Exhibit L - High Cost project Worksheet (NOFA #008)

Purpose:

This form, labeled “Exhibit L – High-Cost Project Worksheet,” requires an Applicant to justify its average cost per passing when the cost per passing resides within the top 25% of all applications submitted to NOFA 8 (“High-Cost Threshold”).

It has been determined by the Office that the Application submitted falls within the High-Cost Threshold and seeks justification for the cost per passing indicated within the Core Application. The Office may use this information to determine the sufficiency of the cost and whether to disqualify an application exceeding the High-Cost Threshold.

Separate High-Cost Thresholds have been generated for wireless and wireline delivery platforms.

Applicants must provide additional information to the Office to justify the high deployment costs of their proposed project. This information may include a narrative (one page or less) describing contributing or exacerbating factors leading to the estimated total project costs as identified within the Core Application.

Organization Name: Liberty Communications

Is rurality a contributing factor to high cost? If yes, please explain how the rurality of your deployment is contributing to high cost.

The rurality of the proposed funded service area in broadband intervention zone #5 is a contributing factor to the cost analysis provided by Finley Engineering Inc. High level engineering estimates conducted by Finley approximate a total of 59 service locations throughout a 25.12-mile mainline distribution network. The ratio of 2.34 eligible service locations for every mile indicates that the area is very rural contributing to longer length on drops (4.5 miles of total drops), more electronics such as pedestals (66) and handholes (27) spread throughout the network and stretches of longer mainline distribution. The rurality and unique distribution of esl’s on Newport Rd NE on the westernmost corner of the broadband intervention zone and west of Highway 1 NE provide no ease of access with the rest of the existing network and ongoing construction not close to existing cabinets, with only one winding route option along the bulk of the highway and along Newport Rd NE. Furthermore, this has resulted in an increased cost in electronics via a new cabinet installation at the intersection of Fox Lane and Highway 1 NE, necessary to transmit light needed to lower latency and improve bandwidth across the rural area.

Liberty Communications is committed to the expedient delivery of broadband services to all Iowa residents barring incidences of rurality, geography, or man-made barriers such as highways that can at times be barriers in rural telecommunications projects. As a proof of concept, Liberty is currently wrapping up the construction of 99 additional drops (marked in exhibit B) fully self-funded in this broadband intervention zone by the end of October; the other 12 in BIZ #5 are committed to South Slope resulting in 100% completion of service of this rural intervention zone if this proposed project were to be awarded. The funds requested in this proposal are necessary to further the deployment of FTTP infrastructure in this area as the 59 remaining esl’s in BIZ #5 are farther away from existing assets than in our self-funded build by a significant margin.

Is topography a contributing factor to high cost? If yes, please explain how the topography of your project area is contributing to high cost.

Located between both the Iowa and Cedar River, and in between the Amana Fault Zone and the Iowa City-Clinton Fault Zone this area is a high-cost topology concern. Fiber being buried at traditionally 18-36” will have to be dug through a Bedrock of Limestone, Dolomite, and a mixture of both. The area has many waterways which will increase the cost to bore beneath, through the Limestones and Dolomites. Most waterways need to be bored 10' beneath the lowest point which puts the project well into the Devonian period bedrock. There is a significant amount of waterway crossings due to where the esl’s have been located. The topology is otherwise relatively flat with low grade slopes (avg of 2-10%). The attached geologic analysis will demonstrate that the geology/topography of this region provides for significant challenges to the affordability of this project.

Both the design and budget of this project were heavily influenced by the geologic and topographic considerations mentioned. Pricing for this project was heavily influenced by recent NOFA007 bids received on August 3rd 2023, a slight percentage decrease was applied from NOFA007 to this proposed project for hard rock bores (labor & material) from 3% to 1%, driveways and culverts decreased from 12% to 9% between budgets, and cobble rock from 5% to 3%.

Regarding topography and its relation to high level design, Liberty surveyed the two proposed routes to reach those on the westernmost edge of BIZ #5. It was mutually agreed upon that Rapid Creek Rd was a less favorable option than Dingleberry Rd for a middle-mile transport network due to a winding creek along large stretches of Rapid Creek Rd, and the unique geology that follows. Documents have been provided via attachments that highlight this region and its unique geography, illustrating the attention to detail was given to avoid high-cost areas for boring and in the process adding mileage to the project.

Is the cost of the technology being used a contributing factor to high cost? If yes, please explain the technology being used and why this lends to high cost.

