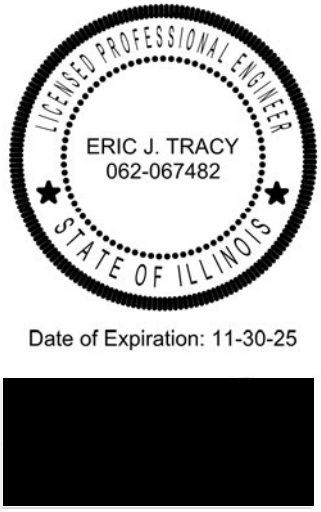
DRAINAGE REPORT – The Grove Lot 1

HWY 47 & Merrill Road

Sugar Grove, Illinois



Date of Expiration: 11-30-25

[redacted]

Prepared by:
Kimley-Horn and Associates, Inc.
570 Lake Cook Road, Suite 200
Deerfield, IL 60015
Contact: Eric Tracy, P.E.

Prepared on: July 1, 2025

Kimley»Horn

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EXHIBITS

1. PROJECT DESCRIPTION

Kimley-Horn and Associates, Inc., serves as the engineering consultant for Crown Community Development, who is proposing to develop approximately 77 acres of existing land used for agricultural purposes into a 214-unit single family residential community. The sitework includes minor demolition, grading, stormwater management facilities, water, sanitary sewer, paving, landscaping, and construction of single-family homes.

This report evaluates the pre and post development runoff characteristics of the development and addresses the stormwater requirements of Kane County and the Village Sugar Grove.

1.1. Pre-Development Conditions

The existing site is currently undeveloped farmland with a single homestead located at the south west corner of the site. It is bound by ComEd right-of-way to the north, existing farmland to the east, a residential neighborhood to the south, and Merrill Road to the west. The site is split by a high point located near the existing residential housing that pushes drainage east towards a low point where drainage is capture within a 2' inlet and conveyed to an existing stormwater system along the southern boundary and to the west where flow is captured at a culvert crossing Merrill Road conveying drainage offsite to the south. In existing conditions, the 30" Merrill Road culvert will take flows from the proposed site as well as offsite flows from farmland to the east and to the north. Large flows from these areas will result in overtopping of Merrill Road at roughly 45 CFS with the existing 100-year 24 hour storm resulting in roughly 222 CFS. Calculations for the existing conditions as well as the existing culvert are provided in **Exhibit 2**.

A wetland map has been provided by Hey and Associates, Inc. (see **Exhibit 1**). A potential farmed wetland (PFW) is provided on the subject property. The portion of the isolated wetland located outside the footprint of the pond is to be mitigated for separately. The off-site stormwater facility (within 100 feet of the property boundary) not depicted in the provided wetland map, does not require a wetland delineation under Subsection 9-169.B.3 of the Kane County Stormwater Management Ordinance.

No portion of the site is located within the FEMA Floodplain per FEMA map number 17089C0315J dated July 17, 2012 (see **Exhibit 1**). A soils survey was obtained from the Natural Resources Conservation Service (NRCS), which shows that the site is underlain with soils consisting of HSG group B, C, and D. HSG "D" will be utilized for post-development conditions due to compaction associated with development. See **Exhibit 1** for a detailed breakdown of the soil groups. An drain tile survey was done for the proposed property. See **Exhibit 1** for the referenced survey.

1.2. Post-Development Conditions

The proposed development will generally maintain the existing west outfall location, but at a runoff rate in accordance with County codes. Two stormwater detention basins will capture runoff from the eastern and western portions of the site while also capturing offsite flow from the east and north. All drainage will be routed to the basins via storm sewer or overland flow. After being collected in the detention basins, drainage will be released below the maximum allowable release rate to the existing culvert and ultimately continue flow south of the property. Volume equal to the required BMP volume will be provided below the outlet pipe elevation to facilitate infiltration and provide BMPs/volume reduction.

The stormwater detention basins were designed per the following:

- 100-year rainfall events per Illinois State Water Survey Bulletin 75
- Allowable release rate of 0.10 cfs/acre for the 100-year, 24-hour, rainfall event

Calculations for the proposed ponds, tributary basins, and existing culvert are provided in **Exhibit 2**.

2. POST-DEVELOPMENT CONDITIONS ANALYSIS

2.1. Runoff Rate and Detention Basin Information

In order to accommodate the development of the site, two detention ponds are proposed. The ponds will split the site into an eastern and western detention pond, mimicking the existing drainage patterns of the site. The two ponds are connected in series with the eastern pond draining to the western pond where it will outfall to the existing drainage culvert crossing, discharging to the south side of Merrill Road.

Of the total site area, 79.70 acres are proposed to be disturbed with 1.57 acres being undetained resulting in a site allowable release rate of 6.70 cfs. 61.02 acres, which include both the proposed site as well as the Denny Road expansion are to be tributary to the eastern pond. The eastern pond will also accommodate 34.35 acres of offsite flow from the agricultural field to the east. Depressional storage compensation of 2.81 ac-ft will be located within the eastern pond.

18.68 acres of the remaining development will be tributary to western detention basin. Of the 18.68 acres, 1.57 acres are undetained. Due to the ponds in series the western pond's release rate will be for the full site. The western detention pond will also accommodate approximately 244.82 acres of offsite flow from the north. A detailed breakdown of the pond calculations is provided in Table 1 below.

Table 1 : Detention Basin Information

	East Basin	West Basin
Detention Service Area	61.02 ac	18.68 ac
Allowable Release	6.10 cfs	1.87 cfs
Undetained Area	0.00 ac	1.57 ac
Undetained Release	0.00 cfs	1.27 cfs
Adjusted Allowable Release	6.10 cfs	0.60 cfs
Total Allowable Release	6.70 cfs	
Impervious Area (65% Lot Coverage)	33.69 ac	8.79 ac
Volume Reduction Required	2.81 ac-ft	0.73 ac-ft
Bottom of Pond	709.30'	700.00'
Normal Water Level (NWL)	710.00'	700.34'
Volume Reduction Provided	3.22 ac-ft	0.82 ac-ft
Actual Release Rate (100yr-24hr)	1.65 cfs	6.66 cfs
High Water Level (HWL)	716.33'	702.59'
Detention Volume Provided	34.38 ac-ft	5.83 ac-ft
Depressional Compensatory Storage Required	2.81 ac-ft	-
Depressional Compensatory Storage Provided	3.11 ac-ft	-
Depressional Compensatory Storage Elevation	716.80'	-
Overflow Weir Elevation	716.80'	702.60'
Overflow Weir Length	175.00'	120.00'
Top of Pond	718.00'	704.30'
Overflow Weir Capacity	598.11 cfs	691.56 cfs
Overflow Weir Capacity Required	51.10 cfs	184.78 cfs
Overflow Weir HWL	716.99'	703.19'
Freeboard	1.01'	1.11'
Offsite Tributary Area	34.35 ac	244.82 ac
Desiltation Volume Required	3.78 ac-ft	1.16 ac-ft
Desiltation Volume Provided	4.07 ac-ft	1.25 ac-ft

2.2. Volume Reduction Summary

According to article V section 9-107 of The Kane County Stormwater Ordinance, category II BMPs shall provide Volume Reduction and water quality treatment of the required volume reduction. The required volume reduction shall be calculated as the product of new impervious area and a one-inch (1.0'') rainfall event with no abstractions. Per the site entitlements, the maximum lot coverage for this property is 65%, and impervious area calculations were done using this criteria.

In accordance with this requirement, volume reduction has been provided below the elevation of the primary gravity outlet of the site runoff storage facility. The bottom of the ponds will consist of naturalized plantings to treat the dead storage volume during larger storm events. The calculations below outline the total new impervious area and total volume reduction required. Also included is the stage storage table for the provided volume reduction.

Impervious Area Calculations

Surface type	**East Basin**		West Basin	
Tributary Lot Area	48.79	AC	13.52	AC
Impervious Area*	31.71	AC	8.79	AC
Denny Road Impervious Area	1.98	AC	-	AC
Volume Reduction Required	2.81	Ac-ft	0.73	Ac-ft
*Impervious area assumed at maximum lot coverage of 65%				

East Basin – Volume Reduction Provided

	Area		Average	Incremental	Cumulative
Elevation			Area	Storage	Storage
(ft)	(ft^2)	(acre)	(acre)	(acre-ft)	(acre-ft)
709.30	197,545	4.54			0.00
			4.60	3.22	
710.00	203,346	4.67			3.22

West Basin – Volume Reduction Provided

	Area		Average	Incremental	Cumulative
Elevation			Area	Storage	Storage
(ft)	(ft^2)	(acre)	(acre)	(acre-ft)	(acre-ft)
700.00	104,179	2.39			0.00
			2.42	0.82	
700.34	106,223	2.44			0.82

2.3. Downstream Capacity Analysis

Downstream of the West Pond discharge, flow is conveyed south across Merrill Road by a 30" culvert and discharged into an existing channel where it is conveyed further south to Blackberry Creek. An analysis of both the existing culvert and channel has been completed in order to evaluate capacity for site discharge. **Exhibit 2** provides Channel Cross sections as well as calculations overland flow calculations for both the culvert and the channel.

3. CRITICAL DURATION & EMERGENCY OVERFLOW WEIR DESIGN

As there are two proposed basins on-site, there will be two proposed emergency overflow weirs. The overflow weirs are sized to convey the onsite flow and offsite flow while maintaining 1-foot of freeboard. The eastern basin emergency overflow weir is sized to convey offsite flow from the east and the onsite area tributary to the eastern pond for the critical duration storm. Limited flow will flow to the restrictor for the east pond and be conveyed directly to the west pond. A majority of the flow will be conveyed via an emergency overflow weir to the north. The flow will enter into a depressional area and route through the adjacent north property. The flow was modeled through a reach by using the average side slopes and channel width. Ultimately the flow is tributary to the west pond along with additional offsite area from the northern parcel. The west pond overflow is sized to convey the flow from the eastern pond, the offsite area to the east, the offsite area to the north, and the area tributary to the west basin. The western pond will discharge south into the existing storm culvert crossing at Merrill Road. The emergency overflow weirs have been sized appropriately utilizing HydroCAD and designed in accordance with the Kane County Stormwater Technical Manual. See Basin Overflow Weir Sizing and Emergency Overflow Weir Design, **Exhibit 3.**

4. STORM SEWER DESIGN SUMMARY

The proposed storm sewer system was designed using Hydraflow Storm Sewer Extensions, Version 10. Runoff rates were calculated using Bulletin 75 data and rational method and the storm sewer was designed to meet the capacity of the 5-year storm event, unless otherwise noted. The velocities and hydraulic grade lines for 5-year storm events have also been evaluated in design. A runoff coefficient of 0.4 was used for pervious areas and 0.96 for impervious areas. A minimum time of concentration of 10 minutes was used for each sub-catchment drainage area.

The eastern tributary area will be conveyed to the eastern pond, where flow will be restricted and then discharge through the 100-year pipe system into the western pond. The western pond will restrict its flow to the allowable release rate, discharge, and be conveyed through the existing roadway culvert at Merrill Road. A flow analysis has been conducted to understand the capacity of the existing culvert and illustrate the reduced flow in the proposed condition due to the restricted flows from the pond. This results in a lower flow through the existing culvert in comparison to the existing conditions.

The storm sewers have been designed to convey the 5-year storm event and convey the bypass southernly as previously exhibited. See **Exhibit 3** for details. All other storm events exceeding the 5-year event will inundate storm sewer infrastructure and be routed to the proposed detention basin via overland flood routes. A portion of the site will flow directly into the outfall pipe for the western pond. The flow will flow towards the restrictor and the flow will backup into the proposed pond. The storm runs have been designed for the 100-year event. See **Exhibit 3** for calculations. Additionally, the storm sewer downstream of the east pond restrictor has been sized to convey the restricted flow from the east pond and additional flow from the inlets. See **Exhibit 3** for calculations. The outlet pipe for the east basin was not modeled due to the flow being restricted by a 5” orifice and the pipe being 18”.

Ponding within rear yards has been designed to be 1’ or less. In the occurrence of clogging or larger rainfall events, overland flood routes are provided within the paved areas and through strategically located side and rear yards to convey stormwater to the proposed basin with at least 2’ of freeboard between the lowest opening of any building and the 100-year high water level. Calculations for the overland flow routes are depicted in **Exhibit 3.**

Storm Sewer has been designed in accordance with the Village of Sugar Grove and Kane County Stormwater Ordinance. See **Exhibit 3** for Drainage Area Map, 5-Yr, and 100-Yr storm sewer sizing.

5. CONCLUSION

In conclusion, the proposed Crown Communities development has been designed in accordance with the criteria set forth in the Kane County Stormwater Technical Manual. There are no anticipated adverse impacts to the existing downstream drainage system as a result of the proposed improvements. Stormwater management easements and maintenance agreements will be provided under separate cover as applicable.

Exhibit 1 – Maps

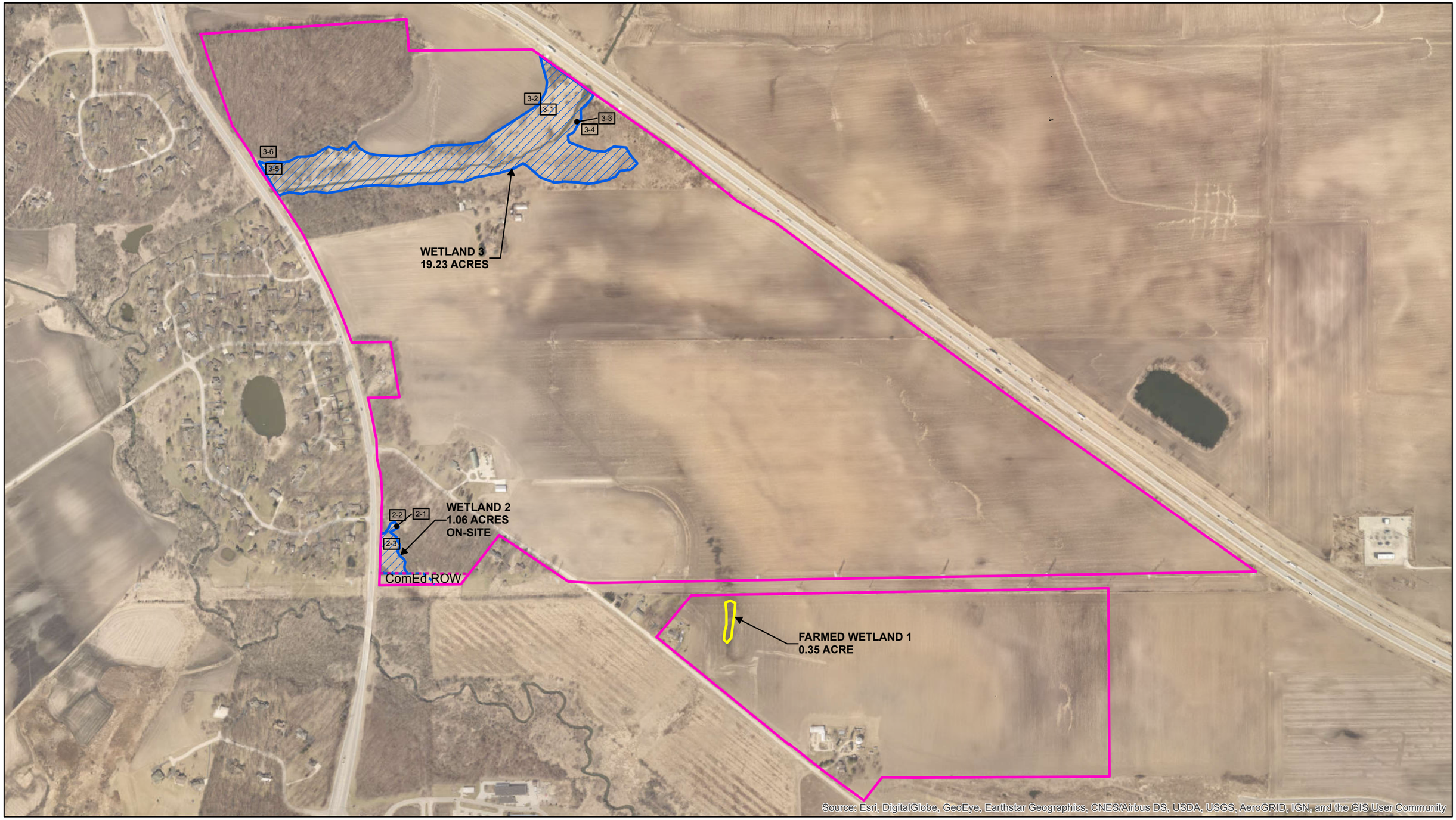
USFWS WETLANDS MAP

FEMA FLOODPLAIN MAP

NRCS SOILS MAP

SOILS REPORT

DRAIN TILE SURVEY



Prepared by:

Hey and Associates, Inc.
Engineering, Ecology and Landscape Architecture

Scale:
0 600 Feet
Project Number: 18-0082

Orientation:
Date: 9/21/2018

Legend:
- [x] Data Point
- Farmed Wetland
- Wetland Boundary
- Project Boundary

Project Name:
Sugar Grove South

Prepared For:
Sugar Grove, LLC

Aerial Date:
2018

Exhibit Title:
Wetland Boundary

Exhibit:
8

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or flood plain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or flood plain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

In the State of Illinois, any portion of a stream or watercourse that lies within the **floodway fringe** of a studied (AE) stream may have a state regulated floodway. The FIRM may not depict these state regulated floodways.

Floodways restricted by anthropogenic features such as bridges and culverts are drawn to reflect natural conditions and may not agree with the model computed widths listed in the Floodway Data table in the Flood Insurance Study report.

Multiple **topographic sources** may have been used in the delineation of Special Flood Hazard Areas. See Flood Insurance Study report for details on source resolution and geographic extent.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 16. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services, NOAA, N/NGS12
National Geodetic Survey SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by Kane County GIS Technologies of Kane County, Illinois. Color digital orthophotos with a 6 inch pixel resolution were photogrammatically compiled from aerial photography obtained during the spring of 2008.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The Special Flood Hazard Areas and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

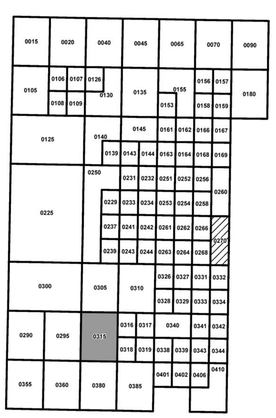
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

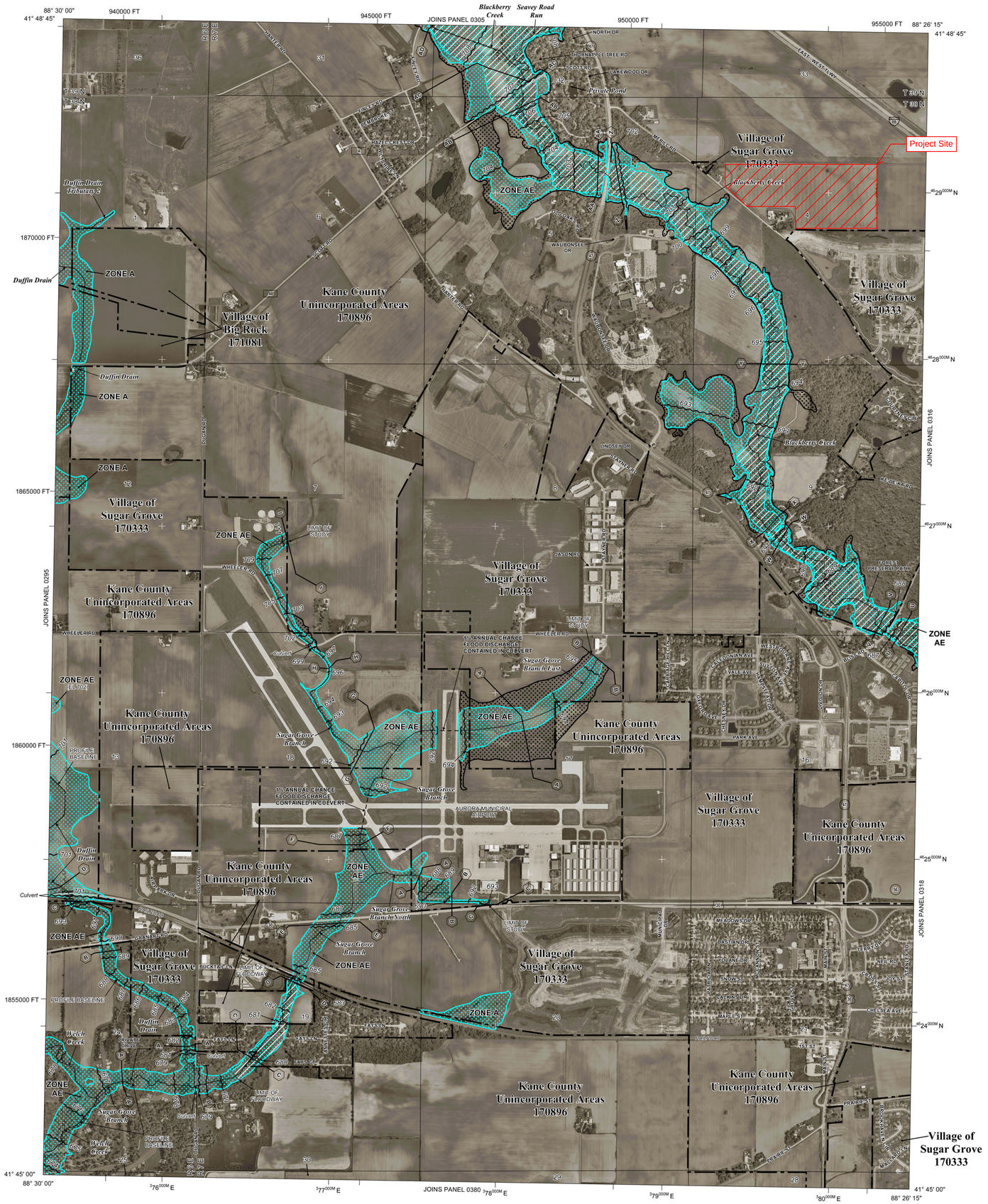
For information on available products associated with this FIRM visit the Map Service Center (MSC) website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

PANEL INDEX



Panel Not Printed



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- A–A — Cross section line
- 23–23 — Transect line
- 45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4689000M N — 1000-meter Universal Transverse Mercator grid values, zone 16
- 1565000 FT — 5000-foot grid tick: Illinois State Plane East Coordinate System, 3776 zone (FIPSZONE 1201) Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
DECEMBER 20, 2002

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 3, 2009 - to reflect updated topographic information, to incorporate previously issued Letters of Map Revision, to change Base Flood Elevations, to add Special Flood Hazard Areas and Base Flood Elevations, to change zone designations

July 17, 2012 - to add Base Flood Elevations, and to change Special Flood Hazard Areas.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0315J

FIRM

FLOOD INSURANCE RATE MAP

KANE COUNTY, ILLINOIS AND INCORPORATED AREAS

PANEL 315 OF 410

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BIG ROCK, VILLAGE OF	171081	0315	J
KANE COUNTY	170896	0315	J
SUGAR GROVE, VILLAGE OF	170333	0315	J

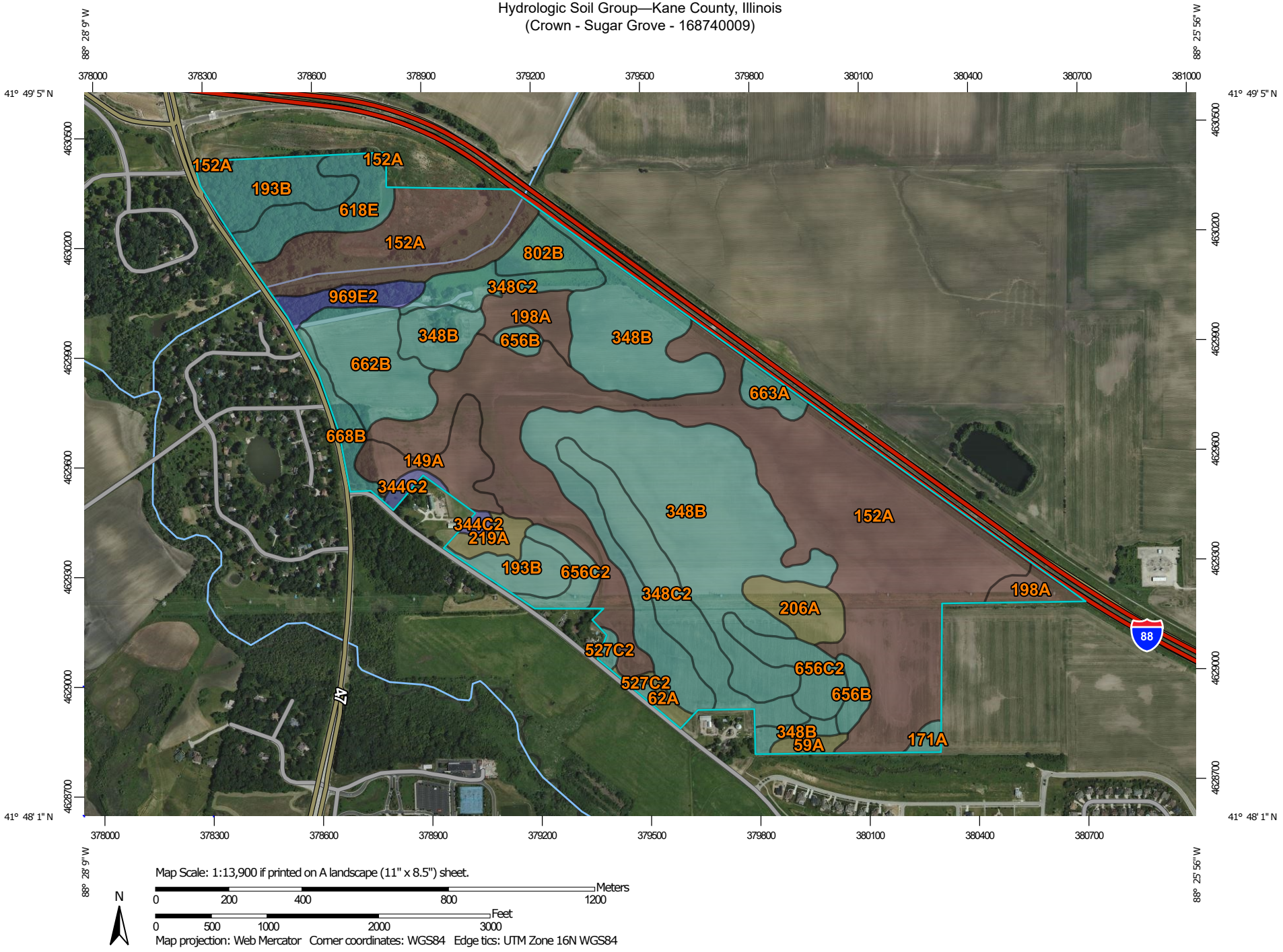
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
17089C0315J

MAP REVISED
JULY 17, 2012

Federal Emergency Management Agency

Hydrologic Soil Group—Kane County, Illinois
(Crown - Sugar Grove - 168740009)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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: Kane County, Illinois
Survey Area Data: Version 18, Aug 21, 2024

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—Jul 6, 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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
59A	Lisbon silt loam, 0 to 2 percent slopes	C/D	2.2	0.5%
62A	Herbert silt loam, 0 to 2 percent slopes	C/D	2.1	0.5%
149A	Brenton silt loam, 0 to 2 percent slopes	B/D	12.1	2.7%
152A	Drummer silty clay loam, 0 to 2 percent slopes	B/D	167.9	37.5%
171A	Catlin silt loam, 0 to 2 percent slopes	C	1.5	0.3%
193B	Mayville silt loam, 2 to 5 percent slopes	C	20.9	4.7%
198A	Elburn silt loam, 0 to 2 percent slopes	B/D	11.3	2.5%
206A	Thorp silt loam, 0 to 2 percent slopes	C/D	8.4	1.9%
219A	Millbrook silt loam, 0 to 2 percent slopes	C/D	4.1	0.9%
344C2	Harvard silt loam, 5 to 10 percent slopes, eroded	B	2.7	0.6%
348B	Wingate silt loam, cool mesic, 2 to 5 percent slopes	C	109.6	24.5%
348C2	Wingate silt loam, 5 to 10 percent slopes, eroded	C	29.5	6.6%
527C2	Kidami loam, 4 to 6 percent slopes, eroded	C	1.6	0.4%
618E	Senachwine silt loam, 12 to 20 percent slopes	C	13.2	2.9%
656B	Octagon silt loam, 2 to 4 percent slopes	C	5.1	1.1%
656C2	Octagon silt loam, 4 to 6 percent slopes, eroded	C	14.7	3.3%
662B	Barony silt loam, 2 to 5 percent slopes	C	19.3	4.3%
663A	Clare silt loam, 0 to 2 percent slopes	C	4.0	0.9%
668B	Somonauk silt loam, 2 to 5 percent slopes	C	4.9	1.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
802B	Orthents, loamy, 1 to 6 percent slopes	C	6.4	1.4%
969E2	Casco-Rodman complex, 12 to 20 percent slopes, eroded	B	6.0	1.3%
Totals for Area of Interest			**447.3**	**100.0%**

Description

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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.

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Geotechnical & Environmental Engineering

Construction Materials Engineering & Testing

Laboratory Testing of Soils, Concrete & Asphalt

Geo-Environmental Drilling & Sampling

Report of Soils Exploration

South Nickels Property

Merrill Road

Sugar Grove, Illinois

Crown Community Development

GEOTECHNICAL GROUP
CAROL STREAM

December 3, 2004

L - 61,021A

PRELIMINARY SOILS EXPLORATION
SOUTH NICKELS PROPERTY
MERRILL ROAD
SUGAR GROVE, ILLINOIS

PREPARED FOR:

CROWN COMMUNITY DEVELOPMENT

3600 THAYER COURT, SUITE 100

AURORA, ILLINOIS 60504

PREPARED BY

TESTING SERVICE CORPORATION

457 EAST GUNDERSEN DRIVE

CAROL STREAM, ILLINOIS 60188

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December 3, 2004
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PRELIMINARY SOILS EXPLORATION
SOUTH NICKELS PROPERTY
MERRILL ROAD
SUGAR GROVE, ILLINOIS

1.0 INTRODUCTION

This report presents results of the preliminary soils exploration performed for the South Nickels Property in Sugar Grove, Illinois. These geotechnical services have been provided in accordance with the attached General Conditions, incorporated herein by reference. Previous reports were prepared in connection with adjoining properties which lie to the north in the Sugar Grove Assemblage (L-53,904 dated December 21, 2001, L-53,904A dated March 5, 2002 and L-61,021 dated August 13, 2004).

The project site is located on the northeast side of Merrill Road, approximately one-half mile southeast of its intersection with Illinois Route 47. It comprises approximately 82 acres of rolling farmland. A farmstead with associated buildings was noted in the southwest corner of the site. Ground surface elevations at the boring locations varied by approximately 35 feet, with the site generally sloping down from the center.

It is understood that residential development is planned for the subject parcel. Associated buildings would most likely consist of 1 to 2-story wood-frame structures, with and without basements. Other site improvements would presumably include paved streets and driveways, underground utilities and on-site detention.

Results of field and laboratory testing and preliminary recommendations based upon these data are included in this report. Specifically addressed are building foundations, mass-grading, pavement design and construction as well as groundwater management. No building or grading plans were available at the time this report was prepared.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

A total of thirty-four (34) soil borings (Nos. 701, 711, 712, 801-809 and 811-832) were performed as a part of this preliminary soils exploration. Boring 810 was not drilled due to the presence of a new building foundation. Borings 701, 711 and 712 were located on the Nickels Property to the north and were previously unable to be drilled. The borings fell on an approximate 400' grid pattern, with an attempt being made to hit low-lying or otherwise suspect areas. Boring locations were staked and ground surface elevations at them provided by Cemcon, Ltd. Ground surface elevations were not referenced to a specific datum, but are relative to elevations given in previous reports. A Boring Location Plan is included in the Appendix.

The borings were extended between 15 and 20 feet below existing grade. They were drilled and samples tested in accordance with currently recommended American Society for Testing and Materials specifications. Soil sampling was performed at 2½-foot intervals in conjunction with the Standard Penetration Test, for which driving resistance to a 2" split-spoon sampler (N-value in blows per foot) provides an indication of the relative density of granular materials and consistency of cohesive soils. Water level readings were taken during and following completion of drilling operations.

Soil samples were examined in the laboratory to verify field descriptions and to classify them in accordance with the Unified Soil Classification System. Laboratory testing included moisture content determinations for all cohesive and intermediate (silt or loamy) soil types. An estimate of unconfined compressive strength was obtained for all cohesive samples using a calibrated pocket penetrometer, with actual measurements of unconfined compressive strength performed on native clay soils.

Reference is made to the boring logs in the Appendix which indicate subsurface stratigraphy and soil descriptions, results of field and laboratory tests, as well as water

level observations. Definitions of descriptive terminology are also included. While strata changes are shown as a definite line on the logs, the actual transition between soil layers will probably be more gradual.

3.0 DISCUSSION OF TEST DATA

Surficial topsoil was between 10 and 18 inches thick at the majority of the boring locations, up to 3 feet deep at Borings 805, 811, 820 and 825-827. These deeper clayey topsoil deposits exhibited moisture contents of 25 to 40 percent. Relatively soft silty clay and sandy clay soils were found directly underlying the topsoil layer at Boring 827, as well as at greater depths in Borings 712, 808, 811, 812, 818 and 826. These low to moderate strength clays had unconfined compressive strengths of 0.75 tons per square foot (tsf) or less at moisture contents ranging from 12 to 34 percent.

Uppermost clay soils in approximately two-thirds of the borings consisted of medium to high plasticity silty clay, generally extending about 3 to 6 feet below existing grade. These tough to very tough CL/CH materials (Unified classification) had unconfined strengths ranging from 1.0 to 3.5 tsf at relatively high moisture contents of 25 to 32 percent.

Tough to hard silty clay, very silty clay and sandy clay soils of low to medium plasticity were encountered underlying the topsoil layer in the majority of the remaining borings, generally extending between 3 and 8 feet below existing grade. They had unconfined strengths typically ranging from 1.5 to 4.5+ tons per square foot (tsf), occasionally lower at Borings 805, 808, 811, 818, 829 and 830. Moisture contents generally varied from 10 to 24 percent. Loose to dense sand, gravel, clayey/silty sand, silt and clayey/sandy silt deposits otherwise predominated, extending to boring completion depths in most cases. These granular/intermediate materials had typical Standard Penetration Test (N) values of 4 to 48 blows per foot (bpf), being as low as 2 to 3 bpf at Boring 825.

Free water was initially revealed between 3 and 13 feet below existing grade in the majority of the borings. Upon completion of drilling operations, the water levels had generally remained within 3 feet of initial readings, rising by as much as 6 feet at Boring 825. Wet to saturated granular deposits were encountered within 6 to 8 feet of ground surface at approximately half of the borings, typically located in the eastern and western

portions of the site. Borings 712, 803, 804, 814, 815, 822 and 824 (7 total) were "dry" both during and upon completion of drilling operations.

4.0 ANALYSIS AND RECOMMENDATIONS

4.1 Bearing Table

Summarized in the following table is the shallowest depth at which in-situ soils considered capable of supporting a net allowable soil bearing pressure of 3000 pounds per square foot (psf) were encountered at each boring location. The 3000 psf bearing value is typical and generally satisfactory for residential construction as is proposed.

The ground surface elevation and depth of topsoil at the borings are also indicated in the bearing table. Added notes relate to the presence of relatively low strength or loose soil deposits underlying bearing elevations shown (L), marginal bearing soils for fill placement and foundation support (M), undercut depth for mass-grading (U) and wet to saturated sand and gravel materials encountered within 6 to 8 feet of ground surface (W). These conditions are discussed in greater detail in the text that follows.

Boring No.	Existing Grade	Depth of Topsoil (Feet)	3000 psf Bearing*	
			Depth (Feet)	Elevation
North Nickels Property (L-61,021)				
701	698.7	1.0	1.0 MLW	697.5
711	701.8	1.0	1.0 M	700.5
712	704.7	1.0	1.0 ML	703.5
South Nickels Property (L-61,021A)				
801	693.0	1.1	1.0 W	692.0
802	700.3	1.1	1.0 MW	699.0
803	715.1	1.1	1.0	714.0
804	711.7	1.0	1.0	710.5
805	707.1	3.0	3.0 ML	704.0
806	705.5	1.1	1.0 MLW	704.5

Boring No.	Existing Grade	Depth of Topsoil (Feet)	3000 psf Bearing*	
			Depth (Feet)	Elevation
807	705.5	1.5	1.5 LW	704.0
808	705.4	1.0	1.0 LW	704.0
809	705.8	0.8	1.0 MLW	705.0
810	Not Drilled			
811	691.8	3.0	3.0 L	688.5
812	694.9	0.8	1.0 MLW	694.0
813	707.4	0.8	1.0 MW	706.5
814	723.8	1.1	1.0	722.5
815	722.2	0.8	1.0 M	721.0
816	711.0	1.0	1.0 M	710.0
817	705.9	0.8	1.0 ML	705.0
818	705.0	1.0	1.0 L	704.0
819	706.1	1.0	1.0 MLW	705.0
820	699.2	3.0	3.0 MW	696.0
821	708.1	1.0	1.0 MW	707.0
822	728.2	1.0	1.0 M	727.0
823	720.2	1.2	1.5 M	719.0
824	713.2	1.2	1.5 L	712.0
825	706.3	3.0	10.5 UML	695.5
826	704.8	3.0	13.0 UM	691.5
827	706.7	3.0	5.5 UMLW	701.0
828	715.7	1.5	1.5 M	714.0
829	710.9	1.5	1.5 L	709.0
830	707.8	0.8	1.0 ML	707.0
831	707.0	1.1	1.0 MLW	706.0
832	709.9	1.1	1.0 MLW	708.5

* Depth/elevation of 3000 psf bearing soils rounded to the nearest 0.5 foot.

L Relatively low strength or loose deposits found underlying bearing elevation shown.

M Marginal bearing soils for fill placement and foundation support.

U Undercut depth for mass-grading.

W Wet to saturated granular/intermediate materials encountered within 6 to 8 feet of ground surface.

4.2 Building Foundations

At the majority of the boring locations, native soils encountered at relatively shallow depths below the topsoil layer are considered suitable (or marginally suitable) for support of 3000 psf bearing. These are for the most part indicated by bearing depths ranging from 1.0 to 3.0 feet in the above table. They typically consist of cohesive soils exhibiting unconfined compressive strengths of 1.5 tsf or greater, 1.0 to 1.5 tsf in the case of marginal bearing soils. Loose to firm sand, silty sand and silt deposits also represent marginal bearing at Borings 822 and 825-827.

In these areas of satisfactory (or marginally satisfactory) bearing, footings may also be constructed on engineered fill that is placed as part of mass-grading. Assuming that all surficial topsoil is stripped and new fill placed and compacted in accordance with mass-grading recommendations given below, footings constructed on engineered fill may also be sized for 3000 psf bearing. However, in areas underlain by low to marginal strength or relatively high moisture content soils, as well as anywhere that the height of new fill is to exceed about 10 feet, it is recommended that settlement considerations related to fill placement be further evaluated.

