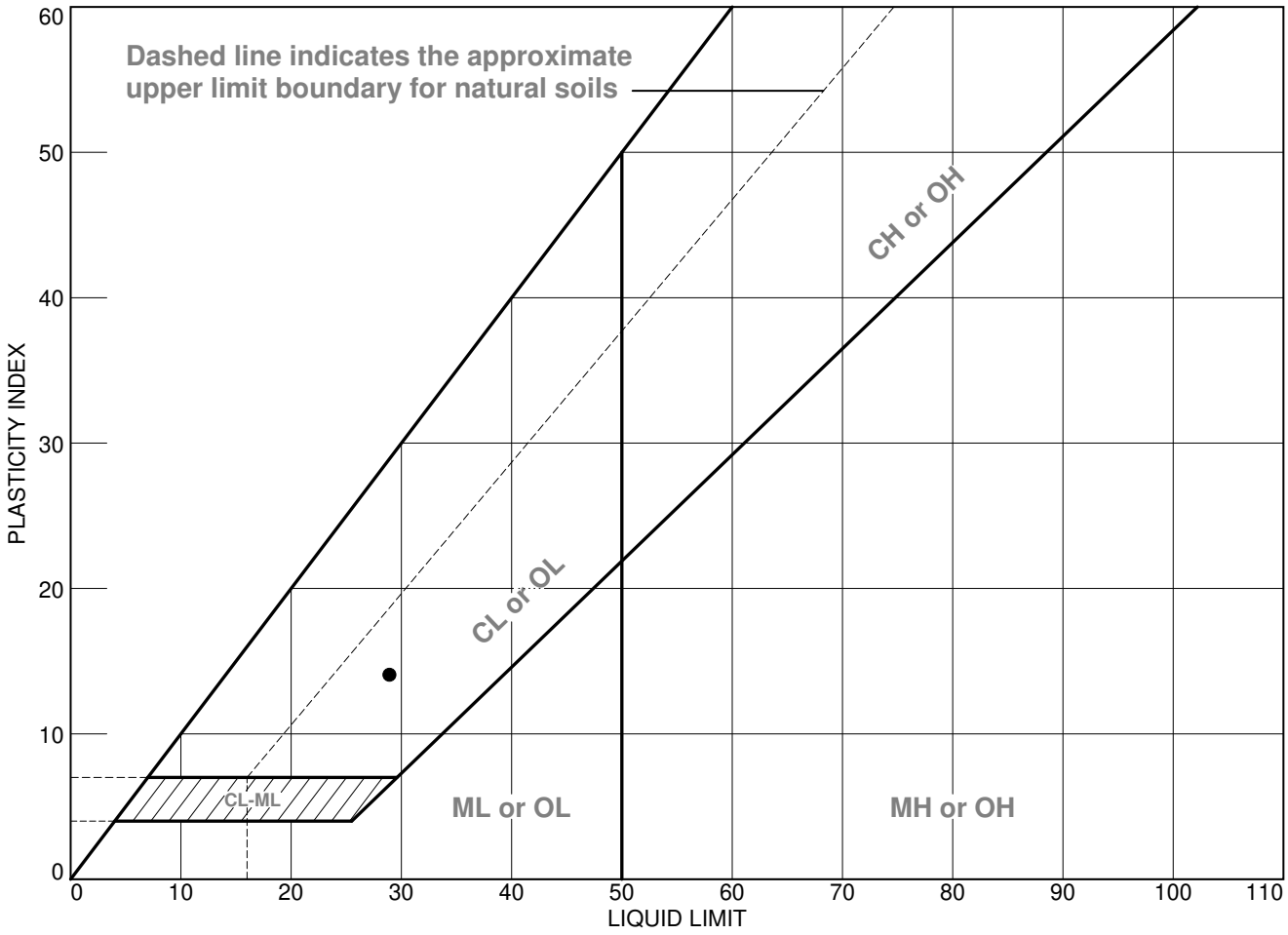
MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No.: INF2001 **Figure**