The proposed network is an FTTP XGS-PON network scalable to 10G/10G shared over a 1X32 split ratio. This technology is widely accepted to be the most future proof in the industry currently, the downside is that fiber is the most expensive type of network to deploy, and the market is competitive. The rates for material, and labor associated with the installation of this network come from recent bids from the Winneshiek project that occurred in NOFA007, and in a Wadena, Volga & Strawberry Point project as well. Liberty Communications works with Finley Engineering to recommend and analyze the best equipment, upgrades, practices, contractors, and materials based on executed NOFA 7 bids occurring in 2023 in the State of Iowa for FTTP XGS-PON design. Finley has 70+ years of experience providing rural telecommunications project services in the State of Iowa related to project management, engineering, and cost analysis expertise for materials and contractors. Decade high inflation, inventory availability concerns, and workforce shortages have all attributed to higher costs for similar goods and services juxtaposed to just last year. We have attached a unit cost summary, as well as one of the previous NOFA007 bids that was referenced indicative of corresponding percentages and pricing sheets for further analysis from the office.

In addition to this, several of Liberty’s existing cabinets are not capable of delivering fiber at the moment. Increased expenses outlining an upgrade from DSL to fiber have been included in this cost analysis for 3 cabinets titled Node 6, Node XC and Node Pond. Proposed upgrades were also itemized in the core application in exhibit D. This project budget includes a small contingency rate built into its formula to account for these cost considerations, as well as accounting for future increase in both the labor and material mandated to make this network operable. Liberty has decided to work with Finley Engineering Inc. to develop designs and budgets for this project. Attached are the high-level designs regarding the proposed technology for this project.

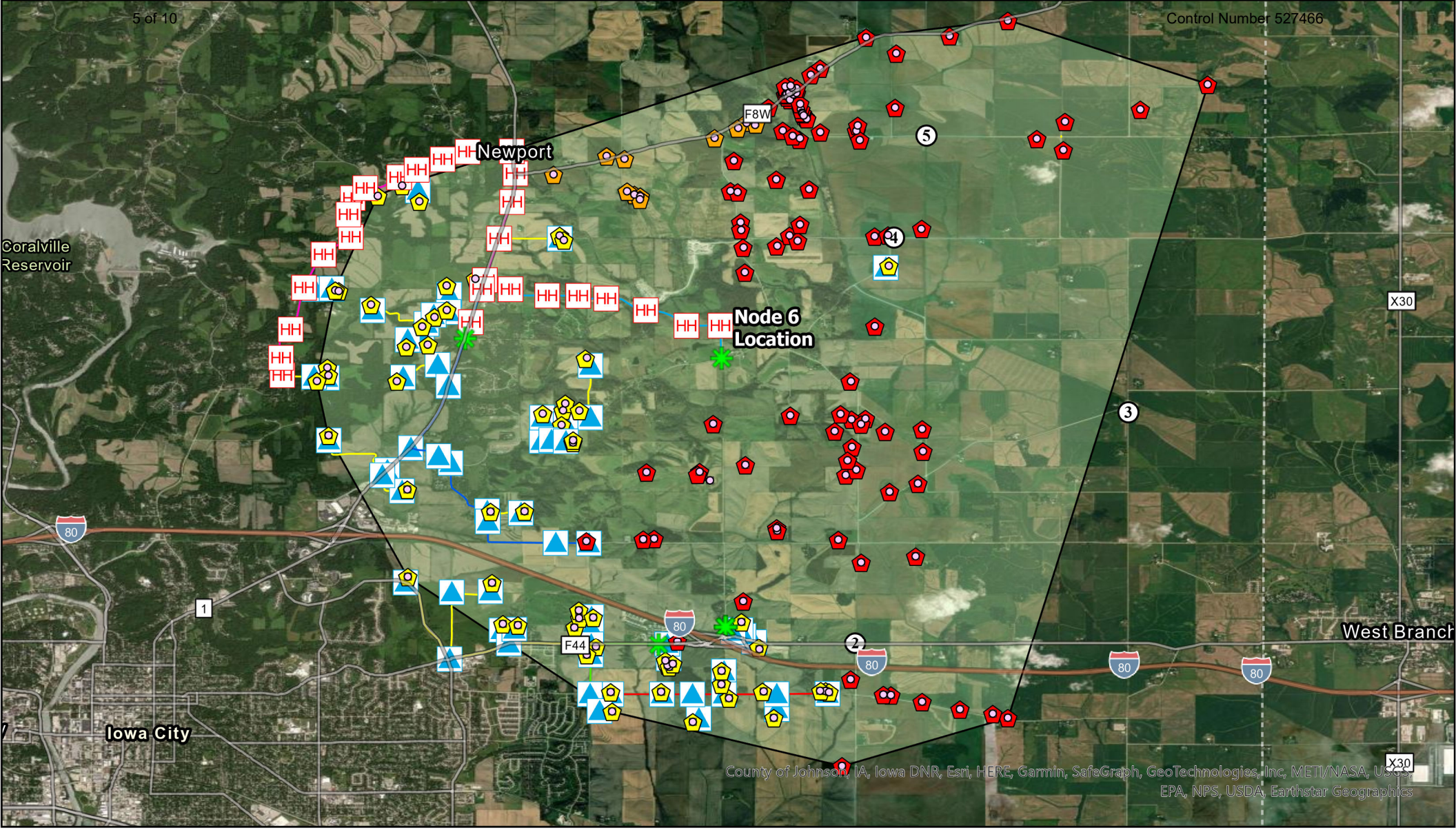
Does your project contain a significant amount of Middle Mile that is contributing to high cost? If yes, please explain the distance and approximate location where your middle mile is coming from, the estimated cost of the middle mile portion of your project, and any other relevant information.