Unsuitable soil types, i.e. soft clay soils and/or very loose granular deposits, extended approximately 5 to 13 feet below existing grade at Borings 825-827. These borings were drilled in a low-lying area found in the east-central portion of the site. If the unsuitable/compressible soil types are left in-place under building pads, consolidation of them could lead to settlement and cracking of floor slabs and foundations constructed thereupon. Close-out borings are recommended to delineate the lateral extent of the unsuitable materials.

At over half of the borings, we have recommended that clay soils having unconfined compressive strengths of less than 1.5 tsf or relatively loose silt and granular soil types be left in-place beneath recommended footing elevations. Although they would not normally be considered suitable for direct support of foundation elements, lateral distribution of footing loads in overlying native materials should reduce actual stresses on these layers to acceptable levels. However, the thickness of stiffer overlying materials should be verified at the time of construction. In this regard, deeper foundation excavations may require undercutting.

Marginal bearing soils were encountered directly underlying the topsoil layer in approximately three-quarters of the borings. They include silty clays having unconfined compressive strengths of 1.5 tsf or less and/or moisture contents in excess of about 25 percent. Clayey/silty sand, silt and clayey/sandy silt deposits were also encountered at relatively shallow depths in approximately half of the borings. These granular/intermediate materials are considered moisture sensitive, i.e. can experience a loss of stability when subjected to moderate or heavy rainfall. They are also easily disturbed due to excavation operations or construction traffic, including foot traffic in the bottom of the foundation trenches.

If relatively low strength or unstable soils are exposed at footing grade, they should be removed and replaced with structural backfill. Undercuts of 1 to 2 feet are typically required based on field observations. Foundation overexcavations are then backfilled and footings constructed at design elevations in accordance with the following recommended procedures.

The base of the overexcavations should exceed footing dimensions by at least 12 inches along each side, 6 inches for every foot of overdig where the undercut exceeds 2.0 feet in depth. Replacement materials should consist of crushed stone or crushed gravel between ¼ to 3 inches in size and containing no fines; IDOT gradations CA-1 and CA-7 meet these criteria. This "structural" fill should be spread in 12-inch layers loose thickness, each lift to be densified using vibratory compaction equipment or by tamping with a backhoe bucket. Footings constructed on the crushed stone or crushed gravel backfill may also be proportioned for 3000 psf bearing.

The need for foundation undercuts may be further evaluated when grading plans are available, i.e. whether marginal bearing soils are likely to be exposed in deeper excavations or cut areas. Undercutting is likely to be widespread across the majority of the site, where relatively low strength or loose soils were revealed in the borings. In order to minimize foundation undercuts, consideration may be given to using a reduced bearing pressure of around 2000 psf.

It is recommended that all continuous wall footings be made at least 18 inches wide, trench footings at least 10 inches wide and isolated foundations at least 2.5 feet square, regardless of calculated dimensions. For frost considerations, all exterior footings should be constructed at least 3.5 feet below outside finished grade and 4.0 feet for foundations located outside of heated building limits. Interior footings may be constructed at higher elevations as long as they are protected against frost heave in the event of winter construction.

Foundation wall reinforcement is typically added in undercut areas and where relatively low-strength soils underlie a stiffer crust on which footings will bear. This recommendation is often based on field observations during mass-grading. It is also made when total fill heights exceed 10 feet or foundation undercuts and crushed stone backfill are 2 feet or greater. Foundation reinforcement typically consists of two #5 rebars placed at both the top and bottom of foundation walls.

4.3 Mass-Grading

It is recommended that building and pavement areas be cleared of vegetation prior to mass-grading. Stripping operations should also include the removal of all surficial topsoil and other decomposable plant matter. The building and pavement areas should then be proof-rolled, in order to detect the presence of unsuitable soil types. The proof-roll should be performed using a loaded dump truck or other approved piece of heavy construction equipment. All soft or unstable materials determined by proof-rolling should be reworked and recompacted or, if that does not substantially improve subgrade stability, removed and replaced. In this regard, clayey subgrade soils will likely need to be reduced in moisture content prior to recompaction.

Removal and replacement of soft clay soils and very loose granular materials is specifically recommended for Borings 825-827, drilled in a low-lying area in the east-central portion of the site. Undercut depths are estimated to be on the order of 5 to 13 feet. Undercutting of compressible soil types will require that building pads be enlarged to permit the horizontal distribution of footing loads. It is recommended that the base of the undercut, or zone of stripping where only topsoil is to be removed, extend a minimum of 5 feet outside the outer edge of the structure plus 0.5 feet for every foot of fill to be placed.

Marginal subgrade stability and/or water problems, common conditions especially in deep undercuts, often mean that clay fill cannot be initially compacted. Where this condition occurs, it is recommended that coarse aggregate be placed in the bottom of the excavation until a stable base for compaction of clay fill is achieved, 12 to 24 inches typically being required. The coarse aggregate may consist of crushed stone or gravel between about ¼ to 4 inches in size and containing no fines; IDOT gradations CA-1, CA-5 and CA-7 meet these criteria.

Marginal subgrade stability, represented by unconfined compressive strengths of 1.5 tsf or less and/or moisture contents in excess of about 25 percent, was encountered in approximately three-quarters of the borings. These soils may need to be reduced in moisture content and recompacted in order to provide a stable base. Lime stabilization can achieve similar results and has the advantage of allowing work to proceed under adverse weather conditions. In any event, the need for subgrade reworking or additional undercutting should be evaluated on the basis of proof-rolling.

The traffic of heavy construction equipment frequently causes clayey/silty sand, silt and clayey/sandy silt deposits encountered in some borings to experience a short-term decrease in stability. The associated soft and spongy condition of exposed soils is commonly referred to as "pumping" in this area. It is recommended that heavy construction equipment be detoured around any areas where pumping conditions are found to be developing. Depending upon grading requirements and specific site conditions, solutions to a persistent pumping problem may include use of geotextile stabilization fabric or geogrid product, removal of unstable soils and replacement with granular backfill, construction of trench drains or a combination thereof.

New fill should consist of approved granular materials or inorganic silty clays of medium plasticity. It is recommended that compaction for building pad and pavement areas be to a minimum of 95 and 90 percent of maximum dry density, respectively, as determined by the Modified Proctor test (ASTM D 1557). The upper 2 feet of roadway subgrade should also be compacted to the 95 percent criterion. The fill should be placed in approximate 9 inch lifts loose measure for cohesive soils and up to 12 inches for granular materials, each lift to be compacted to the specified density prior to the placement of additional fill.

Moisture control is important in the compaction of most soil types, and it is recommended that the water content of new fill be within 3 percentage points of optimum moisture as established by its laboratory compaction curve. If the soil is compacted too dry, it will have an apparent stability which will be lost if it later becomes saturated. If the soil is too wet, the Contractor will not be able to achieve proper compaction.

In regard to use of on-site borrow, shallow silty clay soils were often relatively moist - having water contents of between 23 and 32 percent. It is estimated their use as engineered fill will require that the in-situ moisture be reduced by about 5 to 10+ percentage points. This reduction in moisture content is typically achieved by spreading the material in a single lift and aerating with a continuous discing operation. For obvious reasons it will work best in hot, dry and windy weather. Lime modification can also be used and has the advantage of working in less ideal weather conditions.

Clayey/silty sand, silt and clayey/sandy silt deposits were often encountered in the borings. As previously discussed for footings, these intermediate materials are moisture sensitive, i.e. can experience loss of stability when subjected to rainfall or groundwater seepage. They are also prone to instability under the traffic of heavy construction equipment. While none of these properties makes them unsuitable as engineered fill, they may point to difficulties in handling and compaction of them.

4.4 Pavement Design and Construction

Pavement subgrade preparation may be in general accordance with previous recommendations for mass-grading. Cohesive soil types were encountered at shallow depths in the majority of the borings. It is anticipated that existing subgrade in these areas

will have to be recompacted prior to paving; compaction to at least 90 percent Modified Proctor density is recommended.

If roadways are to be built in the areas where soft clay soils and very loose granular deposits were encountered, complete removal of these unsuitable/compressible materials is recommended. In this regard, undercuts of up to 13 feet would be required in the area of Boring 826. Additional fill typically required to raise roadway grades would only increase the risk of long-term settlement. These conditions should be further evaluated when more detailed information is available, i.e. preliminary grading plans.

Clayey/silty sand, silt and clayey/sandy silt deposits were encountered at relatively shallow depths in approximately half of the borings. These intermediate soil types are often classified as frost susceptible per IDOT guidelines on gradation and plasticity. In areas of high groundwater, they should ideally be removed and replaced to a depth of about 3 feet below top of pavement.

Pumping of silt and loamy soil types, as discussed under mass-grading, is typically more of a problem in pavement areas than for building pads. This condition is likely to require undercuts and the use of geotextile stabilization fabric or geogrid products and coarse aggregate backfill for a portion of pavement areas. Subgrade stability will also be affected by weather conditions at the time of paving.

A nominal Illinois Bearing Ratio (IBR) value of 3.0 is typically used for the design of asphalt pavements in this area, reflecting the clay subgrade which is prevalent. Use of this value assumes that any soft or unstable areas will be remediated, i.e. subgrade stabilized until passing a proof-roll.

Base course materials for anticipated asphalt pavements should conform to IDOT gradation CA-6 and be compacted to 95 percent Modified Proctor density or 100 percent of the Standard Proctor (ASTM D 698) maximum density value. Bituminous materials should conform to IDOT Class I, Type 3 requirements, Standard Specifications for Road and Bridge Construction, Section 406. They should be compacted to between 93 and 97 percent of their theoretical maximum density, the "Big D" as determined by IDOT.

4.5 Groundwater Management

Groundwater was encountered between 3 and 13 feet below existing grade at the majority of the boring locations, typically falling in the range of Elevations 691 to 702. Wet to saturated granular deposits were encountered within 6 to 8 feet of ground surface at Borings 801, 802, 806-809, 812, 813, 819-821, 827, 831 and 832, generally located in relatively low-lying areas found in the eastern and western portions of the site. The shallow groundwater in these areas is expected to impact basement construction as well as subgrade stability in pavement and building pad areas. It is also likely to be a problem for deeper utility lines. If these layers are penetrated during foundation, basement or utility trench construction, normal pumping procedures may not be able to keep up with the rate of groundwater inflow.

Groundwater should be further evaluated when additional information is available (preliminary site and grading plans). Consideration may also be given to the installation of groundwater monitoring wells, to better evaluate overall groundwater conditions across the site. Seasonal fluctuations of the groundwater table would also ideally be monitored.

Basements should not be constructed below the groundwater table. Lower levels should ideally be located at least 3 feet above the groundwater table, 2 feet as a minimum. All basement and below grade structures should otherwise be provided with a perimeter drain tile tied in to a sump pit with automatic pumping system. This is a standard requirement in the project area, the effectiveness of which will be dependent on groundwater at the site being controllable. If associated problems are encountered when excavating test pits or at any time during construction, i.e. continuous and/or high rates of groundwater seepage, the design engineer and geotechnical consultant should be notified so that the condition can be further evaluated.

5.0 CLOSURE

It is recommended that full-time inspection be provided by Testing Service Corporation personnel during foundation construction, so that the soils at undercut and foundation levels can be observed and tested. In addition, adequacy of building materials, stripping and undercutting, fill placement and compaction as well as slab-on-grade and pavement

construction should be monitored for compliance with the recommended procedures and specifications.

This report has been prepared without the benefit of building or grading plans. It is therefore suggested that Testing Service Corporation review these plans when available, to check the accuracy of this report as it may be affected, to verify the correct interpretation of recommendations contained herein and to modify the findings accordingly. Additional borings will be required for specific building structures as site development plans go forward. Close-out borings will also be needed to delineate unsuitable soil types identified in low-lying areas. Consideration may also be given to the installation of monitoring wells in areas of high groundwater.

The analysis and recommendations submitted in this report are based upon the data obtained from the thirty-four (34) soil borings, performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings, the nature and extent of which may not become evident until during the course of construction.

We are available to review this report with you at your convenience.

[redacted]

Michael V. Machalinski
Vice President
Registered Professional Engineer
Illinois No. 062-038559

Prepared by,

[redacted]

Pam Manz, E.I.
Project Manager

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor. ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts.Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

TSC

TESTING SERVICE CORPORATION

GENERAL CONDITIONS

Geotechnical and Construction Services

1. PARTIES AND SCOPE OF WORK: "This Agreement" consists of Testing Service Corporation's ("TSC") proposal, TSC's Schedule of Fees and Services, Client's written acceptance thereof, if accepted by TSC, and these General Conditions. The terms contained in these General Conditions are intended to prevail over any conflicting terms in this Agreement. "Client" refers to the person or entity ordering the work to be done or professional services to be rendered by TSC (except where distinction is necessary, either work or professional services are referred to as "services" herein). If Client is ordering the services on behalf of another, Client represents and warrants that Client is the duly authorized agent of said party for the purpose of ordering and directing said services, and in such case the term "Client" shall also include the principal for whom the services are being performed. Prices quoted and charged by TSC for its services are predicated on the conditions and the allocations of risks and obligations expressed in these General Conditions. Unless otherwise stated in writing, Client assumes sole responsibility for determining whether the quantity and the nature of the services ordered by Client are adequate and sufficient for Client's intended purpose. Client shall communicate these General Conditions to each and every third party to whom the Client transmits any report prepared by TSC. Unless otherwise expressly assumed in writing, TSC shall have no duty to any third party, and in no event shall TSC have any duty or obligation other than those duties and obligations expressly set forth in this Agreement. Ordering services from TSC shall constitute acceptance of TSC's proposal and these General Conditions.

2. SCHEDULING OF SERVICES: The services set forth in this Agreement will be accomplished in a timely and workmanlike manner. If TSC is required to delay any part of its services to accommodate the requests or requirements of Client, regulatory agencies, or third parties, or due to any cause beyond its reasonable control, Client agrees to pay such additional charges, if any, as may be applicable.

3. ACCESS TO SITE: Client will arrange and provide such access to the site as is necessary for TSC to perform its services. TSC shall take reasonable measures and precautions to minimize damage to the site and any improvements located thereon as a result of its services or the use of its equipment; however, TSC has not included in its fee the cost of restoration of damage which may occur. If Client desires or requires TSC to restore the site to its former condition, TSC will, upon written request, perform such additional work as is necessary to do so and Client agrees to pay to TSC the cost thereof plus TSC's normal markup for overhead and profit.

4. CLIENT'S DUTY TO NOTIFY ENGINEER: Client represents and warrants that Client has advised TSC of any known or suspected hazardous materials, utility lines and underground structures at any site at which TSC is to perform services under this Agreement.

5. DISCOVERY OF POLLUTANTS: TSC's services shall not include investigation for hazardous materials as defined by the Resource Conservation Recovery Act, 42 U.S.C.§ 6901, et, seq., as amended ("RCRA") or by any state or Federal statute or regulation. In the event that hazardous materials are discovered and identified by TSC, TSC's sole duty shall be to notify Client.

6. MONITORING: If this Agreement includes testing construction materials or observing any aspect of construction of improvements, TSC will report its test results and observations as more specifically set forth elsewhere in this Agreement. Client shall cause all tests and inspections of the site, materials and work to be timely and properly performed in accordance with the plans, specifications, contract documents, and TSC's recommendations. No claims for loss, damage or injury shall be brought against TSC unless all tests and inspections have been so performed and unless TSC's recommendations have been followed.

TSC's services shall not include determining or implementing the means, methods, techniques or procedures of work done by the contractor(s) being monitored or whose work is being tested. TSC's services shall not include the authority to accept or reject work or to in any manner supervise the work of any contractor. TSC's services or failure to perform same shall not in any way operate or excuse any contractor from the performance of its work in accordance with its contract. "Contractor" as used herein shall include subcontractors, suppliers, architects, engineers and construction managers.

7. ROOF INVESTIGATIONS: Should it be necessary to make roof cuts, Client agrees to provide a roofing contractor of Client's choice to make such cuts, to remove samples as directed by TSC personnel and to promptly make necessary patches or repairs. In the event that a roof contractor is not so provided by Client, Client agrees that TSC may make and remove such cuts as TSC deems necessary in the course of the investigation and Client assumes all risks of damage to the roof system and the building which may arise as a result thereof.

8. LIMITATIONS OF PROCEDURES, EQUIPMENT AND TESTS: Information obtained from borings, observations and analyses of sample materials shall be reported in formats considered appropriate by TSC unless directed otherwise by Client. Such information is considered evidence, but any inference or conclusion based thereon is, necessarily, an opinion also based on engineering judgment and shall not be construed as a representation of fact. Subsurface conditions may not be uniform throughout an entire site and ground water levels may fluctuate due to climatic and other variations. Construction materials may vary from the samples taken. Unless otherwise agreed in writing, the procedures employed by TSC are not designed to detect intentional concealment or misrepresentation of facts by others.

9. SAMPLE DISPOSAL: Unless otherwise agreed in writing, test specimens or samples will be disposed immediately upon completion of the test. All drilling samples or specimens will be disposed sixty (60) days after submission of TSC's report.

10. TERMINATION: This Agreement may be terminated by either party upon seven days prior written notice. In the event of termination, TSC shall be compensated by Client for all services performed up to and including the termination date, including reimbursable expenses.

11. PAYMENT: Client shall be invoiced periodically for services performed. Client agrees to pay each invoice within thirty (30) days of its receipt. Client further agrees to pay interest on all amounts invoiced and not paid or objected to in writing for valid cause within sixty (60) days at the rate of twelve (12%) per annum (or the maximum interest rate permitted by applicable law, whichever is the lesser) until paid and TSC's costs of collection of such accounts, including court costs and reasonable attorney's fees.

12. WARRANTY: TSC's professional services will be performed, its findings obtained and its reports prepared in accordance with this Agreement and with generally accepted principles and practices. In performing its professional services, TSC will use that degree of care and skill ordinarily exercised under similar circumstances by members of its profession. In performing physical work in pursuit of its professional services, TSC will use that degree of care and skill ordinarily used under similar circumstances. This warranty is in lieu of all other warranties or representations, either express or implied. Statements made in TSC reports are opinions based upon engineering judgment and are not to be construed as representations of fact.

Should TSC or any of its employees be found to have been negligent in performing professional services or to have made and breached any express or implied warranty, representation or contract, Client, all parties claiming through Client and all parties claiming to have in any way relied upon TSC's services or work agree that the maximum aggregate amount of damages for which TSC, its officers, employees and agents shall be liable is limited to $50,000 or the total amount of the fee paid to TSC for its services performed with respect to the project, whichever amount is greater.

In the event Client is unwilling or unable to limit the damages for which TSC may be liable in accordance with the provisions set forth in the preceding paragraph, upon written request of Client received within five days of Client's acceptance of TSC's proposal together with payment of an additional fee in the amount of 5% of TSC's estimated cost for its services (to be adjusted to 5% of the amount actually billed by TSC for its services on the project at time of completion), the limit damages shall be increased to $500,000 or the amount of TSC's fee, whichever is the greater. This charge is not to be construed as being a charge for insurance of any type, but is increased consideration for the exposure to an award of greater damages.

13. INDEMNITY: Subject to the provisions set forth herein, TSC and Client hereby agree to indemnify and hold harmless each other and their respective shareholders, directors, officers, partners, employees, agents, subsidiaries and division (and each of their heirs, successors, and assigns) from any and all claims, demands, liabilities, suites, causes of action, judgments, costs and expenses, including reasonable attorneys' fees, arising, or allegedly arising, from personal injury, including death, property damage, including loss of use thereof, due in any manner to the negligence of either of them or their agents or employees. In the event both are negligent or at fault, then any liability shall be apportioned between them pursuant to their pro rata share of negligence or fault. TSC and Client further agree that their liability to any third party shall, to the extent permitted by law, be several and not joint. The indemnities provided hereunder shall not terminate upon the termination or expiration of this Agreement.

14. SUBPOENAS: TSC's employees shall not be retained as expert witnesses except by separate, written agreement. Client agrees to pay TSC pursuant to TSC's then current fee schedule for any TSC employee(s) subpoenaed by any party as an occurrence witness as a result of TSC's services.

15. OTHER AGREEMENTS: TSC shall not be bound by any provision or agreement (i) requiring or providing for arbitration of disputes or controversies arising out of this Agreement, (ii) wherein TSC waives any rights to a mechanics lien or (iii) that conditions TSC's right to receive payment for its services upon payment to Client by any third party. These General Conditions are notice, where required, that TSC shall file a lien whenever necessary to collect past due amounts. This Agreement contains the entire understanding between the parties. Unless expressly accepted by TSC in writing prior to delivery of TSC's services, Client shall not add any conditions or impose conditions which are in conflict with those contained herein, and no such additional or conflicting terms shall be binding upon TSC. The unenforceability or invalidity of any provision or provisions shall not render any other provision or provisions unenforceable or invalid. This Agreement shall be construed and enforced in accordance with the laws of the State of Illinois. In the event of a dispute arising out of or relating to the performance of this Agreement, the breach thereof or TSC's services, the parties agree to try in good faith to settle the dispute by mediation under the Construction Industry Mediation Rules of the American Arbitration Association as a condition precedent to filing any demand for arbitration, or any petition or complaint with any court. Should litigation be necessary, the parties consent to jurisdiction and venue in an appropriate Illinois State Court in and for the County of DuPage, Wheaton, Illinois or the Federal District Court for the Northern District of Illinois. Paragraph headings are for convenience only and shall not be construed as limiting the meaning of the provisions contained in these General Conditions.

APPENDIX

UNIFIED CLASSIFICATION CHART

LEGEND FOR BORING LOGS

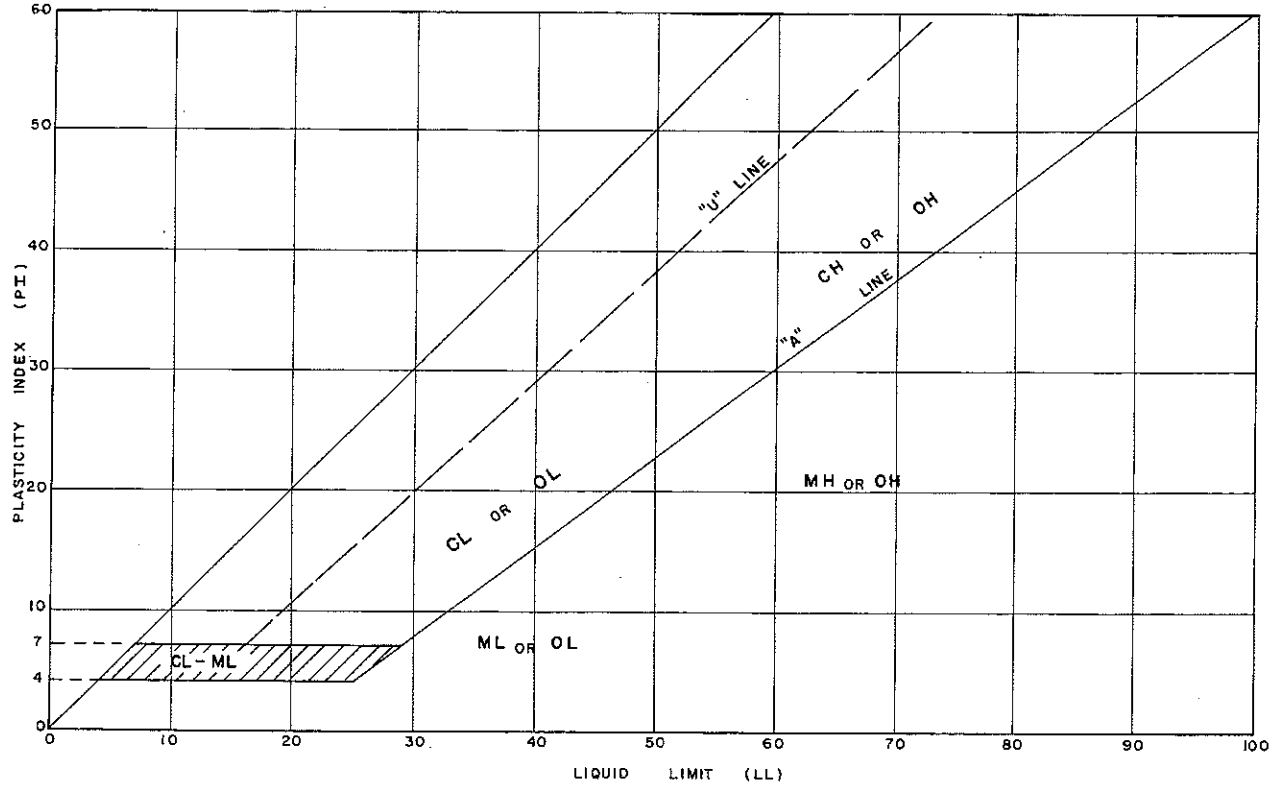
BORING LOGS

BORING LOCATION PLAN

TESTING SERVICE CORPORATION
UNIFIED CLASSIFICATION CHART

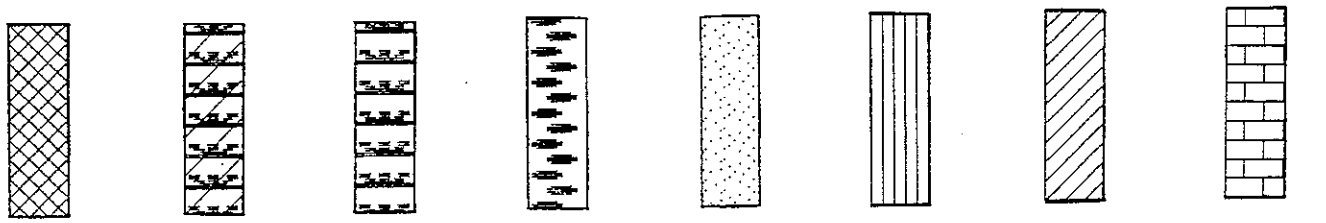
CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS [a]				SOIL CLASSIFICATION	
				GROUP SYMBOL	GROUP NAME [b]
COARSE-GRAINED SOILS more than 50 % retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS Less than 5 % fines [c]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [e]	GW	Well graded gravel [f]
			$C_u < 4$ and/or $1 > C_c > 3$ [e]	GP	Poorly graded gravel [f]
		GRAVELS WITH FINES More than 12 % fines [c]	Fines classify as ML or MH	GM	Silty gravel f,g,h
			Fines classify as CL or CH	GC	Clayey gravel f,g,h
	SANDS 50 % or more of coarse fraction passes No. 4 sieve	CLEAN SANDS Less than 5 % fines [d]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [e]	SW	Well-graded sand [i]
			$C_u < 6$ and/or $1 > C_c > 3$ [e]	SP	Poorly graded sand [i]
		SANDS WITH FINES More than 12 % fines [d]	Fines classify as ML or MH	SM	Silty sand g,h,i
			Fines classify as CL or CH	SC	Clayey sand g,h,i
FINE-GRAINED SOILS 50 % or more passed the No. 200 sieve	SILTS & CLAYS Liquid limit less than 50 %	Inorganic	PI > 7 and plots on or above "A" line j	CL	Lean clay k,l,m
			PI < 4 or plots below "A" line j	ML	Silt k,l,m
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$	OL	Organic clay k,l,m,n Organic silt k,l,m,o
	SILTS & CLAYS Liquid limit 50 % or more	Inorganic	PI plots on or above "A" line	CH	Fat clay k,l,m
			PI plots below "A" line	MH	Elastic silt k,l,m
		Organic	$\frac{\text{Liquid limit — oven dried}}{\text{Liquid limit — not dried}} < 0.75$	OH	Organic clay k,l,m,p Organic silt k,l,m,q
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

a. Based on the material passing the 3-in (75-mm) sieve.
b. If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.
c. Gravels with 5 to 12 % fines require dual symbols
GW-GM well graded gravel with silt
GW-GC well graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
d. Sands with 5 % to 12 % fines require dual symbols
SW-SM well graded sand with silt
SW-SC well graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
e. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
f. If soil contains ≥ 15 % sand, add "with sand" to group name.
g. If fines classify as CL-ML, use dual symbol GC-GM, SC-SM.
h. If fines are organic, add "with organic fines" to group name.
i. If soil contains ≥ 15 % gravel, add "with gravel" to group name.
j. If Atterberg Limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI ≥ 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



TESTING SERVICE CORPORATION

LEGEND FOR BORING LOGS



FILL TOPSOIL PEAT GRAVEL SAND SILT CLAY DOLOMITE

SAMPLE TYPE:

SS = Split Spoon
ST = Thin-Walled Tube
A = Auger

FIELD AND LABORATORY TEST DATA:

N = Standard Penetration Resistance in Blows per Foot
Wc = In-Situ Water Content
Qu = Unconfined Compressive Strength in Tons per Square Foot
* Pocket Penetrometer Measurement; Maximum Reading = 4.5 tsf
γD = Dry Unit Weight in Pounds per Cubic Foot

WATER LEVELS:

▼ While Drilling
▽ End of Boring
▼ 24 Hours

SOIL DESCRIPTION:

MATERIAL	PARTICLE SIZE RANGE
BOULDER	Over 12 inches
COBBLE	12 inches to 3 inches
Coarse GRAVEL	3 inches to ¾ inch
Small GRAVEL	¾ inch to No. 4 Sieve
Coarse SAND	No. 4 Sieve to No. 10 Sieve
Medium SAND	No. 10 Sieve to No. 40 Sieve
Fine SAND	No. 40 Sieve to No. 200 Sieve
SILT and CLAY	Passing No. 200 Sieve

COHESIVE SOILS

CONSISTENCY	Qu
Very Soft	Less than 0.3
Soft	0.3 to 0.6
Stiff	0.6 to 1.0
Tough	1.0 to 2.0
Very Tough	2.0 to 4.0
Hard	4.0 and over

COHESIONLESS SOILS

RELATIVE DENSITY	N
Very Loose	0 - 4
Loose	4 - 10
Firm	10 - 30
Dense	30 - 50
Very Dense	50 and over

MODIFYING TERM	PERCENT BY WEIGHT
Trace	1 - 10
Little	10 - 20
Some	20 - 35

PROJECT **Nickels Property, Illinois Route 47 & Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **701** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021**

ELEVATIONS

GROUND SURFACE **698.7**

END OF BORING **683.7**

WATER LEVEL OBSERVATIONS

WHILE DRILLING **8.5 '**

AT END OF BORING **8.0 '**

24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0	698.7	Black clayey TOPSOIL (OL)
							1.0	697.7	
1	SS		12	25.1	3.5*				Very tough brown and gray silty CLAY, trace to little sand, moist (CL)
							3.0	695.7	
2	SS		7						Loose gray SAND, trace silt, moist (SP-SM)
							5.5	693.2	
3	SS		5						▽ ▼
4	SS		13						Loose to firm gray SAND, trace gravel, moist to saturated (SP)
5	SS		14						
6	SS		11						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual

TSC 61021.GPJ TSC_ALL.GDT 11/29/04

PROJECT **Nickels Property, Illinois Route 47 & Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **711** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021**

ELEVATIONS

GROUND SURFACE **701.8**

END OF BORING **686.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **10.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	700.8	Black clayey TOPSOIL (OL)
1	SS		10	24.8	2.75*				Very tough brown silty CLAY, trace to little sand, moist (CL)
							3.0	698.8	
2	SS		8	14.3					Loose brown clayey SAND, trace gravel, moist (SC)
							5.5	696.3	
3	SS		9						Loose to firm brown SAND, trace gravel, moist to very moist (SP)
4	SS		12						
							10.5	691.3	▽ ▼
5	SS		15						Firm brown SAND and GRAVEL, saturated (SP/GP)
6	SS		18						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

PROJECT **Nickels Property, Illinois Route 47 & Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **712** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021**

ELEVATIONS

GROUND SURFACE **704.7**

END OF BORING **689.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	703.7	Black clayey TOPSOIL (OL)
1	SS		7	25.6	1.42 1.5*				Tough brown silty CLAY, trace to little sand, very moist (CL)
							3.0	701.7	
2	SS		10	12.3	4.5+*				Hard brown sandy CLAY, trace gravel, occasional sand seams, very moist (CL-ML)
							5.5	699.2	
3	SS		10						Loose to firm brown SAND, moist (SP)
							8.0	696.7	
4	SS		30						Firm to dense brown SAND and GRAVEL, occasional Cobbles and Boulders, moist (SP/GP)
							10.5	694.2	
5	SS		12	11.6	1.95 2.0*				Tough to very tough brown sandy CLAY, trace gravel, moist (CL-ML)
							13.0	691.7	
6	SS		6	10.8	0.5*				Soft brown sandy CLAY, trace gravel, very moist (CL-ML)
							15.0		End of Boring at 15.0'

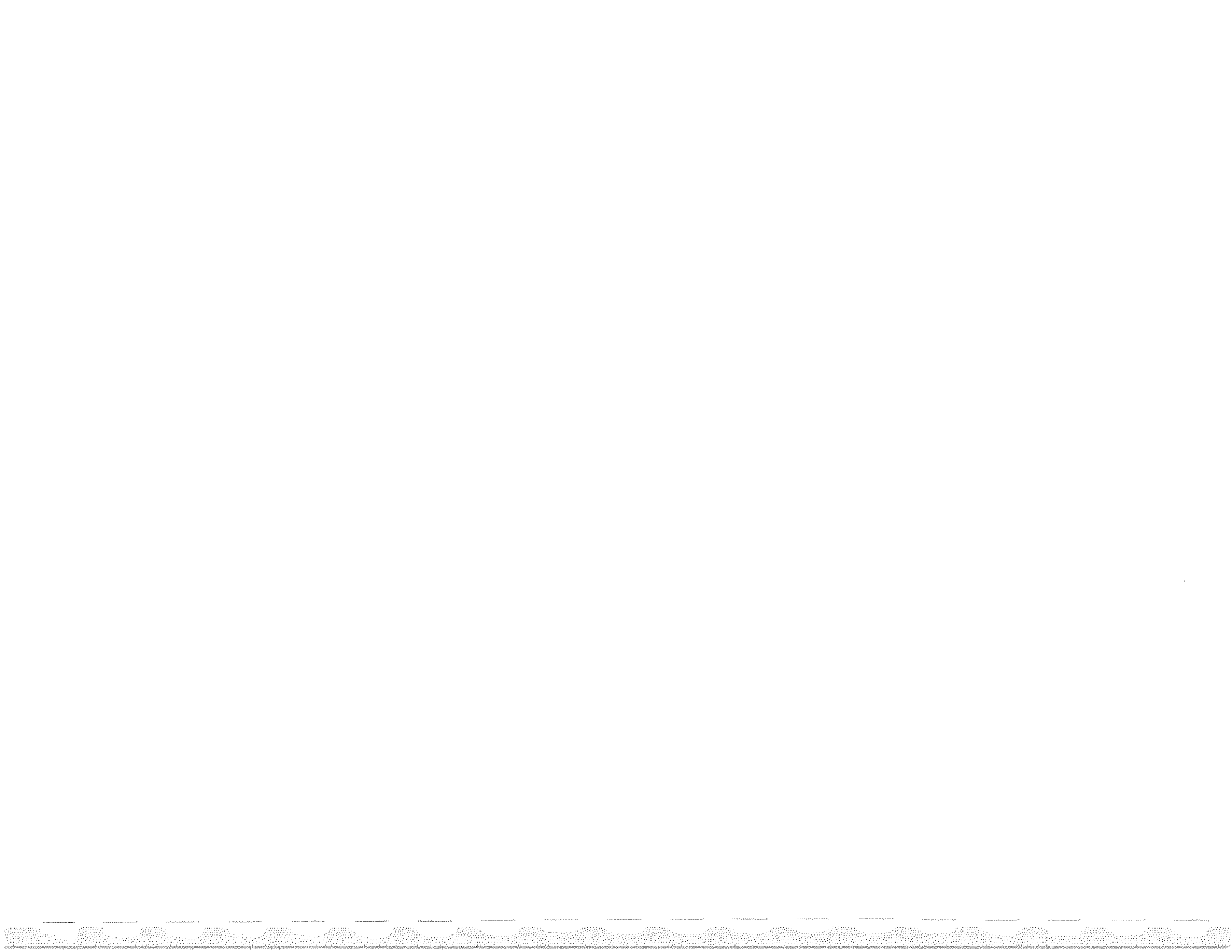
* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual



PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **801** DATE STARTED **10-27-04** DATE COMPLETED **10-27-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **693.0**

END OF BORING **678.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.1	691.9	
1	SS		6	21.0	1.75 2.0*				Tough to very tough brown and gray very silty CLAY, little sand, occasional silt seams, moist (CL-ML)
							3.0	690.0	
2	SS		10	14.3					Loose to firm gray silty SAND, trace gravel, moist to very moist (SM)
							5.5	687.5	
3	SS		10	13.1					Loose to firm gray SAND, trace gravel, trace silt, saturated (SP-SM)
4	SS		17						
							10.5	682.5	
5	SS		17						Firm gray SAND and GRAVEL, saturated (SP/GP)
							13.0	680.0	
6	SS		11	9.9	3.25*				Very tough gray sandy CLAY, trace to little gravel, moist (CL-ML)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **802** DATE STARTED **10-27-04** DATE COMPLETED **10-27-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **700.3**

END OF BORING **685.3**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **5.5 '**

▽ AT END OF BORING **6.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.1	699.2	
1	SS		5	27.8	2.0*				Tough to very tough brown and gray silty CLAY, trace sand, trace organic, moist (CL/CH)
							3.0	697.3	
2	SS		12						▼ ▽
3	SS		22						
4	SS		20						Firm gray SAND and GRAVEL, occasional Cobbles and Boulders, moist to saturated (SP/GP)
5	SS		19						
6	SS		22						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **803** DATE STARTED **10-22-04** DATE COMPLETED **10-22-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **715.1**

END OF BORING **700.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Dark brown clayey TOPSOIL (OL)
							1.1	714.0	
1	SS		5	14.0	2.75*				Very tough brown silty CLAY, little sand and gravel, moist (CL)
							3.0	712.1	
2	SS		14						
3	SS		15						
4	SS		17						Firm brown SAND, trace gravel, trace to little silt, moist (SP-SM)
5	SS		18						
6	SS		20						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 282

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **804** DATE STARTED **10-22-04** DATE COMPLETED **10-22-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **711.7**

END OF BORING **696.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	710.7	Black clayey TOPSOIL (OL)
1	SS		12	18.9	4.5*				Hard brown silty CLAY, little sand and gravel, moist (CL)
							3.0	708.7	
2	SS		14	10.3					
3	SS		16	11.0					Firm brown silty SAND, trace gravel, moist (SM)
4	SS		17	12.9					
5	SS		20	17.4					
6	SS		25	20.2					
							15.0		End of Boring at 15.0'

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO **282**

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual.