Tested By: J. Patel **Checked By:** F. Granville

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		22-358	20'		15	29	14	CL

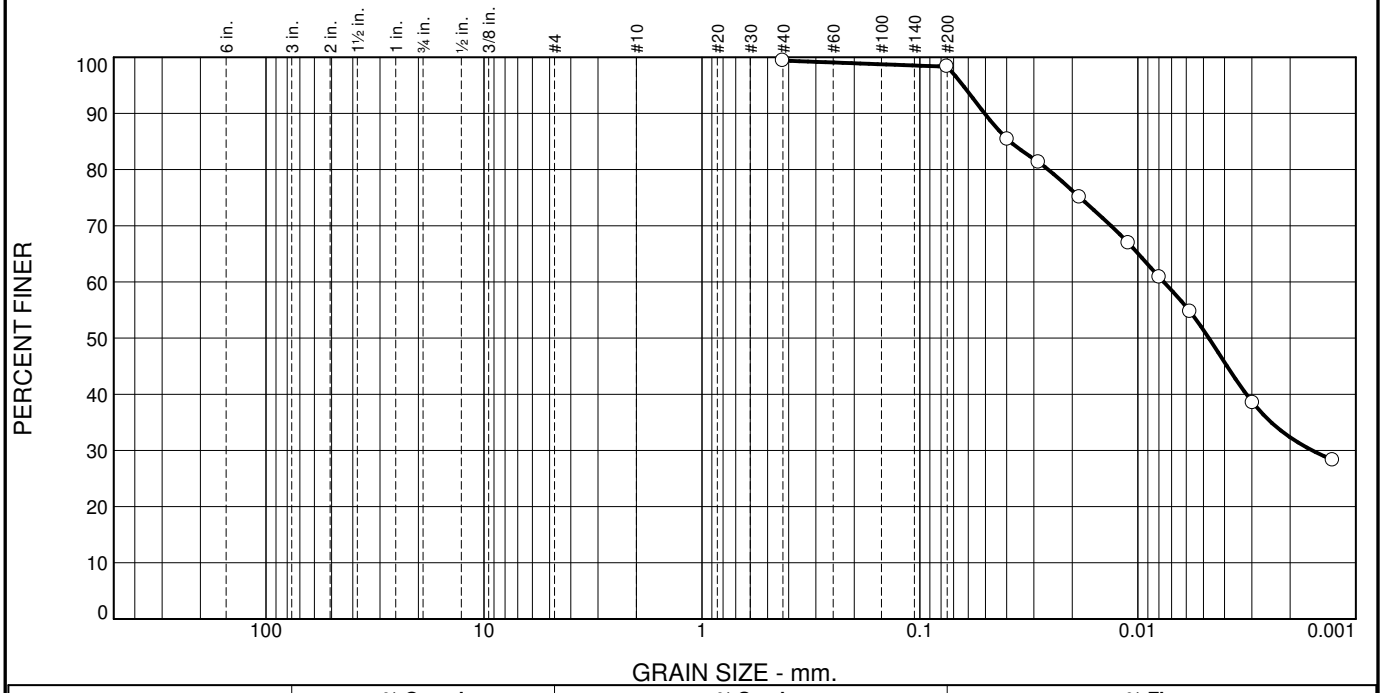
MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No.: INF2001 **Figure**

Tested By: J. Patel **Checked By:** F. Granville

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					1.1	46.9	51.4

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#40	99.4		
#200	98.3		
0.0396 mm.	85.4		
0.0285 mm.	81.3		
0.0185 mm.	75.1		
0.0110 mm.	66.9		
0.0080 mm.	60.8		
0.0058 mm.	54.7		
0.0030 mm.	38.5		
0.0013 mm.	28.3		

* (no specification provided)

Material Description

Gray Silty Clay (trace fine sand)

Atterberg Limits (ASTM D 4318)

PL= 15 **LL=** 29 **PI=** 14

Classification

USCS (D 2487)= CL **AASHTO (M 145)=**

Coefficients

D_{90}= 0.0505 D_{85}= 0.0386 D_{60}= 0.0076
D_{50}= 0.0047 D_{30}= 0.0016 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8/18/2022 **Date Tested:** 8/25/2022

Tested By: J. Patel

Checked By: F. Granville

Title: Lab Manager

Location: Boring 2
Sample Number: 22-358 **Depth:** 20'