The remaining 59 esl's in broadband intervention zone #5 exist on the fringe of the intervention zone, as demonstrated in the provided engineering attachment. Therefore, significant futureproof middle-mile construction is mandatory to reach the eligible service locations in the proposed project area coming from an existing cabinet labeled Node 6 in the attachments. Engineering designs estimate precisely 8.29 miles of middle-mile construction from the nearest available node to the furthest eligible service location. Due to the length of this middle-mile deployment, engineers have recommended the construction of a new cabinet at the intersection of Fox Lane NE and Highway 1 NE to run both transport in the North feeding those hardest to reach, and distribution to the South. There is no through road going west that can reach the addresses along Newport Rd NE. There are also 27 handholes along this middle-mile route that contribute to this high-cost development as well. Middle-mile networks are the backbone necessary to deliver mainline distribution services, it is common that they are often larger, more expensive optics needed to power new cabinet sites throughout network expansion and transmit large amounts of data across long distances. The esl's South of Highway 80 enjoy close access to existing cabinets in the area, diminishing the need for long and expensive middle-mile network construction regarding this part of the project.

Applicants may also provide any additional information, documents or data sets that might further justify the High Cost of the proposed project.

All narrative and additional information should be submitted in a single PDF format named as: “Application Number -Applicant Name – Exhibit L.” Email the completed PDF to ociogrants@iowa.gov.