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **805** DATE STARTED **10-27-04** DATE COMPLETED **10-27-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **707.1**

END OF BORING **692.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **9.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	1	SS	6	26.0					Black clayey TOPSOIL, very moist (OL)
							3.0	704.1	
	2	SS	6	15.9	1.0*				Stiff to tough brown and gray silty CLAY, little sand and gravel, very moist (CL)
							5.5	701.6	
	3	SS	7	15.5					Loose to firm brown silty SAND, trace gravel, moist to very moist (SM) ▽
	4	SS	12	11.7					▼
							10.5	696.6	
	5	SS	20						Firm brown SAND, saturated (SP)
							13.0	694.1	
	6	SS	14						Firm gray SAND, saturated (SP)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **806** DATE STARTED **10-27-04** DATE COMPLETED **10-27-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **690.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.1	704.4	Black clayey TOPSOIL (OL)
1	SS		10	26.5	2.15 2.0*				Very tough brown and gray silty CLAY, trace to little sand, trace organic, moist (CL)
							3.0	702.5	
2	SS		6	16.8					Loose to firm brown silty SAND, trace gravel, moist to wet (SP-SM)
3	SS		13						▼
4	SS		13						
							10.5	695.0	
5	SS		10	22.4					Loose to firm gray clayey SILT, trace to little sand, wet (ML)
6	SS		20	17.6					
							15.0	690.5	End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

DRILL RIG NO **256**

TSC: 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **807** DATE STARTED **10-27-04** DATE COMPLETED **10-27-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.5**

END OF BORING **690.5**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **6.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL, moist (OL)
1	SS		10	24.2	1.62 1.5*		1.5	704.0	
									Tough brown and gray silty CLAY, trace to little sand, moist (CL)
							3.0	702.5	
2	SS		14	14.8					Firm brown clayey SAND, trace gravel, moist (SC)
							5.5	700.0	
									▽
3	SS		11						
									▼ Firm brown SAND, trace gravel, trace to little silt, moist to saturated (SP-SM)
4	SS		14						
							10.5	695.0	
5	SS		7						Loose to firm gray SAND, trace gravel, saturated (SP)
6	SS		11						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **808** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.4**

END OF BORING **690.4**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL (OL)
							1.0	704.4	
1	SS		7	23.5	2.5*				Very tough brown and gray silty CLAY, trace to little sand, moist (CL)
							3.0	702.4	
2	SS		9	21.3					Loose brown clayey SAND, trace gravel, moist (SC)
							5.5	699.9	
3	SS		9	15.9	1.25*				▽ Tough gray silty CLAY, little sand and gravel, very moist (CL)
							8.0	697.4	▼
4	SS		16						Firm gray SAND, saturated (SP)
							10.5	694.9	
5	SS		6	21.3	0.75*				Stiff gray silty CLAY, little sand, occasional silt seams, very moist (CL)
							13.0	692.4	
6	SS		12	12.5	1.42 1.75*				Tough gray sandy CLAY, trace gravel, moist (CL-ML)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **809** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.8**

END OF BORING **690.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	705.0	Black clayey TOPSOIL (OL)
	A			25.7	1.42		1.3	704.5	Tough to very tough dark brown and gray silty CLAY, trace to little sand, trace organic, moist (CL)
	1	SS	7		2.0*				
	B			22.8	1.5*				Tough brown and gray silty CLAY, little sand, moist to very moist (CL)
							3.0	702.8	
	2	SS	4	19.9					Loose brown and gray silty SAND, trace to little gravel, moist (SM)
							5.5	700.3	
	3	SS	7	25.3					▽ ▼ Loose to firm brown and gray clayey SILT, trace to little sand, occasional clay seams, moist to wet (ML)
	4	SS	5	21.0					
	5	SS	10	21.2					
							13.0	692.8	
	6	SS	14						Firm gray SAND, trace gravel, saturated (SP)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **811** DATE STARTED **10-25-04** DATE COMPLETED **10-25-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **691.8**

END OF BORING **676.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **3.0 '**

▽ AT END OF BORING **5.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
	1	SS	7	29.8			3.0	688.8	Black clayey TOPSOIL, moist (OL)
	2	SS	4	11.0	1.69 1.5*				
	3	SS	8	12.5	1.0*				Tough to stiff gray sandy CLAY, trace gravel, occasional Cobbles and Boulders, moist to very moist (CL-ML)
	4	SS	6	13.1	1.5*				
	5	SS	8	12.2	1.5*				
	6	SS	11	13.0	0.75*				
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual.

TSC 61021A GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **812** DATE STARTED **10-25-04** DATE COMPLETED **10-25-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **694.9**

END OF BORING **679.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **3.0 '**

▽ AT END OF BORING **1.5 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	694.1	Black clayey TOPSOIL (OL)
	1	SS	4	32.2	1.0*		3.0	691.9	▽ Stiff to tough brown and gray silty CLAY, trace sand, occasional sand seams, little organic, very moist (CL/CH) ▼
	2	SS	10						Loose to firm gray SAND and GRAVEL, occasional Cobbles and Boulders, saturated (SP/GP)
	3	SS	19						
	4	SS	22						
	5	SS	20				13.0	681.9	
	6	SS	7	12.0	0.75*				Stiff gray sandy CLAY, trace gravel, occasional sand seams, very moist (CL-ML)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **813** DATE STARTED **10-25-04** DATE COMPLETED **10-25-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **707.4**

END OF BORING **692.4**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **10.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	706.6	Black clayey TOPSOIL (OL)
1	SS		9	25.2	2.25*				Very tough brown silty CLAY, trace to little sand, moist (CL)
							3.0	704.4	
2	SS		10						Loose to firm brown silty SAND, trace gravel, moist (SM)
							5.5	701.9	
3	SS		16						▼
4	SS		9						▽ Loose to firm brown SAND, trace gravel, trace silt, moist to saturated (SP-SM)
5	SS		10						
6	SS		12						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **814** DATE STARTED **10-22-04** DATE COMPLETED **10-22-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **723.8**

END OF BORING **708.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.1	722.7	
1	SS		10	17.2	4.5+*				Hard dark brown silty CLAY, little sand and gravel, moist (CL)
							3.0	720.8	
2	SS		14	11.9					
3	SS		15	10.9					Firm brown clayey SAND, trace gravel, moist (SC)
4	SS		18	11.5					
							10.5	713.3	
5	SS		22						Firm brown SAND, trace gravel, trace silt, moist (SP-SM)
6	SS		18						
							15.0		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 282

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **815** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **722.2**

END OF BORING **707.2**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	721.4	Black clayey TOPSOIL (OL)
1	SS		13	25.2	1.5*				Tough dark brown silty CLAY, trace to little sand, trace organic, moist to very moist (CL)
							3.0	719.2	
2	SS		9						Loose to firm brown SAND, trace gravel, trace silt, moist (SP-SM)
3	SS		11						
							8.0	714.2	
4	SS		16						Firm brown silty SAND, trace gravel, moist (SM)
5	SS		19						
6	SS		18						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **816** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **711.0**

END OF BORING **696.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.0 '**

▽ AT END OF BORING **12.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	710.0	Black clayey TOPSOIL (OL)
	1	SS	10	25.4	2.25*				Very tough brown silty CLAY, trace to little sand, moist (CL)
							3.0	708.0	
	2	SS	11	11.8					Firm brown clayey SILT, trace to little sand, moist (ML)
							5.5	705.5	
	3	SS	11	11.3	3.0*				Very tough brown sandy CLAY, trace gravel, moist (CL-ML)
							8.0	703.0	
	4	SS	15						
	5	SS	20						▽ Firm brown SAND, trace gravel, trace silt, moist to saturated (SP-SM) ▼
	6	SS	13						
							15		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **817** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.9**

END OF BORING **690.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.5 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	705.1	Black clayey TOPSOIL (OL)
1	SS		5	25.1	1.75*				Tough brown and gray silty CLAY, trace to little sand, trace organic, moist (CL)
							3.0	702.9	
2	SS		6	15.5					Loose brown and gray silty SAND, trace to little gravel, occasional clay pieces, moist (SM)
							5.5	700.4	
3	SS		10						Loose to firm brown silty SAND, trace gravel, moist (SM)
4	SS		17						
5	SS		15	11.1					
							13.0	692.9	▽ ▼
6	SS		17						Firm gray SAND, trace gravel, saturated (SP)

End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **818** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **705.0**

END OF BORING **690.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.0 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	704.0	Black clayey TOPSOIL (OL)
1	SS		12	17.7	3.25*				Very tough to tough brown and black silty CLAY, little sand and gravel, moist (CL)
							3.0	702.0	
2	SS		4	23.6	0.50 0.5*				Soft dark brown and gray silty CLAY, trace to little sand, very moist (CL)
							5.5	699.5	
3	SS		15	15.0					Firm gray clayey SILT, trace to little sand, moist (ML)
							8.0	697.0	
4	SS		9	11.7	1.0*				Stiff to tough gray sandy CLAY, trace gravel, very moist (CL-ML)
							10.5	694.5	
5	SS		13	15.7					▼ Firm gray SAND, trace gravel, occasional clay pieces, moist to saturated (SP)
6	SS		11						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO 256

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **819** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **706.1**

END OF BORING **691.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **6.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.0	705.1	
1	SS		8	25.3	1.29 1.25*				Tough brown and gray silty CLAY, trace to little sand, very moist (CL)
							3.0	703.1	
2	SS		4	17.9	1.5*				Tough brown silty CLAY, little sand and gravel, moist to very moist (CL)
							5.5	700.6	▽
3	SS		12	17.0	4.5*				Hard brown silty CLAY, little sand and gravel, occasional to numerous silt seams, moist (CL)
							8.0	698.1	▼
4	SS		14	14.8					Firm to loose gray clayey SAND, trace gravel, wet (SC)
5	SS		5	18.5					
							13.0	693.1	
6	SS		5						Loose gray sandy SILT, trace gravel, wet (ML)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **820** DATE STARTED **10-28-04** DATE COMPLETED **10-28-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **699.2**

END OF BORING **684.2**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **7.5 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		7	26.6					Black clayey TOPSOIL, moist (OL)
							3.0	696.2	
2	SS		5	25.9	1.5*				Tough brown and gray silty CLAY, trace to little sand, moist to very moist (CL)
							5.5	693.7	
3	SS		4	20.9	2.25*				Very tough brown and gray silty CLAY, trace to little sand and gravel, moist (CL)
							8.0	691.2	
4	SS		14						Firm brown and gray SAND, trace gravel, trace silt, saturated (SP-SM)
5	SS		16						
							13.0	686.2	
6	SS		16						Firm gray SAND, saturated (SP)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **821** DATE STARTED **10-29-04** DATE COMPLETED **10-29-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **708.1**

END OF BORING **693.1**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL (OL)
							1.0	707.1	
1	SS		10	27.0	3.25*				Very tough brown silty CLAY, trace sand, trace organic, moist (CL/CH)
							3.0	705.1	
2	SS		12	19.3	4.0*				Hard to very tough brown very silty CLAY, trace to little sand, occasional silt seams, moist (CL-ML)
3	SS		12	21.5	2.02 2.0*				
							8.0	700.1	▼
4	SS		14	20.3					Firm brown SILT, trace to little sand, wet (ML)
							10.5	697.6	
5	SS		12						▽ Firm brown silty SAND, wet (SM)
6	SS		14						
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types. In-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **822** DATE STARTED **10-22-04** DATE COMPLETED **10-22-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **728.2**

END OF BORING **713.2**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
							1.0	727.2	Dark brown clayey TOPSOIL (OL)
1	SS		11						Firm brown silty SAND, trace gravel, moist (SM)
							3.0	725.2	
2	SS		15						Firm brown SAND, trace gravel, trace to little silt, moist (SP-SM)
3	SS		14						
4	SS		19						
5	SS		24						
							13.0	715.2	
6	SS		32						Dense brown sandy SILT, trace gravel, very moist (ML)
									End of Boring at 15.0'

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO **282**

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual.

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **823** DATE STARTED **10-29-04** DATE COMPLETED **10-29-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **720.8**

END OF BORING **705.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.5 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.2	719.6	
1	SS		9	25.5	3.0*				Very tough brown silty CLAY, trace to little sand, moist (CL)
							3.0	717.8	
2	SS		6	14.7	4.25*				Hard brown silty CLAY, little sand and gravel, moist (CL)
							5.5	715.3	
3	SS		16						
4	SS		20						Firm brown SAND, trace gravel, moist (SP)
5	SS		22						
							13.0	707.8	▽ ▼
6	SS		16	14.1					Firm brown clayey SAND, trace gravel, wet (SC)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **824** DATE STARTED **10-29-04** DATE COMPLETED **10-29-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **713.2**

END OF BORING **698.2**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **Dry**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		Black clayey TOPSOIL (OL)
							1.2	712.0	
1	SS		11	20.6	4.5+*				Hard brown silty CLAY, trace to little sand and gravel, moist (CL)
							3.0	710.2	
2	SS		16	25.8	1.23 1.0*				Tough brown and gray silty CLAY, trace to little sand, very moist (CL)
							5.5	707.7	
3	SS		18	11.5					Firm brown clayey SAND, trace gravel, occasional silt pockets, moist (SC)
4	SS		22	10.2					
5	SS		23	9.6					
							13.0	700.2	
6	SS		24						Firm brown SAND, trace silt, moist (SP-SM)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO **256**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **825** DATE STARTED **10-29-04** DATE COMPLETED **10-29-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **706.3**

END OF BORING **686.3**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.0 '**

▽ AT END OF BORING **7.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		9	25.5					Black clayey TOPSOIL, moist to very moist (OL)
							3.0	703.3	
2	SS		6	17.5					▽ Loose to very loose brown and gray silty SAND, trace to little gravel, moist (SM)
3	SS		3	27.6					
4	SS		3	15.3					
							10.5	695.8	
5	SS		5	12.5					Loose gray silty SAND, trace gravel, moist to very moist (SM)
							13.0	693.3	▼
6	SS		3						Very loose gray SAND, saturated (SP)
							15.5	690.8	
7	SS		13						Firm gray SAND, trace gravel, saturated (SP)
8	SS		16						
									End of Boring at 20.0'

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **826** DATE STARTED **11-1-04** DATE COMPLETED **11-1-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **704.8**

END OF BORING **689.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **13.0 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
1	SS		6	40.1					Black clayey TOPSOIL, moist (OL)
							3.0	701.8	
2	SS		6	30.0	2.0*				Tough to very tough brown and gray silty CLAY, trace sand, little organic, moist (CL/CH)
							5.5	699.3	
3	SS		4	32.3	0.50 0.25*				Very soft to soft gray silty CLAY, trace sand, little organic, very moist (CL)
4	SS		4	34.3	0.5*				
5	SS		4	33.9	0.25*				
							13.0	691.8	▼
6	SS		10	16.5					Loose to firm gray SILT and SAND layers, occasional clay seams, wet (ML/SP)
							15.0		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types: in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **827** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **706.7**

END OF BORING **686.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **8.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
1	SS		5	25.3					Black clayey TOPSOIL, moist to very moist (OL)
							3.0	703.7	
2	SS		5	25.9	0.57 0.5*				Soft brown and gray silty CLAY, trace to little sand, very moist (CL)
							5.5	701.2	
3	SS		4						▼ Loose to firm brown and gray silty SAND, trace gravel, moist to wet (SM)
4	SS		14						
							10.5	696.2	
5	SS		15						Firm to loose gray silty SAND, trace to little gravel, wet (SM)
6	SS		5	11.7					
							15.5	691.2	
7	SS		10						Firm gray SAND, trace gravel, saturated (SP)
8	SS		12						
									End of Boring at 20.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **828** DATE STARTED **11-3-04** DATE COMPLETED **11-3-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **715.7**

END OF BORING **700.7**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **11.0 '**

▽ AT END OF BORING **Dry**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
A				28.2					Dark brown clayey TOPSOIL, very moist (OL)
1	SS		8				1.5	714.2	
B				27.3	1.25*				Tough brown silty CLAY, trace sand, very moist (CL)
							3.0	712.7	
2	SS		10	12.3					Loose to firm brown silty SAND, trace gravel, moist (SM)
3	SS		19	11.3					
							8.0	707.7	
4	SS		28						Firm brown SAND, trace gravel, moist (SP)
							10.5	705.2	
A				19.3					▼ Dense brown silty SAND, trace gravel, wet (SM)
5	SS		48						
B							12.0	703.7	Dense brown SAND, little gravel, saturated (SP)
							13.0	702.7	
A				21.1	3.74				Very tough brown very silty CLAY, little sand, moist (CL-ML)
6	SS		40		3.75*				
B				5.2			14.5	701.2	Dense brown SAND, trace to little silt, moist (SP-SM)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual.

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **829** DATE STARTED **11-3-04** DATE COMPLETED **11-3-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **710.9**

END OF BORING **695.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **10.5 '**

▽ AT END OF BORING **13.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
	A 1 B	SS	5	24.3 24.0	2.25*		1.5	709.4	Dark brown clayey TOPSOIL, very moist (OL)
	2	SS	7	25.2	2.0*				Very tough to tough brown silty CLAY, trace to little sand, occasional silt seams, trace organic, moist (CL)
	3	SS	3	16.3	1.09 1.0*		5.5	705.4	Tough brown silty CLAY, little sand and gravel, very moist (CL)
	4	SS	4				8.0	702.9	▼ Loose brown SAND, trace to little gravel, moist to saturated (SP)
	5	SS	8						
	A 6 B	SS	11	24.1			13.0	697.9	▽ Firm brown SILT, trace to little sand, wet (ML)
							14.5	696.4	Firm brown SAND, trace gravel, saturated (SP)
							15		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO **256**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **830** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **707.8**

END OF BORING **692.8**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **10.5 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.8	707.0	Black clayey TOPSOIL (OL)
	1	SS	12	26.6	2.25*				Very tough brown and gray silty CLAY, trace to little sand, trace organic, moist (CL)
							3.0	704.8	
	2	SS	12	15.0	2.25*				Very tough to tough brown and gray silty CLAY, little sand and gravel, moist (CL)
	3	SS	18	15.0	1.82 2.0*				
							8.0	699.8	▼
	4	SS	8	11.6	1.5*				▽ Tough to stiff gray sandy CLAY, trace gravel, moist to very moist (CL-ML)
	5	SS	8	11.1	1.0*				
							13.0	694.8	
	6	SS	12						Firm gray SAND, saturated (SP)
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **831** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **707.0**

END OF BORING **692.0**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **9.0 '**

▼ 24 HOURS

SAMPLE NO.	SAMPLE TYPE	LENGTH RECOVERY	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.1	705.9	
1	SS		7	25.5	3.75*				Very tough brown and gray silty CLAY, trace to little sand, moist (CL)
							3.0	704.0	
2	SS		7	14.3					Loose brown and gray sandy SILT, trace gravel, moist to very moist (ML)
3	SS		7	17.5					
							8.0	699.0	▼
4	SS		10	10.9					▽
5	SS		10	10.4					Loose to firm gray sandy SILT, trace gravel, wet (ML)
6	SS		11	9.3					
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

0 5 10 15 20 25

DRILL RIG NO. 256

Division lines between deposits represent approximate boundaries between soil types, in-situ, the transition may be gradual

TSC 61021A.GPJ TSC_ALL.GDT 11/29/04

PROJECT **South Nickels Property, Merrill Road, Sugar Grove, Illinois**

CLIENT **Crown Community Development, Aurora, Illinois**

BORING **832** DATE STARTED **11-8-04** DATE COMPLETED **11-8-04** JOB **L-61,021A**

ELEVATIONS

GROUND SURFACE **709.9**

END OF BORING **694.9**

WATER LEVEL OBSERVATIONS

▼ WHILE DRILLING **8.0 '**

▽ AT END OF BORING **11.0 '**

▼ 24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		
									Black clayey TOPSOIL (OL)
							1.1	708.8	
	1	SS	8	26.6	2.75*				Very tough brown silty CLAY, trace to little sand, moist (CL)
							3.0	706.9	
	2	SS	12	16.9	2.75*				Very tough brown silty CLAY, little sand and gravel, moist (CL)
							5.5	704.4	
	3	SS	9	16.5					Loose brown silty SAND, trace gravel, occasional clay pieces, moist to very moist (SM)
							8.0	701.9	▼
	4	SS	7	12.2					Loose brown clayey SAND, trace to little gravel, ▽ wet (SC)
	5	SS	6	14.7					
							13.0	696.9	
	6	SS	13						Firm brown SAND, saturated (SP)
							15		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DISTANCE BELOW SURFACE IN FEET

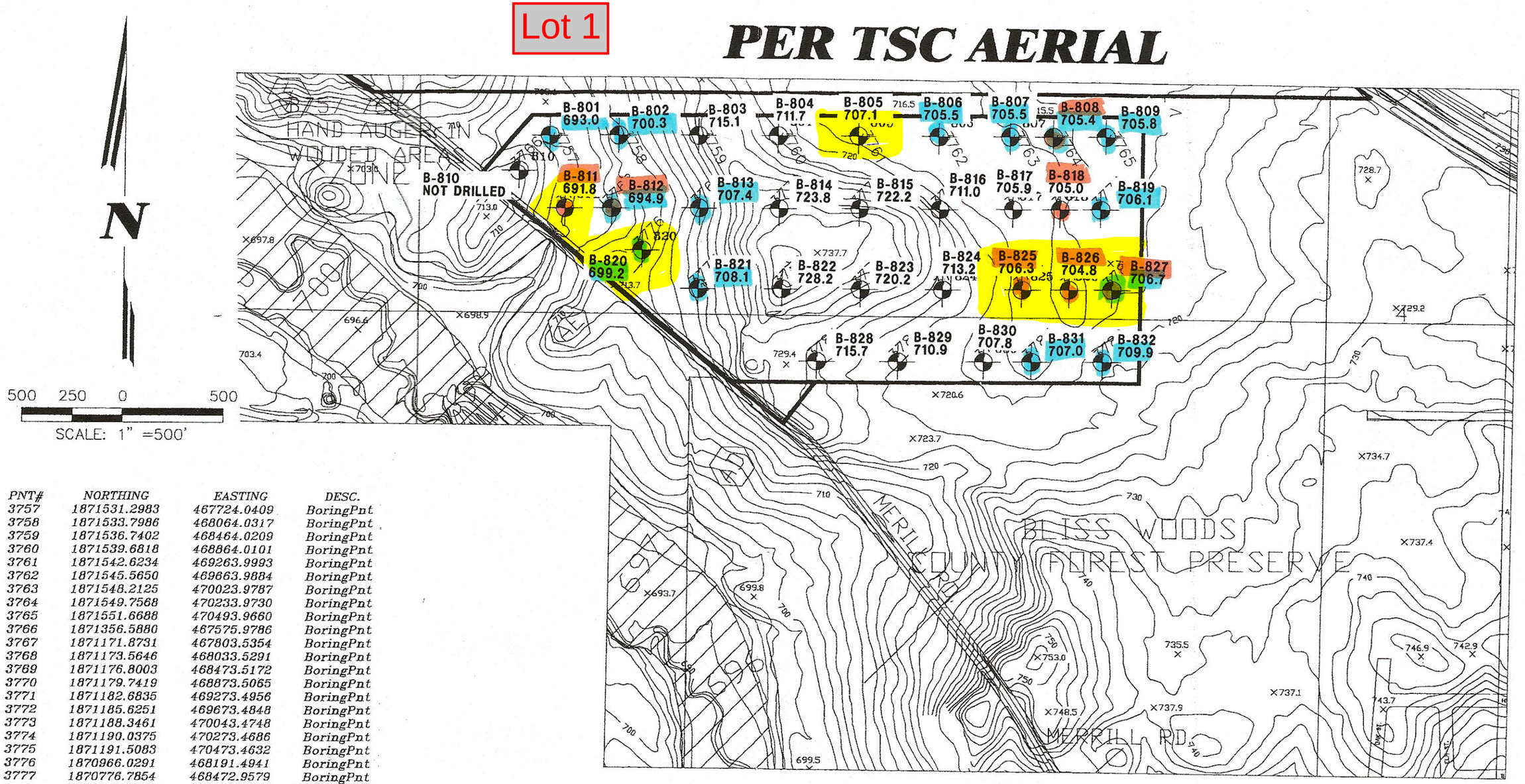
0 5 10 15 20 25

DRILL RIG NO. **256**

Division lines between deposits represent approximate boundaries between soil types in-situ the transition may be gradual

Lot 1

PER TSC AERIAL



PNT#	NORTHING	EASTING	DESC.
3757	1871531.2983	467724.0409	BoringPnt
3758	1871533.7986	468064.0317	BoringPnt
3759	1871536.7402	468464.0209	BoringPnt
3760	1871539.6818	468864.0101	BoringPnt
3761	1871542.6234	469263.9993	BoringPnt
3762	1871545.5650	469663.9884	BoringPnt
3763	1871548.2125	470023.9787	BoringPnt
3764	1871549.7568	470233.9730	BoringPnt
3765	1871551.6688	470493.9660	BoringPnt
3766	1871356.5880	467575.9786	BoringPnt
3767	1871171.8731	467803.5354	BoringPnt
3768	1871173.5646	468033.5291	BoringPnt
3769	1871176.8003	468473.5172	BoringPnt
3770	1871179.7419	468873.5065	BoringPnt
3771	1871182.6835	469273.4956	BoringPnt
3772	1871185.6251	469673.4848	BoringPnt
3773	1871188.3461	470043.4748	BoringPnt
3774	1871190.0375	470273.4686	BoringPnt
3775	1871191.5083	470473.4632	BoringPnt
3776	1870966.0291	468191.4941	BoringPnt
3777	1870776.7854	468472.9579	BoringPnt
3778	1870779.8741	468892.9466	BoringPnt
3779	1870782.7421	469282.9360	BoringPnt
3780	1870785.7573	469692.9250	BoringPnt
3781	1870788.6989	470092.9141	BoringPnt
3782	1870790.3903	470322.9079	BoringPnt
3783	1870791.9346	470532.9022	BoringPnt
3784	1870421.1844	469072.4383	BoringPnt
3785	1870424.1260	469472.4333	BoringPnt
3786	1870427.2882	469902.4159	BoringPnt
3787	1870429.0532	470142.4119	BoringPnt
3788	1870431.6270	470492.3999	BoringPnt

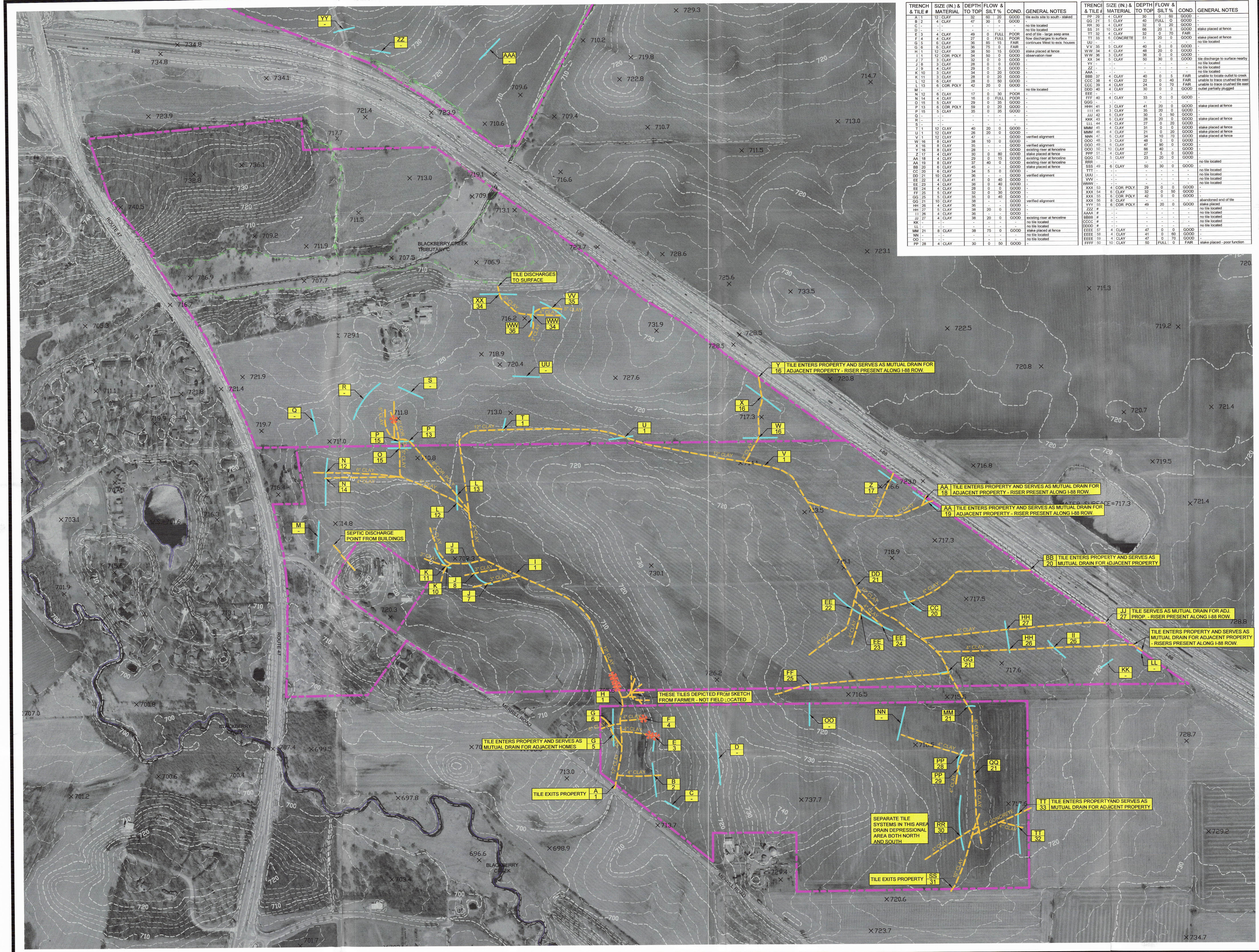
BORING LOCATION PLAN

SOUTH NICKELS PROPERTY
MERRILL ROAD
SUGAR GROVE, ILLINOIS

TESTING SERVICE CORPORATION
457 EAST GUNDERSEN DRIVE
CAROL STREAM, ILLINOIS 60188

DRAWN BY:	DJM
CHECKED BY:	
JOB NO.:	L-61,021A
DATE:	NOVEMBER 2004

PAGE NO. 1



TRENCH & TILE #		SIZE (IN.) & MATERIAL		DEPTH TO TOP	FLOW & SILT %		COND.	GENERAL NOTES
A	1	12	CLAY	32	60	20	GOOD	tile exits site to south - staked
B	2	4	CLAY	47	30	0	GOOD	-
C	-	-	-	-	-	-	-	no tile located
D	-	-	-	-	-	-	-	no tile located
E	3	4	CLAY	49	0	FULL	POOR	end of tile - large seep area
F	4	4	CLAY	27	0	FULL	POOR	flow discharges to surface
G	5	6	CLAY	36	85	15	FAIR	continues West to exis. houses
G	6	6	CLAY	36	75	0	FAIR	-
H	1	12	CLAY	38	50	15	GOOD	stake placed at fence
I	1	12	COR. POLY	34	50	0	GOOD	observation riser
J	7	3	CLAY	32	0	0	GOOD	-
J	8	3	CLAY	28	0	0	GOOD	-
J	9	4	CLAY	29	0	0	GOOD	-
K	10	3	CLAY	34	0	20	GOOD	-
K	11	3	CLAY	28	0	20	GOOD	-
L	12	6	CLAY	28	0	50	GOOD	-
L	13	6	COR. POLY	42	20	0	GOOD	-
M	-	-	-	-	-	-	-	no tile located
N	12	6	CLAY	17	0	30	POOR	-
N	14	4	CLAY	16	0	FULL	POOR	-
O	15	5	CLAY	29	0	35	GOOD	-
P	13	6	COR. POLY	59	0	20	GOOD	-
P	15	5	CLAY	35	0	35	GOOD	-
Q	-	-	-	-	-	-	-	-
R	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-
T	1	12	CLAY	40	20	0	GOOD	-
U	1	12	CLAY	26	20	0	GOOD	-
V	1	12	CLAY	47	-	-	GOOD	verified alignment
W	16	8	CLAY	38	10	0	GOOD	-
X	16	8	CLAY	35	-	-	GOOD	verified alignment
Y	16	8	CLAY	28	-	-	GOOD	existing riser at fenceline
Z	17	4	CLAY	30	0	80	GOOD	stake placed at fence
AA	18	4	CLAY	29	0	15	GOOD	existing riser at fenceline
AA	19	8	CLAY	37	40	0	GOOD	existing riser at fenceline
BB	20	6	CLAY	45	-	-	GOOD	stake placed at fence
CC	20	6	CLAY	34	5	0	GOOD	-
DD	21	10	CLAY	36	-	-	GOOD	verified alignment
EE	22	4	CLAY	41	0	40	GOOD	-
EE	23	4	CLAY	38	0	40	GOOD	-
EE	24	4	CLAY	28	0	0	GOOD	-
FF	25	5	CLAY	32	0	30	GOOD	-
GG	25	5	CLAY	35	0	40	GOOD	-
GG	21	10	CLAY	38	-	-	GOOD	verified alignment
HH	26	4	CLAY	36	-	-	GOOD	-
HH	27	5	CLAY	38	20	0	GOOD	-
II	26	4	CLAY	36	-	-	GOOD	-
JJ	27	4	CLAY	38	20	0	GOOD	existing riser at fenceline
KK	-	-	-	-	-	-	-	no tile located
LL	-	-	-	-	-	-	-	no tile located
MM	21	8	CLAY	38	75	0	GOOD	stake placed at fence
NN	-	-	-	-	-	-	-	no tile located
OO	-	-	-	-	-	-	-	no tile located
PP	28	4	CLAY	30	0	50	GOOD	-

TRENCH & TILE #		SIZE (IN.) & MATERIAL		DEPTH TO TOP	FLOW & SILT %		COND.	GENERAL NOTES
PP	29	4	CLAY	30	0	60	GOOD	-
QQ	21	5	CLAY	40	FULL	0	GOOD	-
RR	30	4	CLAY	32	0	20	GOOD	-
SS	31	10	CLAY	66	20	0	GOOD	stake placed at fence
TT	32	4	CLAY	32	0	70	FAIR	-
TT	33	6	CONCRETE	51	20	0	GOOD	stake placed at fence
UU	-	-	-	-	-	-	-	no tile located
VV	35	5	CLAY	40	0	0	GOOD	-
WW	34	4	CLAY	48	20	0	GOOD	-
WW	36	3	CLAY	36	0	0	GOOD	-
XX	34	5	CLAY	50	30	0	GOOD	tile discharge to surface nearby
YY	-	-	-	-	-	-	-	no tile located
ZZ	-	-	-	-	-	-	-	no tile located
AAA	-	-	-	-	-	-	-	no tile located
BBB	37	4	CLAY	40	0	5	FAIR	unable to locate outlet to creek
CCC	38	4	CLAY	22	0	40	FAIR	unable to trace crushed tile east
CCC	39	4	CLAY	24	0	70	FAIR	unable to trace crushed tile east
DDD	40	4	CLAY	30	0	0	GOOD	outlet partially plugged
EEE	-	-	-	-	-	-	-	-
FFF	40	4	CLAY	33	0	0	GOOD	-
GGG	-	-	-	-	-	-	-	-
HHH	41	3	CLAY	41	20	0	GOOD	stake placed at fence
III	41	3	CLAY	35	20	0	GOOD	-
JJJ	42	6	CLAY	30	0	50	GOOD	-
KKK	43	6	CLAY	28	20	0	GOOD	stake placed at fence
LLL	44	4	CLAY	27	0	20	GOOD	-
MMM	45	4	CLAY	31	0	0	GOOD	stake placed at fence
MMM	46	4	CLAY	21	0	20	GOOD	stake placed at fence
NNN	47	6	CLAY	34	10	70	GOOD	stake placed at fence
OOO	48	3	CLAY	48	0	0	GOOD	-
OOO	49	6	CLAY	47	90	0	GOOD	-
OOO	50	10	CLAY	66	40	-	GOOD	-
PPP	51	4	CLAY	27	5	0	GOOD	-
QQQ	52	5	CLAY	23	20	0	GOOD	-
RRR	-	-	-	-	-	-	-	no tile located
SSS	49	6	CLAY	50	30	0	GOOD	-
TTT	-	-	-	-	-	-	-	no tile located
UUU	-	-	-	-	-	-	-	no tile located
VVV	-	-	-	-	-	-	-	no tile located
WWW	-	-	-	-	-	-	-	no tile located
XXX	53	4	COR. POLY.	29	0	0	GOOD	-
XXX	54	6	CLAY	32	0	50	GOOD	-
XXX	55	6	COR. POLY.	42	0	0	GOOD	-
XXX	56	8	CLAY	-	-	-	-	abandoned end of tile
YYY	55	6	COR. POLY.	49	20	0	GOOD	stake placed
ZZZ	#	-	-	-	-	-	-	no tile located
AAAA	#	-	-	-	-	-	-	no tile located
BBBB	#	-	-	-	-	-	-	no tile located
CCCC	#	-	-	-	-	-	-	no tile located
DDDD	#	-	-	-	-	-	-	no tile located
EEEE	57	4	CLAY	47	0	0	GOOD	-
EEEE	58	4	CLAY	41	0	60	GOOD	-
EEEE	59	4	CLAY	47	0	70	GOOD	-
FFFF	50	10	CLAY	50	FULL	0	FAIR	stake placed - poor function

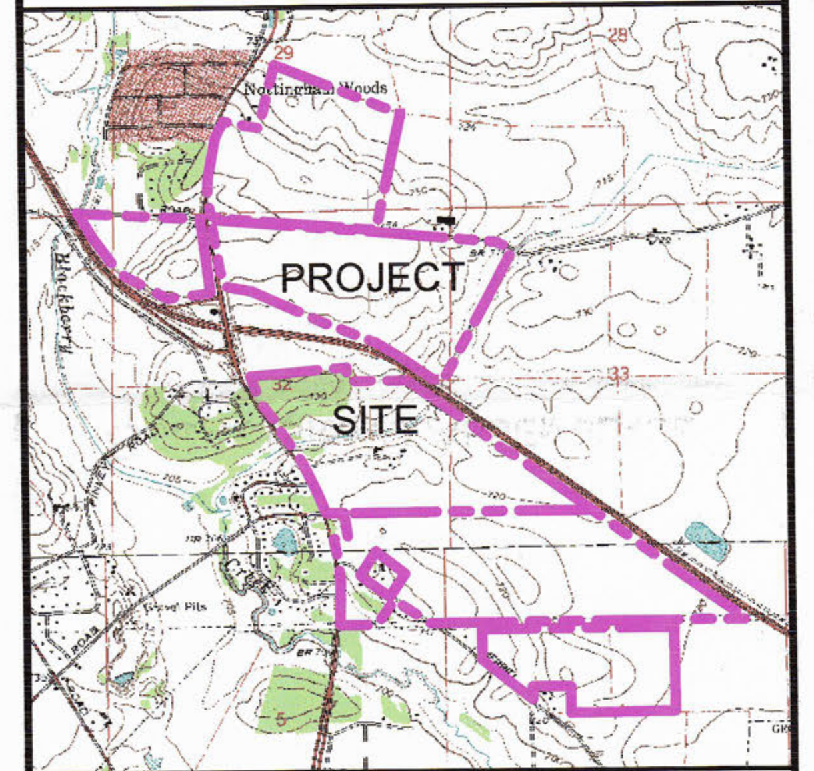
0 300 600

SCALE: 1" = 300'

N

T38N - R7E - S. 4,5 SUGAR GROVE TWP.
T39N - R7E - S. 29,31,32,33 BLACKBERRY TWP.