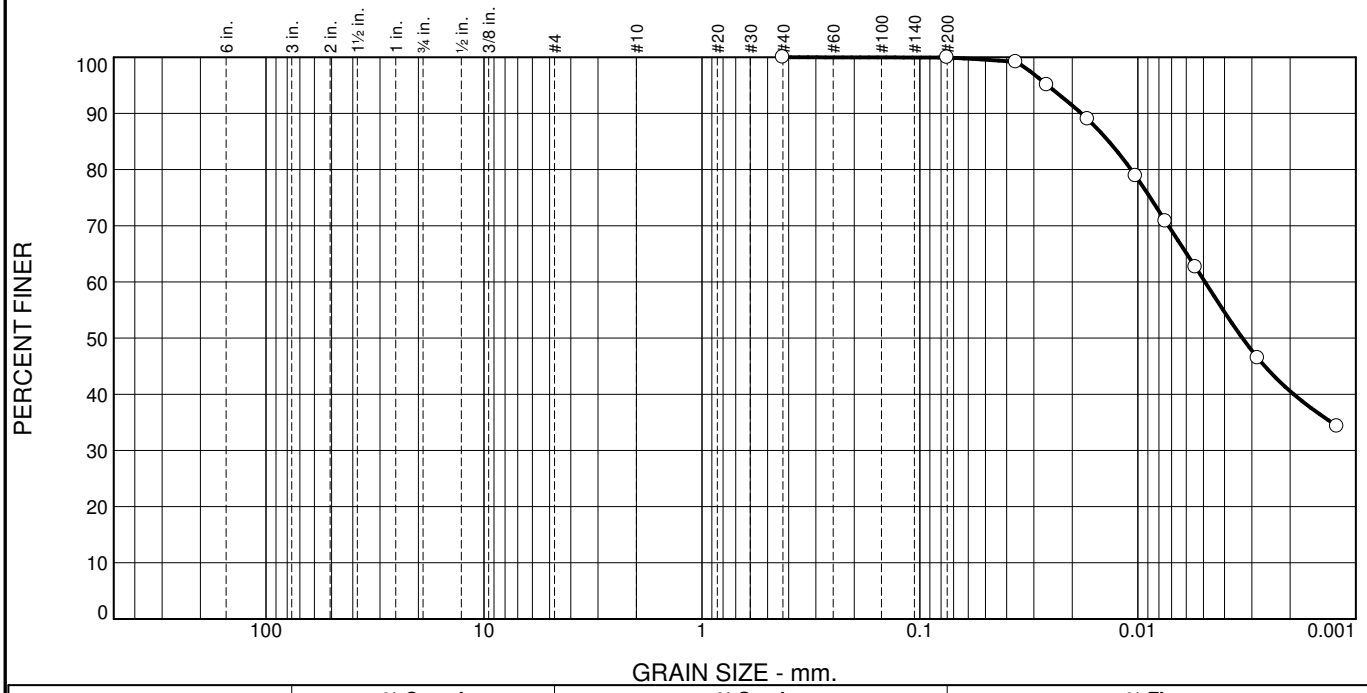
Date Sampled: 8/18/2022

MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No: INF2001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.0	0.1	39.5	60.4

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#40	100.0		
#200	99.9		
0.0362 mm.	99.1		
0.0261 mm.	95.1		
0.0170 mm.	89.0		
0.0102 mm.	78.9		
0.0075 mm.	70.8		
0.0054 mm.	62.7		
0.0028 mm.	46.4		
0.0012 mm.	34.3		

* (no specification provided)

Material Description

Gray Silty Clay (trace fine sand)

Atterberg Limits (ASTM D 4318)

PL= 15 **LL=** 27 **PI=** 12

Classification

USCS (D 2487)= CL **AASHTO (M 145)=** A-6(10)

Coefficients

D_{90}= 0.0182 D_{85}= 0.0136 D_{60}= 0.0049
D_{50}= 0.0033 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8/18/20222 **Date Tested:** 8/22/2022

Tested By: J. Patel

Checked By: f. Granville

Title: Lab Manager

Location: Boring 1
Sample Number: 22-357 **Depth:** 10'