Control Number 527466



Legend

- V5 Data
- ProposedCabinet
- Handhole

Node_6_Service_Lo

NOFA8

- Self-Funded
- South Slope
- Y
- <all other values>

- Node_6_Underground_S

Node 6 Fiber Distribution

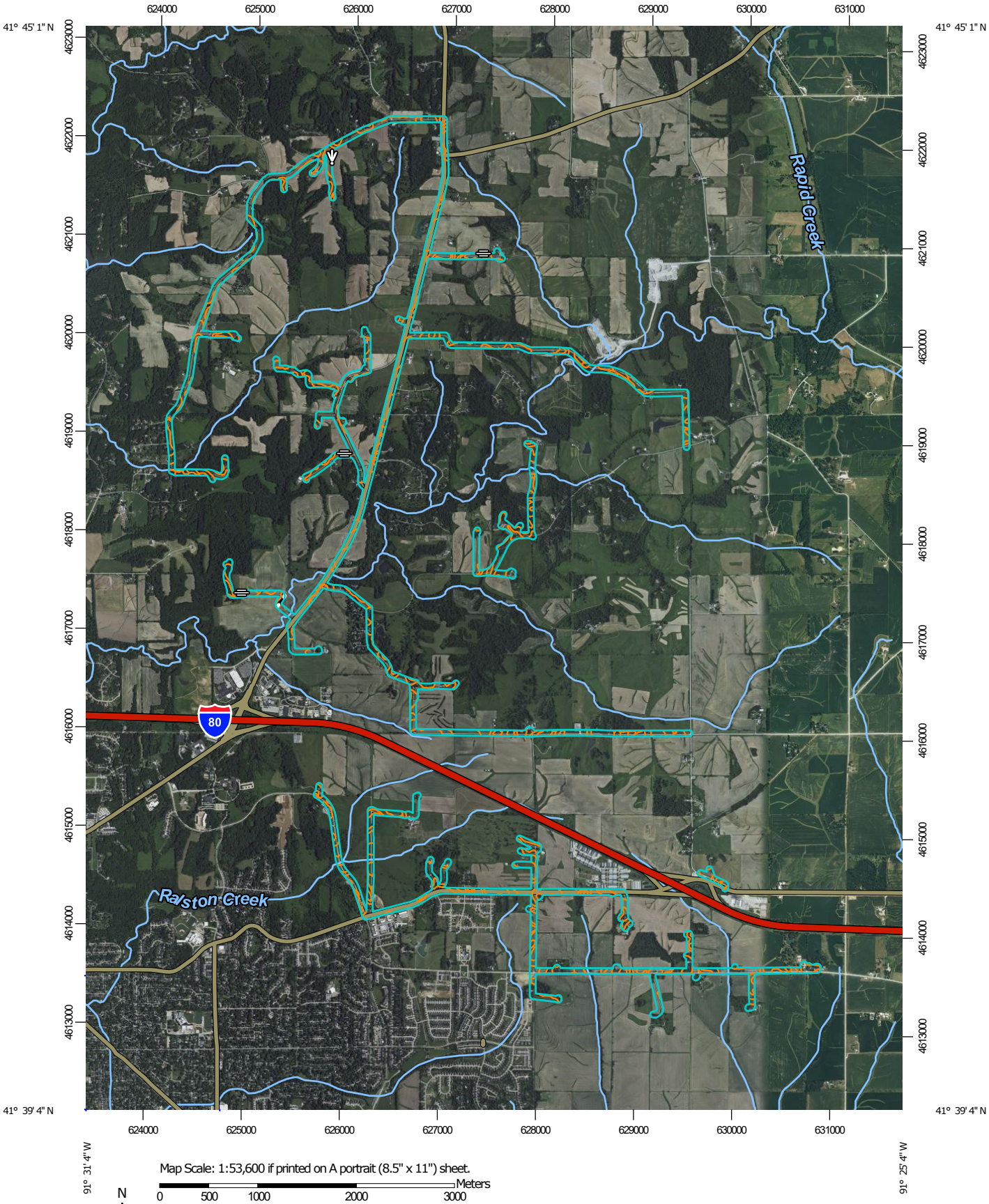
Size

- 12
- 24
- 48
- 96
- 144
- 288
- <all other values>

- Node_6_Fiber_Drops
- BIZ_5

	LABOR	MATERIAL	
MAINLINE DISTRIBUTION	$ 1,580,664.62	$ 451,940.85	$ 2,032,605.47
SEBO4	$ 226,691.52	$ 12,942.45	$ 239,633.97
NID,GROUND, & SPLICE	$ 21,328.33	$ 8,476.65	$ 29,804.98
Cutover	$ 23,897.38	$ 7,965.00	$ 31,862.38
Electronics	$ 26,339.29	$ 127,123.23	$ 153,462.52
Permitting	$ 700.00	$ -	$ 700.00
Total Cost			$ 2,488,069.32

Soil Map—Johnson County, Iowa
(Buffer for Carter Soils)



Map Scale: 1:53,600 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 500 1000 2000 3000

Feet
0 2500 5000 10000 15000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Soil Map—Johnson County, Iowa
(Buffer for Carter Soils)

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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.

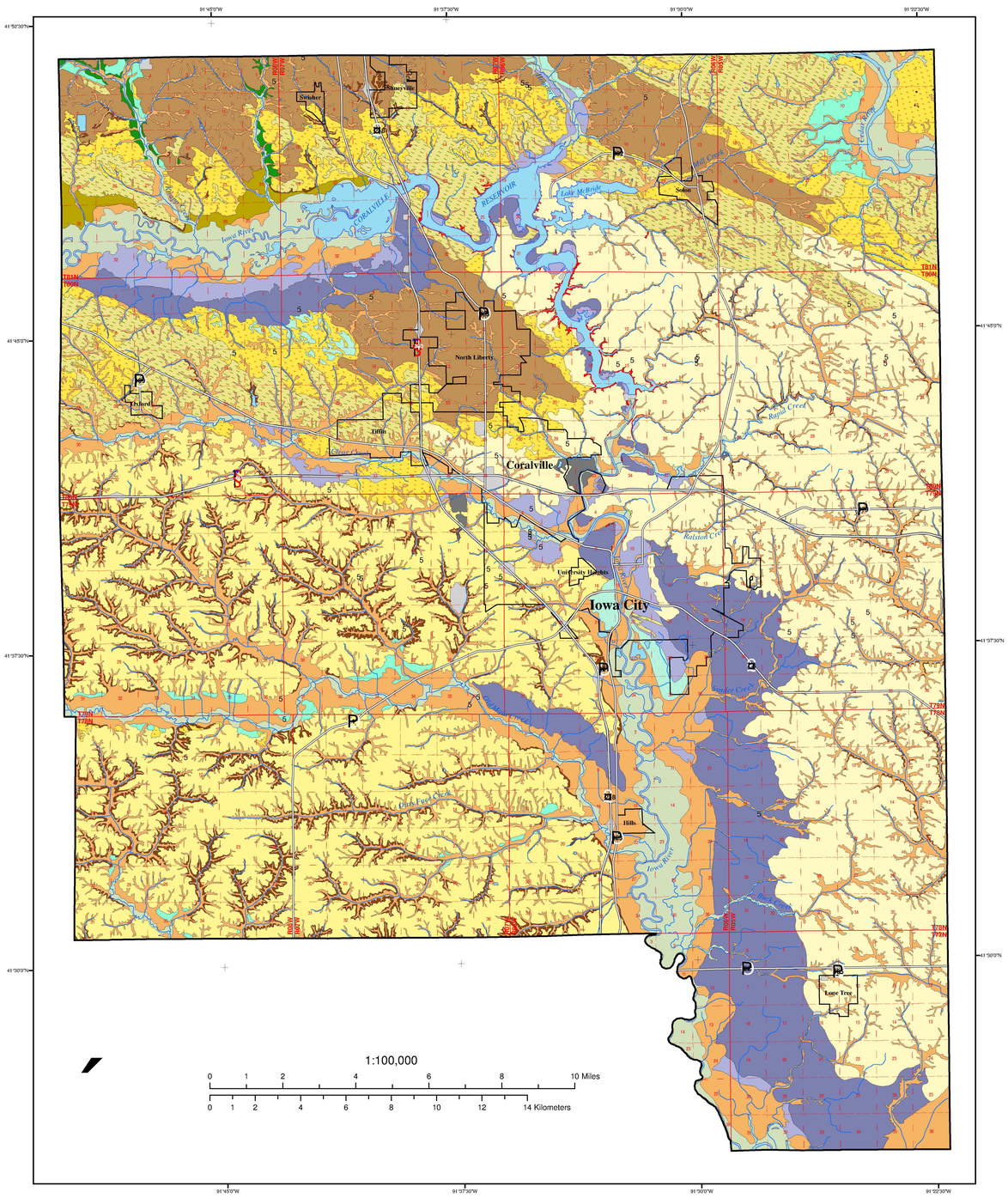
Soil Survey Area: Johnson County, Iowa
Survey Area Data: Version 25, Sep 2, 2022