KANE COUNTY, ILLINOIS



LEGEND

- Property Boundary
- Existing Contours
- Existing Wetlands
- Investigation Trench
- Existing Drain Tiles
- Drain Tile Failure
- A / 1 = Trench / = Tile — Drain Tile Data Point (See Table at Left)

No.	Revision/Issue	Date

Hey and Associates, Inc.
Water Resources, Wetlands and Ecology
26575 West Commerce Drive, Suite 601
Volo, Illinois 60073
Office (847) 740-0888
Fax (847) 740-2888
Volo@HeyAssoc.com

CROWN COMMUNITY DEVELOPMENT

SUGAR GROVE ASSEMBLAGE

DRAIN TILE INVESTIGATION PLAN

SOUTHERN PORTION

PROJECT NO.	04249	DATE	EXHIBIT NO.
FIELDWORK BY	KGK	04/05/05	1
DRAWN BY	KGK	05/20/05	
CHECKED BY	KGK	05/20/05	
APPROVED BY			

SHEET 1 OF 2

Exhibit 2 – Existing & Proposed Conditions Exhibits & Models

EXISTING DEPRESSIONAL STORAGE & DRAINAGE AREA MAP

EXISTING CONDITIONS HYDROCAD MODEL

PROPOSED DRAINAGE AREA MAP

PERVIOUS/IMPERVIOUS AREA EXHIBIT

PROPOSED CONDITIONS HYDROCAD MODEL

BASIN OVERFLOW WEIR SIZING – HYDROCAD MODEL OUTPUT (PEAK EVENT)

EMERGENCY OVERFLOW WEIR DESIGN

EXISTING CULVERT ANALYSIS

EXISTING CHANNEL ANALYSIS

Drawing name: K:\CHS_LIDEX\168740009_Drawn_Lots1&2_Sugar Grove _IL\2 Design\CAD\Exhibits\Lot 1\DEPRESSIONAL STORAGE EXHIBIT_Lot 1.dwg Layout1 Jun 10, 2025 11:36am by: ChrisOsterman

EAST OFFSITE TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.2	100	0.0124	0.05		**Sheet Flow, East Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 0.50"
28.0	1,434	0.0090	0.85		**Shallow Concentrated Flow, East Shallow Concentrated** Cultivated Straight Rows Kv= 9.0 fps
61.2	1,534	Total			

WEST OFFSITE TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
290.4	7,013	0.0020	0.40		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps

NORTH

GRAPHIC SCALE IN FEET
0 125 250 500

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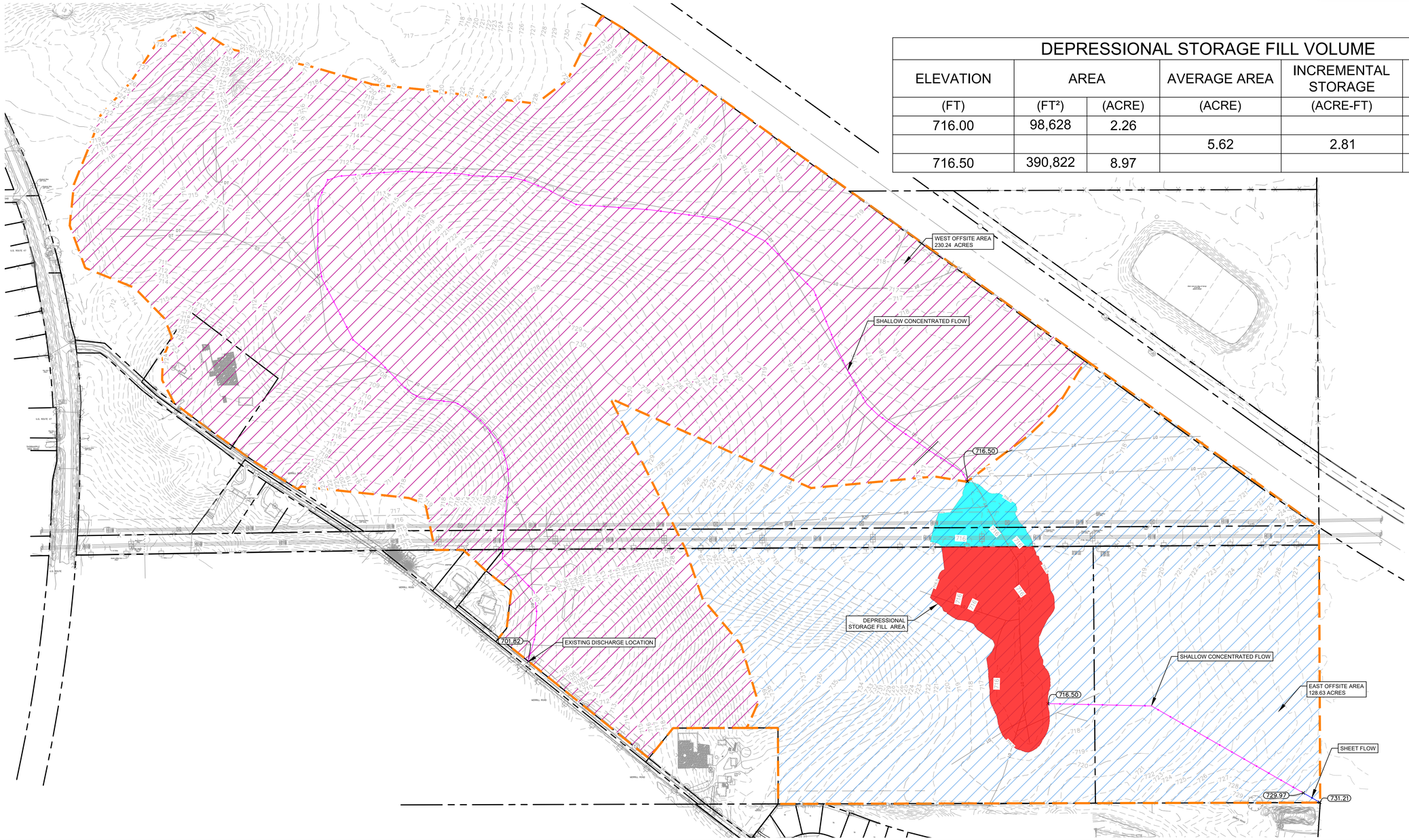
CONTOUR ELEVATIONS

- DEPRESSIONAL STORAGE FILL AREA
- REMAINING DEPRESSIONAL STORAGE AREA
- EAST OFFSITE DRAINAGE — STRAIGHT ROW CROPS, GOOD CON, HSG C CN = 85
- WEST OFFSITE DRAINAGE — STRAIGHT ROW CROPS, GOOD CON, HSG C CN = 85
- SHEET FLOW
- SHALLOW CONCENTRATED FLOW



DEPRESSIONAL STORAGE FILL VOLUME

ELEVATION	AREA		AVERAGE AREA	INCREMENTAL STORAGE	CUMULATIVE STORAGE
(FT)	(FT²)	(ACRE)	(ACRE)	(ACRE-FT)	(ACRE-FT)
716.00	98,628	2.26			0.00
			5.62	2.81	
716.50	390,822	8.97			2.81

NO.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

© 2025 KIMLEY-HORN AND ASSOCIATES, INC.
570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-405-9004
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED | DESIGNED BY: JRH | DRAWN BY: SPH | CHECKED BY: EJT

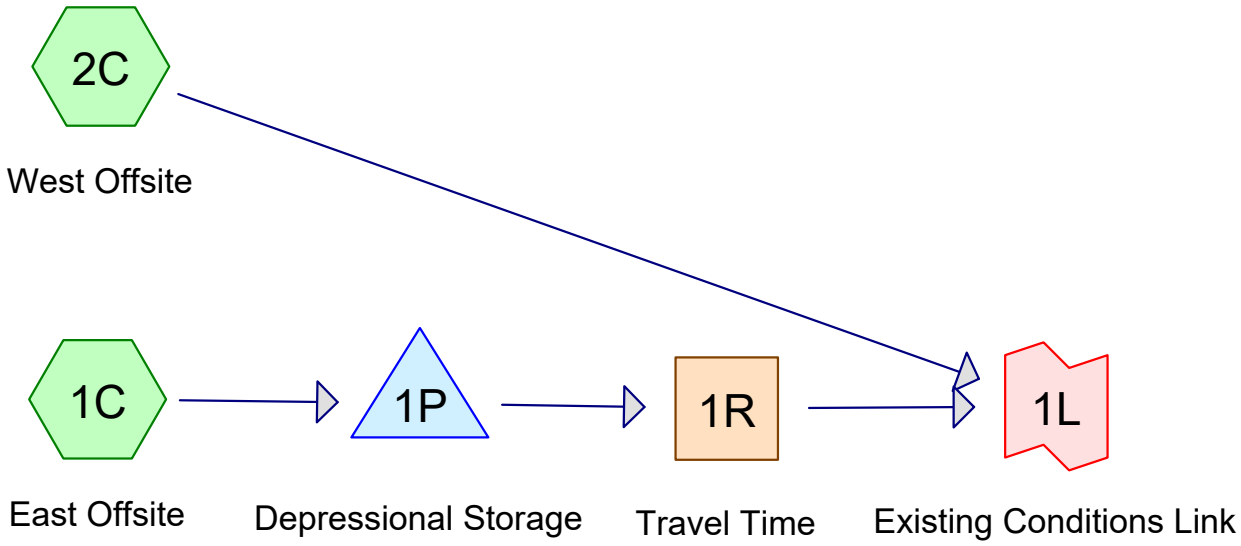
SUGAR GROVE, LLC

EXISTING DRAINAGE AREA MAP

THE GROVE - AREA 1 (SINGLE FAMILY)
SUGAR GROVE, IL 60554

ORIGINAL ISSUE: 1/31/2025
KHA PROJECT NO. 168740009
SHEET NUMBER
EXH

Existing Condition



Subcat Reach Pond Link

Summary for Subcatchment 1C: East Offsite

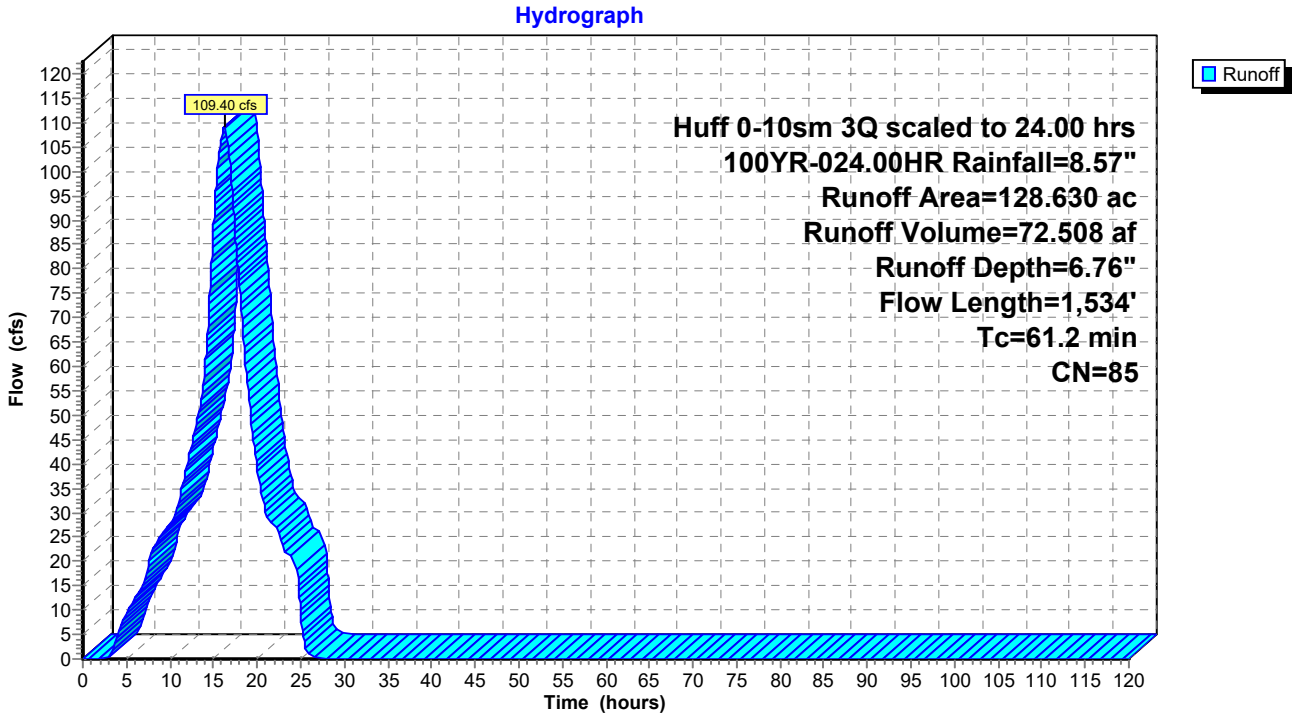
Runoff = 109.40 cfs @ 16.26 hrs, Volume= 72.508 af, Depth= 6.76"
Routed to Pond 1P : Depressional Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
128.630	85	Row crops, straight row, Good, HSG C
128.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.2	100	0.0124	0.05		**Sheet Flow, East Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 0.50"
28.0	1,434	0.0090	0.85		**Shallow Concentrated Flow, East Shallow Concentrated** Cultivated Straight Rows Kv= 9.0 fps
61.2	1,534	Total			

Subcatchment 1C: East Offsite



Summary for Pond 1P: Depressional Storage

Inflow Area = 128.630 ac, 0.00% Impervious, Inflow Depth = 6.76" for 100YR-024.00HR event
Inflow = 109.40 cfs @ 16.26 hrs, Volume= 72.508 af
Outflow = 107.33 cfs @ 16.58 hrs, Volume= 68.870 af, Atten= 2%, Lag= 19.2 min
Primary = 107.33 cfs @ 16.58 hrs, Volume= 68.870 af
Routed to Reach 1R : Travel Time

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 716.86' @ 16.58 hrs Surf.Area= 21.076 ac Storage= 9.541 af

Plug-Flow detention time= 123.6 min calculated for 68.842 af (95% of inflow)
Center-of-Mass det. time= 99.0 min (1,037.6 - 938.5)

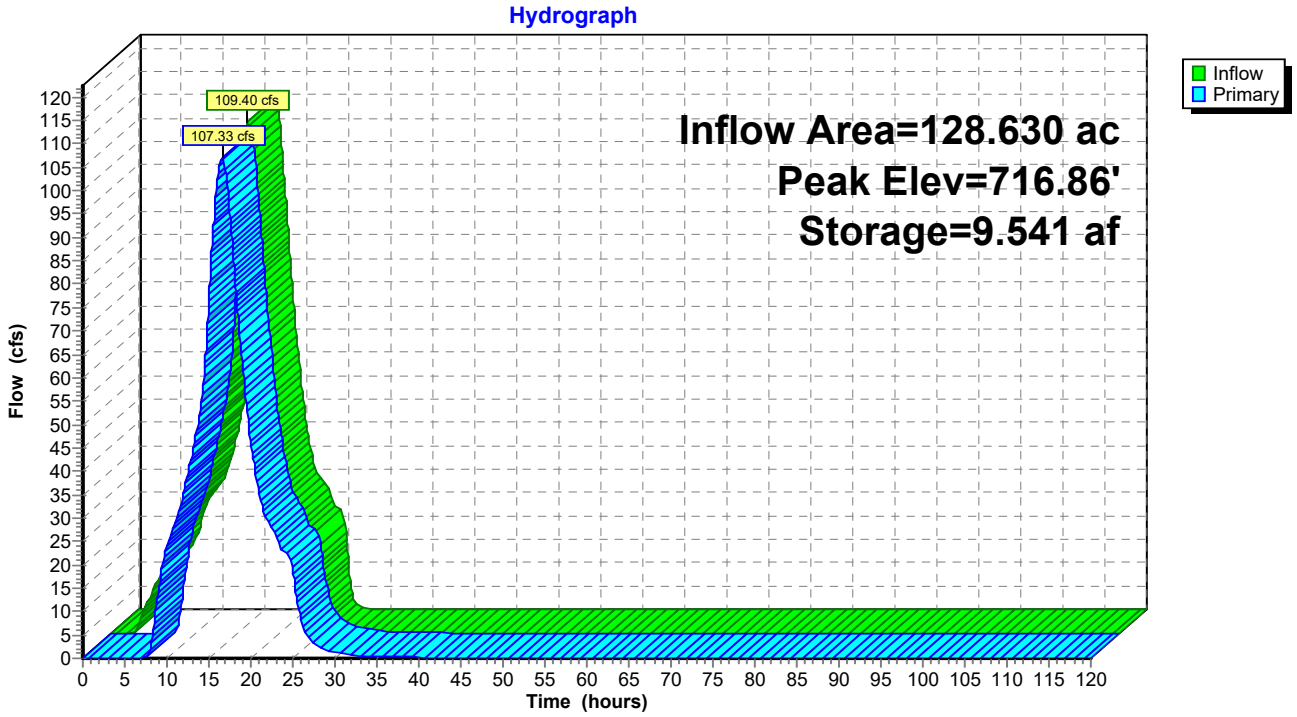
Volume	Invert	Avail.Storage	Storage Description
#1	716.00'	12.665 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
716.00	2.820	0.000	0.000
716.50	11.600	3.605	3.605
717.00	24.640	9.060	12.665

Device	Routing	Invert	Outlet Devices
#1	Primary	716.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.50 Width (feet) 6.00 500.00

Primary OutFlow Max=107.28 cfs @ 16.58 hrs HW=716.86' (Free Discharge)
↑**1=Custom Weir/Orifice** (Weir Controls 107.28 cfs @ 1.59 fps)

Pond 1P: Depressional Storage



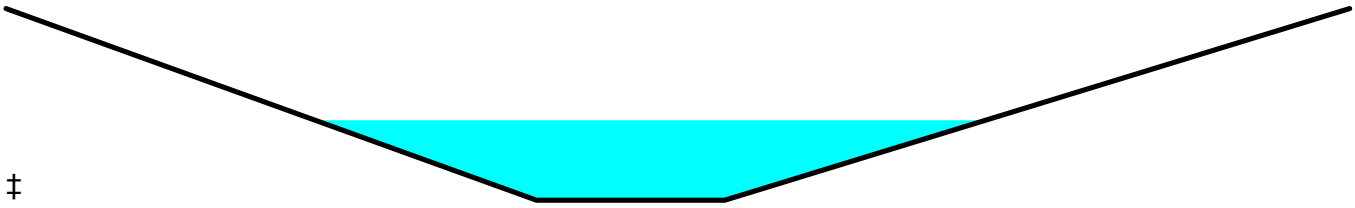
Summary for Reach 1R: Travel Time

Inflow Area = 128.630 ac, 0.00% Impervious, Inflow Depth = 6.42" for 100YR-024.00HR event
Inflow = 107.33 cfs @ 16.58 hrs, Volume= 68.870 af
Outflow = 68.54 cfs @ 23.37 hrs, Volume= 68.659 af, Atten= 36%, Lag= 407.6 min
Routed to Link 1L : Existing Conditions Link

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.42 fps, Min. Travel Time= 279.5 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 868.3 min

Peak Storage= 1,149,394 cf @ 18.71 hrs
Average Depth at Peak Storage= 1.67' , Surface Width= 153.24'
Bank-Full Depth= 4.00' Flow Area= 700.0 sf, Capacity= 484.85 cfs

43.00' x 4.00' deep channel, n= 0.170
Side Slope Z-value= 30.3 35.7 '/' Top Width= 307.00'
Length= 7,013.0' Slope= 0.0021 '/'
Inlet Invert= 716.50', Outlet Invert= 701.82'



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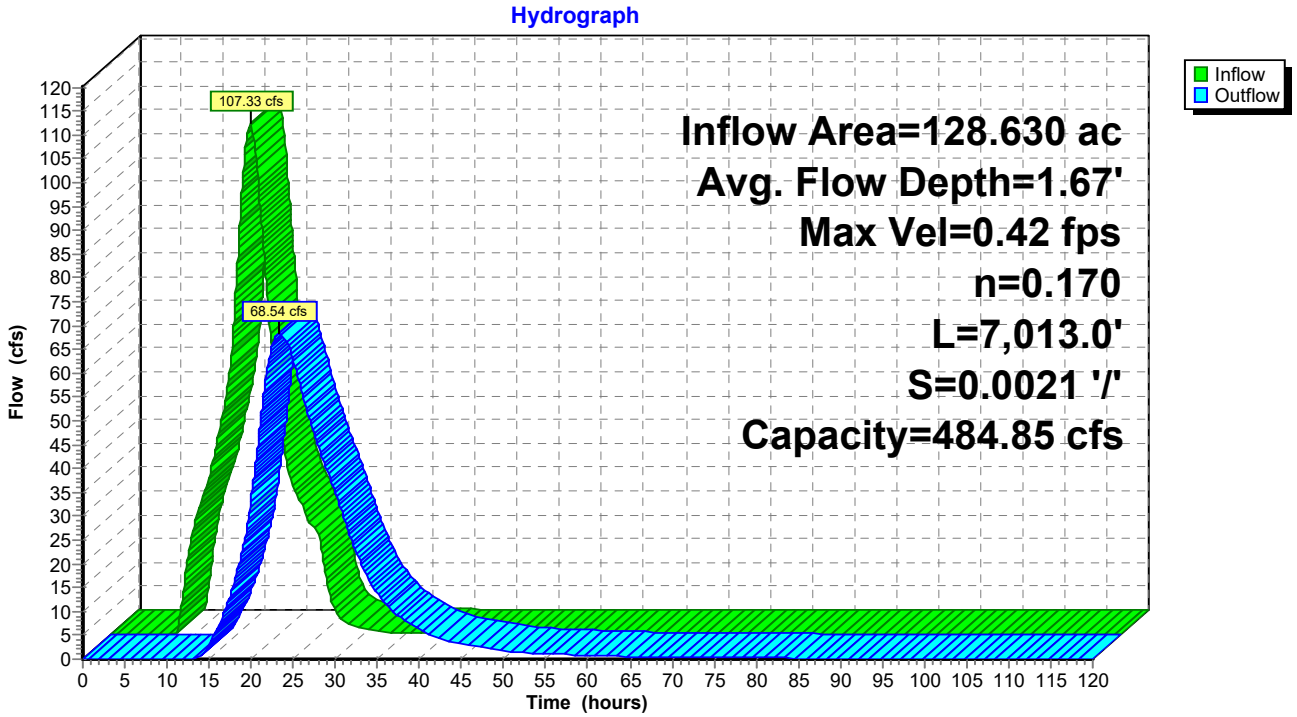
Reach 1R: Travel Time



Summary for Subcatchment 2C: West Offsite

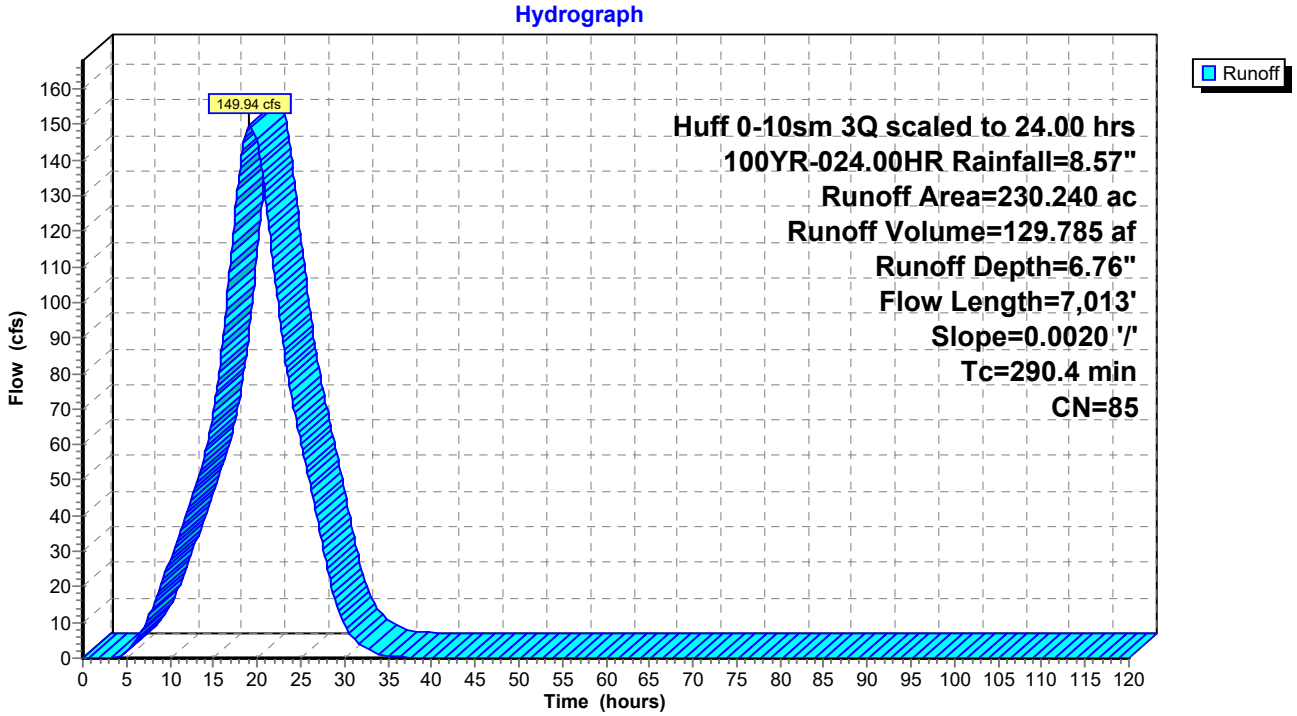
Runoff = 149.94 cfs @ 19.07 hrs, Volume= 129.785 af, Depth= 6.76"
Routed to Link 1L : Existing Conditions Link

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
230.240	85	Row crops, straight row, Good, HSG C
230.240		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
290.4	7,013	0.0020	0.40		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps

Subcatchment 2C: West Offsite

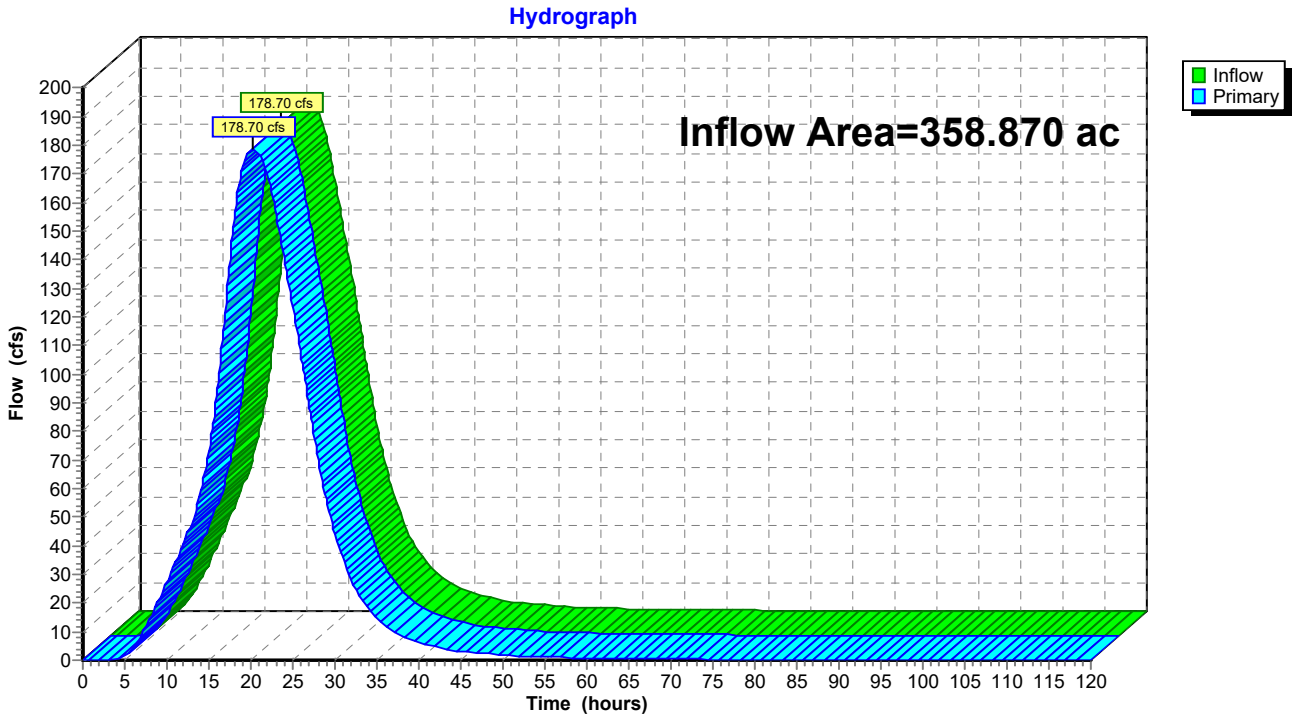


Summary for Link 1L: Existing Conditions Link

Inflow Area = 358.870 ac, 0.00% Impervious, Inflow Depth > 6.64" for 100YR-024.00HR event
Inflow = 178.70 cfs @ 20.31 hrs, Volume= 198.444 af
Primary = 178.70 cfs @ 20.31 hrs, Volume= 198.444 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link 1L: Existing Conditions Link



Events for Link 1L: Existing Conditions Link

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
002YR-024.00HR	45.65	45.65	**0.00**
100YR-001.00HR	132.54	132.54	0.00
100YR-002.00HR	172.08	172.08	0.00
100YR-003.00HR	184.76	184.76	0.00
100YR-006.00HR	184.49	184.49	0.00
100YR-012.00HR	183.25	183.25	0.00
100YR-018.00HR	**189.64**	**189.64**	0.00
100YR-024.00HR	178.70	178.70	0.00
100YR-048.00HR	135.36	135.36	0.00
100YR-072.00HR	105.35	105.35	0.00
100YR-120.00HR	74.40	74.40	0.00

EAST TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
78.7					**Direct Entry, See line 1 in 5 Yr Hydroflow Report**

EAST OFFSITE TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.2	100	0.0124	0.05		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
28.0	1,434	0.0090	0.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
61.2	1,534	Total			

WEST TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1					**Direct Entry, See line 19 in 5 Yr Hydroflow report**

WEST OFFSITE TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
263.6	6,365	0.0020	0.40		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps

DEPRESSIONAL STORAGE OFFSITE TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.6	100	0.0059	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
29.5	1,379	0.0075	0.78		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
74.1	1,479	Total			

NORTH

GRAPHIC SCALE IN FEET
0 125 250 500

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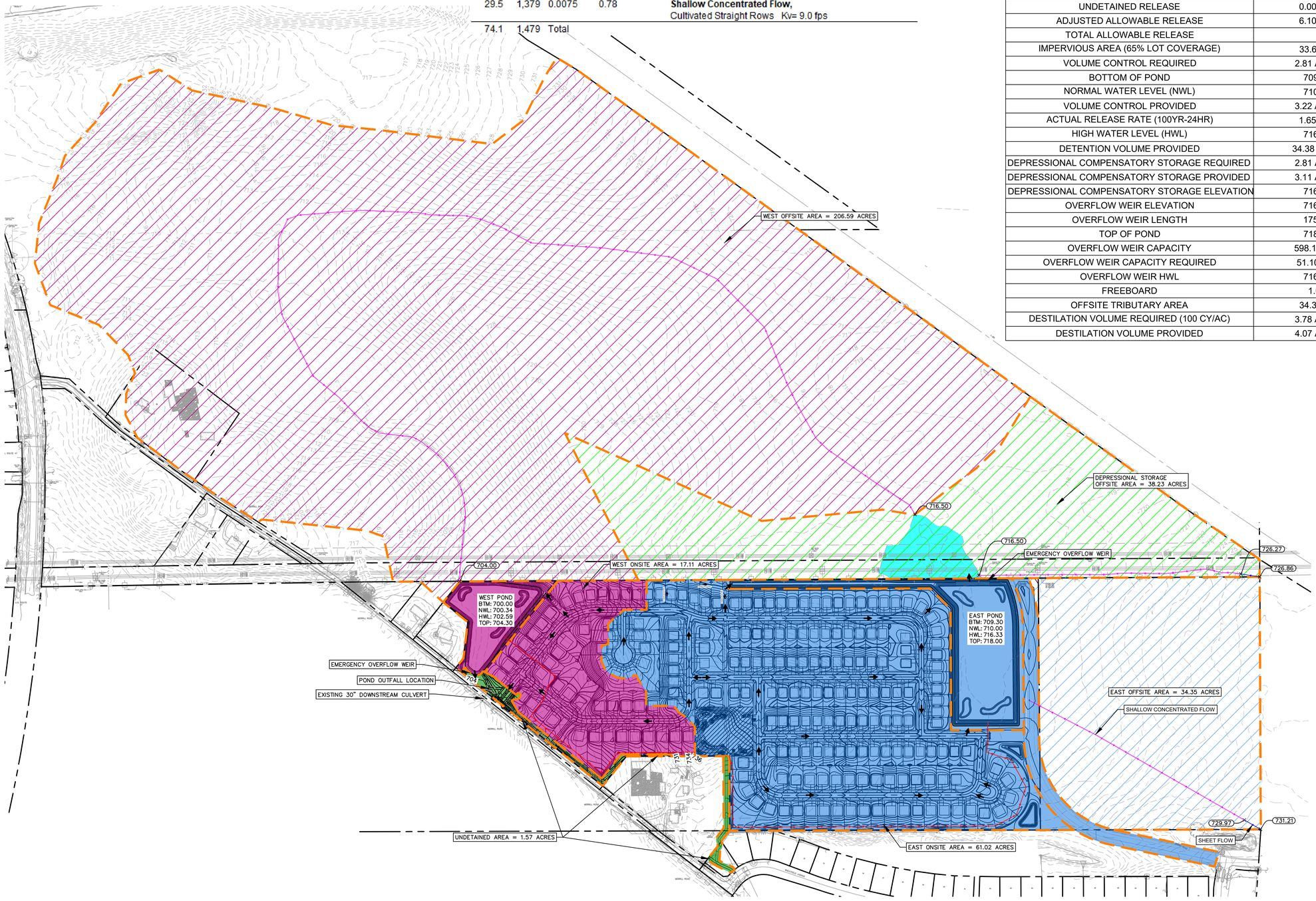

Detention Basin Information

DESCRIPTION	EAST BASIN	WEST BASIN
DETENTION SERVICE AREA	61.02 AC	18.68 AC
ALLOWABLE RELEASE	6.10 CFS	1.87 CFS
UNDETAINED AREA	0.00 AC	1.57 AC
UNDETAINED RELEASE	0.00 CFS	1.27 CFS
ADJUSTED ALLOWABLE RELEASE	6.10 CFS	0.60 CFS
TOTAL ALLOWABLE RELEASE	6.70 CFS	
IMPERVIOUS AREA (65% LOT COVERAGE)	33.69 AC	8.79 AC
VOLUME CONTROL REQUIRED	2.81 AC-FT	0.73 AC-FT
BOTTOM OF POND	709.30'	700.00'
NORMAL WATER LEVEL (NWL)	710.00'	700.34'
VOLUME CONTROL PROVIDED	3.22 AC-FT	0.82 AC-FT
ACTUAL RELEASE RATE (100YR-24HR)	1.65 CFS	6.66 CFS
HIGH WATER LEVEL (HWL)	716.33'	702.59'
DETENTION VOLUME PROVIDED	34.38 AC-FT	5.83 AC-FT
DEPRESSIONAL COMPENSATORY STORAGE REQUIRED	2.81 AC-FT	-
DEPRESSIONAL COMPENSATORY STORAGE PROVIDED	3.11 AC-FT	-
DEPRESSIONAL COMPENSATORY STORAGE ELEVATION	716.80'	-
OVERFLOW WEIR ELEVATION	716.80'	702.60'
OVERFLOW WEIR LENGTH	175.00'	120.00'
TOP OF POND	718.00'	704.30'
OVERFLOW WEIR CAPACITY	598.11 CFS	691.56 CFS
OVERFLOW WEIR CAPACITY REQUIRED	51.10 CFS	184.78 CFS
OVERFLOW WEIR HWL	716.99'	703.19'
FREEBOARD	1.01'	1.11'
OFFSITE TRIBUTARY AREA	34.35 AC	244.82 AC
DESTILATION VOLUME REQUIRED (100 CY/AC)	3.78 AC-FT	1.16 AC-FT
DESTILATION VOLUME PROVIDED	4.07 AC-FT	1.25 AC-FT

DRAINAGE AREAS

- EAST BASIN SERVICE AREA
- EAST OFFSITE AREA
- DEPRESSIONAL STORAGE OFFSITE AREA
- WEST BASIN SERVICE AREA
- WEST OFFSITE AREA
- WEST BASIN UNDETAINED
- REMAINING DEPRESSIONAL STORAGE
- SHEET FLOW
- SHALLOW CONCENTRATED FLOW
- CHANNEL FLOW
- PROPOSED TC

No.	REVISIONS	DATE	BY
△	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn
© 2025 KIMLEY-HORN AND ASSOCIATES, INC.
570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-520-9004
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

SUGAR GROVE, LLC

DRAINAGE EXHIBIT

THE GROVE - AREA 1
(SINGLE FAMILY)
SUGAR GROVE, IL 60554

ORIGINAL ISSUE: 1/31/2025
KHA PROJECT NO. 168740009
SHEET NUMBER
EXH

NORTH

GRAPHIC SCALE IN FEET
0 75 150 300

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IMPERVIOUS LEGEND

IMPERVIOUS AREA

PERVIOUS AREA

NOTE: IMPERVIOUS AREA FOR INDIVIDUAL LOTS WAS CALCULATED AT 65% IMPERVIOUS AREA AND NOT BASED ON HATCHING BELOW.

