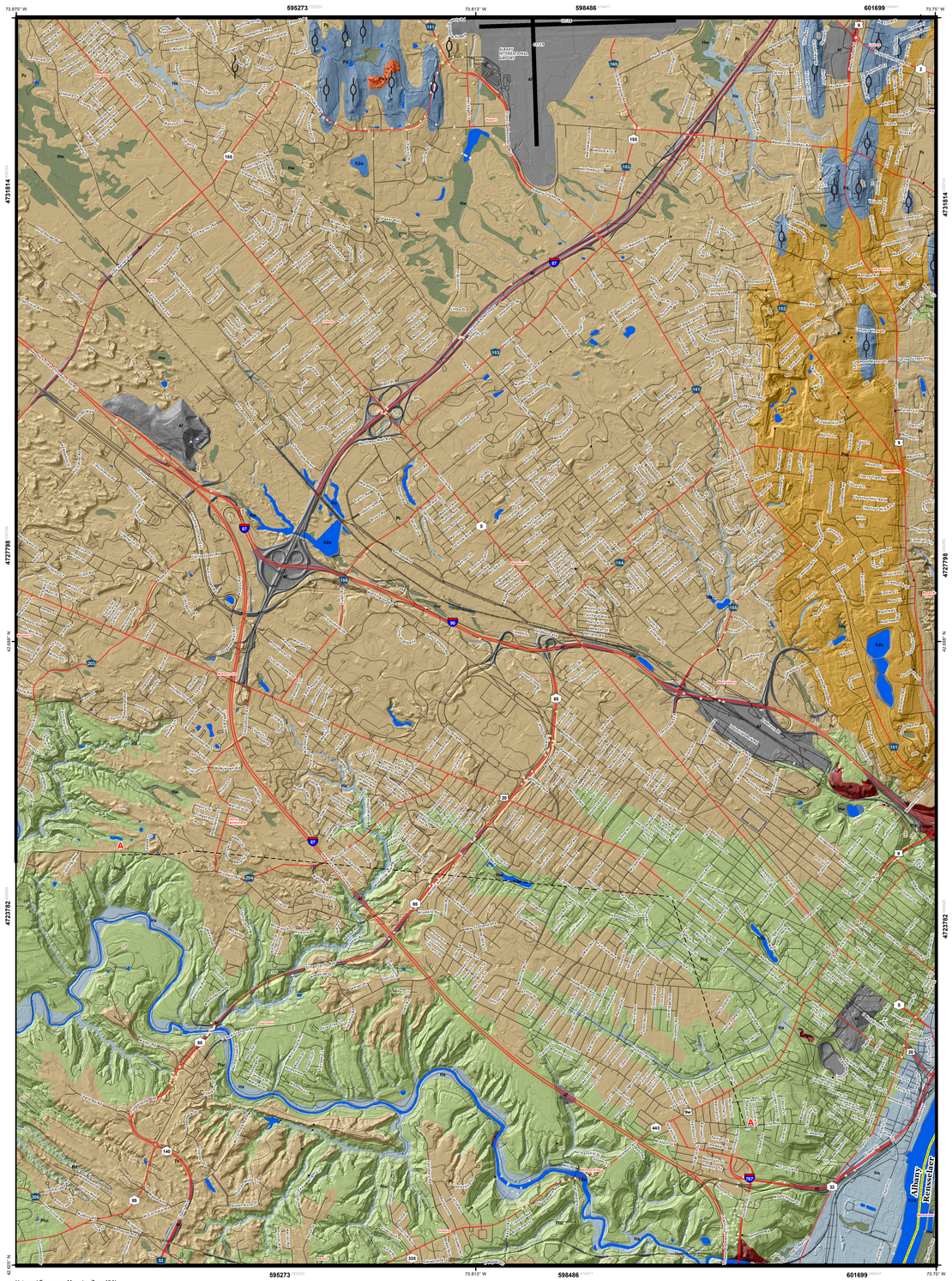
New York State Museum
Mark Schaming, Director

New York State Geological Survey



Universal Transverse Mercator, Zone 18 N
North American Datum of 1983

Hydrology, and planimetry layers from the
New York State DOT Raster Quadrangle separates for Albany
and Rensselaer Counties
(https://gis.ny.gov/gisdata/inventories/member.cfm?OrganizationID=108).
Geographic data layers from 2019 TIGER/Line shapes for transportation and
hydrogrpaphy (https://www.census.gov/cgi-bin/geo/shapefiles/index.php)

Shaded relief from Capital District 2-meter and NYS 10m DEM lidar data sets
(http://gis.ny.gov/elevation/index.cfm)

Magnetic declination from the NOAA online Declination Calculator:
http://www.ngdc.noaa.gov/geomag-web/#declination

SCALE 1:24,000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL: 10 FEET

Geologic mapping by K. Backhaus and J. Leone, 2020
Digital data and cartography, Karl J. Backhaus, 2020.