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

Date(s) aerial images were photographed: Apr 12, 2011—Nov 18, 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.

Surficial Geologic Materials of Johnson County, Iowa



LEGEND

Description of Map Units

HUDSON EPISODE

Qal - Alluvium (De Forest Formation-Undifferentiated) One to four meters of massive to weakly stratified, grayish brown to brown loam, silt loam, clay loam, or loamy sand overlying less than three meters of poorly to moderately well sorted, massive to moderately well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel and more than three meters of pre-Wisconsin or late Wisconsin Noah Creek Formation sand and gravel. Also includes colluvium derived from adjacent map units in stream valleys, on hillslopes, and in closed depressions. Includes areas previously mapped as Qalit (Intermediate Terrace), Qaliht (Intermediate-High Terrace), and Qalht (High Terrace) on the Tiffin and Iowa City East Quadrangle maps. Eolian dunes composed of Peoria Formation-sand facies (associated with Qaliht and Qalht) may be located on the surface. Seasonal high water table occurs in this map unit.

Qallt - Iowa River Valley- Low Terrace (DeForest Formation-Camp Creek Mbr. and Roberts Creek Mbr.) Variable thickness of less than 1 to 5 meters of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the Holocene channel belt of the Iowa River valley. Overlies Noah Creek Formation. Ox-bow lakes and meander scars are common features associated with this terrace level. Post settlement alluvium thickness varies from .5 meter in higher areas to 2 meters along the river course and in lower lying areas. Seasonal high water table and frequent flooding potential.

Qaf - Alluvial fan (Corrington Mbr.) Variable thickness of 2 to 5 meters of dark brown to yellowish brown, noncalcreous, silt loam to loam with interbedded lenses of fine sand and silts. A pebble lag is commonly found at or near the fan surface. Overlies a buried intermediate terrace. Steep angled fans at the base of low order drainages and colluvial slopes along the northern margin of the Iowa River Valley.

WISCONSIN EPISODE

Qnw - Sand and Gravel (Noah Creek Formation) More than three meters of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel. In places mantled with one to three meters of fine to medium, well sorted sand derived from wind reworking of the alluvium. This unit encompasses deposits that accumulated in stream valleys during the Wisconsin Episode.

Qpt- High Terrace- either Late Phase or Early Phase (Peoria Formation – silt and/or sand facies) Two to seven meters of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. May grade downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium (Late Phase) or may overlie a Farmdale Geosol developed in Roxanna Silt which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase).

Qptlp - Late Phase High Terrace (LPHT) (Peoria Formation—silt and/or sand facies) Two to seven meters of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. Grades downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium.

Qptep - Early Phase High Terrace (EPHT) (Peoria Formation—silt and/or sand facies) Two to seven meters of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. The Peoria deposits overlie a Farmdale Geosol developed in Roxanna Silt which in turn overlies a well-expressed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium.

Qps - Loess (Peoria Formation—silt facies) Generally 2 to 6 meters of yellowish to grayish brown, massive, jointed noncalcareous grading downward to calcareous silt loam to silty clay loam. This unit is very uniform and sands are rarely present. Overlies a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation—eroded Farmdale Geosol) which is less than 1.5 meters thick. The Farmdale Geosol appears to be disturbed by periglacial action and is welded to an older Sangamon Geosol developed in loess. This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.