IMPERVIOUS AREA CALCULATIONS

SURFACE TYPE	EAST BASIN	WEST BASIN
TRIBUTARY LOT AREA	48.79 AC	13.52 AC
IMPERVIOUS AREA (65% LOT COVERAGE)	31.71 AC	8.79 AC
DENNY ROAD IMPERVIOUS AREA	1.98 AC	0.00 AC
TOTAL IMPERVIOUS AREA	33.69 AC	8.79 AC
VOLUME CONTROL REQUIRED	2.81 AC-FT	0.73 AC-FT

MERRILL ROAD

WHEATFIELD AVENUE

NO.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-405-9004
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SFH
CHECKED BY: EJT

SUGAR GROVE, LLC

IMPERVIOUS AREA EXHIBIT

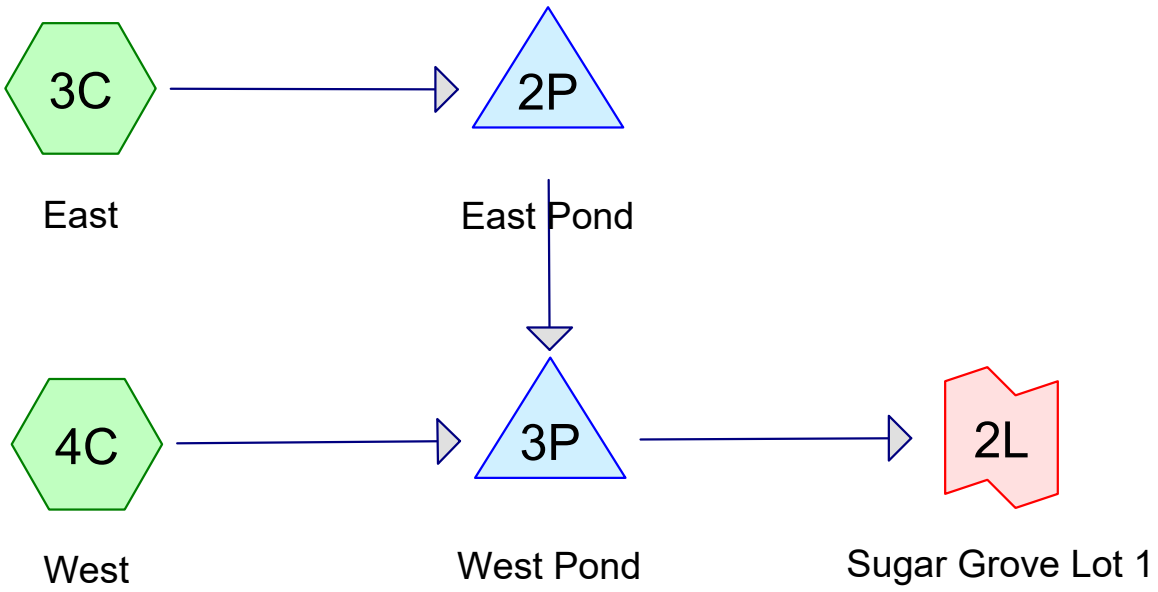
THE GROVE - AREA 1
(SINGLE FAMILY)
SUGAR GROVE, IL 60554

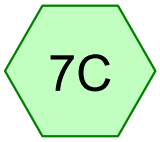
ORIGINAL ISSUE:
1/31/2025

KHA PROJECT NO.
168740009

SHEET NUMBER
EXH

Proposed Condition





West Undetained

Subcat Reach Pond Link

Routing Diagram for Sugar Grove Lot 1
Prepared by Kimley-Horn & Associates, Printed 5/29/2025

Summary for Subcatchment 3C: East

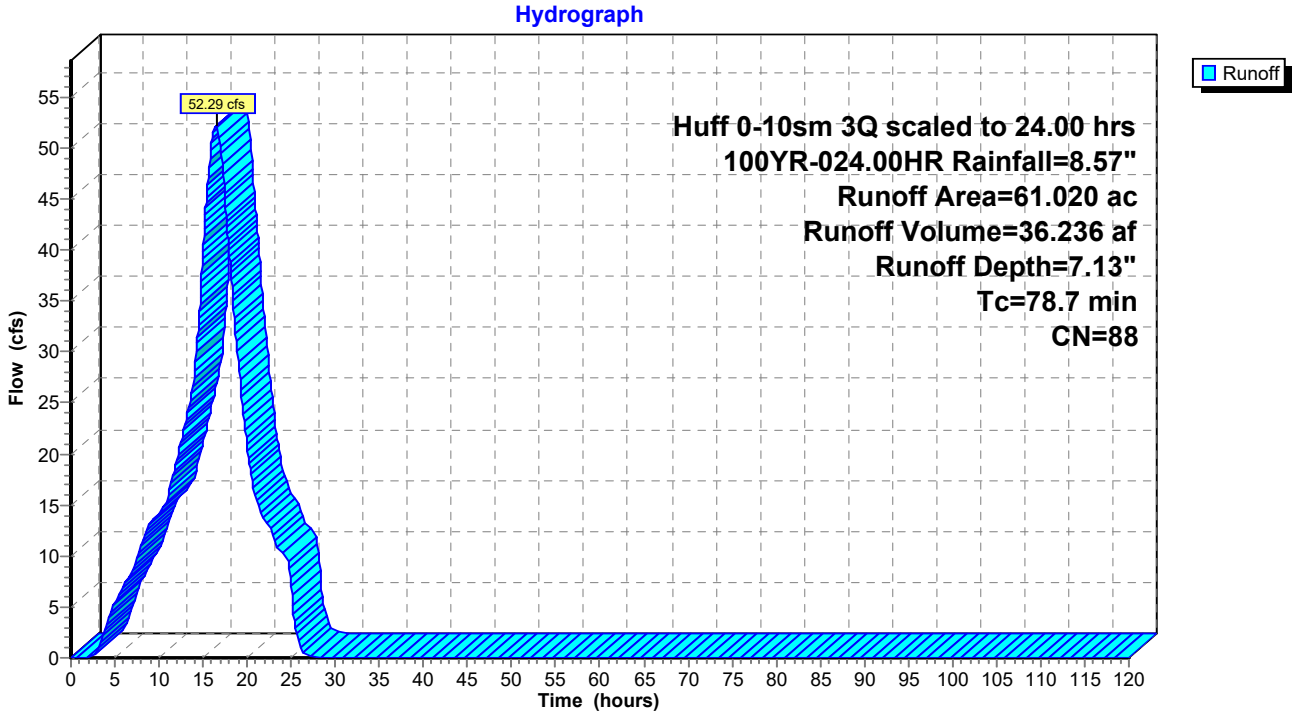
Runoff = 52.29 cfs @ 16.50 hrs, Volume= 36.236 af, Depth= 7.13"
Routed to Pond 2P : East Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

	Area (ac)	CN	Description
	48.790	90	1/8 acre lots, 65% imp, HSG C
	8.310	74	>75% Grass cover, Good, HSG C
*	1.980	98	Denny Rd Impervious
*	1.940	80	Denny Rd Pervious
	61.020	88	Weighted Average
	27.326		44.78% Pervious Area
	33.694		55.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
78.7					**Direct Entry, See line 1 in 5 Yr Hydroflow Report**

Subcatchment 3C: East



Summary for Pond 2P: East Pond

Inflow Area = 61.020 ac, 55.22% Impervious, Inflow Depth = 7.13" for 100YR-024.00HR event
Inflow = 52.29 cfs @ 16.50 hrs, Volume= 36.236 af
Outflow = 1.65 cfs @ 25.79 hrs, Volume= 13.591 af, Atten= 97%, Lag= 557.2 min
Primary = 1.65 cfs @ 25.79 hrs, Volume= 13.591 af
Routed to Pond 3P : West Pond

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 716.33' @ 25.79 hrs Surf.Area= 6.553 ac Storage= 34.375 af

Plug-Flow detention time= 3,206.6 min calculated for 13.591 af (38% of inflow)
Center-of-Mass det. time= 2,926.7 min (3,866.8 - 940.2)

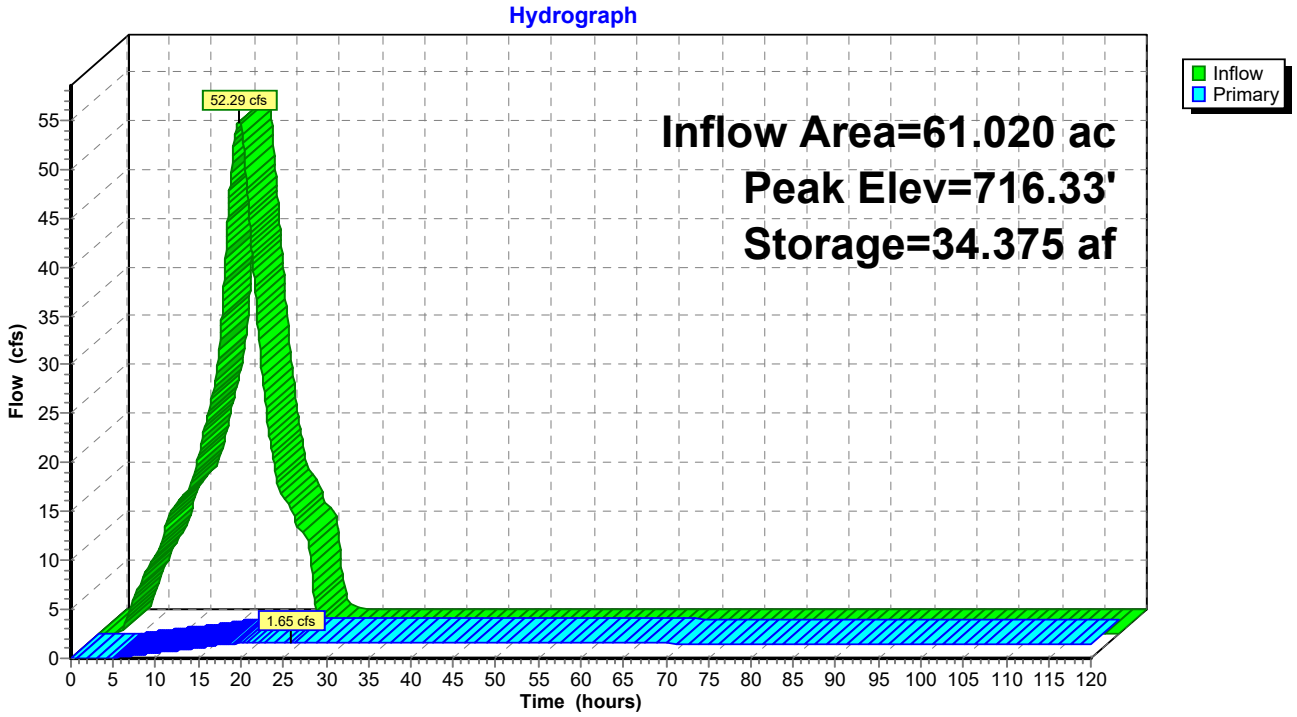
Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	45.860 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	4.670	0.000	0.000
711.00	4.870	4.770	4.770
712.00	5.060	4.965	9.735
713.00	5.280	5.170	14.905
714.00	5.460	5.370	20.275
715.00	6.010	5.735	26.010
716.00	6.420	6.215	32.225
716.80	6.740	5.264	37.489
717.00	6.820	1.356	38.845
718.00	7.210	7.015	45.860

Device	Routing	Invert	Outlet Devices
#1	Primary	710.00'	**5.0" Vert. Orifice/Grate** C= 0.610 Limited to weir flow at low heads
#2	Primary	716.80'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)**
			Head (feet) 0.00 1.20
			Width (feet) 175.00 175.00

Primary OutFlow Max=1.65 cfs @ 25.79 hrs HW=716.33' (Free Discharge)
1=Orifice/Grate (Orifice Controls 1.65 cfs @ 12.11 fps)
2=Custom Weir/Orifice (Controls 0.00 cfs)

Pond 2P: East Pond



Summary for Subcatchment 4C: West

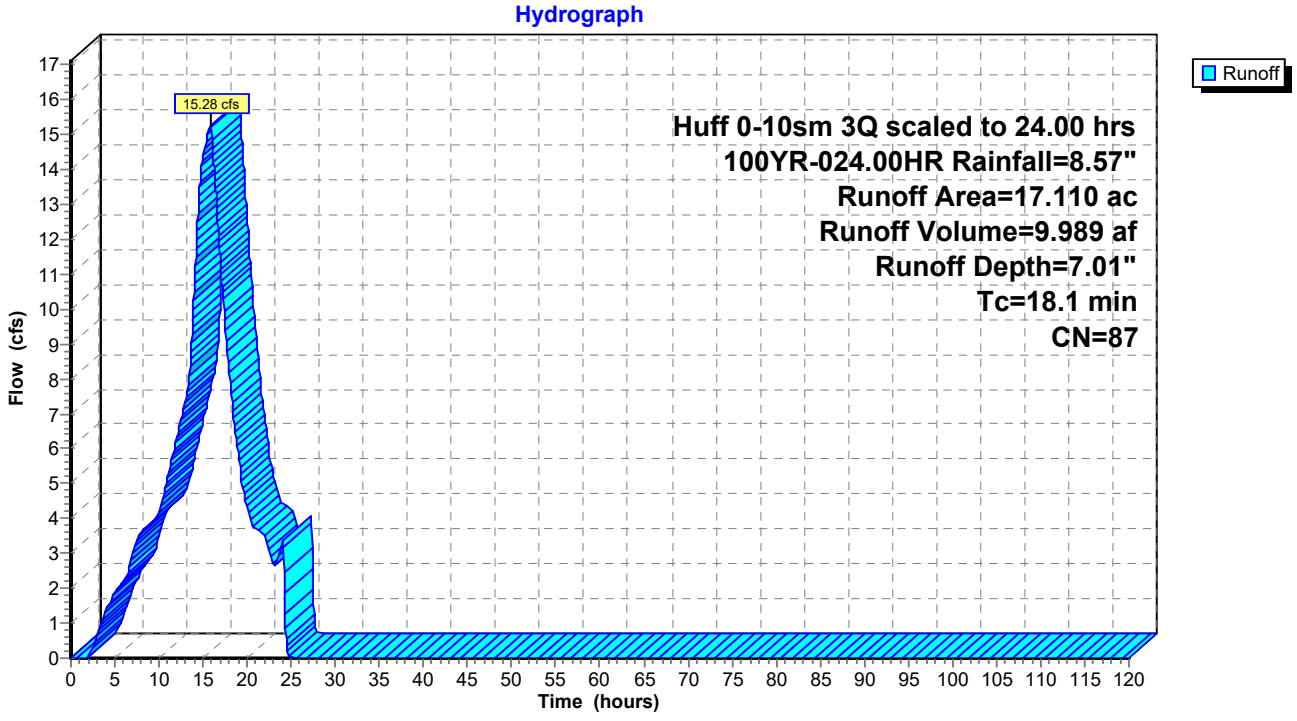
Runoff = 15.28 cfs @ 15.79 hrs, Volume= 9.989 af, Depth= 7.01"
Routed to Pond 3P : West Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
13.520	90	1/8 acre lots, 65% imp, HSG C
3.590	74	>75% Grass cover, Good, HSG C
17.110	87	Weighted Average
8.322		48.64% Pervious Area
8.788		51.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1					**Direct Entry, See line 19 in 5 Yr Hydroflow report**

Subcatchment 4C: West



Summary for Subcatchment 7C: West Undetained

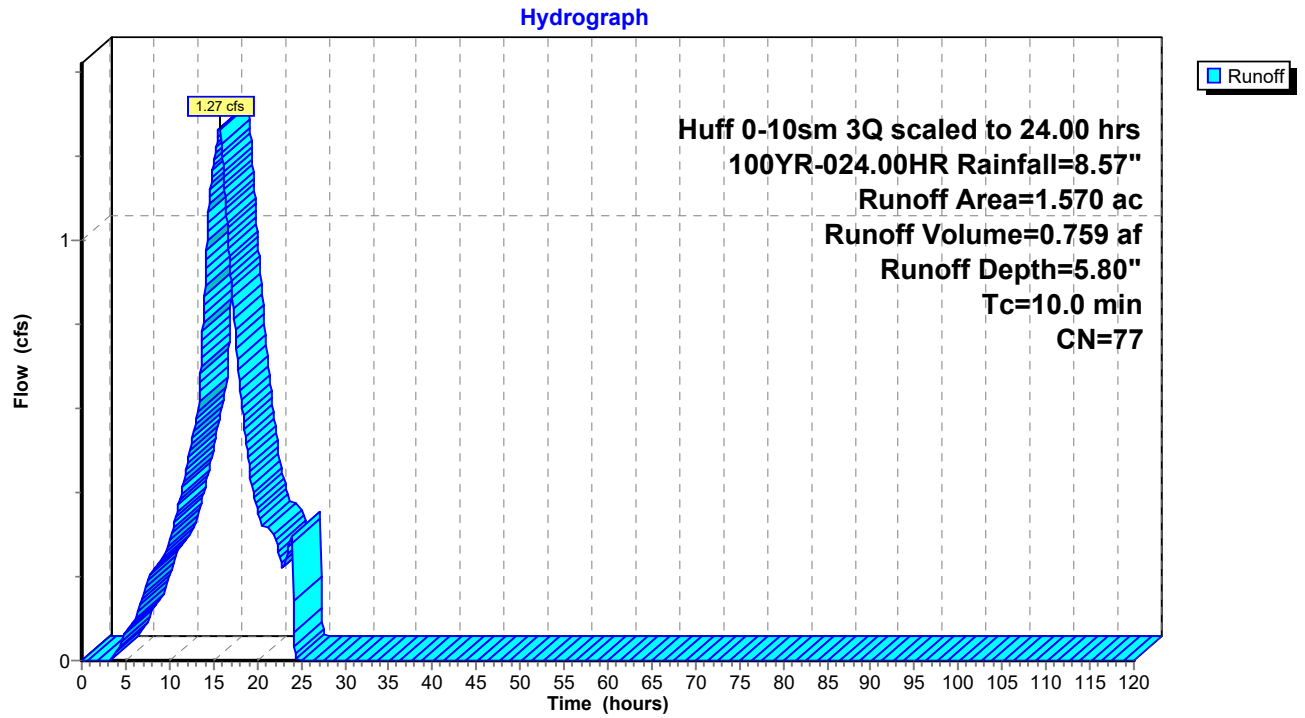
Runoff = 1.27 cfs @ 15.71 hrs, Volume= 0.759 af, Depth= 5.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

	Area (ac)	CN	Description
	1.050	74	>75% Grass cover, Good, HSG C
*	0.020	98	Onsite paved area, HSG C
*	0.160	98	Offsite asphalt trail, HSG C
*	0.340	74	Offsite trail >75% Grass cover, Good, HSG C
	1.570	77	Weighted Average
	1.390		88.54% Pervious Area
	0.180		11.46% Impervious Area

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

Subcatchment 7C: West Undetained



Summary for Pond 3P: West Pond

Inflow Area = 78.130 ac, 54.37% Impervious, Inflow Depth > 3.62" for 100YR-024.00HR event
Inflow = 16.45 cfs @ 15.79 hrs, Volume= 23.580 af
Outflow = 6.66 cfs @ 19.34 hrs, Volume= 22.141 af, Atten= 60%, Lag= 212.8 min
Primary = 6.66 cfs @ 19.34 hrs, Volume= 22.141 af
Routed to Link 2L : Sugar Grove Lot 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 702.59' @ 19.34 hrs Surf.Area= 2.752 ac Storage= 5.830 af

Plug-Flow detention time= 627.2 min calculated for 22.131 af (94% of inflow)
Center-of-Mass det. time= 353.1 min (2,958.4 - 2,605.3)

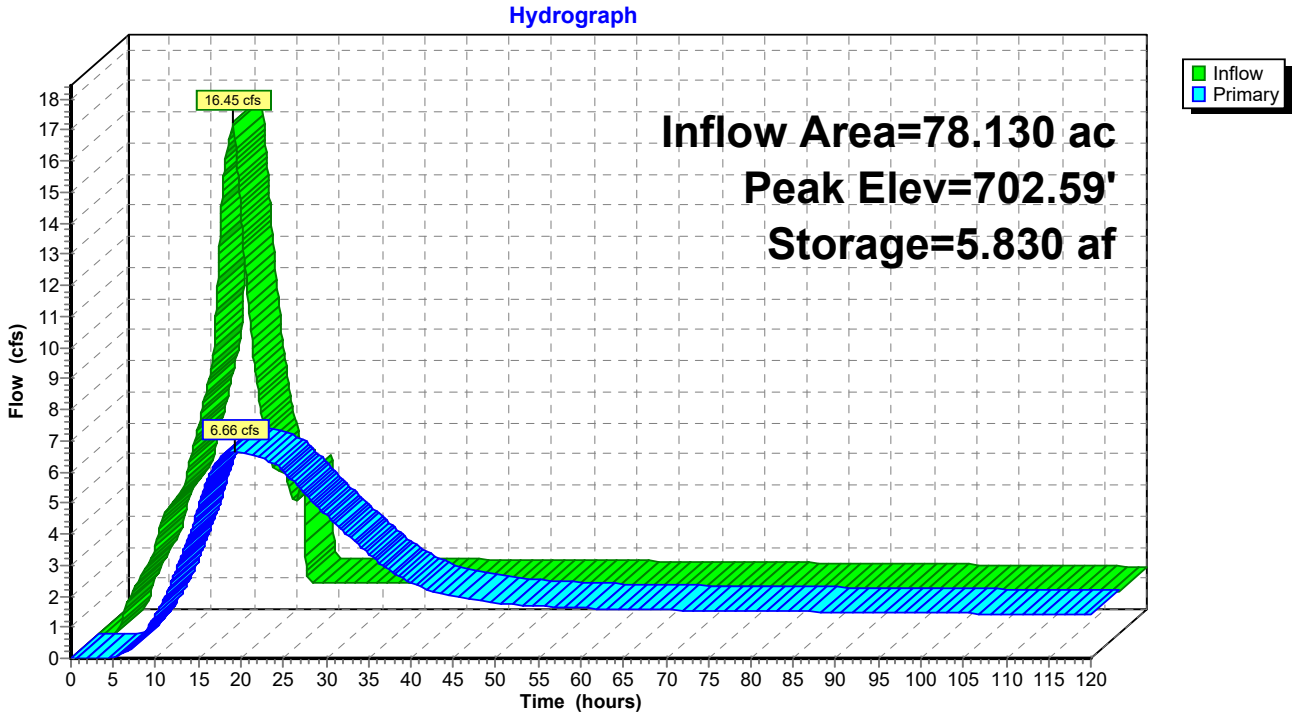
Volume	Invert	Avail.Storage	Storage Description
#1	700.34'	10.759 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
700.34	2.440	0.000	0.000
701.00	2.530	1.640	1.640
702.00	2.670	2.600	4.240
703.00	2.810	2.740	6.980
704.00	2.960	2.885	9.865
704.30	3.000	0.894	10.759

Device	Routing	Invert	Outlet Devices
#1	Primary	700.34'	**13.9" Vert. Orifice/Grate** C= 0.610 Limited to weir flow at low heads
#2	Primary	702.60'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 1.00 Width (feet) 120.00 120.00

Primary OutFlow Max=6.66 cfs @ 19.34 hrs HW=702.59' (Free Discharge)
└**1=Orifice/Grate** (Orifice Controls 6.66 cfs @ 6.32 fps)
└**2=Custom Weir/Orifice** (Controls 0.00 cfs)

Pond 3P: West Pond

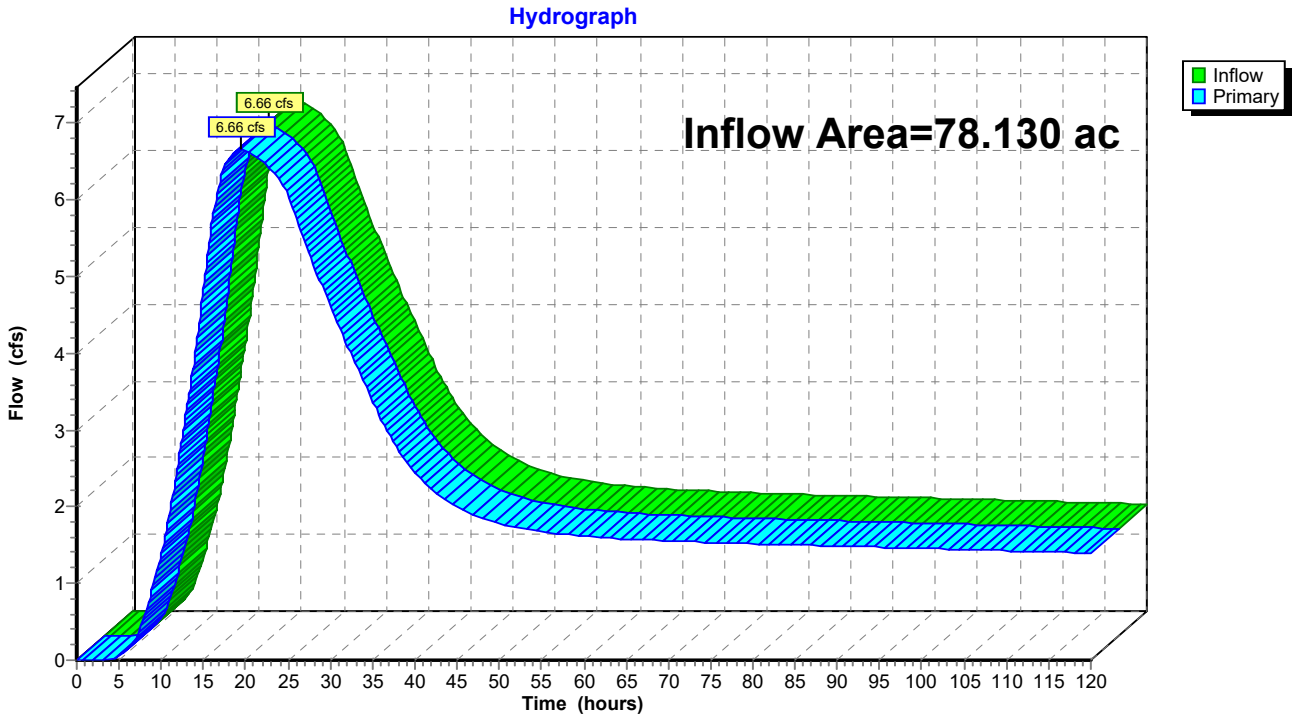


Summary for Link 2L: Sugar Grove Lot 1

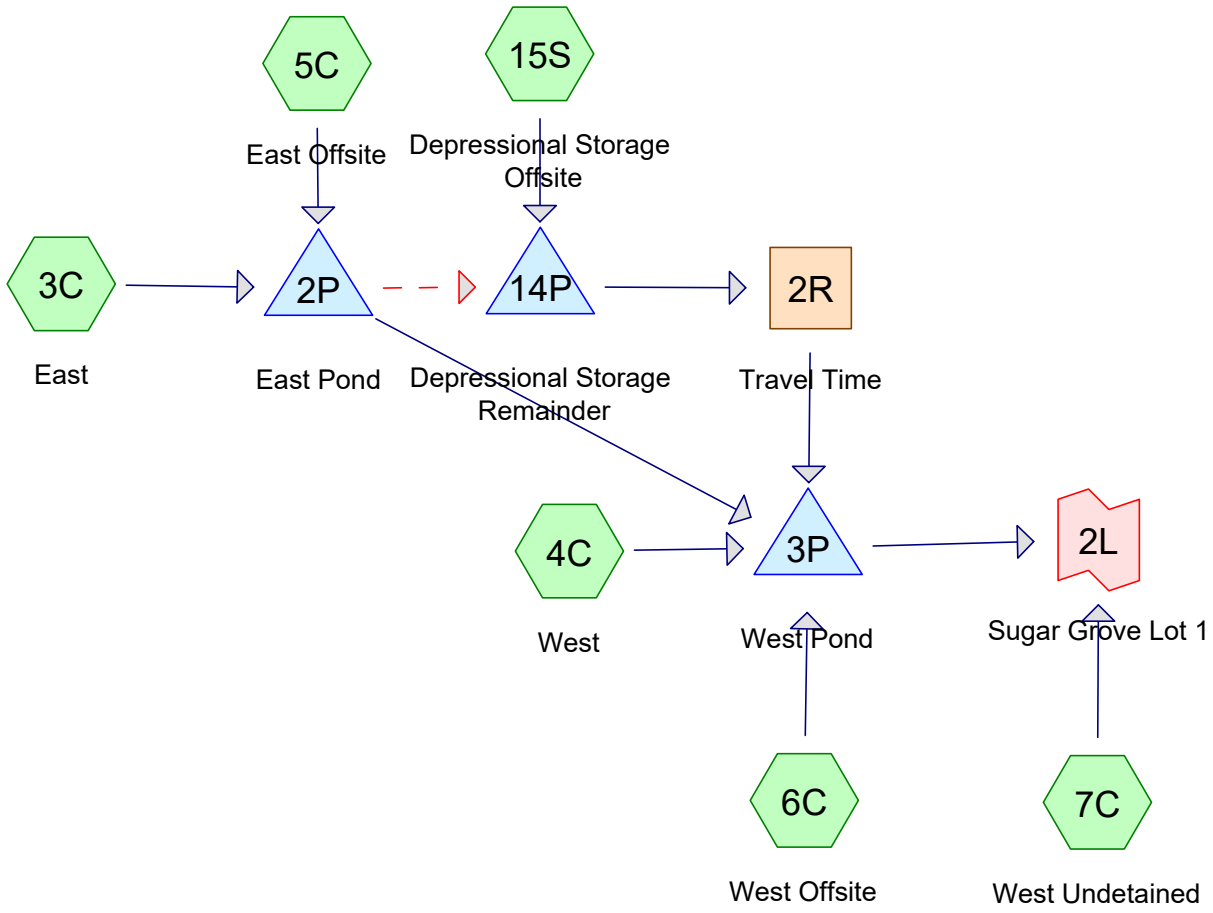
Inflow Area = 78.130 ac, 54.37% Impervious, Inflow Depth > 3.40" for 100YR-024.00HR event
Inflow = 6.66 cfs @ 19.34 hrs, Volume= 22.141 af
Primary = 6.66 cfs @ 19.34 hrs, Volume= 22.141 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Link 2L: Sugar Grove Lot 1



Proposed Critical Condition



Subcat Reach Pond Link

Routing Diagram for Sugar Grove Lot 1 - Copy
Prepared by Kimley-Horn & Associates, Printed 6/10/2025

Summary for Subcatchment 3C: East

Runoff = 52.29 cfs @ 16.50 hrs, Volume= 36.236 af, Depth= 7.13"
Routed to Pond 2P : East Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

	Area (ac)	CN	Description
	48.790	90	1/8 acre lots, 65% imp, HSG C
	8.310	74	>75% Grass cover, Good, HSG C
*	1.980	98	Denny Rd Impervious
*	1.940	80	Denny Rd Pervious
	61.020	88	Weighted Average
	27.326		44.78% Pervious Area
	33.694		55.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
78.7					**Direct Entry, See line 1 in 5 Yr Hydroflow Report**

Summary for Subcatchment 5C: East Offsite

Runoff = 29.21 cfs @ 16.26 hrs, Volume= 19.363 af, Depth= 6.76"
Routed to Pond 2P : East Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
34.350	85	Row crops, straight row, Good, HSG C
34.350		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.2	100	0.0124	0.05		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
28.0	1,434	0.0090	0.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
61.2	1,534	Total			

Events for Pond 2P: East Pond

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (acre-feet)
002YR-024.00HR	26.37	1.12	1.12	0.00	713.04	15.132
100YR-001.00HR	193.02	1.32	1.32	0.00	714.09	20.774
100YR-002.00HR	**200.27**	1.50	1.50	0.00	715.27	27.618
100YR-003.00HR	189.76	1.59	1.59	0.00	715.87	31.423
100YR-006.00HR	154.25	9.36	1.72	7.64	716.85	37.807
100YR-012.00HR	117.48	34.91	1.73	33.18	716.95	38.492
100YR-018.00HR	98.64	49.83	1.74	48.09	716.99	38.786
100YR-024.00HR	81.37	**51.10**	**1.74**	**49.36**	**716.99**	**38.809**
100YR-048.00HR	46.98	45.96	1.74	44.22	716.98	38.713
100YR-072.00HR	33.70	33.29	1.73	31.55	716.94	38.455
100YR-120.00HR	22.15	22.08	1.73	20.35	716.90	38.198

Summary for Subcatchment 15S: Depressional Storage Offsite

Runoff = 32.09 cfs @ 16.41 hrs, Volume= 21.550 af, Depth= 6.76"
Routed to Pond 14P : Depressional Storage Remainder

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
38.230	85	Row crops, straight row, Good, HSG C
38.230		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.6	100	0.0059	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
29.5	1,379	0.0075	0.78		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
74.1	1,479	Total			

Events for Pond 14P: Depressional Storage Remainder

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
002YR-024.00HR	9.97	9.79	716.64	1.295
100YR-001.00HR	72.86	67.28	716.80	2.252
100YR-002.00HR	**76.18**	**71.95**	**716.81**	**2.311**
100YR-003.00HR	72.04	68.90	716.80	2.272
100YR-006.00HR	58.41	56.96	716.78	2.116
100YR-012.00HR	47.31	46.08	716.76	1.963
100YR-018.00HR	68.38	66.21	716.80	2.238
100YR-024.00HR	70.03	68.27	716.80	2.264
100YR-048.00HR	62.50	62.29	716.79	2.187
100YR-072.00HR	44.79	44.70	716.75	1.943
100YR-120.00HR	29.13	29.09	716.71	1.695

Summary for Reach 2R: Travel Time

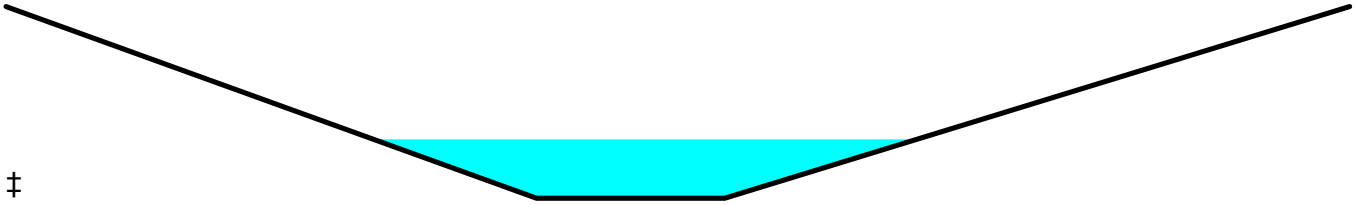
[81] Warning: Exceeded Pond 14P by 1.00' @ 21.55 hrs

Inflow Area = 38.230 ac, 0.00% Impervious, Inflow Depth = 11.50" for 100YR-024.00HR event
Inflow = 68.27 cfs @ 18.64 hrs, Volume= 36.634 af
Outflow = 34.92 cfs @ 26.21 hrs, Volume= 36.505 af, Atten= 49%, Lag= 454.2 min
Routed to Pond 3P : West Pond

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.34 fps, Min. Travel Time= 311.1 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 943.9 min

Peak Storage= 651,789 cf @ 21.02 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 123.95'
Bank-Full Depth= 4.00' Flow Area= 700.0 sf, Capacity= 469.62 cfs

43.00' x 4.00' deep channel, n= 0.170
Side Slope Z-value= 30.3 35.7 '/' Top Width= 307.00'
Length= 6,365.0' Slope= 0.0020 '/'
Inlet Invert= 716.50', Outlet Invert= 704.00'



‡

Summary for Subcatchment 4C: West

Runoff = 15.28 cfs @ 15.79 hrs, Volume= 9.989 af, Depth= 7.01"
Routed to Pond 3P : West Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
13.520	90	1/8 acre lots, 65% imp, HSG C
3.590	74	>75% Grass cover, Good, HSG C
17.110	87	Weighted Average
8.322		48.64% Pervious Area
8.788		51.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.1					**Direct Entry, See line 19 in 5 Yr Hydroflow report**

Summary for Subcatchment 6C: West Offsite

Runoff = 138.61 cfs @ 18.99 hrs, Volume= 116.454 af, Depth= 6.76"
Routed to Pond 3P : West Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
206.590	85	Row crops, straight row, Good, HSG C
206.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
263.6	6,365	0.0020	0.40		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps

Events for Pond 3P: West Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
002YR-024.00HR	45.33	45.25	702.81	6.451
100YR-001.00HR	132.37	132.12	703.06	7.162
100YR-002.00HR	168.99	168.73	703.15	7.408
100YR-003.00HR	180.56	180.12	703.18	7.480
100YR-006.00HR	**185.11**	**184.78**	**703.19**	**7.510**
100YR-012.00HR	178.94	178.90	703.17	7.472
100YR-018.00HR	166.88	166.64	703.15	7.394
100YR-024.00HR	151.14	151.11	703.11	7.292
100YR-048.00HR	107.62	107.58	703.00	6.985
100YR-072.00HR	85.99	85.98	702.94	6.817
100YR-120.00HR	65.67	65.65	702.88	6.645

Summary for Subcatchment 7C: West Undetained

Runoff = 1.27 cfs @ 15.71 hrs, Volume= 0.759 af, Depth= 5.80"
Routed to Link 2L : Sugar Grove Lot 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

	Area (ac)	CN	Description
	1.050	74	>75% Grass cover, Good, HSG C
*	0.020	98	Onsite paved area, HSG C
*	0.160	98	Offsite asphalt trail, HSG C
*	0.340	74	Offsite trail >75% Grass cover, Good, HSG C
	1.570	77	Weighted Average
	1.390		88.54% Pervious Area
	0.180		11.46% Impervious Area

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

Events for Link 2L: Sugar Grove Lot 1

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
002YR-024.00HR	45.38	45.38	**0.00**
100YR-001.00HR	132.12	132.12	0.00
100YR-002.00HR	168.73	168.73	0.00
100YR-003.00HR	180.12	180.12	0.00
100YR-006.00HR	**185.38**	**185.38**	0.00
100YR-012.00HR	179.43	179.43	0.00
100YR-018.00HR	167.11	167.11	0.00
100YR-024.00HR	151.58	151.58	0.00
100YR-048.00HR	108.07	108.07	0.00
100YR-072.00HR	86.32	86.32	0.00
100YR-120.00HR	65.89	65.89	0.00

Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 27 2025

EAST POND OVERFLOW WEIR

Rectangular Weir

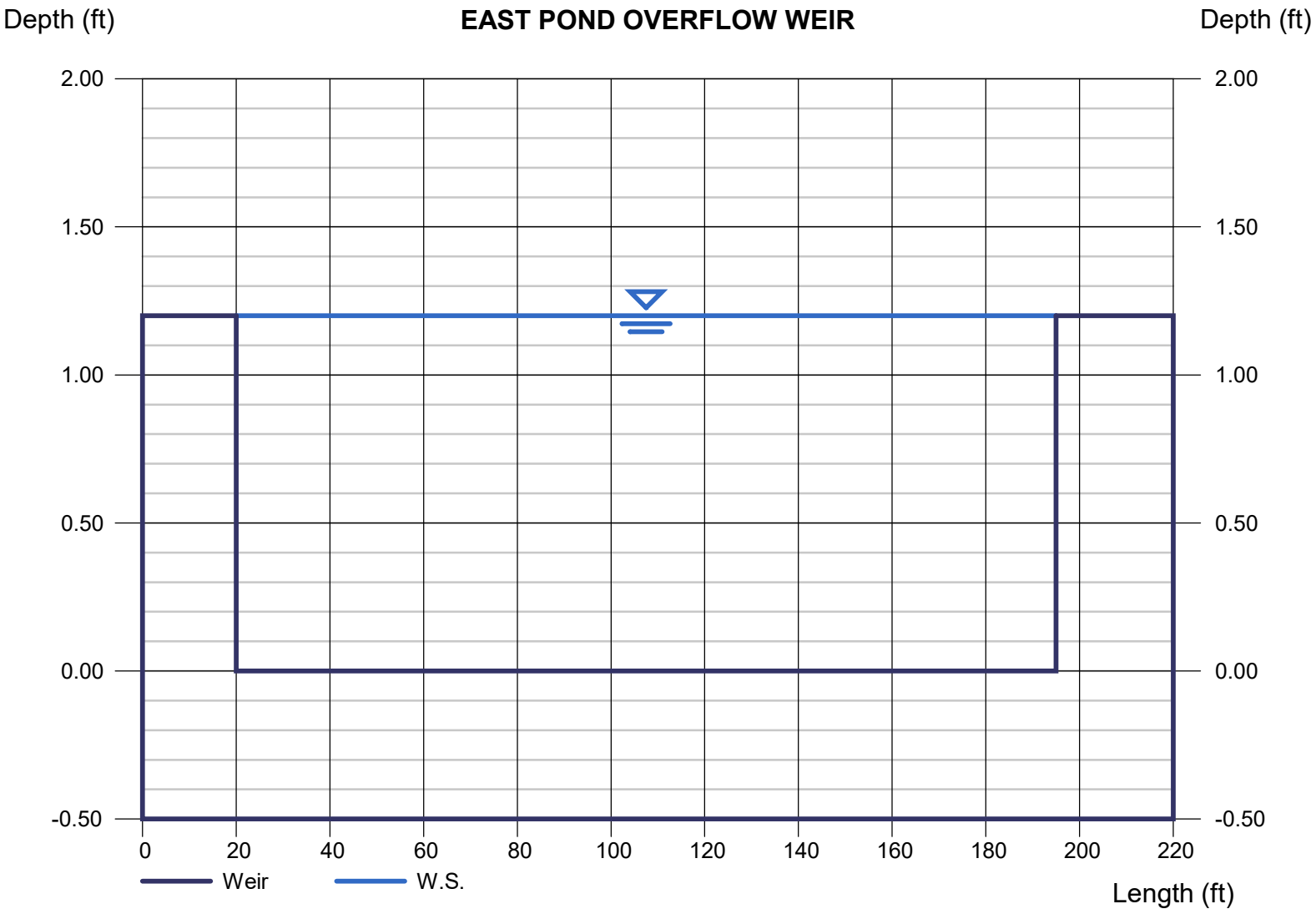
Crest	= Broad
Bottom Length (ft)	= 175.00
Total Depth (ft)	= 1.20