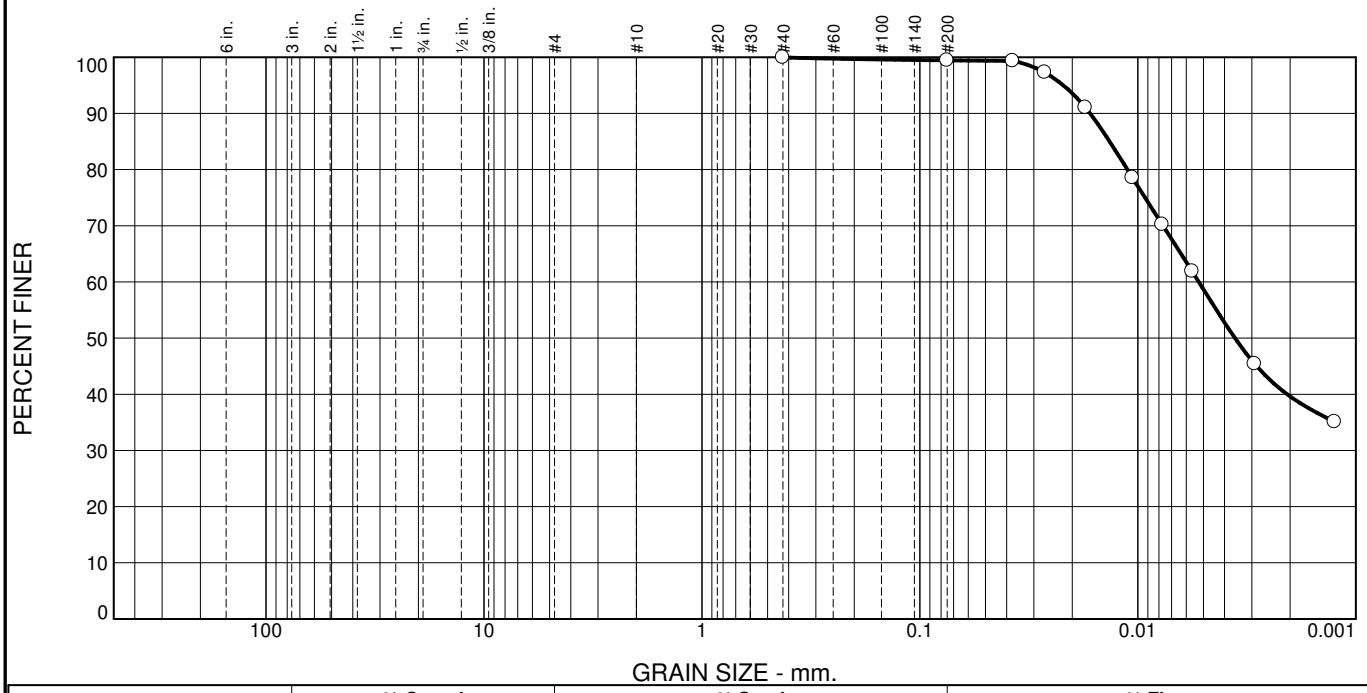
Date Sampled: 8/18/2022

MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No: INF2001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					0.5	40.7	58.7

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#40	99.9		
#200	99.4		
0.0374 mm.	99.4		
0.0267 mm.	97.3		
0.0174 mm.	91.0		
0.0106 mm.	78.5		
0.0077 mm.	70.2		
0.0056 mm.	61.9		
0.0029 mm.	45.4		
0.0012 mm.	35.1		

* (no specification provided)

Material Description

Gray Silty Clay

Atterberg Limits (ASTM D 4318)

PL= 16 **LL=** 28 **PI=** 12

Classification

USCS (D 2487)= CL **AASHTO (M 145)=**

Coefficients

D_{90}= 0.0166 D_{85}= 0.0135 D_{60}= 0.0053
D_{50}= 0.0036 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8/18/2022 **Date Tested:** 8/22/2022

Tested By: J. Patel

Checked By: F. Granville

Title: Lab Manager

Location: Boring 1
Sample Number: 22-357 **Depth:** 20'