MN 17.20° 239 MILS
GN 0.48° 14 MILS

UTM GRID AND 2016 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

SURFICIAL GEOLOGY OF THE ALBANY 7.5-MINUTE QUADRANGLE, ALBANY AND RENNSELAER COUNTIES, NEW YORK

Karl J. Backhaus, Andrew L. Kozlowski, Robert J. Dineen and James R. Leone

2020

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prepared by
Karl J. Backhaus

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National Cooperative Geologic Mapping Program (STATEMAP)

INTRODUCTION:
The Albany 7.5-Minute Quadrangle was mapped as part of the 2019 National Cooperative Geologic Mapping Program funded STATEMAP project (award #G19AC00249). This quadrangle was one of eighteen partial and full quadrangles mapped as part of the Albany County Surficial Geologic mapping project being undertaken by the New York State Geological Survey. This county-wide mapping project started in 2016 and is scheduled to conclude sometime in the early to mid-2020's. The purpose of this map was to identify and delineate various surficial and geologic materials with the intent that this geologic information may serve as a guide to municipalities when making decisions regarding land use, environmental and natural resource considerations across its roughly 55 square mile area.

The Albany quadrangle is in eastern Albany County in the Capital District Region of New York State along the western shore of the Hudson River. The City of Albany, the Towns of Bethlehem, Colonie and the southwestern potion of the Village of Menands and much of the Hamlet of Latham and Loudonville are the main municipalities within the quadrangle. This portion of Albany County is mostly urban and suburban with highly industrialized areas within lower lying valleys and within most of the boundaries for the City of Albany and along the Hudson River. Suburban developments and shopping centers are found within the Town of Colonie and along the section of Interstate 87 known as the Adirondack Northway. This quadrangle is situated within the Hudson-Mohawk Lowlands physiographic province, is generally a flay-lying floodplain just above sea-level to a long North-South running ridge cut into by small tributary creeks. There is roughly 450 feet (137 meters) of elevation change between the highest peak atop a drumlin in the north-central boundary of the quadrangle at 450 feet above mean sea level (amsl) to the Hudson River 0 feet-amsl (0 meters-amsl) (figure 2). Rensselaer Lake, the Normans Kill and the Hudson River are the largest water bodies in this quadrangle.

Bedrock in the area is grey and black shales and with some sandstone interbeds that are Ordovician age (Rickard and Fisher, 1970). The bedrock in this quadrangle is highly deformed, fractured, and folded with some horizontal to vertical and angled beds. According to the Hudson-Mohawk sheet of the Geologic Map of New York State, the bedrock in the quadrangle is comprised of the Austin Glen formation and Normanskill shale. The Austin Glen formation consists of greywacke and shale and lastly the Normanskill shale is comprised of mudstones and sandstones (Rickard and Fisher, 1970).

The surficial geologic units in this quadrangle were previously mapped at 1:250,000 scale and were reported to be kame, lacustrine sand, recent deposits (alluvium), till and lacustrine silt and clays (Cadwell and Dineen, 1987). Geologic mapping at a 1:24,000 scale has previous been completed by Dineen (1976) and drafted the general distribution of sediments within the quadrangle.

METHDOLOGY:
To create the surficial geology map of the Albany quadrangle, preliminary field maps were created using the ESRI ArcMap 10.7 software and consisted of all available topographic data (roads, lidar surface terrain and hydrography) to plot all field data on including field stops, bedrock outcrops and important site information. Surficial soil sampling employed the use of a five-and-a-half-foot hand auger to allow sampling below the variably thick organic soil horizon (below the topsoil). Another tool used is an entrenching shovel and pick. This tool was used to remove topsoil and/or eroded sediments from outcrops or exposures to expose fresh sediments for analysis. At each field stop, the coordinates (latitude and longitude in decimal degrees) were taken using a Garmin GPS 66st, descriptive notes on the sediment found, whether a sample and/or a high-resolution, scaled photo were taken, and the time at which the stop was taken were logged into a field notebook (TPK_FN7).

At most of the field sampling sites, a soil sample was taken for grain-size analysis and processed using either wet sieve or dry sieve methods, following the procedure outlined by Bowles (1978). The predominantly cohesive (fine-grain dominant) samples were sorted using the wet-sieve analysis, while the cohesionless (coarse-grain dominant) samples were sorted using the dry-sieve analysis.

The final surficial geologic map, cross-section and elevation maps were produced using the ESRI ArcMap and Adobe Illustrator CS6 programs. The subsurface and surface units were compiled using 39 water wells and 15 Oil and Gas wells from the New York State Department of Environmental Conservation, 284 engineering boreholes by the New York State Department of Transportation and 41 engineering boreholes from the New York State Thruway Authority. The cross-sections were created in ArcMap using the XArco Cross-section 10 tool developed by Jennifer Carell, formerly of the Illinois Geologic Survey, and then exporting the cross-section into Adobe Illustrator to connect the stratigraphic units. The surficial geologic map was created by producing polygons to digitize the map in ArcMap and its symbol was colored according to its respective RGB color value in the NYSGS Surficial Geologic Unit Legend. The final map was drafted in Adobe Illustrator and exported as a PDF file.