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Depth
Known Depth (ft)	= 1.20

Highlighted

Depth (ft)	= 1.20
Q (cfs)	= 598.11
Area (sqft)	= 210.00
Velocity (ft/s)	= 2.85
Top Width (ft)	= 175.00



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, May 27 2025

WEST POND OVERFLOW WEIR

Rectangular Weir

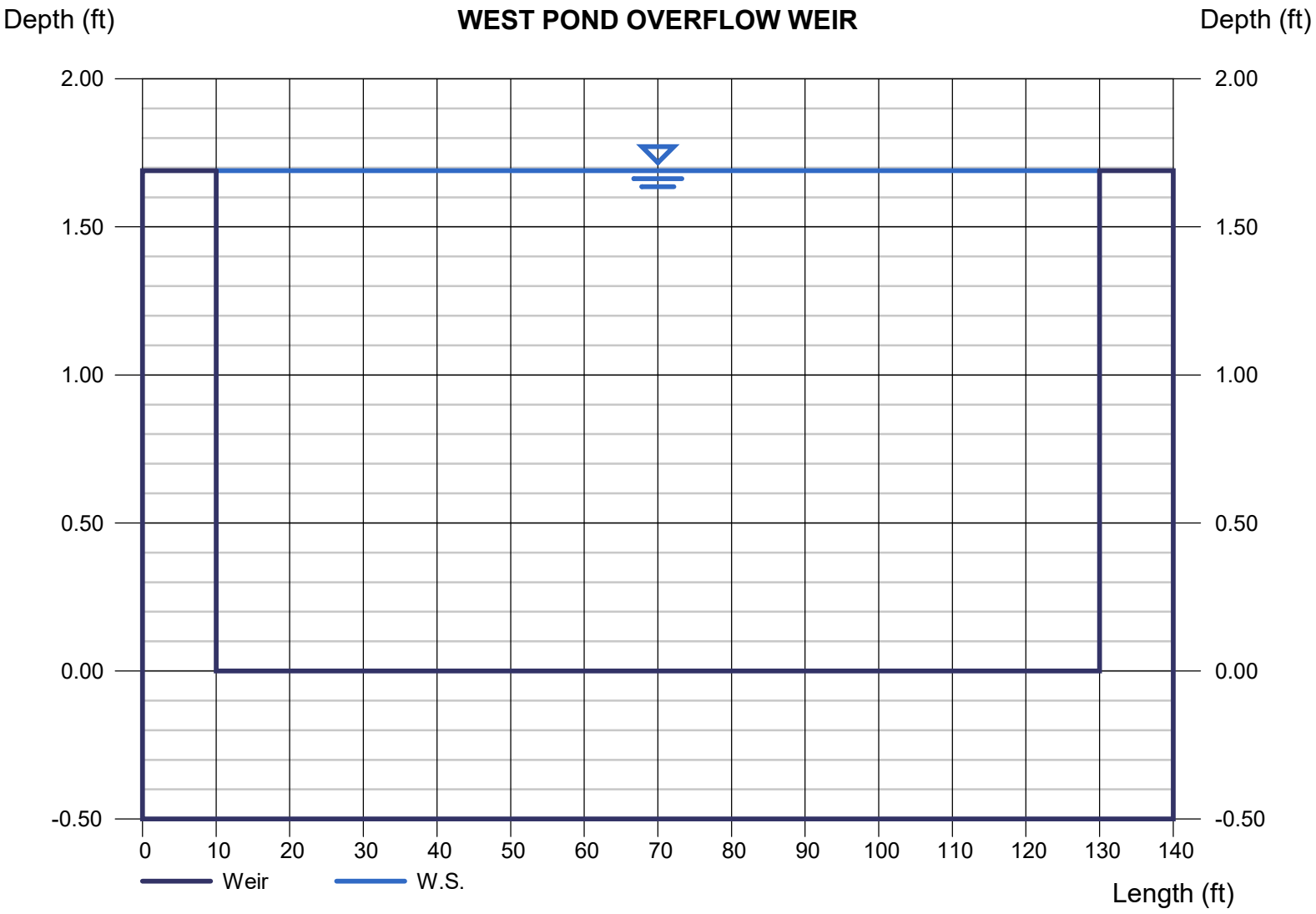
Crest	= Broad
Bottom Length (ft)	= 120.00
Total Depth (ft)	= 1.69

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Depth
Known Depth (ft)	= 1.69

Highlighted

Depth (ft)	= 1.69
Q (cfs)	= 685.46
Area (sqft)	= 202.80
Velocity (ft/s)	= 3.38
Top Width (ft)	= 120.00



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jun 10 2025

Merrill Rd Culvert - Existing Critical Storm

Invert Elev Dn (ft)	=	699.32
Pipe Length (ft)	=	50.00
Slope (%)	=	1.68
Invert Elev Up (ft)	=	700.16
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

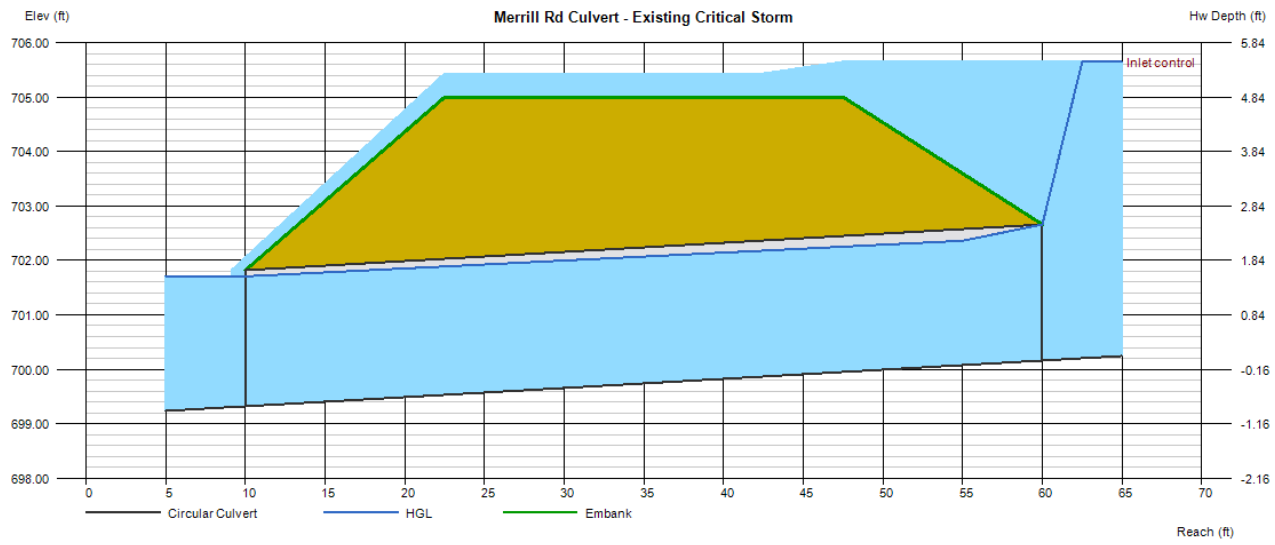
Top Elevation (ft)	=	705.00
Top Width (ft)	=	25.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	189.64
Qmax (cfs)	=	189.64
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	189.64
Qpipe (cfs)	=	48.18
Qovertop (cfs)	=	141.46
Veloc Dn (ft/s)	=	9.98
Veloc Up (ft/s)	=	10.28
HGL Dn (ft)	=	701.71
HGL Up (ft)	=	702.43
Hw Elev (ft)	=	705.65
Hw/D (ft)	=	2.20
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jun 10 2025

Merrill Rd Culvert - Existing Critical Storm + 12 Inch Drain Tile

Invert Elev Dn (ft)	=	699.32
Pipe Length (ft)	=	50.00
Slope (%)	=	1.68
Invert Elev Up (ft)	=	700.16
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	705.00
Top Width (ft)	=	25.00
Crest Width (ft)	=	100.00

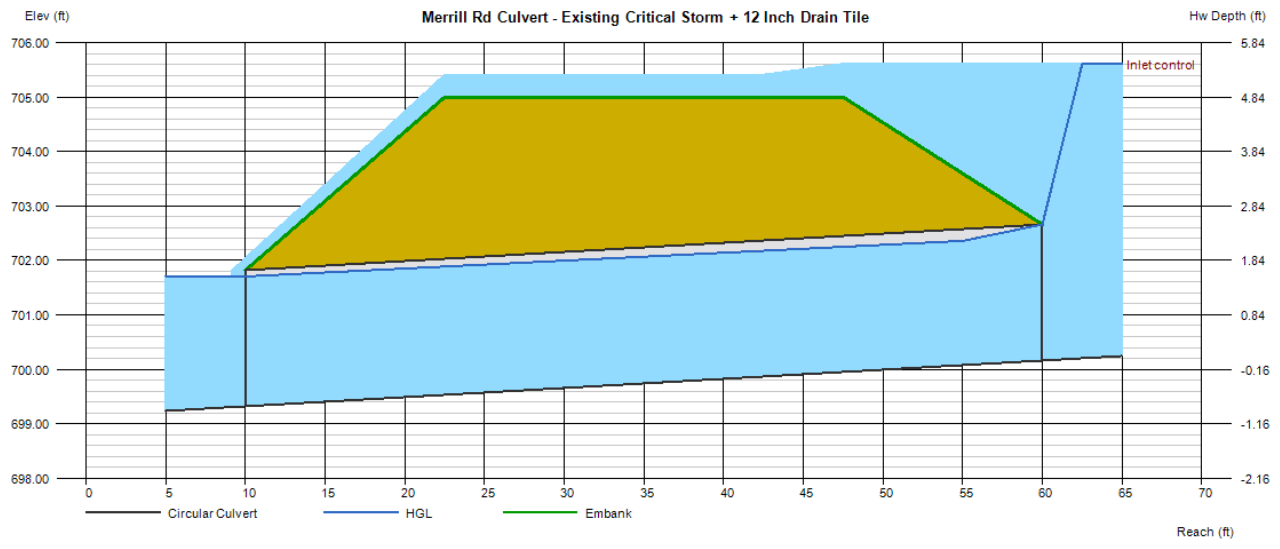
Calculations

Qmin (cfs)	=	187.62
Qmax (cfs)	=	189.64
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	187.62
Qpipe (cfs)	=	47.94
Qovertop (cfs)	=	139.68
Veloc Dn (ft/s)	=	9.93
Veloc Up (ft/s)	=	10.24
HGL Dn (ft)	=	701.71
HGL Up (ft)	=	702.43
Hw Elev (ft)	=	705.61
Hw/D (ft)	=	2.18
Flow Regime	=	Inlet Control

12" Drain tile max capacity @ 0.32% = 2.02 CFS



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jun 10 2025

Merrill Rd Culvert - Proposed Critical Storm

Invert Elev Dn (ft)	=	699.32
Pipe Length (ft)	=	50.00
Slope (%)	=	1.68
Invert Elev Up (ft)	=	700.16
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

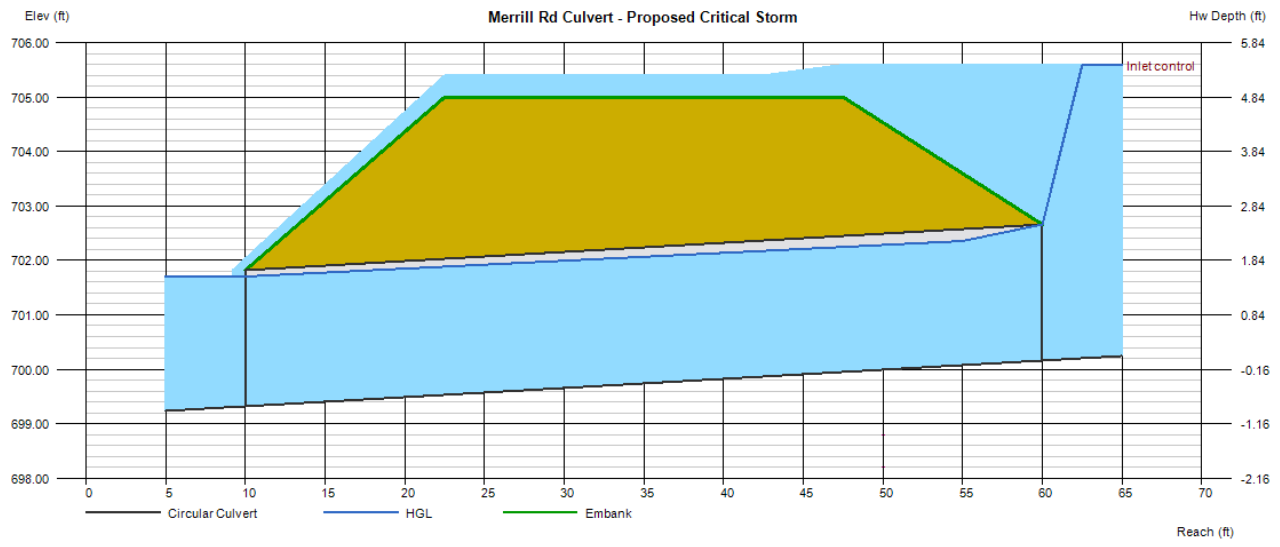
Top Elevation (ft)	=	705.00
Top Width (ft)	=	25.00
Crest Width (ft)	=	100.00

Calculations

Qmin (cfs)	=	185.38
Qmax (cfs)	=	189.64
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	185.38
Qpipe (cfs)	=	47.83
Qovertop (cfs)	=	137.55
Veloc Dn (ft/s)	=	9.91
Veloc Up (ft/s)	=	10.22
HGL Dn (ft)	=	701.70
HGL Up (ft)	=	702.43
Hw Elev (ft)	=	705.59
Hw/D (ft)	=	2.17
Flow Regime	=	Inlet Control



NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

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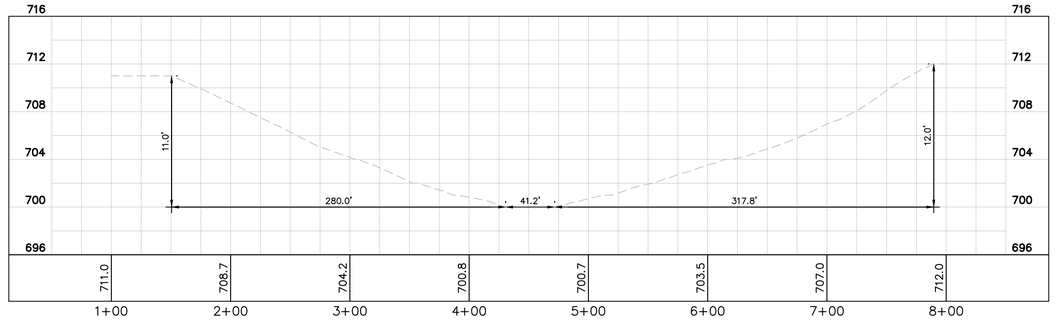
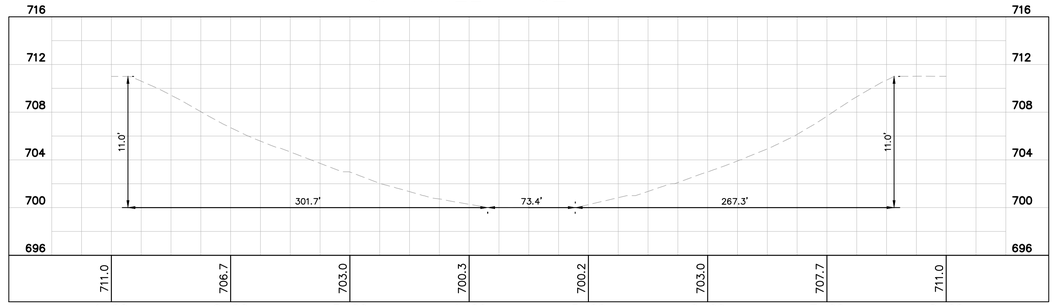
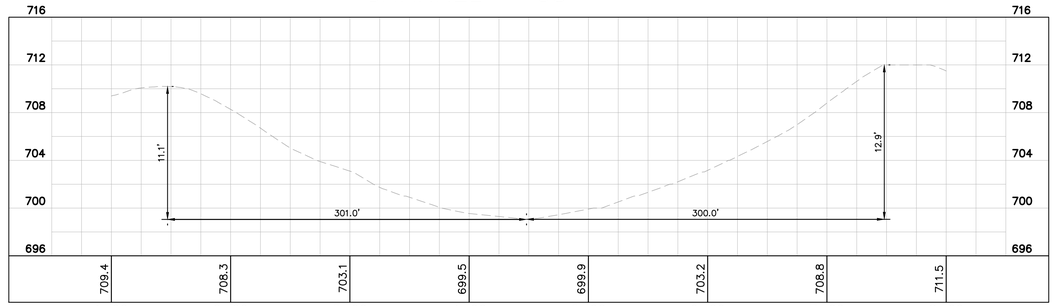
CHANNEL – 01



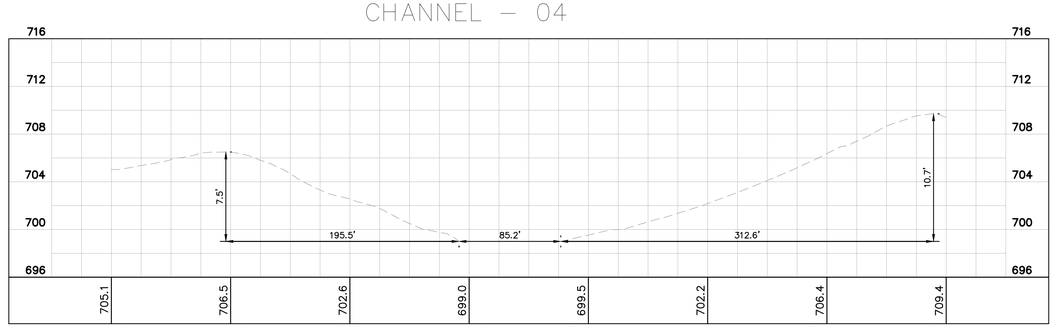
CHANNEL – 02



CHANNEL – 03



CHANNEL – 04



No.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-520-9574
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

SUGAR GROVE, LLC

EXISTING CHANNEL EXHIBIT

THE GROVE - AREA 1
(SINGLE FAMILY)
SUGAR GROVE, IL 60554

ORIGINAL ISSUE:
1/31/2025

KHA PROJECT NO.
168740009

SHEET NUMBER
EXHB

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 6 2025

Channel - 01

Trapezoidal

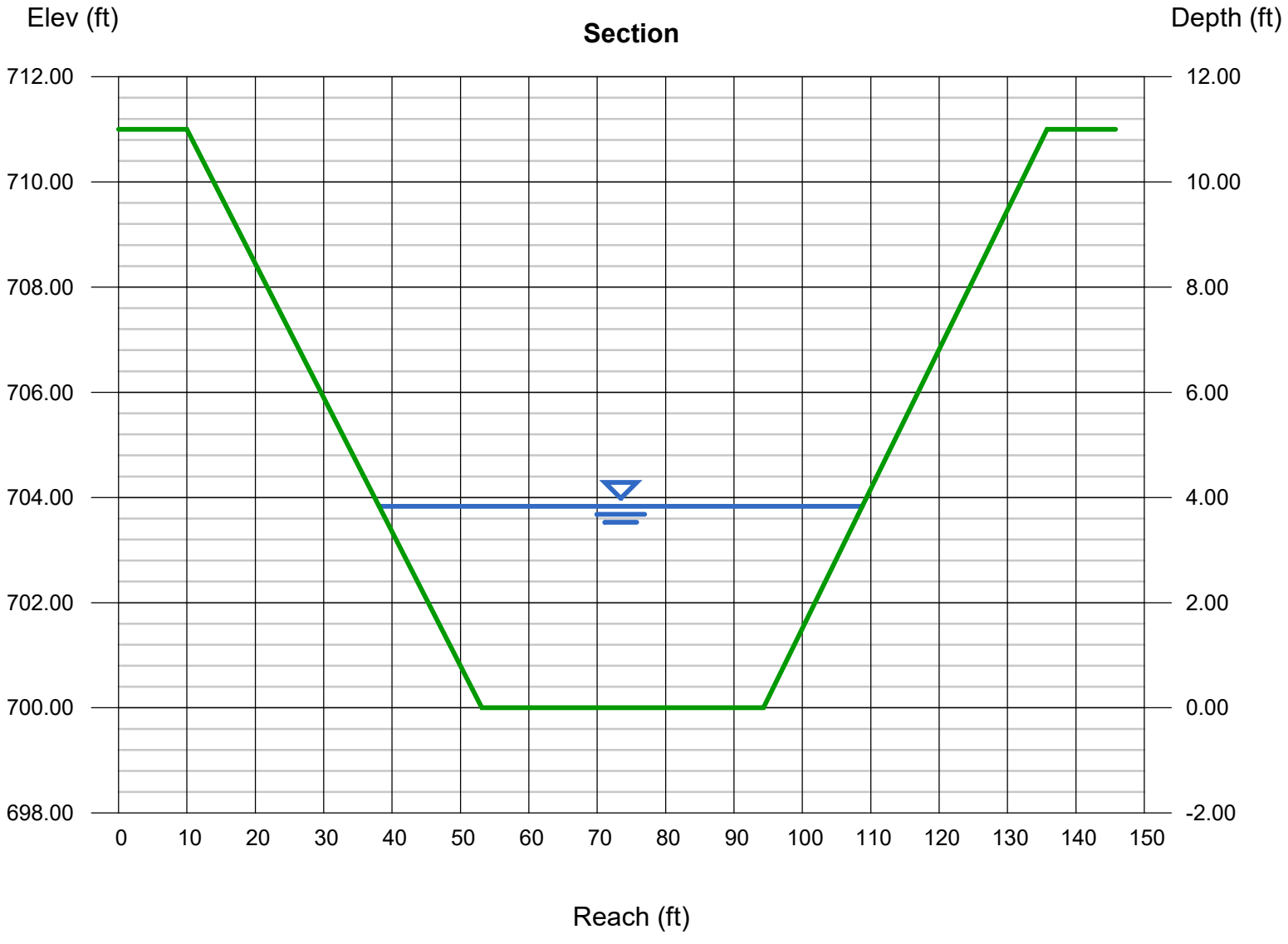
Bottom Width (ft)	= 41.20
Side Slopes (z:1)	= 3.92, 3.77
Total Depth (ft)	= 11.00
Invert Elev (ft)	= 700.00
Slope (%)	= 0.25
N-Value	= 0.300

Calculations

Compute by:	Known Q
Known Q (cfs)	= 110.09

Highlighted

Depth (ft)	= 3.83
Q (cfs)	= 110.09
Area (sqft)	= 214.20
Velocity (ft/s)	= 0.51
Wetted Perim (ft)	= 71.63
Crit Depth, Yc (ft)	= 0.60
Top Width (ft)	= 70.65
EGL (ft)	= 3.83



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 6 2025

Channel - 02

Trapezoidal

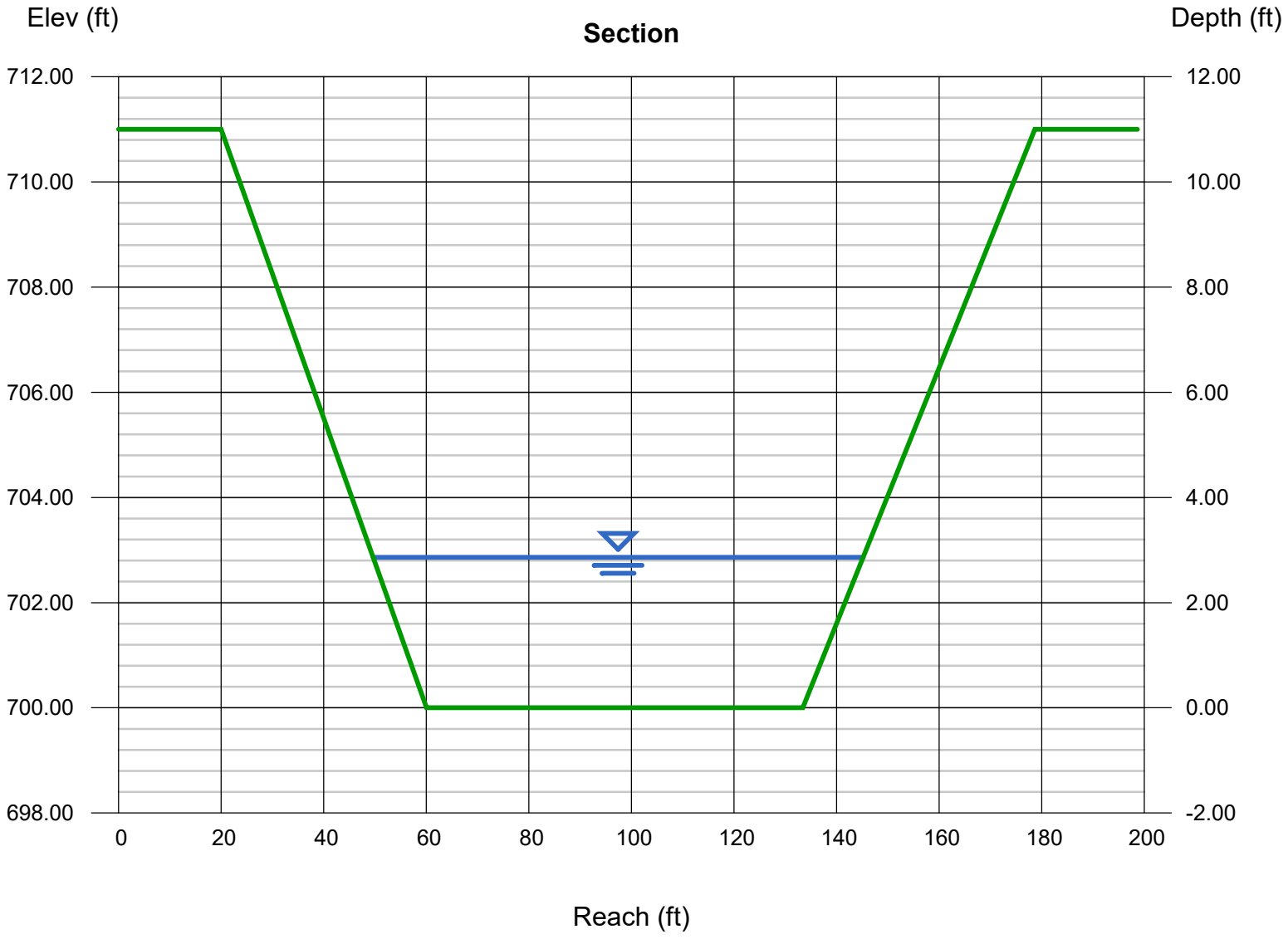
Bottom Width (ft)	= 73.40
Side Slopes (z:1)	= 3.64, 4.11
Total Depth (ft)	= 11.00
Invert Elev (ft)	= 700.00
Slope (%)	= 0.25
N-Value	= 0.300

Calculations

Compute by:	Known Q
Known Q (cfs)	= 110.09

Highlighted

Depth (ft)	= 2.86
Q (cfs)	= 110.09
Area (sqft)	= 241.62
Velocity (ft/s)	= 0.46
Wetted Perim (ft)	= 96.29
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 95.56
EGL (ft)	= 2.86



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 6 2025

Channel - 04

Triangular

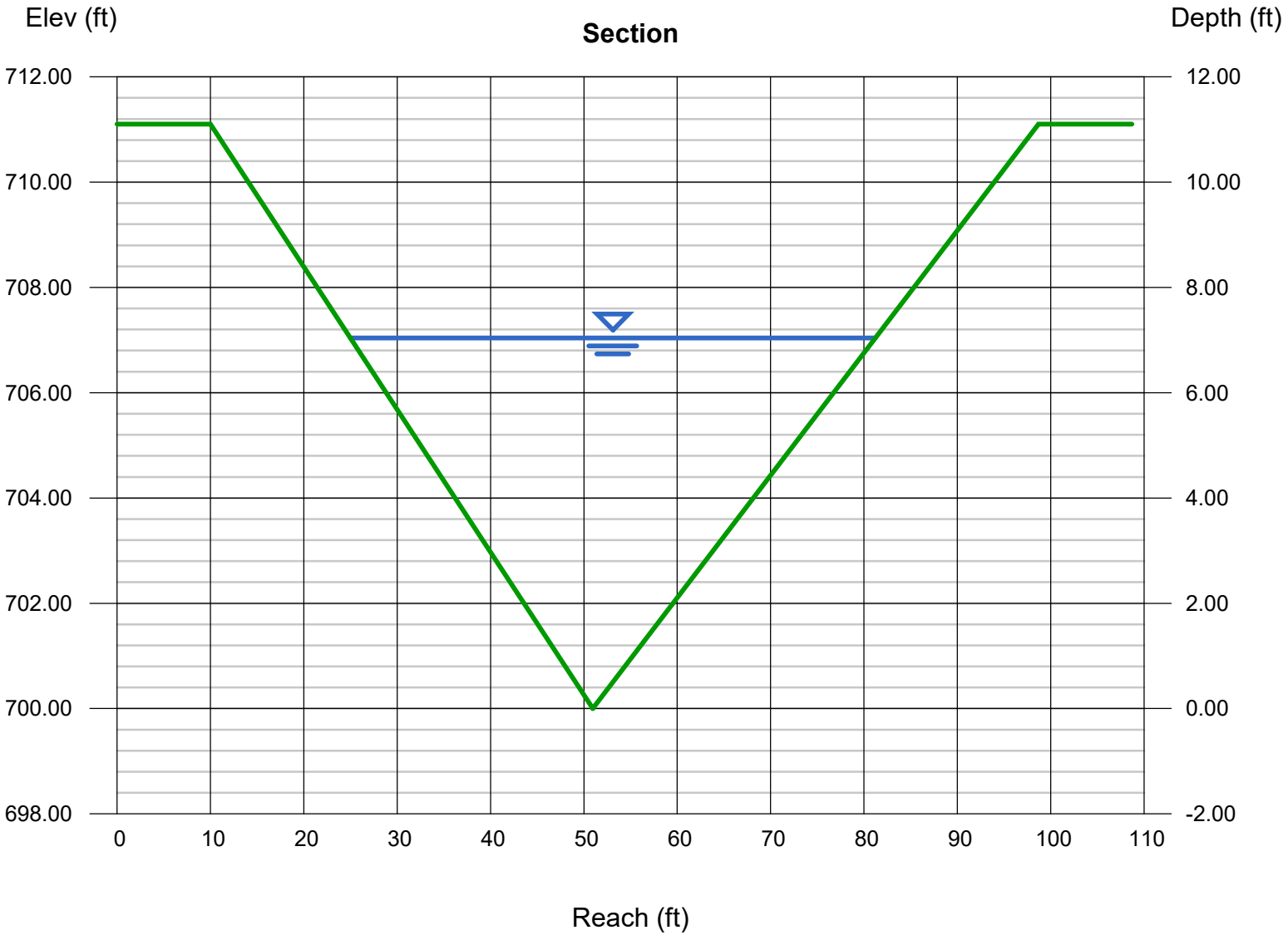
Side Slopes (z:1)	= 3.69, 4.30
Total Depth (ft)	= 11.10
Invert Elev (ft)	= 700.00
Slope (%)	= 0.25
N-Value	= 0.300

Calculations

Compute by:	Known Q
Known Q (cfs)	= 110.90

Highlighted

Depth (ft)	= 7.04
Q (cfs)	= 110.90
Area (sqft)	= 198.00
Velocity (ft/s)	= 0.56
Wetted Perim (ft)	= 58.00
Crit Depth, Yc (ft)	= 2.17
Top Width (ft)	= 56.25
EGL (ft)	= 7.04



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Feb 6 2025

Channel - 04

Trapezoidal

Bottom Width (ft)	= 85.20
Side Slopes (z:1)	= 3.83, 3.42
Total Depth (ft)	= 7.50
Invert Elev (ft)	= 700.00
Slope (%)	= 0.25
N-Value	= 0.300

Calculations

Compute by:	Known Q
Known Q (cfs)	= 110.09

Highlighted

Depth (ft)	= 2.64
Q (cfs)	= 110.09
Area (sqft)	= 250.19
Velocity (ft/s)	= 0.44
Wetted Perim (ft)	= 105.06
Crit Depth, Yc (ft)	= 0.38
Top Width (ft)	= 104.34
EGL (ft)	= 2.64

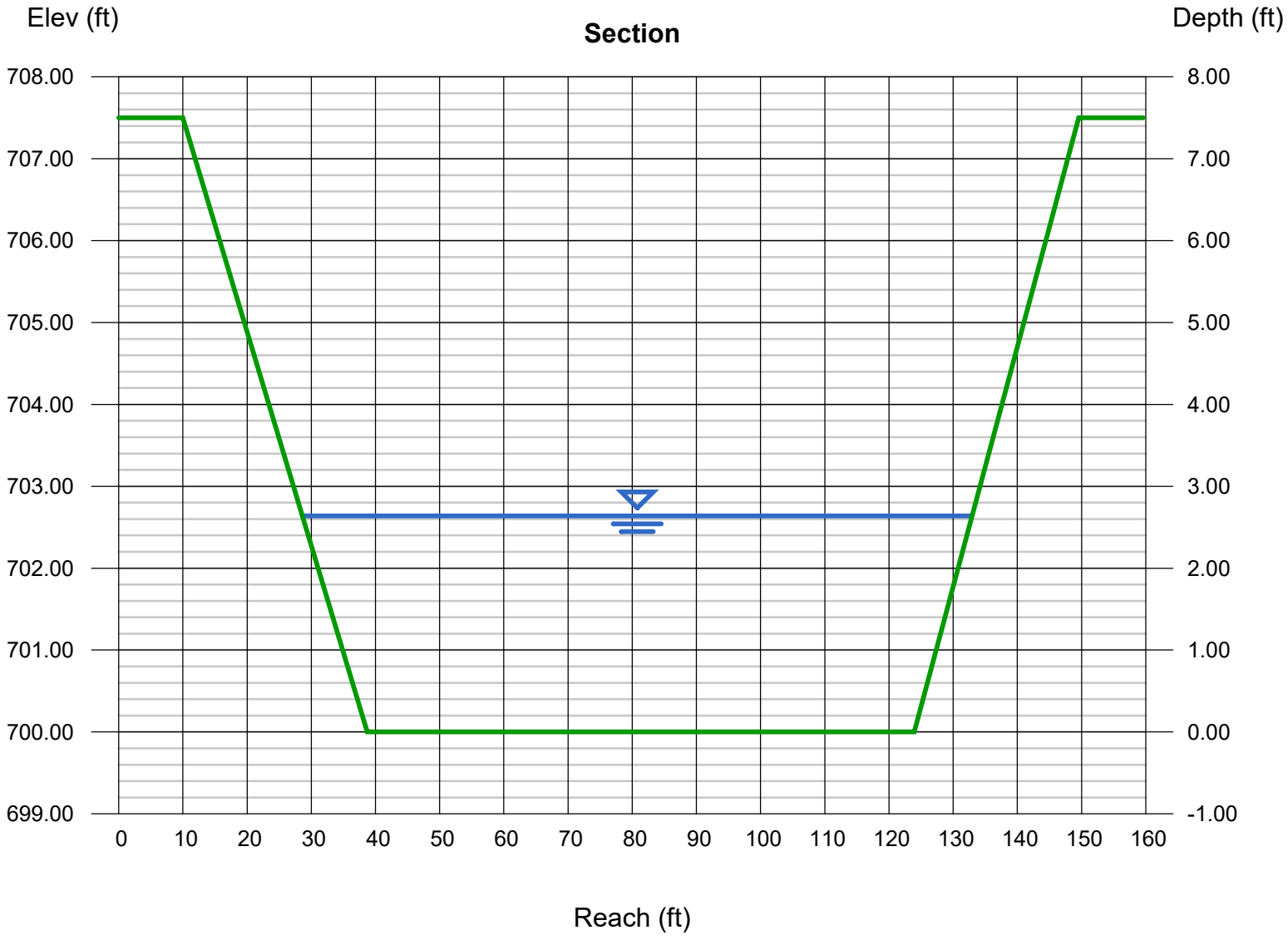


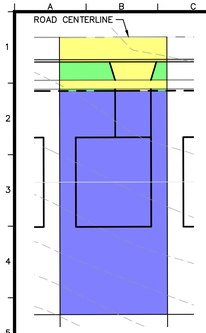
Exhibit 3 – Storm Sewer Sizing

DRAINAGE AREA MAP / STORM SEWER CATCHMENT EXHIBIT

HYDRAFLOW OUTPUTS – 5-YR STORM SEWER SIZING

PROPOSED CULVERT ANALYSIS

OVERLAND FLOW CALCULATIONS



GRAPHIC SCALE IN FEET
0 20 40 80

TYPICAL LOT C CALCULATIONS

FRONT LOT

LOT AREA	(65% IA/C=0.76)	=	3,060 SQ FT	
IMPERVIOUS AREA	(C=0.96)	=	1,390 SQ FT	
PERVIOUS AREA	(C=0.40)	=	410 SQ FT	
COMPOSITE C VALUE	= (3,060*0.76) + (1,390*0.96) + (410*.40) / 4860	=	0.78	

BACK LOT

LOT AREA	(65% IC/C=0.76)	=	4440 SQ FT	
COMPOSITE C VALUE	= (2886*0.96) + (1,554*0.40) / 4440	=	0.76	

UTILITY LEGEND

- PROPOSED STORM SEWER LINE
- PROPOSED OPEN LID STORM STRUCTURE
- PROPOSED CLOSED LID STORM STRUCTURE
- PROPOSED COMBINATION CURB INLET
- PROPOSED FLARED END SECTION
- DRAINAGE AREA DELINEATION