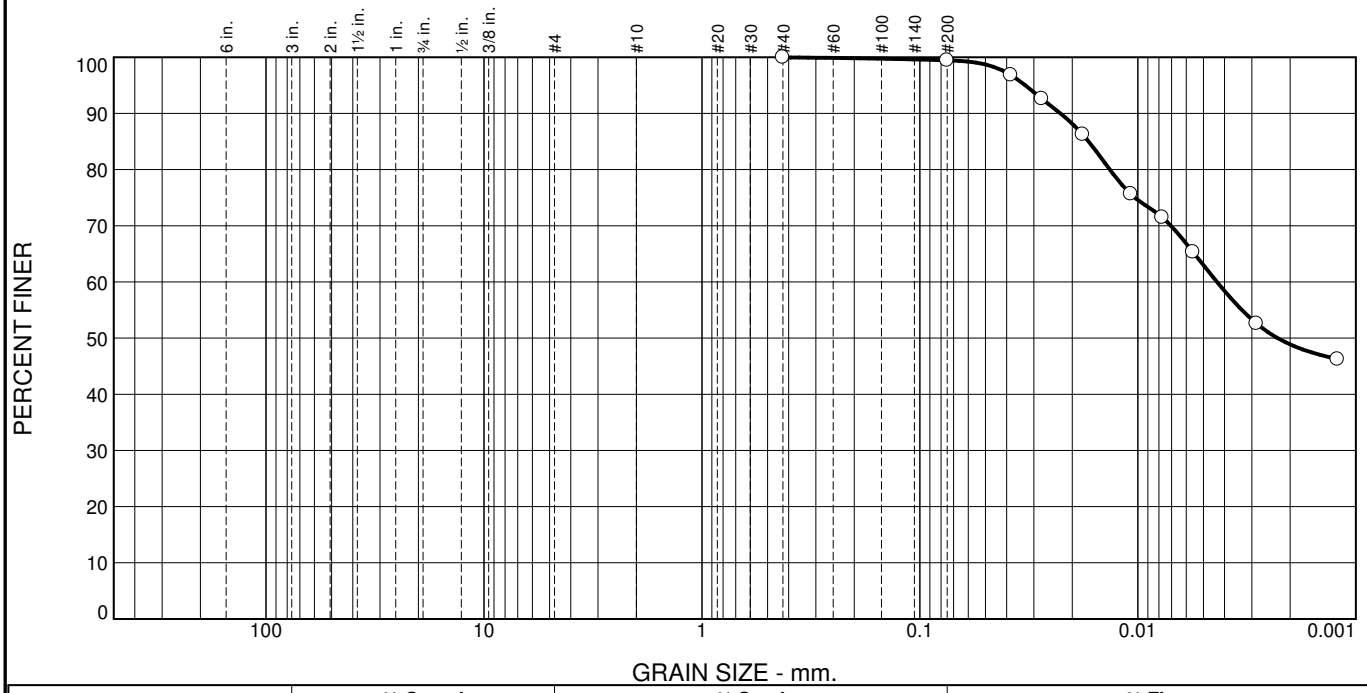
Date Sampled: 8/18/2022

MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No: INF2001 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
					0.6	36.4	63.0

TEST RESULTS

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#40	100.0		
#200	99.4		
0.0382 mm.	96.8		
0.0275 mm.	92.6		
0.0179 mm.	86.2		
0.0108 mm.	75.6		
0.0077 mm.	71.5		
0.0056 mm.	65.3		
0.0029 mm.	52.6		
0.0012 mm.	46.2		

* (no specification provided)

Material Description

Gray Silty Clay (trace fine sand)

Atterberg Limits (ASTM D 4318)

PL= 15 **LL=** 30 **PI=** 15

Classification

USCS (D 2487)= CL **AASHTO (M 145)=**

Coefficients

D_{90}= 0.0227 D_{85}= 0.0168 D_{60}= 0.0043
D_{50}= 0.0023 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 8/18/2022 **Date Tested:** 8/24/2022

Tested By: J. Patel

Checked By: F. Granville

Title: Lab Manager

Location: Boring 2 **Date Sampled:** 8/18/2022
Sample Number: 22-358 **Depth:** 10'

MATERIAL SERVICE TESTING

Client: Infrastructure Engineering, Inc.
Project: Lacey Lake, Donlea Road Drainage Investigation

Project No: INF2001 **Figure**

Exhibit J - Field Survey & Aerial Imagery

B-2

230
DONLEA RD.

210
DONLEA RD.

B-1

15" RCP
INV: 793.61

15" RCP
INV: 794.43

DONLEA RD.