Qps1 - Loess and Intercalated Eolian Sand (Peoria Formation—silt facies) Two to five meters of yellowish brown to gray, massive, fractured, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Sand is most abundant in lower part of the eolian package. Overlies massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without intervening clayey Farmdale /Sangamon Geosol.

Qps1b - Thick Loess and Intercalated Eolian Sand (Peoria Formation-silt facies) Five to fifteen meters of yellowish brown to gray, massive, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Minimum thickness of five meters on uplands. Maximum thickness of two to seven meters of loess occurs on adjacent slopes. Overlies massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without intervening clayey Farmdale /Sangamon Geosol.

Qps2 - Eolian Sand and Intercalated Silt (Peoria Formation—sand facies) Five to fifteen meters of yellowish brown to gray, moderately to well stratified noncalcareous or calcareous, fine to medium, well sorted, eolian sand. May contain interbeds of yellowish brown to gray, massive, silt loam loess. Overlies eroded, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations or fractured Devonian-age carbonate bedrock.

Qwa1 - Sand and Gravel Shallow to Till (Unnamed erosion surface sediment) One to three meters of yellowish brown to pale brown, massive to weakly stratified, noncalcareous, medium to coarse, poorly sorted pebbly to cobbly sand with intercalated gravel and loam. Overlies massive, fractured, firm, loamy glacial till of the Wolf Creek or Alburnett formations. Deposits in this mapping unit are derived primarily from erosion of glacial till in the adjacent drainage basin. Seasonally high water table may occur in this map unit. Moderate flood potential.

Qwa2 - Loamy and Sandy Sediment Shallow to Glacial Till (Unnamed erosion surface sediment) One to three meters of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than two meters of Peoria Silt (loess). Overlies massive, fractured, firm glacial till of the Wolf Creek and Alburnett formations. Seasonally high water table may occur in this map unit.

PRE ILLINOIAN EPISODE

Qwa3 - Till (Wolf Creek or Alburnett Formations) Generally 10 to 35 meters of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett Formations with or without a thin loess mantle (Peoria Formation—less than 2 meters) and intervening clayey Farmdale/ Sangamon Geosol. This mapping unit encompasses narrowly dissected interfluves and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained.

PALEOZOIC

Penn – Undifferentiated Pennsylvanian Bedrock Sandstones, siltstones, and mudstones

Du - Fractured Devonian Carbonate Bedrock Interbedded limestones and dolostones primarily of the Cedar Valley Group and minor areas of the Wapsipinicon Group. Locally developed as bedrock aquifer.

Su – Undifferentiated Silurian Bedrock Dolomite

Qpq - Pits and Quarries Sand and gravel pits and rock quarries.

Qf - Fill Areas of cut and fill associated with railroad grades, major highways, airports and retail and industrial developments. Deposits within this map unit are similar to those in adjacent map units but may have significant mantles of fill or deep cuts that expose underlying deposits.

Water Features Rivers, lakes and small ponds formed by blockage of drainageways and river channels.

5 **Drilling Sites**

SURFICIAL GEOLOGIC MATERIALS OF JOHNSON COUNTY, IOWA
Iowa Geological Survey Open File Map 04-03, September 2004

Prepared by Stephanie A. Tassier-Surine[1], Judith J. Krieg[2], Deborah J. Quade[1], E. Arthur Bettis III[3], Joe A. Artz[4], and James D. Giglierano[1]

Iowa Geological Survey, Robert D. Libra, State Geologist
Iowa Department of Natural Resources, Jeffrey R. Vonk, Director

Supported by the U.S. Geological Survey, Cooperative Agreement Number 03HQAG0087
National Cooperative Geologic Mapping Program (STATEMAP)