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

Call Before You Dig
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OUTLOT FOR DETENTION POND
130,572 SF (3.00 AC)

OUTLOT FOR PARK/
GREEN SPACE
78,758 SF (1.8 AC)

OUTLOT FOR DETENTION POND
314,007 SF (7.21 AC)

TYPICAL LOT
C CALCULATION

MERRILL ROAD
Asphalt Surface
w/Gravel Surface

WHEATFIELD AVENUE

No.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-520-9200
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

SUGAR GROVE, LLC

DRAINAGE AREA EXHIBIT

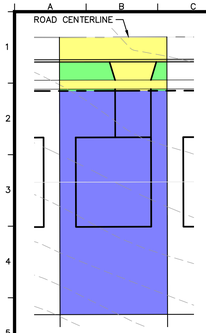
THE GROVE - AREA 1 (SINGLE FAMILY)

SUGAR GROVE, IL 60554

ORIGINAL ISSUE:
1/31/2025

KHA PROJECT NO.
168740009

SHEET NUMBER



GRAPHIC SCALE IN FEET
0 20 40 80

TYPICAL LOT C CALCULATIONS

FRONT LOT

LOT AREA (65% IA/C=0.76) = 3,060 SQ FT

IMPERVIOUS AREA (C=0.96) = 1,390 SQ FT

PERVIOUS AREA (C=0.40) = 410 SQ FT

COMPOSITE C VALUE = (3,060*0.76) + (1,390*0.96) + (410*.40) / 4860 = 0.78

BACK LOT

LOT AREA (65% IC/C=0.76) = 4440 SQ FT

COMPOSITE C VALUE = (2886*0.96) + (1,554*0.40) / 4440 = 0.76

DENNY ROAD C CALCULATIONS

DS2

IMPERVIOUS AREA (C=0.96) = 11,289 SQ FT

PERVIOUS AREA (C=0.40) = 365,069 SQ FT

COMPOSITE C VALUE = (11,289*0.96) + (365,069*.40) / 376358 = 0.42

DR3

IMPERVIOUS AREA (C=0.96) = 9,678 SQ FT

PERVIOUS AREA (C=0.40) = 240,792 SQ FT

COMPOSITE C VALUE = (9,678*0.96) + (240,792*.40) / 250470 = 0.42

DR2

IMPERVIOUS AREA (C=0.96) = 39,778 SQ FT

PERVIOUS AREA (C=0.40) = 980,397 SQ FT

COMPOSITE C VALUE = (39,778*0.96) + (980,397*.40) / 1,020,175 = 0.42

DS2 TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.5	100	0.0085	0.04		**Sheet Flow, East Sheet Flow** Cultivated: Residue>20% n= 0.170 P2= 0.50"
21.8	1,176	0.0100	0.90		**Shallow Concentrated Flow, East Shallow Concentrated** Cultivated Straight Rows Kv= 9.0 fps
60.4	1,276	Total			

DR3 TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.2	100	0.0072	0.04		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
19.7	1,113	0.0110	0.94		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
60.9	1,213	Total			

DR2 TC

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.2	100	0.0124	0.05		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
28.0	1,434	0.0090	0.85		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
61.2	1,534	Total			

UTILITY LEGEND

- PROPOSED STORM SEWER LINE
- PROPOSED OPEN LID STORM STRUCTURE
- PROPOSED CLOSED LID STORM STRUCTURE
- PROPOSED COMBINATION CURB INLET
- PROPOSED FLARED END SECTION
- DRAINAGE AREA DELINEATION

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

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TYPICAL LOT C CALCULATION

OUTLOT FOR DETENTION POND
314,007 SF (7.21 AC)

OUTLOT FOR PARK/ GREEN SPACE
78,758 SF (1.8 AC)

DS2
A = 8.64 AC
C = 0.42

DR3
A = 5.75 AC
C = 0.42

DR2
A = 23.42 AC
C = 0.42

SHALLOW CONCENTRATED FLOW

DENNY RD IMPERVIOUS AREA

SHEET FLOW

WHEATFIELD AVENUE

DENNY ROAD

714.54
715.70
715.94
727.26
728.11
727.00
727.72
729.97
731.21

No.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-520-9200
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

SUGAR GROVE, LLC

DRAINAGE AREA EXHIBIT

THE GROVE - AREA 1 (SINGLE FAMILY)

SUGAR GROVE, IL 60554

ORIGINAL ISSUE: 1/31/2025

KHA PROJECT NO. 168740009

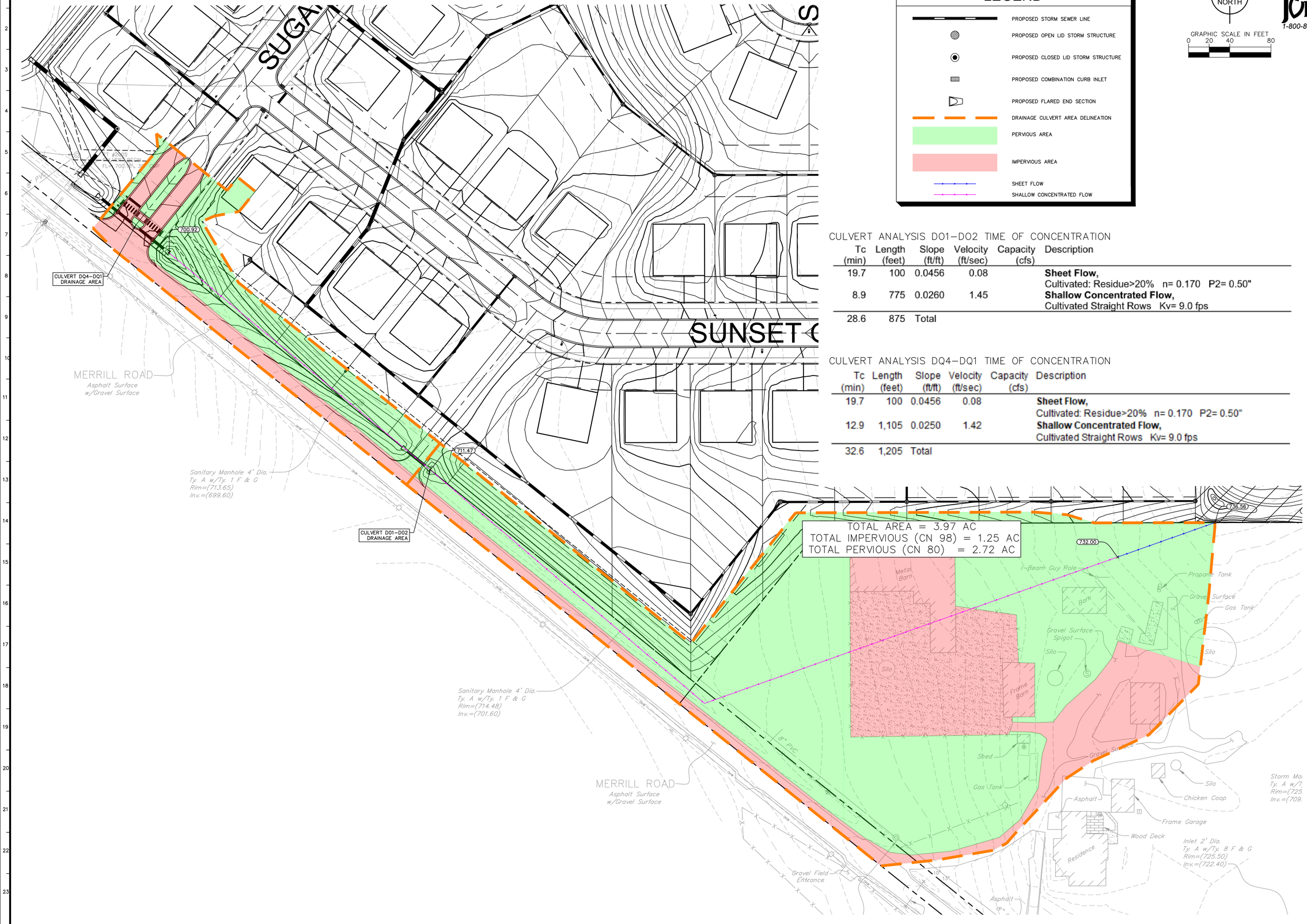
SHEET NUMBER

Proposed 5-Year Hydraflow Report - The Grove, Sugar Grove

Line	InletID	DnStrmLine No.	LineLength	DrainageArea	TotalArea	RunoffCoeff	IncrCxA	TotalCxA	InletTime	Tc	iSys	TotalRunoff	KnownQ	FlowRate	CapacityFull	VelAve	LineSize	LineSlope	InvertDn	InvertUp	HGLDn	HGLUp	Grnd/RimElev Dn	Grnd/RimElev Up	LineID
			(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	DL2	Outfall	117.789	0	9.97	0	0	7.69	0	78.7	1.65	12.69	0	12.69	44.53	4.39	42	0.2	710	710.23	711.08	711.57	713.96	719.68	DL2 TO DL1
2	DL24	1	30.353	0	9.97	0	0	7.69	0	78.6	1.65	12.71	0	12.71	44.55	3.68	42	0.2	710.23	710.29	711.6	711.64	719.68	720.42	DL24 TO DL2
3	DL3	2	21.52	0	9.97	0	0	7.69	0	78.5	1.65	12.73	0	12.73	44.51	3.63	42	0.2	710.29	710.33	711.67	711.7	720.42	720.76	DL3 TO DL24
4	DM1	3	132.27	0	0.52	0	0	0.4	0	71.3	1.78	0.71	0	0.71	36.11	1.64	30	0.78	711.33	712.36	711.9	712.63 j	720.76	721.41	DM1 TO DL3
5	DM2	4	163.086	0	0.52	0	0	0.4	0	62.6	1.96	0.78	0	0.78	18.34	1.85	30	0.2	712.36	712.69	712.71	713.04	721.41	721.99	DM2 TO DM1
6	DM3	5	153.783	0	0.52	0	0	0.4	0	54.6	2.16	0.86	0	0.86	18.34	1.86	30	0.2	712.69	712.99	713.08	713.35	721.99	721.95	DM3 TO DM2
7	DM4	6	125.823	0	0.52	0	0	0.4	0	48.2	2.36	0.94	0	0.94	18.34	1.92	30	0.2	712.99	713.24	713.4	713.62	721.95	721.91	DM4 TO DM3
8	DM5	7	162.85	0	0.52	0	0	0.4	0	40	2.66	1.06	0	1.06	18.34	2.04	30	0.2	713.24	713.57	713.65	713.98	721.91	719.74	DM5 TO DM4
9	DM6	8	140	0	0.52	0	0	0.4	0	33.2	3	1.19	0	1.19	18.34	2.11	30	0.2	713.57	713.85	714	714.28	719.74	718.93	DM6 TO DM5
10	DM7	9	140	0	0.52	0	0	0.4	0	28.9	3.25	1.3	0	1.3	10.12	2.21	24	0.2	714.35	714.63	714.83	715.11	718.93	719.72	DM7 TO DM6
11	DM8	10	140	0	0.52	0	0	0.4	0	24.7	3.55	1.41	0	1.41	10.11	2.26	24	0.2	714.63	714.91	715.14	715.42	719.72	719.72	DM8 TO DM7
12	DM9	11	140	0	0.52	0	0	0.4	0	22.3	3.74	1.49	0	1.49	7.43	3.27	18	0.5	715.41	716.11	715.87	716.57	719.72	721.44	DM9 TO DM8
13	DM10	12	140	0	0.52	0	0	0.4	0	20.1	3.94	1.57	0	1.57	7.43	3.32	18	0.5	716.11	716.81	716.58	717.28	721.44	721.44	DM10 TO DM9
14	DM11	13	140	0	0.52	0	0	0.4	0	18.5	4.09	1.63	0	1.63	5.78	3.77	15	0.8	717.06	718.18	717.52	718.69	721.44	722.46	DM11 TO DM10
15	DM12	14	140	0	0.52	0	0	0.4	0	17.6	4.2	1.67	0	1.67	3.86	4.26	12	1.18	718.43	720.08	718.89	720.63	722.46	723.46	DM12 TO DM11
16	DM13	15	234.549	0	0.52	0	0	0.4	0	16	4.37	1.74	0	1.74	3.86	3.89	12	1.18	720.08	722.83	720.63	723.4	723.46	726.62	DM13 TO DM12
17	DM14	16	76.318	0.39	0.52	0.76	0.3	0.4	10	15.5	4.43	1.77	0	1.77	2.32	3.25	12	0.42	722.83	723.16	723.49	723.81	726.62	727.16	DM14 TO DM13
18	DM15	17	226.46	0.14	0.14	0.76	0.1	0.1	10	10	5.22	0.54	0	0.54	4.68	1.81	12	1.73	723.16	727.07	723.83	727.38 j	727.16	731.07	DM15 TO DM14
19	DD2	Outfall	41.84	0	8.4	0	0	6.48	0	18.1	4.14	26.79	0	26.79	16.91	6.58	30	0.17	700.34	700.41	702.1	702.58	703.22	709.62	DD2 TO DD1
20	DD3	19	302.036	0.21	6.51	0.76	0.16	5	10	17	4.26	21.32	0	21.32	41.86	5.46	30	1.04	700.41	703.56	703.12	705.12 j	709.62	709.75	DD3 TO DD2
21	DE1	20	59.346	0	3.59	0	0	2.79	0	16.6	4.31	12	0	12	18.34	3.74	30	0.2	703.56	703.68	705.12	705.22	709.75	710.94	DE1 TO DD3
22	DE2	21	91.88	0	3.59	0	0	2.79	0	16	4.38	12.2	0	12.2	18.34	3.7	30	0.2	703.68	703.86	705.29	705.43	710.94	713.77	DE2 TO DE1
23	DE3	22	96.106	0	3.59	0	0	2.79	0	15.3	4.45	12.41	0	12.41	18.34	3.7	30	0.2	703.86	704.05	705.5	705.64	713.77	713.18	DE3 TO DE2
24	DE4	23	140	0	3.41	0	0	2.65	0	14.7	4.53	12	0	12	34.78	5.67	24	2.36	704.55	707.86	705.86	709.11 j	713.18	713.18	DE4 TO DE3
25	DE5	24	75.572	0	1.89	0	0	1.46	0	14.1	4.6	6.73	0	6.73	14.38	3.71	24	0.4	707.86	708.17	709.11	709.2	713.18	715.81	DE5 TO DE4
26	DE6	25	263.081	0	1.89	0	0	1.46	0	12.2	4.87	7.13	0	7.13	14.38	4.5	24	0.4	708.17	709.23	709.24	710.18	715.81	713.99	DE6 TO DE5
27	DE7	26	139.326	0	1.89	0	0	1.46	0	11.6	4.96	7.25	0	7.25	18.79	6.46	18	3.2	709.73	714.19	710.55	715.23	713.99	719.74	DE7 TO DE6
28	DE8	27	122.482	0.3	1.89	0.76	0.23	1.46	10	11.3	5.01	7.33	0	7.33	11.55	7.72	15	3.2	714.44	718.36	715.23	719.44	719.74	723.25	DE8 TO DE7
29	DE9	28	140	0.36	0.36	0.76	0.27	0.27	10	10	5.22	1.42	0	1.42	6.41	2.81	12	3.24	718.61	723.14	719.44	723.65 j	723.25	727.6	DE9 TO DE8
30	DK2	Outfall	42.8	0	6.86	0	0	5.3	0	14.3	4.58	24.29	0	24.29	48.03	6.93	30	1.37	710	710.59	711.68	712.26 j	712.88	719.78	DK2 TO DK1
31	DK3	30	137.5	0.54	6.86	0.78	0.42	5.3	10	13.8	4.64	24.62	0	24.62	48.03	7	30	1.37	710.59	712.47	712.26	714.16	719.78	718.59	DK3 TO DK2
32	DK4	31	27	0.45	6.32	0.78	0.35	4.88	10	13.7	4.66	22.73	0	22.73	18.34	4.63	30	0.2	712.47	712.53	714.97	715.03	718.59	718.59	DK4 TO DK3
33	DK5	32	84.013	0.38	5.88	0.76	0.29	4.53	10	13.4	4.7	21.32	0	21.32	18.34	4.34	30	0.2	712.53	712.7	715.08	715.3	718.59	718.2	DK5 TO DK4
34	DK6	33	120	0.54	5.5	0.76	0.41	4.25	10	12.9	4.77	20.26	0	20.26	18.34	4.13	30	0.2	712.7	712.94	715.35	715.64	718.2	718.2	DK6 TO DK5
35	DK7	34	120	0.27	3.35	0.76	0.21	2.58	10	12.4	4.85	12.51	0	12.51	33.55	4.96	24	2.2	713.44	716.08	715.91	717.35 j	718.2	721.46	DK7 TO DK6
36	DK8	35	120	0.34	3.08	0.76	0.26	2.37	10	11.8	4.93	11.7	0	11.7	20.23	5.67	24	0.8	716.08	717.04	717.35	718.26 j	721.46	721.46	DK8 TO DK7
37	DK9	36	60	0.27	2.74	0.76	0.21	2.12	10	11.5	4.97	10.52	0	10.52	15.67	5.3	24	0.48	717.04	717.32	718.26	718.51	721.46	723.03	DK9 TO DK8
38	DK10	37	120	0.41	2.47	0.76	0.31	1.91	10	11.2	5.03	9.6	0	9.6	7.28	5.44	18	0.48	717.82	718.4	719.32	720.33	723.03	722.95	DK10 TO DK9
39	DK14	38	145.5	0.47	0.94	0.78	0.37	0.73	10	10.3	5.17	3.78	0	3.78	10.72	3.87	15	2.75	718.65	722.66	720.79	723.44 j	722.95	726.79	DK14 TO DK10
40	DK15	39	27	0.47	0.47	0.78	0.37	0.37	10	10	5.22	1.91	0	1.91	4.57	2.6	15	0.5	722.66	722.79	723.44	723.46	726.79	726.79	DK15 TO DK14
41	DA10	Outfall	45.844	0	9.19	0	0	7.09	0	17	4.26	30.21	0	30.21	0	5.97	36	-0.2	704.73	704.64	706.51	707.02	715.3	718.63	DA10 TO DA15
42	DA9	41	64.23	0.31	6.33	0.76	0.23	4.89	10	16.6	4.3	21.04	0	21.04	0	3.03	36	-0.4	704.64	704.39	707.41	707.48	718.63	718.83	DA10 TO DA9
43	DA8	42	120	0.22	6.03	0.76	0.16	4.66	10	16	4.38	20.39	0	20.39	0	2.88	36	-0.4	704.39	703.91	707.5	707.62	718.83	721.14	DA9 TO DA8
44	DA7	43	120	0.2	5.81	0.76	0.15	4.49	10	15.3	4.46	20.03	0	20.03	0	2.83	36	-0.39	703.91	703.44	707.63	707.74	721.14	724.63	DA8 TO DA7
45	DC1	44	129	0.55	5.61	0.78	0.43	4.34	10	14.6	4.55	19.75	0	19.75	29.83	4.51	36	0.2	714.31	714.57	716.09	716.35	724.63	724.26	DC1 TO DA7
46	DC2	45	27	0.68	5.06	0.78	0.53	3.91	10	14.4	4.57	17.89	0	17.89	29.83	3.98	36	0.2	714.57	714.62	716.4	716.44	724.26	724.26	DC2 TO DC1
47	DC3	46	44.002	0	4.38	0	0	3.38	0	14.1	4.61	15.6	0	15.6	29.83	3.12	36	0.2	714.62	714.71	716.65	716.68	724.26	723.74	DC3 TO DC2
48	DC4	47	66.998	0.43	2.97	0.76	0.33	2.28	10	13.6	4.68	10.67	0	10.67	25.88	3.53	30	0.4	715.21	715.48	716.82	716.85	723.74	720.9	DC4 TO DC3
49	DC5	48	60	0.37	2.53	0.76	0.28	1.95	10	13.3	4.72	9.21	0	9.21	13.53	4.63	24	0.36	715.98	716.19	717.19	717.4	720.9	720.9	DC5 TO DC4
50	DC6	49	119.989	0.35	2.16	0.76	0.27	1.67	10	12.5	4.83	8.06	0	8.06	13.53	4.18	24	0.36	716.19	716.62	717.45	717.73	720.9	721.3	DC6 TO DC5
51	DC9	50	145.5	0.64	1.18	0.78	0.5	0.92	10	10.2	5.19	4.78	0	4.78	18.44	3.96	18	3.08	716.87	721.36	718.05	722.20 j	721.3	725.74	DC9 TO DC6
52	DC10	51	27	0.55	0.55	0.78	0.43	0.43	10	10	5.22	2.22	0	2.22	2.52	3.62	12	0.5	721.61	721.74	722.34	722.47	725.74	725.74	DC10 TO DC9
53	DK11	38	120	0.39	1.12	0.76	0.3	0.87	10	10.6	5.12	4.44	0	4.44	4.47	3.62	15	0.48	718.65	719.23	720.79	721.36	722.95	722.95	DK11 TO DK10
54	DK12	53	84.095	0.38	0.73	0.78	0.3	0.57	10	10.3	5.18	2.94	0	2.94	5.63	4.25	12	2.5	719.48	721.58	721.39	722.31 j	722.95	725.68	DK12 TO DK11
55	DK13	54	27	0.35	0.35	0.78	0.27	0.27	10	10	5.22	1.41	0	1.41	2.25	2.4	12	0.4	721.58	721.68	722.31	722.35	725.68	725.68	DK13 TO DK12
56	DL4	3	71.575	0.7	9.44	0.78	0.54	7.3	10	15.1	4.48	32.66	0	32.66	44.54	5.06	42	0.2	710.33	710.47	712.56	712.7	720.76	720.39	DL4 TO DL3
57	DL5	56	21.5	0	8.75	0	0	6.75	0	15	4.49	30.33	0	30.33	44.53	3.94	42	0.2	710.47	710.51	713.1	713.11	720.39	719.2	DL5 TO DL4
58	DL6	57	27	0.22	8.75	0.78	0.17	6.75	10	14.9	4.51	30.45	0	30.45	44.54	3.94	42	0.2	710.51	710.57	713.15	713.18	719.2	719.2	DL6 TO DL5
59	DL7	58	87.747	0.26	8.53	0.76	0.2	6.58	10	14.4	4.57	30.1	0	30.1	44.53	3.93	42	0.2	710.57	710.74	713.21	713.29	719.2	716.64	DL7 TO DL6
60	DL8	59	55.486	0.42	8.27	0.76	0.32	6.39	10	14.1	4.61	29.46	0	29.46	44.53	3.91	42	0.2	710.74	710.85	713.33	713.38	716.64	717.67	DL8 TO DL7
61	DL9	60	124.514	0.3	5.96	0.76	0.23	4.59	10	13.6	4.68	21.5	0	21.5	53.02	6.19	30	1.67	711.85	713.93	713.62	715.50 j	717.67	719.07	DL9 TO DL8
62	DL10	61	85.486	0.32	5.67	0.76	0.25	4.37	10	13.2	4.73	20.65	0	20.65	18.34	4.21	30	0.2	713.93	714.1	716.43	716.6	719.07	719.76	DL10 TO DL9
63	DL11	62	94.514	0.41	5.34	0.76	0.31	4.12	10	13	4.76	19.64	0	19.64	10.11	6.25	24	0.2	714.6	714.79	716.64	717.35	719.76	719.18	DL11 TO DL10
64	DL12	63	115.486	0.29	4.94	0.76	0.22	3.81	10	12.6	4.81	18.34	0	18.34	29.49	6.45	24	1.7	714.79	716.75	717.44	718.29 j	719.18	721.19	DL12 TO DL11
65	DL13	64	124.514	0.41	3.09	0.76	0.31	2.38	10	12.1	4.89	11.64	0	11.64	14.3	4.73	24	0.4	716.75	717.25	718.29	718.64	721.19	721.56	DL13 TO DL12
66	DL14	65	85.486	0.32	2.68	0.76	0.25	2.07	10	11.6	4.96	10.26	0	10.26	35.08	4.86	24	2.41	717.25	719.31	718.7	720.45 j	721.56	724.73	DL14 TO DL13
67	DL15	66	94.514	0.39	2.36	0.76	0.3	1.82	10	11.3	5.01	9.12	0	9.12	5.75	5.16	18	0.3	719.81	720.09	721.31	722.02	724.73	724.96	DL15 TO DL14
68	DL16	67	120	0.45	1.97	0.76	0.34	1.53	10	10.8	5.08	7.75	0	7.75	5.75	4.39	18	0.3	720.09	720.45	722.08	722.74	724.96	725.07	DL16 TO DL15
69	DL18	68	145.5	0.62	1.52	0.78	0.48	1.18	10	10.2	5.2	6.15	0	6.15	6.64	3.48	18	0.4	720.45	721.03	723.04	723.53	725.07	725.39	DL18 TO DL16
70	DL19	69	27	0.9	0.9	0.78	0.7	0.7	10	10	5.22	3.65	0	3.65	4.08	2.97	15	0.4	721.28	721.39	723.56	723.65	725.39	725.39	DL19 TO DL18
71	DB1	41	38.975	0.16	2.85	0.76	0.12	2.2	10	16.5	4.32	9.48	0	9.48	7.47	3.02	24	0.11	704.64	704.68	707.41	707.48	718.63	720.94	DB1 TO DA10
72	DB2	71	137.501	0.37	2.69	0.78	0.29	2.08	10	15.7	4.4	9.15	0	9.15	26.76	6.5	24	1.4	714.53	716.45	715.33	717.53	720.94	723.17	DB2 TO DB1
73	DB3	72	27	0.38	2.32	0.78	0.3	1.79	10	15.6	4.42	7.89	0	7.89	12.43	6.6	18	1.4	716.95	717.33	717.82	718.42	723.17	723.17	DB3 TO DB2
74	DB4	73	99.489	0.21	1.94	0.76	0.16	1.49	10	15.2	4.47	6.65	0	6.65	12.43	5.09	18	1.4	717.33	718.72	718.42	719.72 j	723.17	725.18	DB4 TO DB3
75	DB5	74	84	0.31	1.45	0.76	0.24	1.11	10	14.8	4.52	5.03	0	5.03	12.43	5.72	18	1.4	719.22	720.4	719.89	721.26	725.18	725.17	DB5 TO DB4
76	DB6	75	99.512	0.29	1.14	0.78	0.23	0.88	10	14.1	4.61	4.04	0	4.04	4.7	2.99	18	0.2	720.4	720.6	721.47	721.67	725.17	726.77	DB6 TO DB5
77	DB7	76	27	0.39	0.85	0.78	0.31	0.65	10	13.9	4.64	3.02	0	3.02	4.69	2.22	18	0.2	720.6	720.65	721.69	721.72	726.77	726.77	DB7 TO DB6

78	DB8	77	137.5	0.07	0.45	0.76	0.06	0.35	10	11.6	4.97	1.71	0	1.71	4.7	1.45	18	0.2	720.65	720.93	721.73	721.78	726.77	726.78	DB8 TO DB7
79	DB10	78	75	0.2	0.2	0.76	0.16	0.16	10	10	5.22	0.81	0	0.81	1.95	1.77	12	0.3	721.18	721.4	721.83	721.91	726.78	725.4	DB10 TO DB8
80	DB9	78	85	0.18	0.18	0.76	0.13	0.13	10	10	5.22	0.7	0	0.7	2.76	2.09	12	0.6	721.18	721.69	721.83	722.04 j	726.78	725.7	DB9 TO DB8
81	DB11	74	45.735	0.15	0.29	0.76	0.11	0.22	10	11.5	4.99	1.08	0	1.08	2.52	3.09	12	0.5	719.47	719.7	719.93	720.16	725.18	723.54	DB11 TO DB4
82	DB12	81	60	0.14	0.14	0.76	0.1	0.1	10	10	5.22	0.54	0	0.54	2.52	1.68	12	0.5	719.7	720	720.29	720.35	723.54	724.05	DB12 TO DB11
83	DH10	Outfall	42.8	0	10.67	0	0	8.27	0	15.9	4.39	36.29	0	36.29	74.41	6.94	42	0.55	710	710.23	711.87	712.1	713.96	719.71	DH10 TO DH1
84	DH2	83	76.075	0	10.67	0	0	8.27	0	15.5	4.43	36.62	0	36.62	74.41	6.99	42	0.55	710.23	710.65	712.1	712.53	719.71	719.76	DH2 TO DH10
85	DH3	84	162.657	0.96	10.67	0.78	0.75	8.27	10	15	4.49	37.16	0	37.16	49.33	7.58	36	0.55	711.15	712.04	713.1	714.02	719.76	718.89	DH3 TO DH2
86	DH4	85	27	0	9.71	0	0	7.52	0	14.9	4.51	33.87	0	33.87	29.83	4.79	36	0.2	712.04	712.09	715.04	715.09	718.89	718.79	DH4 TO DH3
87	DH5	86	134.607	0.67	9.71	0.78	0.52	7.52	10	14.4	4.56	34.32	0	34.32	29.82	4.86	36	0.2	712.09	712.36	715.35	715.71	718.79	720.56	DH5 TO DH4
88	DH6	87	113.003	0.51	9.05	0.76	0.39	7	10	14	4.62	32.32	0	32.32	29.83	4.57	36	0.2	712.36	712.59	716.08	716.34	720.56	718.88	DH6 TO DH5
89	DJ1	88	124	0.54	7.38	0.76	0.41	5.71	10	13.5	4.69	26.8	0	26.8	29.83	3.79	36	0.2	712.59	712.84	716.67	716.87	718.88	718.27	DJ1 TO DH6
90	DJ2	89	120	0.41	5.48	0.76	0.31	4.24	10	12.8	4.79	20.29	0	20.29	29.83	2.87	36	0.2	712.84	713.08	717.09	717.2	718.27	719.17	DJ2 TO DJ1
91	DJ3	90	120	0.14	3.97	0.76	0.1	3.07	10	12.1	4.88	14.99	0	14.99	18.34	3.05	30	0.2	713.58	713.82	717.33	717.49	719.17	720.81	DJ3 TO DJ2
92	DJ4	91	120	0.48	3.84	0.76	0.36	2.97	10	11.5	4.98	14.78	0	14.78	18.34	3.01	30	0.2	713.82	714.06	717.51	717.67	720.81	719.46	DJ4 TO DJ3
93	DJ5	92	60	0.41	1.9	0.76	0.31	1.46	10	11	5.06	7.4	0	7.4	12.86	4.19	18	1.5	715.06	715.96	717.81	718.11	719.46	720.5	DJ5 TO DJ4
94	DJ7	93	145.5	0.56	1.08	0.78	0.44	0.84	10	10.2	5.19	4.38	0	4.38	5	5.57	12	1.97	716.46	719.33	718.38	720.58	720.5	723.86	DJ7 TO DJ5
95	DJ8	94	27	0.52	0.52	0.78	0.4	0.4	10	10	5.22	2.1	0	2.1	5	2.8	12	1.97	719.33	719.86	720.65	720.72	723.86	723.86	DJ8 TO DJ7
96	DE11	28	150.5	0.71	1.23	0.78	0.56	0.96	10	10.2	5.19	5	0	5	4.08	4.07	15	0.4	718.36	718.96	719.61	720.51	723.25	723.32	DE11 TO DE8
97	DE12	96	27	0.52	0.52	0.78	0.41	0.41	10	10	5.22	2.12	0	2.12	2.25	2.7	12	0.4	719.21	719.32	720.55	720.64	723.32	723.32	DE12 TO DE11
98	DL20	64	145.5	0.78	1.56	0.78	0.61	1.22	10	10.2	5.19	6.32	0	6.32	10.31	5.02	18	0.96	717.25	718.66	718.29	719.63 j	721.19	723.14	DL20 TO DL12
99	DL21	98	27	0.78	0.78	0.78	0.61	0.61	10	10	5.22	3.18	0	3.18	6.06	4.35	15	0.88	718.91	719.14	719.63	719.86 j	723.14	723.14	DL21 TO DL20
100	DJ11	90	145.5	0.55	1.1	0.78	0.43	0.86	10	10.2	5.19	4.46	0	4.46	9.01	4.31	15	1.95	714.83	717.66	717.33	718.51 j	719.17	722.49	DJ11 TO DJ2
101	DJ12	100	27	0.55	0.55	0.78	0.43	0.43	10	10	5.22	2.24	0	2.24	4.97	4.37	12	1.95	717.91	718.43	718.51	719.07	722.49	722.49	DJ12 TO DJ11
102	DC7	50	120	0.63	0.63	0.76	0.48	0.48	10	10	5.22	2.5	0	2.5	13.53	1.75	24	0.36	716.87	717.3	718.05	718.09	721.3	721.3	DC7 TO DC6
103	DC11	47	172.09	0.75	1.41	0.78	0.58	1.1	10	10.1	5.2	5.73	0	5.73	14.3	3.86	24	0.4	715.71	716.4	716.82	717.25	723.74	721.01	DC11 TO DC3
104	DC12	103	27	0.67	0.67	0.78	0.52	0.52	10	10	5.22	2.72	0	2.72	2.25	3.47	12	0.4	716.9	717.01	717.9	718.01	721.01	721.01	DC12 TO DC11
105	DJ6	93	120	0.41	0.41	0.76	0.31	0.31	10	10	5.22	1.62	0	1.62	4.36	2.9	12	1.5	716.46	718.26	718.38	718.80 j	720.5	722.29	DJ6 TO DJ5
106	DJ9	92	137.5	0.73	1.46	0.78	0.57	1.14	10	10.3	5.18	5.91	0	5.91	19.38	1.88	24	0.73	714.56	715.57	717.81	717.9	719.46	720.27	DJ9 TO DJ4
107	DJ10	106	27	0.73	0.73	0.78	0.57	0.57	10	10	5.22	2.98	0	2.98	9	1.69	18	0.73	716.07	716.27	717.91	717.93	720.27	720.27	DJ10 TO DJ9
108	DL22	60	145.5	0.74	1.88	0.78	0.58	1.47	10	10.1	5.21	7.65	0	7.65	8.67	7.34	15	1.8	713.1	715.72	714.01	716.82	717.67	720.4	DL22 TO DL8
109	DL23	108	27	1.14	1.14	0.78	0.89	0.89	10	10	5.22	4.65	0	4.65	4.48	6.37	12	1.58	715.97	716.4	716.83	717.29	720.4	720.4	DL23 TO DL22
110	DK16	34	145.5	0.8	1.61	0.78	0.63	1.25	10	10.1	5.2	6.51	0	6.51	11.28	4.32	18	1.15	713.7	715.37	715.91	716.42	718.2	720.19	DK16 TO DK6
111	DK17	110	27	0.8	0.8	0.78	0.63	0.63	10	10	5.22	3.27	0	3.27	3.83	5.24	12	1.15	715.87	716.19	716.59	716.96	720.19	720.19	DK17 TO DK16
112	DH7	88	52.698	0	1.15	0	0	0.9	0	10.6	5.13	4.59	0	4.59	18.45	1.46	24	0.67	713.59	713.94	716.67	716.69	718.88	720.1	DH7 TO DH6
113	DH8	112	92.888	0.56	1.15	0.78	0.44	0.9	10	10.1	5.2	4.65	0	4.65	5.27	3.79	15	0.67	714.69	715.31	716.69	717.18	720.1	719.74	DH8 TO DH7
114	DH9	113	27	0.58	0.58	0.78	0.46	0.46	10	10	5.22	2.38	0	2.38	2.9	3.03	12	0.67	715.56	715.74	717.21	717.33	719.74	719.74	DH9 TO DH8
115	DJ13	89	137.5	0.68	1.36	0.78	0.53	1.06	10	10.3	5.17	5.48	0	5.48	7.56	3.1	18	0.52	714.34	715.05	717.09	717.47	718.27	719.19	DJ13 TO DJ1
116	DJ14	115	27	0.68	0.68	0.78	0.53	0.53	10	10	5.22	2.77	0	2.77	7.56	1.57	18	0.52	715.05	715.19	717.49	717.51	719.19	719.19	DJ14 TO DJ13
117	DN2	Outfall	69.3	0.35	1.49	0.78	0.27	1.16	10	10.1	5.2	6.04	0	6.04	12.9	5.79	15	3.99	710	712.76	710.99	713.76	711.52	717.84	DN2 TO DN1
118	DN3	117	27	1.14	1.14	0.78	0.89	0.89	10	10	5.22	4.64	0	4.64	12.92	4.75	15	4	712.76	713.84	713.76	714.71 j	717.84	717.84	DN3 TO DN2
119	DD4	20	70.061	0.17	2.7	0.76	0.13	2.05	10	12.4	4.84	9.95	0	9.95	30.85	5.64	24	1.86	704.06	705.36	705.12	706.49	709.75	712.11	DD4 TO DD3
120	DD5	119	73.71	0.71	2.53	0.76	0.54	1.92	10	12.2	4.88	9.39	0	9.39	14.32	7.46	18	1.86	705.86	707.23	706.75	708.41	712.11	711.73	DD5 TO DD4
121	DD6	120	117.491	0.67	1.4	0.76	0.51	1.06	10	11.7	4.94	5.25	0	5.25	5.7	5.28	15	0.78	707.48	708.4	708.43	709.34	711.73	712.65	DD6 TO DD5
122	DD7	121	112.551	0.34	0.72	0.76	0.26	0.55	10	11.2	5.03	2.76	0	2.76	6.66	4.24	12	3.5	708.65	712.59	709.5	713.30 j	712.65	720.63	DD7 TO DD6
123	DD8	122	140	0.39	0.39	0.76	0.29	0.29	10	10	5.22	1.53	0	1.53	6.66	3.12	12	3.5	712.59	717.49	713.3	718.02 j	720.63	721.49	DD8 TO DD7
124	DA2	Outfall	41.85	0	1.53	0	0	1.19	0	14.7	4.53	5.38	0	7.05	5.89	4.9	18	0.31	700.34	700.47	701.37	701.77	702.13	709.99	DA2 TO DA1
125	DA3	124	180.004	0.34	1.53	0.76	0.26	1.19	10	14	4.62	5.49	0	7.16	6.61	4.05	18	0.4	700.47	701.18	702.06	702.9	709.99	713.92	DA3 TO DA2
126	DA4	125	208.598	0	1.19	0	0	0.93	0	13.1	4.75	4.42	0	6.09	6.61	3.45	18	0.4	701.18	702.01	703.1	703.81	713.92	720.69	DA4 TO DA3
127	DA13	126	129	0	0.16	0	0	0.13	0	10.5	5.13	0.66	0	0.66	2.25	2.48	12	0.4	712.03	712.54	712.4	712.92	720.69	716.65	DA13 TO DA4
128	DA14	127	27	0.16	0.16	0.78	0.13	0.13	10	10	5.22	0.67	0	0.67	2.25	2.46	12	0.4	712.54	712.65	712.93	713.02	716.65	716.65	DA14 TO DA13
129	DD9	120	72.926	0.27	0.43	0.76	0.2	0.32	10	11.1	5.04	1.63	0	1.63	6.8	3.3	12	3.65	707.73	710.39	708.41	710.93 j	711.73	714.02	DD9 TO DD5
130	DD10	129	52.949	0.16	0.16	0.76	0.12	0.12	10	10	5.22	0.63	0	0.63	6.8	2.12	12	3.65	710.39	712.33	710.93	712.66 j	714.02	717.63	DD10 TO DD9
131	DE13	24	122.306	0.82	1.52	0.78	0.64	1.19	10	10.1	5.2	6.17	0	6.17	6.64	4.27	18	0.4	708.36	708.85	709.51	710	713.18	713.46	DE13 TO DE4
132	DE14	131	27	0.7	0.7	0.78	0.55	0.55	10	10	5.22	2.86	0	2.86	2.25	3.65	12	0.4	709.35	709.46	710.35	710.53	713.46	713.46	DE14 TO DE13
133	DE15	23	70	0.18	0.18	0.76	0.14	0.14	10	10	5.22	0.71	0	0.71	2.25	2.55	12	0.4	705.55	705.83	705.94	706.22	713.18	709.83	DE15 TO DE3
134	DA5	126	120	1.03	1.03	0.78	0.8	0.8	10	10	5.22	4.19	0	5.86	2.24	7.46	12	0.4	702.01	702.49	703.99	707.24	720.69	725.83	DA5 TO DA4
135	DA6	134	120	0	0	0	0	0	0	0.9	0	0	0	1.67	2.24	2.13	12	0.4	702.49	702.96	707.37	707.64	725.83	728.03	DA6 TO DA5
136	ll Structu	135	120	0	0	0	0	0	0	0	0	0	1.67	1.67	2.25	2.13	12	0.4	702.96	703.44	707.65	707.91	728.03	724.63	DA7 TO DA6
137	DD12	19	140	0	1.89	0	0	1.47	0	11.1	5.05	7.44	0	7.44	11.39	2.37	24	0.25	700.91	701.27	703.12	703.27	709.62	706.62	DD12 TO DD2
138	DD13	137	137.5	0.7	1.89	0.78	0.54	1.47	10	10.1	5.2	7.66	0	7.66	11.39	2.47	24	0.25	701.27	701.62	703.35	703.49	706.62	706.43	DD13 TO DD12
139	DD14	138	27	1.19	1.19	0.78	0.93	0.93	10	10	5.22	4.85	0	4.85	3.25	3.95	15	0.25	702.37	702.43	703.62	703.77	706.43	706.43	DD14 TO DD13
140	DF2	Outfall	58.901	0	0	0	0	0	0	0	5.22	0	6.69	6.69	21.29	3.66	36	0.1	700.16	700.22	700.97	701.28	703.58	707.17	DF2 TO DF1