LACEY
LAKE

N

20 0 20 40
SCALE: 1 " = 20' FEET

MODEL: Default
FILE NAME: H:\FILES\VBH\VBH003 Drainage\VBH003-052020.01-Donlea Road\CADD\DGN\Exhibits\Exhibit 1.dgn

TROTTER ASSOCIATES, INC. ENGINEERS AND SURVEYORS	VILLAGE OF BARRINGTON HILLS	COUNTY HIGHWAY:	COUNTY OF COOK DEPARTMENT OF TRANSPORTATION AND HIGHWAYS	COMPUTED:	REVISIONS	DATE	DONLEA ROAD DRAINAGE INVESTIGATION	Field Survey & Aerial Imagery
		FISCAL YEAR:		DRAWN:				
		SECTION:		CHECKED:				SCALE: 1"=20' SHEET 1 OF 4

15" RCP
INV: 792.23

18" RCP
INV: 803.59

18" RCP
INV: 802.69

15" RCP
INV: 796.91

W. COUNTY LINE RD.

381 COUNTY LINE RD

38

N

20 0 20 40
SCALE: 1" = 20' FEET

MODEL: Default
FILE NAME: H:\FILES\VBH\VBH003 Drainage\VBH003-052020.01-Donlea Road\CADD\DGN\Exhibits\Exhibit 2.dgn

TROTTER ASSOCIATES, INC.
ENGINEERS AND SURVEYORS

VILLAGE OF BARRINGTON HILLS

COUNTY HIGHWAY:
FISCAL YEAR:
SECTION:

COUNTY OF COOK
DEPARTMENT OF TRANSPORTATION AND HIGHWAYS

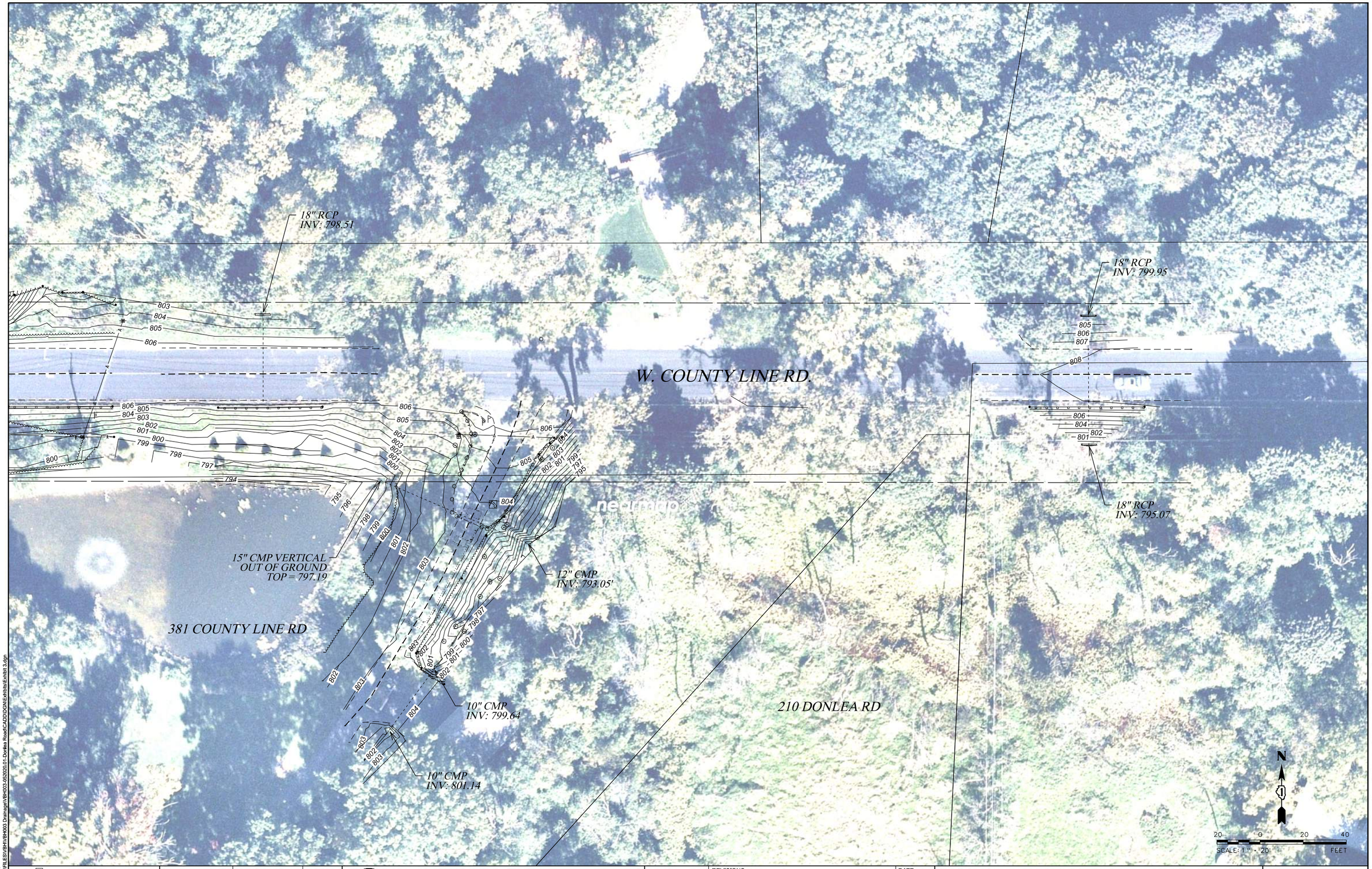
COMPUTED:
DRAWN:
CHECKED:

REVISIONS	DATE

DONLEA ROAD DRAINAGE INVESTIGATION

Field Survey & Aerial Imagery

SCALE: 1"=20' SHEET 2 OF 4



MODEL: Default
FILE NAME: H:\FILES\VBH\VBH003 Drainage\VBH003-052020\01-Donlea Road\CADD\DGN\Exhibits\Exhibit 3.dgn

TROTTER ASSOCIATES, INC.
ENGINEERS AND SURVEYORS

VILLAGE OF BARRINGTON HILLS

COUNTY HIGHWAY:
FISCAL YEAR:
SECTION:

COUNTY OF COOK
DEPARTMENT OF TRANSPORTATION AND HIGHWAYS

COMPUTED:
DRAWN:
CHECKED:

REVISIONS	DATE

DONLEA ROAD DRAINAGE INVESTIGATION

Field Survey & Aerial Imagery

SCALE: 1"=20' SHEET 3 OF 4

MODEL: Default
FILE NAME: H:\FILES\VBH\VBH003 Drainage\VBH003-052020\01-Donlea Road\CADD\DGN\Exhibits\Exhibit 4.dgn

TROTTER ASSOCIATES, INC.
ENGINEERS AND SURVEYORS

VILLAGE OF BARRINGTON HILLS

COUNTY HIGHWAY:
FISCAL YEAR:
SECTION:

COUNTY OF COOK
DEPARTMENT OF TRANSPORTATION AND HIGHWAYS

COMPUTED:
DRAWN:
CHECKED:

REVISIONS	DATE

DONLEA ROAD DRAINAGE INVESTIGATION

Field Survey & Aerial Imagery

SCALE: 1"=20' SHEET 4 OF 4

Exhibit J - Existing Agricultural Drain Tile Investigation Plan - Trotter

EXISTING AGRICULTURAL DRAIN TILE INVESTIGATION PLAN

BARRINGTON HILLS
LACEY-DONLEA RD AREA

PREPARED FOR TROTTER AND ASSOC.

Section no. 33 & 34 Cuba Twp., Lake Co.IL.

FLINT CREEK

EXISTING 6" CLAY DRAIN TILE OUTFALL SECTION TO OUTFALL AT FLINT CREEK

EXISTING 6" CLAY DRAIN TILE OUTFALL SECTION CONTINUES TO OUTFALL AT FLINT CREEK

INVESTIGATION PROBE TRENCH A
6" CLAY DRAIN TILE FAIR CONDITION
10% RESTRICTIVE SILT
SLIGHT FLOW
35" GRD TO INVERT

INVESTIGATION PROBE TRENCH B
6" CLAY DRAIN TILE FA R CONDITION
10% RESTRICTIVE SILT
SLIGHT FLOW FAIR CONDITION
34" GRD TO INVERT