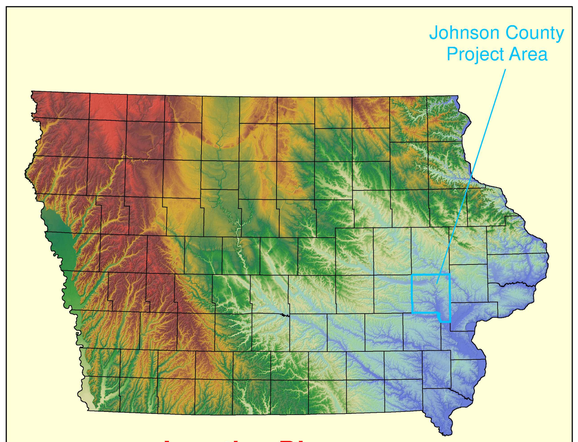
ACKNOWLEDGEMENTS: Recognized for their direct contribution to the map production: Deep drilling was provided under contract by Aquadrill; a special thanks to Diane Edberg and drilling crew members. Bob Rowden of the Iowa Geological Survey completed shallow drilling. Bill Bunker, Brian Witzke and Bob McKay of the Iowa Geological Survey provided information for the bedrock mapping units. Special thanks to the landowners who graciously allowed access to their land for drilling: John Maier, Tom and Anita Wall, Bob Crane, Delbert and Helen Hesseltine, David and Susan McCurry, John Weihl, Bill and Joan Frees, Joseph and Tonya Lehman, Prospect Farms, Micheal Lehman, Dunlap Farms, Paul and Donna Hemingway, Elmer Hemingway, John Brogaard, Ray Hruby, Cary Vorheis, Tom and Susan Hoyt, Paul Langenberg, Tim Meade, Mosica Arabians of North Liberty, George Crosheck, Jim Wagner, David Bowersox, Roy Smyth, Dan Poduska, Judith Poduska, Kenneth Cuhel, Gary Swenka, and Randy Swenka. Other logistical assistance with drilling locations was provided by the City of Coralville; Allen Stroh - University of Iowa; JoEllen Carter and Steve McMenemin - IDOT and the Johnson County Board of Supervisors. Assistance obtaining drilling records and geologic information was also provided by Dan Scott - City of Iowa City, City of Tiffin, City of North Liberty, Harry Graves - Johnson County Conservation Board Director, Mike Roberts - Iowa Realty, Kelly Beckler - MMS, Shoemaker and Haaland, Al Miller and Mike Gardner - Johnson County Secondary Roads Department, Greg Brennan - Howard R. Green, Johnson County Department of Public Health, and Lon Drake.

[1] Iowa Department of Natural Resources, Iowa Geological Survey , 109 Trowbridge Hall, Iowa City, IA 52242-1319

[2] Earthview Environmental, 1001 25th Ave., Suite 7, Coralville, IA 52241

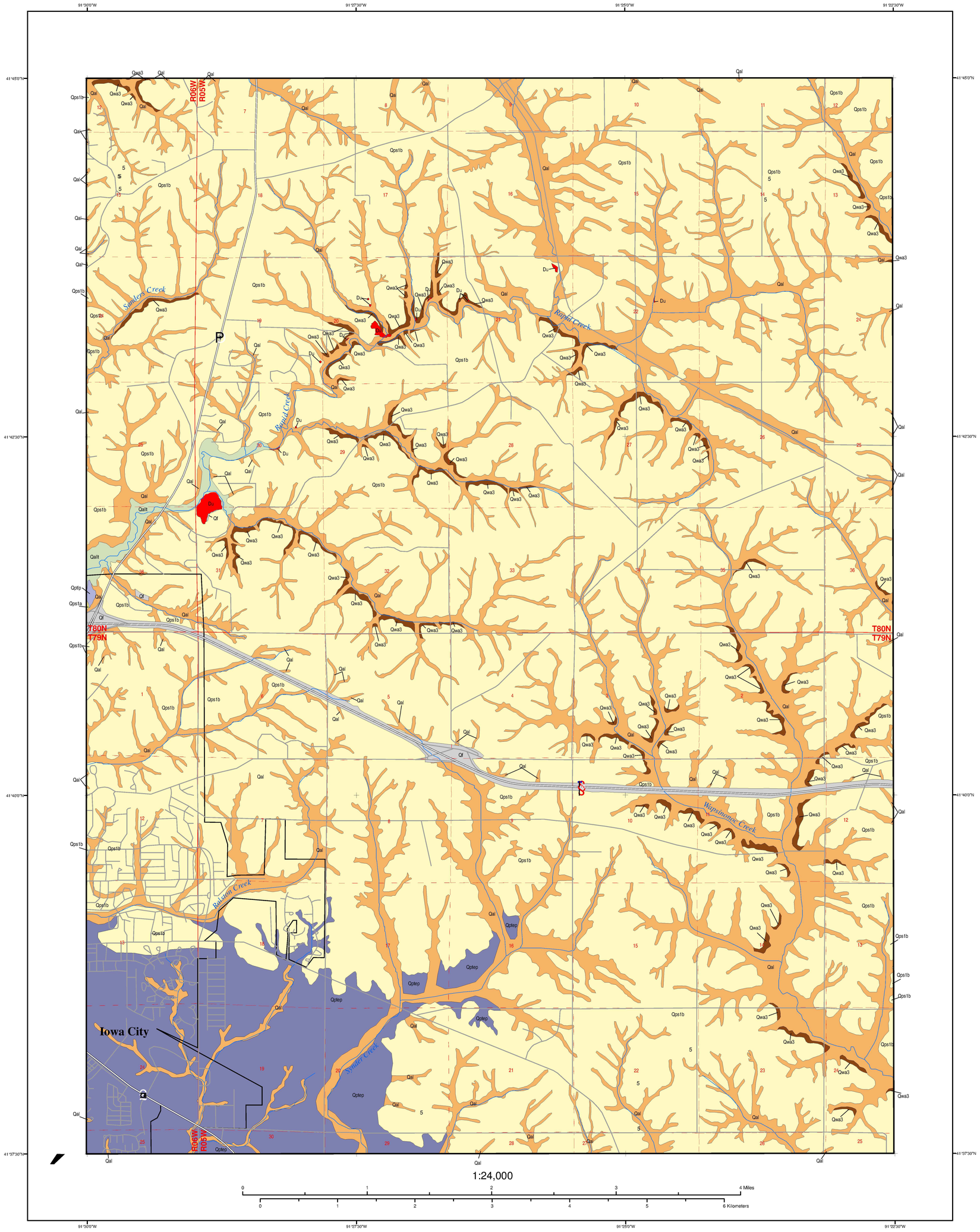
[3] Department of Geoscience, The University of Iowa, 121 Trowbridge Hall, Iowa City, IA 52242