Proposed 100-Year Hydraflow Report - The Grove, Sugar Grove																								
Line	InletID	DnStrmLine No.	LineLength	DrainageArea	TotalArea	RunoffCoeff	IncrCxA	TotalCxA	InletTime	Tc	iSys	TotalRunoff	KnownQ	FlowRate	CapacityFull	VelAve	LineSize	LineSlope	InvertDn	InvertUp	HGLDn	HGLUp	Grnd/RimElev Dn	Grnd/RimElev Up	LineID
			(ft)	(ac)	(ac)	(C)			(min)	(min)	(in/hr)	(cfs)	(cfs)	(cfs)	(cfs)	(ft/s)	(in)	(%)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	
1	DA10	Outfall	45.844	0	9.19	0	0	7.09	0	13.4	9.61	68.12	0	68.12	0	10	36	-0.2	704.73	704.64	707.36	708.04	715.3	718.63	DA10 TO DA15
2	DA9	1	64.23	0.31	6.33	0.76	0.23	4.89	10	13.2	9.67	47.27	0	47.27	0	6.69	36	-0.4	704.64	704.39	709.49	709.81	718.63	718.83	DA10 TO DA9
3	DA8	2	120	0.22	6.03	0.76	0.16	4.66	10	12.9	9.77	45.49	0	45.49	0	6.44	36	-0.4	704.39	703.91	709.91	710.47	718.83	721.14	DA9 TO DA8
4	DA7	3	120	0.2	5.81	0.76	0.15	4.49	10	12.6	9.87	44.36	0	44.36	0	6.28	36	-0.39	703.91	703.44	710.57	711.1	721.14	724.63	DA8 TO DA7
5	DC1	4	129	0.55	5.61	0.78	0.43	4.34	10	12.2	9.99	43.37	0	43.37	29.83	6.14	36	0.2	714.31	714.57	717.31	717.86	724.63	724.26	DC1 TO DA7
6	DC2	5	27	0.68	5.06	0.78	0.53	3.91	10	12.1	10.02	39.21	0	39.21	29.83	5.55	36	0.2	714.57	714.62	717.94	718.04	724.26	724.26	DC2 TO DC1
7	DC3	6	44.002	0	4.38	0	0	3.38	0	12	10.07	34.07	0	34.07	29.83	4.82	36	0.2	714.62	714.71	718.45	718.56	724.26	723.74	DC3 TO DC2
8	DC4	7	66.998	0.43	2.97	0.76	0.33	2.28	10	11.7	10.15	23.15	0	23.15	25.88	4.72	30	0.4	715.21	715.48	718.87	719.09	723.74	720.9	DC4 TO DC3
9	DC5	8	60	0.37	2.53	0.76	0.28	1.95	10	11.6	10.21	19.9	0	19.9	13.53	6.34	24	0.36	715.98	716.19	719.14	719.6	720.9	720.9	DC5 TO DC4
10	DC6	9	119.989	0.35	2.16	0.76	0.27	1.67	10	11.2	10.34	17.26	0	17.26	13.53	5.49	24	0.36	716.19	716.62	719.7	720.4	720.9	721.3	DC6 TO DC5
11	DC9	10	145.5	0.64	1.18	0.78	0.5	0.92	10	10.1	10.77	9.92	0	9.92	18.44	6.04	18	3.08	716.87	721.36	720.87	722.57 j	721.3	725.74	DC9 TO DC6
12	DC10	11	27	0.55	0.55	0.78	0.43	0.43	10	10	10.8	4.59	0	4.59	2.52	5.85	12	0.5	721.61	721.74	722.61	723.06	725.74	725.74	DC10 TO DC9
13	DB1	1	38.975	0.16	2.85	0.76	0.12	2.2	10	13.1	9.69	21.27	0	21.27	7.47	6.77	24	0.11	704.64	704.68	709.49	709.83	718.63	720.94	DB1 TO DA10
14	DB2	13	137.501	0.37	2.69	0.78	0.29	2.08	10	12.8	9.8	20.36	0	20.36	26.76	8.43	24	1.4	714.53	716.45	715.83	718.07	720.94	723.17	DB2 TO DB1
15	DB3	14	27	0.38	2.32	0.78	0.3	1.79	10	12.7	9.82	17.55	0	17.55	12.43	9.93	18	1.4	716.95	717.33	718.45	719.21	723.17	723.17	DB3 TO DB2
16	DB4	15	99.489	0.21	1.94	0.76	0.16	1.49	10	12.5	9.88	14.71	0	14.71	12.43	8.33	18	1.4	717.33	718.72	719.44	721.39	723.17	725.18	DB4 TO DB3
17	DB5	16	84	0.31	1.45	0.76	0.24	1.11	10	12.3	9.96	11.07	0	11.07	12.43	6.27	18	1.4	719.22	720.4	722.05	722.98	725.18	725.17	DB5 TO DB4
18	DB6	17	99.512	0.29	1.14	0.78	0.23	0.88	10	12	10.07	8.83	0	8.83	4.7	5	18	0.2	720.4	720.6	723.07	723.78	725.17	726.77	DB6 TO DB5
19	DB7	18	27	0.39	0.85	0.78	0.31	0.65	10	11.9	10.11	6.57	0	6.57	4.69	3.72	18	0.2	720.6	720.65	723.84	723.94	726.77	726.77	DB7 TO DB6
20	DB8	19	137.5	0.07	0.45	0.76	0.06	0.35	10	10.8	10.51	3.63	0	3.63	4.7	2.05	18	0.2	720.65	720.93	723.98	724.14	726.77	726.78	DB8 TO DB7
21	DB10	20	75	0.2	0.2	0.76	0.16	0.16	10	10	10.8	1.68	0	1.68	1.95	2.13	12	0.3	721.18	721.4	724.2	724.37	726.78	725.4	DB10 TO DB8
22	DB9	20	85	0.18	0.18	0.76	0.13	0.13	10	10	10.8	1.46	0	1.46	2.76	1.86	12	0.6	721.18	721.69	724.2	724.35	726.78	725.7	DB9 TO DB8
23	DB11	16	45.735	0.15	0.29	0.76	0.11	0.22	10	10.7	10.53	2.29	0	2.29	2.52	2.91	12	0.5	719.47	719.7	722.05	722.24	725.18	723.54	DB11 TO DB4
24	DB12	23	60	0.14	0.14	0.76	0.1	0.1	10	10	10.8	1.12	0	1.12	2.52	1.42	12	0.5	719.7	720	722.35	722.41	723.54	724.05	DB12 TO DB11
25	DC7	10	120	0.63	0.63	0.76	0.48	0.48	10	10	10.8	5.18	0	5.18	13.53	1.65	24	0.36	716.87	717.3	720.87	720.93	721.3	721.3	DC7 TO DC6
26	DC11	7	172.09	0.75	1.41	0.78	0.58	1.1	10	10.1	10.78	11.88	0	11.88	14.3	3.78	24	0.4	715.71	716.4	718.87	719.35	723.74	721.01	DC11 TO DC3
27	DC12	26	27	0.67	0.67	0.78	0.52	0.52	10	10	10.8	5.63	0	5.63	2.25	7.17	12	0.4	716.9	717.01	719.38	720.06	721.01	721.01	DC12 TO DC11
28	DA2	Outfall	41.85	0	1.53	0	0	1.19	0	12.4	9.92	11.79	0	13.44	5.89	7.78	18	0.31	700.34	700.47	701.7	702.43	702.13	709.99	DA2 TO DA1
29	DA3	28	180.004	0.34	1.53	0.76	0.26	1.19	10	12	10.06	11.94	0	13.59	6.61	7.69	18	0.4	700.47	701.18	703.33	706.35	709.99	713.92	DA3 TO DA2
30	DA4	29	208.598	0	1.19	0	0	0.93	0	11.5	10.24	9.54	0	11.19	6.61	6.33	18	0.4	701.18	702.01	707.09	709.46	713.92	720.69	DA4 TO DA3
31	DA13	30	129	0	0.16	0	0	0.13	0	10.3	10.7	1.37	0	1.37	2.25	3.01	12	0.4	712.03	712.54	712.59	713.11	720.69	716.65	DA13 TO DA4
32	DA14	31	27	0.16	0.16	0.78	0.13	0.13	10	10	10.8	1.39	0	1.39	2.25	2.95	12	0.4	712.54	712.65	713.13	713.22	716.65	716.65	DA14 TO DA13
33	DA5	30	120	1.03	1.03	0.78	0.8	0.8	10	10	10.8	8.67	0	10.32	2.24	13.14	12	0.4	702.01	702.49	710.09	720.17	720.69	725.83	DA5 TO DA4
34	DA6	33	120	0	0	0	0	0	0	1	0	0	0	1.65	2.24	2.1	12	0.4	702.49	702.96	720.57	720.83	725.83	728.03	DA6 TO DA5
35	ll Structu	34	120	0	0	0	0	0	0	0	0	0	1.65	1.65	2.25	2.1	12	0.4	702.96	703.44	720.84	721.1	728.03	724.63	DA7 TO DA6
36	DR2	Outfall	84.5	23.42	29.17	0.42	9.84	12.25	61.2	62.2	3.93	48.13	0	48.13	48.13	6.81	36	0.52	710	710.44	713.34	713.78	711.25	715.94	DR2 TO DR1
37	DR3	36	240	5.75	5.75	0.42	2.42	2.42	60.9	60.9	3.99	9.63	0	9.63	16.39	3.07	24	0.53	710.44	711.7	714.5	714.94	715.94	715.7	DR3 TO DR2
38	DS2	Outfall	84.521	8.64	8.64	0.42	3.63	3.63	60.4	60.4	4.01	14.56	0	14.56	18.08	5.51	24	0.64	710	710.54	711.92	711.91	711.25	714.54	DS2 TO DS1



LEGEND

- PROPOSED STORM SEWER LINE
- PROPOSED OPEN LID STORM STRUCTURE
- PROPOSED CLOSED LID STORM STRUCTURE
- PROPOSED COMBINATION CURB INLET
- PROPOSED FLARED END SECTION
- DRAINAGE CULVERT AREA DELINEATION
- PERVIOUS AREA
- IMPERVIOUS AREA
- SHEET FLOW
- SHALLOW CONCENTRATED FLOW

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

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JULIE
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CULVERT ANALYSIS D01–D02 TIME OF CONCENTRATION

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.0456	0.08		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
8.9	775	0.0260	1.45		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
28.6	875	Total			

CULVERT ANALYSIS DQ4–DQ1 TIME OF CONCENTRATION

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.0456	0.08		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
12.9	1,105	0.0250	1.42		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.6	1,205	Total			

NO.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-405-2004
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

SUGAR GROVE, LLC

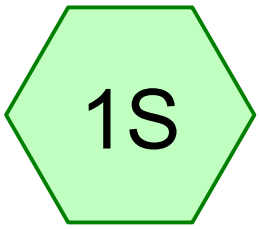
CULVERT DRAINAGE AREA EXHIBIT

THE GROVE - AREA 1
(SINGLE FAMILY)
SUGAR GROVE, IL 60554

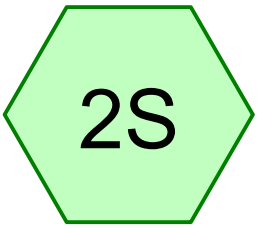
ORIGINAL ISSUE:
1/31/2025

KHA PROJECT NO.
168740009

SHEET NUMBER
EXH.



Culvert Analysis
DO1-DO2



Culvert Analysis
DQ4-DQ1

Subcat Reach Pond Link

Routing Diagram for The Grove Area 1 Culvert Analysis
Prepared by Kimley-Horn & Associates, Printed 7/1/2025

Summary for Subcatchment 1S: Culvert Analysis DO1-DO2

Runoff = 3.03 cfs @ 15.89 hrs, Volume= 1.977 af, Depth= 6.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
2.321	80	>75% Grass cover, Good, HSG D
1.125	98	Unconnected pavement, HSG D
3.446	86	Weighted Average
2.321		67.35% Pervious Area
1.125		32.65% Impervious Area
1.125		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.0456	0.08		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
8.9	775	0.0260	1.45		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
28.6	875	Total			

Events for Subcatchment 1S: Culvert Analysis DO1-DO2

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.97	0.562	1.96
100YR-001.00HR	4.03	**12.07**	0.739	2.57
100YR-002.00HR	4.97	10.86	0.987	3.44
100YR-003.00HR	5.49	9.30	1.127	3.93
100YR-006.00HR	6.43	6.92	1.384	4.82
100YR-012.00HR	7.46	4.49	1.668	5.81
100YR-018.00HR	8.06	3.75	1.834	6.39
100YR-024.00HR	8.57	3.03	1.977	6.88
100YR-048.00HR	9.28	1.72	2.175	7.58
100YR-072.00HR	9.85	1.23	2.335	8.13
100YR-120.00HR	**10.66**	0.80	**2.546**	**8.87**

Summary for Subcatchment 2S: Culvert Analysis DQ4-DQ1

Runoff = 3.49 cfs @ 15.92 hrs, Volume= 2.278 af, Depth= 6.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Huff 0-10sm 3Q scaled to 24.00 hrs 100YR-024.00HR Rainfall=8.57"

Area (ac)	CN	Description
2.720	80	>75% Grass cover, Good, HSG D
1.250	98	Unconnected pavement, HSG D
3.970	86	Weighted Average
2.720		68.51% Pervious Area
1.250		31.49% Impervious Area
1.250		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
19.7	100	0.0456	0.08		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 0.50"
12.2	1,105	0.0281	1.51		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
31.9	1,205	Total			

Events for Subcatchment 2S: Culvert Analysis DQ4-DQ1

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	1.11	0.648	1.96
100YR-001.00HR	4.03	**13.16**	0.851	2.57
100YR-002.00HR	4.97	12.06	1.138	3.44
100YR-003.00HR	5.49	10.45	1.299	3.93
100YR-006.00HR	6.43	7.75	1.594	4.82
100YR-012.00HR	7.46	5.15	1.922	5.81
100YR-018.00HR	8.06	4.31	2.114	6.39
100YR-024.00HR	8.57	3.49	2.278	6.88
100YR-048.00HR	9.28	1.98	2.507	7.58
100YR-072.00HR	9.85	1.41	2.691	8.13
100YR-120.00HR	**10.66**	0.92	**2.931**	**8.86**

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Jul 1 2025

PROPOSED CULVERT DO1-DO2

Invert Elev Dn (ft)	=	711.40
Pipe Length (ft)	=	35.00
Slope (%)	=	0.20
Invert Elev Up (ft)	=	711.47
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

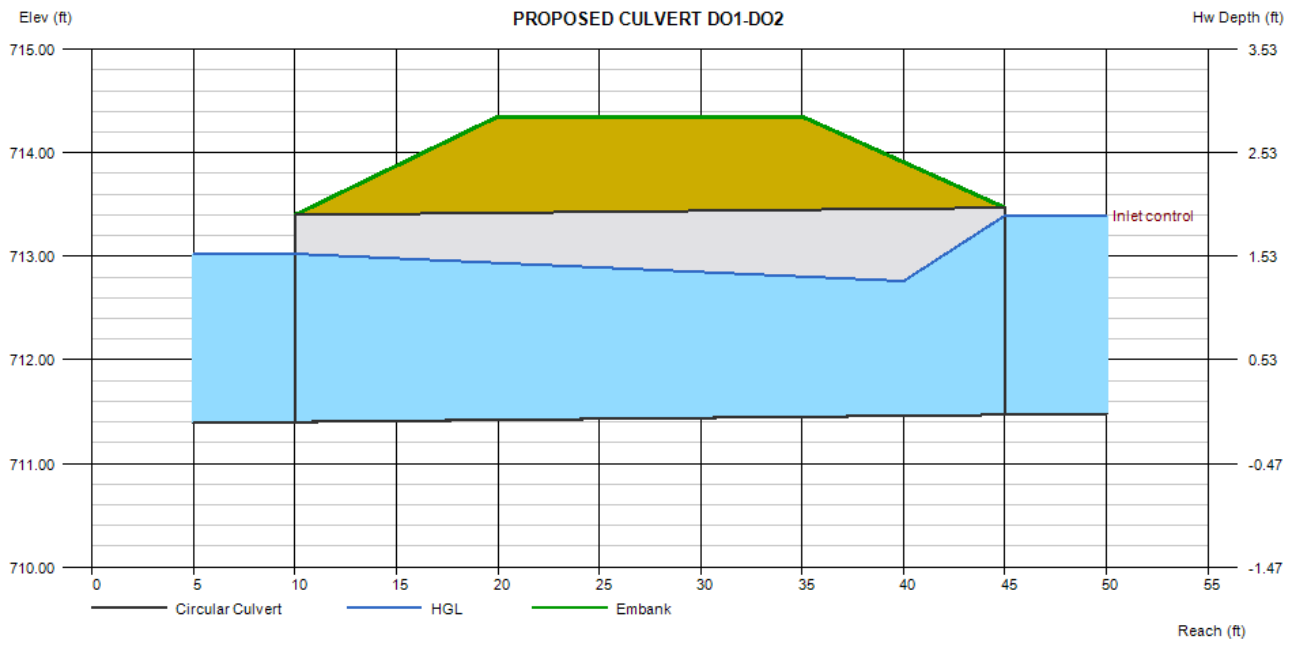
Top Elevation (ft)	=	714.35
Top Width (ft)	=	15.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	12.07
Qmax (cfs)	=	12.07
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	12.07
Qpipe (cfs)	=	12.07
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.42
Veloc Up (ft/s)	=	5.86
HGL Dn (ft)	=	713.02
HGL Up (ft)	=	712.72
Hw Elev (ft)	=	713.39
Hw/D (ft)	=	0.96
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Jun 30 2025

PROPOSED CULVERT DQ4-DQ1

Invert Elev Dn (ft)	=	700.63
Pipe Length (ft)	=	90.00
Slope (%)	=	0.32
Invert Elev Up (ft)	=	700.92
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

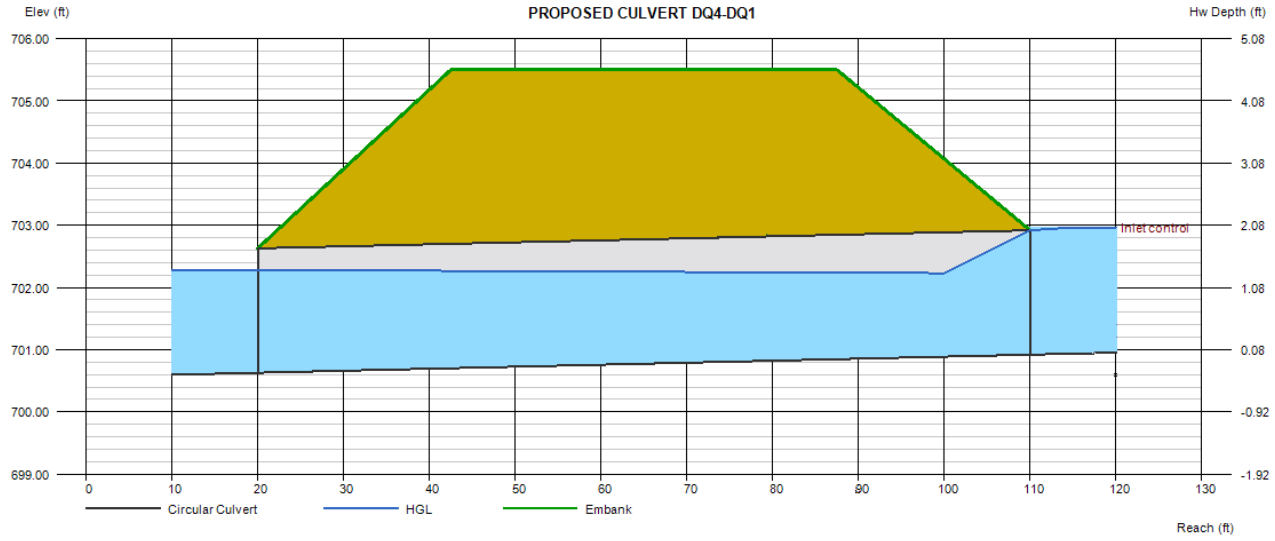
Top Elevation (ft)	=	705.50
Top Width (ft)	=	45.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	13.16
Qmax (cfs)	=	13.16
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	13.16
Qpipe (cfs)	=	13.16
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.74
Veloc Up (ft/s)	=	6.07
HGL Dn (ft)	=	702.28
HGL Up (ft)	=	702.22
Hw Elev (ft)	=	702.96
Hw/D (ft)	=	1.02
Flow Regime	=	Inlet Control



UTILITY LEGEND

- PROPOSED STORM SEWER LINE
- PROPOSED OPEN LID STORM STRUCTURE
- PROPOSED CLOSED LID STORM STRUCTURE
- PROPOSED COMBINATION CURB INLET
- PROPOSED FLARED END SECTION
- DRAINAGE AREA DELINEATION

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

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JULIE
1-800-892-0123

OVERLAND FLOOD AREA A–A A=7.91 ac
OVERLAND FLOOD AREA B–B A=1.55 ac
OVERLAND FLOOD AREA D–D A=2.98 ac
OVERLAND FLOOD AREA E–E A=1.50 ac
OVERLAND FLOOD AREA F–F A=7.55 ac
OVERLAND FLOOD AREA G–G A=3.09 ac
OVERLAND FLOOD AREA H–H A=2.59 ac
OVERLAND FLOOD AREA J–J A=21.95 ac
OVERLAND FLOOD AREA K–K A=3.55 ac

SUGAR MAPLE WAY
SILVER BRANCH LANE
SUMMER TREE LANE
MISTY WOOD TRAIL
SUNSET GROVE
MILLSTONE WAY
BLOSSOM DRIVE
MILLSTONE COURT
WHEATFIELD AVENUE
MERRILL ROAD

No.	REVISIONS	DATE	BY
1	PER VILLAGE COMMENT	04/21/25	JRH

Kimley»Horn

570 LAKE COOK ROAD, SUITE 200
DEERFIELD, IL 60015
PHONE: 847-520-9200
WWW.KIMLEY-HORN.COM

SCALE: AS NOTED
DESIGNED BY: JRH
DRAWN BY: SPH
CHECKED BY: EJT

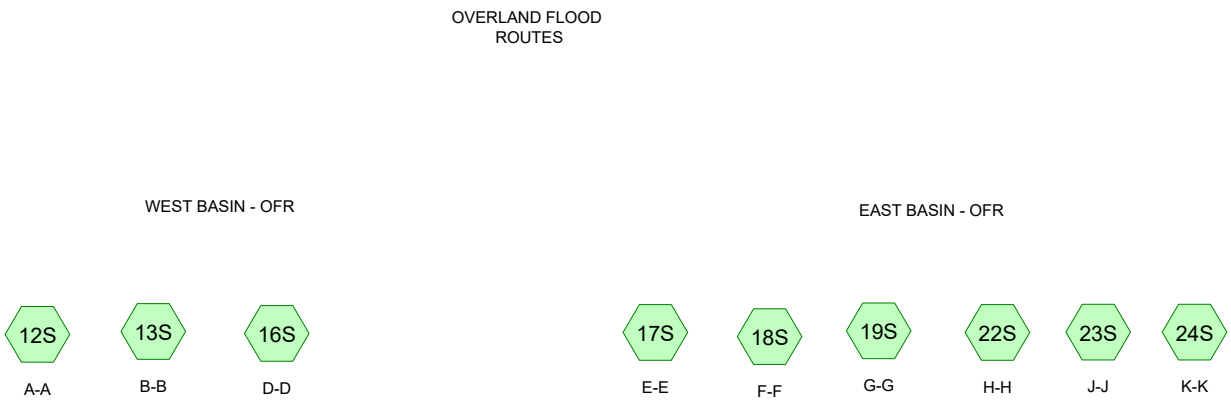
SUGAR GROVE, LLC

OVERLAND FLOW EXHIBIT

THE GROVE - AREA 1 (SINGLE FAMILY)

SUGAR GROVE, IL 60554

ORIGINAL ISSUE: 1/31/2025
KHA PROJECT NO. 168740009
SHEET NUMBER
EXH.



Subcat Reach Pond Link

Routing Diagram for The Grove Area 1 Overland Flood
Prepared by Kimley-Horn & Associates, Printed 6/4/2025

Events for Subcatchment 12S: A-A

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	2.39	1.400	2.12
100YR-001.00HR	4.03	9.71	0.132	0.20
100YR-002.00HR	4.97	15.04	0.784	1.19
100YR-003.00HR	5.49	**17.92**	1.356	2.06
100YR-006.00HR	6.43	16.43	2.541	3.85
100YR-012.00HR	7.46	10.81	3.982	6.04
100YR-018.00HR	8.06	8.91	4.368	6.63
100YR-024.00HR	8.57	7.15	4.697	7.13
100YR-048.00HR	9.28	4.02	5.157	7.82
100YR-072.00HR	9.85	2.86	**5.507**	**8.35**
100YR-120.00HR	**10.66**	0.53	1.624	2.46

Events for Subcatchment 13S: B-B

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.47	0.274	2.12
100YR-001.00HR	4.03	1.90	0.026	0.20
100YR-002.00HR	4.97	2.95	0.154	1.19
100YR-003.00HR	5.49	**3.51**	0.266	2.06
100YR-006.00HR	6.43	3.22	0.498	3.85
100YR-012.00HR	7.46	2.12	0.780	6.04
100YR-018.00HR	8.06	1.75	0.856	6.63
100YR-024.00HR	8.57	1.40	0.920	7.13
100YR-048.00HR	9.28	0.79	1.010	7.82
100YR-072.00HR	9.85	0.56	**1.079**	**8.35**
100YR-120.00HR	**10.66**	0.10	0.318	2.46

Events for Subcatchment 16S: D-D

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.93	0.549	2.21
100YR-001.00HR	4.03	3.70	0.050	0.20
100YR-002.00HR	4.97	5.74	0.298	1.20
100YR-003.00HR	5.49	**6.85**	0.516	2.08
100YR-006.00HR	6.43	6.34	0.968	3.90
100YR-012.00HR	7.46	4.13	1.529	6.16
100YR-018.00HR	8.06	3.38	1.675	6.75
100YR-024.00HR	8.57	2.71	1.800	7.25
100YR-048.00HR	9.28	1.52	1.973	7.95
100YR-072.00HR	9.85	1.08	**2.106**	**8.48**
100YR-120.00HR	**10.66**	0.20	0.634	2.55

Events for Subcatchment 17S: E-E

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.47	0.276	2.21
100YR-001.00HR	4.03	1.86	0.025	0.20
100YR-002.00HR	4.97	2.89	0.150	1.20
100YR-003.00HR	5.49	**3.45**	0.260	2.08
100YR-006.00HR	6.43	3.19	0.487	3.90
100YR-012.00HR	7.46	2.08	0.770	6.16
100YR-018.00HR	8.06	1.70	0.843	6.75
100YR-024.00HR	8.57	1.37	0.906	7.25
100YR-048.00HR	9.28	0.77	0.993	7.95
100YR-072.00HR	9.85	0.54	**1.060**	**8.48**
100YR-120.00HR	**10.66**	0.10	0.319	2.55

Events for Subcatchment 18S: F-F

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	2.35	1.390	2.21
100YR-001.00HR	4.03	9.38	0.127	0.20
100YR-002.00HR	4.97	14.54	0.756	1.20
100YR-003.00HR	5.49	**17.36**	1.308	2.08
100YR-006.00HR	6.43	16.07	2.453	3.90
100YR-012.00HR	7.46	10.46	3.874	6.16
100YR-018.00HR	8.06	8.57	4.244	6.75
100YR-024.00HR	8.57	6.88	4.559	7.25
100YR-048.00HR	9.28	3.86	4.999	7.95
100YR-072.00HR	9.85	2.74	**5.334**	**8.48**
100YR-120.00HR	**10.66**	0.52	1.607	2.55

Events for Subcatchment 19S: G-G

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.96	0.569	2.21
100YR-001.00HR	4.03	3.84	0.052	0.20
100YR-002.00HR	4.97	5.95	0.309	1.20
100YR-003.00HR	5.49	**7.11**	0.535	2.08
100YR-006.00HR	6.43	6.58	1.004	3.90
100YR-012.00HR	7.46	4.28	1.586	6.16
100YR-018.00HR	8.06	3.51	1.737	6.75
100YR-024.00HR	8.57	2.81	1.866	7.25
100YR-048.00HR	9.28	1.58	2.046	7.95
100YR-072.00HR	9.85	1.12	**2.183**	**8.48**
100YR-120.00HR	**10.66**	0.21	0.658	2.55

Events for Subcatchment 22S: H-H

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	0.80	0.477	2.21
100YR-001.00HR	4.03	3.22	0.044	0.20
100YR-002.00HR	4.97	4.99	0.259	1.20
100YR-003.00HR	5.49	**5.96**	0.449	2.08
100YR-006.00HR	6.43	5.51	0.841	3.90
100YR-012.00HR	7.46	3.59	1.329	6.16
100YR-018.00HR	8.06	2.94	1.456	6.75
100YR-024.00HR	8.57	2.36	1.564	7.25
100YR-048.00HR	9.28	1.32	1.715	7.95
100YR-072.00HR	9.85	0.94	**1.830**	**8.48**
100YR-120.00HR	**10.66**	0.18	0.551	2.55

Events for Subcatchment 23S: J-J

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	6.82	4.042	2.21
100YR-001.00HR	4.03	27.27	0.370	0.20
100YR-002.00HR	4.97	42.27	2.197	1.20
100YR-003.00HR	5.49	**50.47**	3.801	2.08
100YR-006.00HR	6.43	46.73	7.130	3.90
100YR-012.00HR	7.46	30.40	11.263	6.16
100YR-018.00HR	8.06	24.91	12.339	6.75
100YR-024.00HR	8.57	19.99	13.255	7.25
100YR-048.00HR	9.28	11.21	14.534	7.95
100YR-072.00HR	9.85	7.97	**15.509**	**8.48**
100YR-120.00HR	**10.66**	1.50	4.672	2.55

Events for Subcatchment 24S: K-K

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
002YR-024.00HR	3.34	1.10	0.654	2.21
100YR-001.00HR	4.03	4.41	0.060	0.20
100YR-002.00HR	4.97	6.84	0.355	1.20
100YR-003.00HR	5.49	**8.16**	0.615	2.08
100YR-006.00HR	6.43	7.56	1.153	3.90
100YR-012.00HR	7.46	4.92	1.822	6.16
100YR-018.00HR	8.06	4.03	1.996	6.75
100YR-024.00HR	8.57	3.23	2.144	7.25
100YR-048.00HR	9.28	1.81	2.351	7.95
100YR-072.00HR	9.85	1.29	**2.508**	**8.48**
100YR-120.00HR	**10.66**	0.24	0.756	2.55

Worksheet for A-A Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	8.500	%
Left Side Slope	25.000	%
Right Side Slope	13.000	%
Bottom Width	12.00	ft
Discharge	17.92	cfs

Results		
Normal Depth	0.34	ft
Flow Area	4.7	ft²
Wetted Perimeter	16.0	ft
Hydraulic Radius	0.29	ft
Top Width	15.92	ft
Critical Depth	0.38	ft
Critical Slope	5.291	%
Velocity	3.82	ft/s
Velocity Head	0.23	ft
Specific Energy	0.56	ft
Froude Number	1.243	
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.34	ft
Critical Depth	0.38	ft
Channel Slope	8.500	%
Critical Slope	5.291	%

Worksheet for B-B Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Left Side Slope	8.360	%
Right Side Slope	11.140	%
Discharge	3.51	cfs

Results		
Normal Depth	0.46	ft
Flow Area	2.2	ft²
Wetted Perimeter	9.7	ft
Hydraulic Radius	0.23	ft
Top Width	9.66	ft
Critical Depth	0.37	ft
Critical Slope	6.431	%
Velocity	1.58	ft/s
Velocity Head	0.04	ft
Specific Energy	0.50	ft
Froude Number	0.578	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.46	ft
Critical Depth	0.37	ft
Channel Slope	2.000	%
Critical Slope	6.431	%

Worksheet for D-D Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Left Side Slope	3.000	%
Right Side Slope	20.000	%
Discharge	6.85	cfs

Results		
Normal Depth	0.47	ft
Flow Area	4.3	ft²
Wetted Perimeter	18.2	ft
Hydraulic Radius	0.24	ft
Top Width	18.10	ft
Critical Depth	0.38	ft
Critical Slope	6.360	%
Velocity	1.60	ft/s
Velocity Head	0.04	ft
Specific Energy	0.51	ft
Froude Number	0.581	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.47	ft
Critical Depth	0.38	ft
Channel Slope	2.000	%
Critical Slope	6.360	%

Worksheet for E-E Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	1.000	%
Left Side Slope	16.000	%
Right Side Slope	12.000	%
Bottom Width	10.00	ft
Discharge	3.45	cfs

Results		
Normal Depth	0.26	ft
Flow Area	3.1	ft²
Wetted Perimeter	13.9	ft
Hydraulic Radius	0.23	ft
Top Width	13.83	ft
Critical Depth	0.15	ft
Critical Slope	7.104	%
Velocity	1.10	ft/s
Velocity Head	0.02	ft
Specific Energy	0.28	ft
Froude Number	0.408	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.26	ft
Critical Depth	0.15	ft
Channel Slope	1.000	%
Critical Slope	7.104	%

Worksheet for F-F Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Left Side Slope	10.360	%
Right Side Slope	9.620	%
Discharge	17.36	cfs

Results		
Normal Depth	0.85	ft
Flow Area	7.3	ft²
Wetted Perimeter	17.2	ft
Hydraulic Radius	0.42	ft
Top Width	17.12	ft
Critical Depth	0.71	ft
Critical Slope	5.168	%
Velocity	2.38	ft/s
Velocity Head	0.09	ft
Specific Energy	0.94	ft
Froude Number	0.641	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.85	ft
Critical Depth	0.71	ft
Channel Slope	2.000	%
Critical Slope	5.168	%

Worksheet for G-G Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.050
Channel Slope	2.000 %
Left Side Slope	3.000 %
Right Side Slope	3.000 %
Discharge	7.11 cfs

Results	
Normal Depth	0.39 ft
Flow Area	5.0 ft²
Wetted Perimeter	25.9 ft
Hydraulic Radius	0.19 ft
Top Width	25.93 ft
Critical Depth	0.31 ft
Critical Slope	6.791 %
Velocity	1.41 ft/s
Velocity Head	0.03 ft
Specific Energy	0.42 ft
Froude Number	0.564
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.00 ft
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.00 ft
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	0.39 ft
Critical Depth	0.31 ft
Channel Slope	2.000 %
Critical Slope	6.791 %

Worksheet for H-H Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Left Side Slope	4.000	%
Right Side Slope	5.000	%
Discharge	5.96	cfs

Results		
Normal Depth	0.42	ft
Flow Area	4.0	ft²
Wetted Perimeter	19.0	ft
Hydraulic Radius	0.21	ft
Top Width	18.98	ft
Critical Depth	0.34	ft
Critical Slope	6.603	%
Velocity	1.49	ft/s
Velocity Head	0.03	ft
Specific Energy	0.46	ft
Froude Number	0.571	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.42	ft
Critical Depth	0.34	ft
Channel Slope	2.000	%
Critical Slope	6.603	%

Worksheet for J-J Channel

Project Description	
Friction Method	Manning Formula
Solve For	Bottom Width

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Normal Depth	0.34	ft
Left Side Slope	5.000	%
Right Side Slope	5.000	%
Discharge	50.47	cfs

Results		
Bottom Width	69.94	ft
Flow Area	26.1	ft²
Wetted Perimeter	83.6	ft
Hydraulic Radius	0.31	ft
Top Width	83.54	ft
Critical Depth	0.25	ft
Critical Slope	5.933	%
Velocity	1.93	ft/s
Velocity Head	0.06	ft
Specific Energy	0.40	ft
Froude Number	0.610	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	(N/A)	ft/s
Upstream Velocity	(N/A)	ft/s
Normal Depth	0.34	ft
Critical Depth	0.25	ft
Channel Slope	2.000	%
Critical Slope	5.933	%

Worksheet for K-K Channel

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	2.000	%
Left Side Slope	8.000	%
Right Side Slope	9.000	%
Discharge	8.16	cfs

Results		
Normal Depth	0.61	ft
Flow Area	4.3	ft²
Wetted Perimeter	14.3	ft
Hydraulic Radius	0.30	ft
Top Width	14.29	ft
Critical Depth	0.49	ft
Critical Slope	5.830	%
Velocity	1.89	ft/s
Velocity Head	0.06	ft
Specific Energy	0.66	ft
Froude Number	0.605	
Flow Type	Subcritical	

GVF Input Data		
Downstream Depth	0.00	ft
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.00	ft
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	0.00	ft/s
Upstream Velocity	0.00	ft/s
Normal Depth	0.61	ft
Critical Depth	0.49	ft
Channel Slope	2.000	%
Critical Slope	5.830	%