END

NOTE IT IS OUR ASSUMPTION THAT ADDITIONAL SMALL DIAMETER DRAIN TILE FEEDER LATERALS THAT OUTFALL TO THE IDENTIFIED MAILINE SYSTEM MAY EXISTING IN THIS AREA

NOTE IT IS OUR ASSUMPTION THAT ADDITIONAL SMALL DIAMETER DRAIN TILE FEEDER LATERALS THAT OUTFALL TO THE IDENTIFIED MAILINE SYSTEM MAY EXISTING IN THIS AREA

INVESTIGATION PROBE TRENCH C
NO DRAIN TILE LOCATED

NOTE IN ACCORDANCE WITH OUR FIELD DRAINAGE TILE INVESTIGATION AND RECONNAISSANCE IT IS OUR OPINION THAT THERE ARE NO EXISTING DRAIN TILES WITHIN THE LACEY LAKE OUTFALL REACH THAT HAVE HISTORICALLY CONTROLLED NORMAL WATER ELEVATIONS WITHIN THE LACEY LAKE BASIN.
AFTER SIGNIFICANT FIELD EXPLORATION IT IS ALSO OUR OPINION THAT THE ORIGINAL LACEY LAKE HIGH WATER SURFACE OUTFALL CONVEYANCE CHANNEL HAS BEEN COMPROMISED FROM RANDOM DEVELOPMENT AND MAINTENANCE NEGLECT CAUSING SURCHARGED DEPRESSIONAL STORAGE AND FLASH FLOODING DURING SEASONALLY WET PERIODS
(*DELINEATES POTENTIAL SURFACE FLOOD ROUTE*)

INVESTIGATION PROBE TRENCH D
NO DRAIN TILE LOCATED

STEEPLECHASE ROAD

EXISTING 12" (-)
ROADWAY CROSS CULVERT

COUNTYLINE ROAD

EXISTING 15" (-)
ROADWAY CROSS CULVERT

EXIST. 12" CMP POND OUTFALL WITH WATER CONTROL RISER

INVESTIGATION PROBE TRENCH E
NO DR IN TILE LOC TED

INVESTIGATION PROBE TRENCH F
NO DRAIN TILE LOCATED

INVESTIGATION PROBE TRENCH G
NO DRAIN TILE LOCATED

DONLEA ROAD

INVESTIGATION PROBE TRENCH H
NO DRAIN TILE LOCATED

EXISTING 15" (-)
ROADWAY CROSS CULVERT

INVESTIGATION PROBE TRENCH I
NO DRAIN TILE LOCATED

LACEY LAKE

SITE LOCATION
Section no. 33 & 34 Cuba Twp., Lake Co.IL.

PROJECT CLIENT:

TROTTER AND ASSOC.

Steve Cieslica , Project Manager
38 W.Grand Ave., Ste 300, Fox Lake ,IL., 60020

APPROVED BY AND DATE: TOM HUDDLESTON 1/15/22	PROJECT DATE: 1/15/22		
ACKNOWLEDGMENTS: HUDDLESTON DRAINAGE MAP and ARCHIVE SYSTEMS	FIELD FILE NO.: 10-5-33		
DRAWN BY AND DATE: TOM HUDDLESTON 1/15/22	DRAWING NO. 10-5-33_x1	WEATHER CONDITIONS: SUNNY/ WARM - 25o	DRAWING SCALE: 1" TO 100' / SHEET NO. ONE OF ONE

REVISIONS: DATE: BY: DESCRIPTION:

NORTH

BARRINGTON HILLS LAKE LACEY-DONLEA RD AREA

HUDDLESTON McBRIDE
PROFESSIONAL LAND DRAINAGE SERVICES
9504 FOWLER RD., ROCHELLE, ILLINOIS PHONE 815-562-6007

COORDINATE SYSTEM: ILLINOIS STATE PLANE EAST NAD 83

M HUDDMAC ACTIVE I ES AUTOCAD DRAWINGS ACT VE CADD 6-4-33@TROTTER BARRINGTON HI S 6-4-33_X dwg 3 2022 6 29 00 AM Tom AutoCAD D (Sma lest ile) pc3 ARCH u l b ed D (24 00 x 36 00 Inches) 200