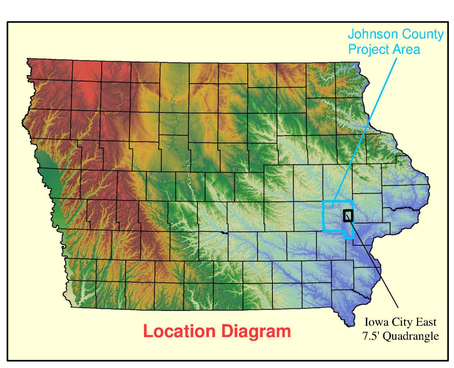
[4] Office of State Archaeologist, The University of Iowa , Iowa City, IA 52242



Location Diagram

Surficial Geologic Materials of the Iowa City East 7.5' Quadrangle





SURFICIAL GEOLOGIC MATERIALS OF THE IOWA CITY EAST 7.5' QUADRANGLE, JOHNSON COUNTY, IOWA

Iowa Geological Survey Open File Map 04-05, September 2004

Prepared by Judith J. Krieg[2], Stephanie A. Tassier-Surine[1], Deborah J. Quade[1], E. Arthur Bettis III[3], Joe A. Artz[4], and James D. Giglierano[1]

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[4] Office of State Archaeologist, The University of Iowa, Iowa City, IA 52242

LEGEND

Description of Map Units

HUDSON EPISODE

Qal - Alluvium (De Forest Formation-Undifferentiated) One to seven meters of massive to weakly stratified, grayish brown to brown loam, silt loam, clay loam, or loamy sand overlying less than three meters of poorly to moderately well sorted, massive to moderately well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel and more than three meters of pre-Wisconsin or late Wisconsin Noah Creek Formation sand and gravel. Unit also includes colluvial deposits derived from adjacent map units. Seasonally high water tables occur in this map unit.

Qallt - Iowa River Valley- Low Terrace (DeForest Formation-Camp Creek Mbr. and Roberts Creek Mbr.) Variable thickness of less than 1 meter to 5 meters of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the Holocene channel belt of the Iowa River valley. Overlies Noah Creek Formation. Ox-bow lakes and meander scars are common features associated with this terrace level. Post-settlement alluvium thickness varies from .5 meter in higher areas to 2 meters along the river course and in lower lying areas. Seasonal high water table and frequent flooding potential.

WISCONSIN EPISODE

Qptlp - Late Phase High Terrace (LPHT) (Peoria Formation—silt and/or sand facies) Two to seven meters of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. Grades downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium.

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Qps1 - Loess and Intercalated Eolian Sand (Peoria Formation—silt facies) Two to five meters of yellowish brown to gray, massive, fractured, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Sand is most abundant in lower part of the eolian package. Overlies massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without intervening clayey Farmdale /Sangamon Geosol.

Qps1b - Thick Loess and Intercalated Eolian Sand (Peoria Formation-silt facies) Five to fifteen meters of yellowish brown to gray, massive, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well sorted, sand. Minimum thickness of five meters on uplands. Maximum thickness of two to seven meters of loess occurs on adjacent slopes. Overlies massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without intervening clayey Farmdale /Sangamon Geosol.

PRE-ILLINOIAN EPISODE

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PALEOZOIC

Du - Fractured Devonian Carbonate Bedrock Interbedded limestones and dolostones primarily of the Cedar Valley Group and minor areas of the Wapsipinicon Group. Locally developed as bedrock aquifer.

Qpq - Pits and Quarries Sand and gravel pits and rock quarries.

Qf - Fill Areas of cut and fill associated with railroad grades, major highways, airports, retail and industrial developments. Deposits within this map unit are similar to those in adjacent map units but may have significant mantles of fill or deep cuts that expose underlying deposits.

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