RESULTS:
A total of 44 field stops were taken, with 19 samples for grain-size analysis within the quadrangle. Some stops contained more than one sample as they exhibited stratigraphy either in an exposure or at depth with the hand-auger. The final count for lithologies found during field sampling was: 18 were sand, 12 were sand and gravel, seven were glaciolacustrine sediment, three were diamicton, three were bedrock and one stop for artificial fill. The surficial geologic units found within the quadrangle are as follows:

Artificial Fill (Af)
This unit is generally composed of coarse/fine, large cement mounds and/or crushed rock anthropogenically transported and used for construction purposes. This material is used in artificial dams, airport runways built to retain water, large, raised roadbeds for bridges and former factory/railroad shops within the quadrangle.

Holocene Alluvium (Ha) and Holocene Wetland Deposits (Hw)
Post glacial sediments occupy the low areas or land depression throughout the quadrangle. Ha is associated with fluvial process in creek valleys and on the Hudson River floodplain throughout the quadrangle. This lithology generally consists of stratified silt, sand, and gravel. Hw is associated with low areas and depressions in the highlands of the quadrangle where wetlands form due to poor drainage. This lithology consists of peat, marl, clay or sand in these areas of poor drainage.

Pleistocene Silt and Clay (Plsc)
Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deep-water settings of glacial lakes. May include marl, rhythmites, and varves. Plsc is found in both the lowlands of the Hudson River floodplain and draped across bedrock and diamicton along the Normanskill valley in the southern half of the quadrangle.

Pleistocene Sand (Ps)
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments. Well-sorted sand deposits were observed down-slope from deposits of coarser sand and gravel deposits (Psg), likely due to a decrease in energy during deposition. Ps is found at elevations higher than and overlies the Plsc deposits and represents former beach fronts, deltaic deposits or dunes that activated during or after the drainage of glacial lakes. A large concentration of Ps is found in the Albany-Schenectady sand plain, most notoriously within the Pine Barrens of the Albany Pine Bush Preserve.

Pleistocene Sand and Gravel (Psg)
Characterized as well-sorted and stratified sand and gravel this unit is interpreted to be deposited by glacial meltwater at or very near the glacier and can be found several meters in elevation higher than the present-day river valley floors. Psg is found in small pockets between drumlins in the northwest corner of the quadrangle and as a small sliver atop the N-S ridge along the western boundary of the quadrangle.

Pleistocene Cobbles to Sand (Pics)
Stratified ice contacted deposits, variable coarse-grained sediment consisting of boulders to sand size particles. Inferred to be deposited with stagnant ice in the form of sand and gravel hummocks the north-central boundary line as an ice-contact deposit.

Pleistocene Diamicton (Pd)
This unit is a mixture of sediment grains that range from clay to boulders in size. In this quadrangle, all diamicton is interpreted to be glacial till, sediment deposited directly beneath the glacier. It is generally matrix supported, sand-dominant, and blue to purple brown in color. Diamicton makes up the drumlins and is found outcropping in creek beds to the north and east.

SUMMARY AND CONCLUSIONS:
The lithologic units distributed across the map area are influenced by a full glacial cycle within the confines of a single quadrangle. Diamicton (Pd), which is generally deposited in a subglacial environment at the base of a ice sheet, is found along the northern and eastern boundaries of the quadrangle as drumlins. These N-S trending drumlins were deposited beneath the advancing and/or retreating Hudson Lobe that advanced through this area from the Hudson/Champlain Valleys (Dineen and Hanson, 1983). Upon the retreat of the Hudson Lobe, coarse-grained sediment (Plcs) was deposited at high elevations atop the drumlins in the north-central portion of the quadrangle representing a kame moraine. These deposits contain boulders to medium sand in grain-sizes and were generally poorly sorted. This deposit represents the only ice-marginal position within the quadrangle. Meltwater from the retreating Hudson Lobe deposited sand and gravel (Psg) deposits along highlands within the quadrangle where high-energy flows close to the ice margin could escape.

SUMMARY AND CONCLUSIONS: Continued...

While the Hudson Lobe was retreating within this region, areas to the south that were previously glaciated began to rise due to isostatic rebound with the loss of the weight of the ice sheet. This rebound begin damming meltwater flows from the north and formed Glacial Lake Albany (Desimone, et. al., 2008). Fine-grained sediment settled out in the lower energy setting of the glacial lake and formed deposits of glaciolacustrine silts and clays (Plsc) atop bedrock, diamicton and generally within preglacial river channels. There were multiple stages of Glacial Lake Albany and at each of these depths, beach sand and sands and gravels were deposited above the lake levels, which was at its highest at 360 feet-amsl. (Dineen and Hanson, 1983). After retreat of the glacial lake, prevailing northwest winds deposited aeolian sands across the former lakebed and formed the Albany-Schenectady sand plain (Dineen, 1982; Stefank, et. al., 2011). The aeolian sand formed dunes by remobilizing previously deposited medium to fine sand (Ps) into dunes. This sand plain makes up much of the quadrangle and overlies diamicton, glaciolacustrine silts and clays, ice-contact deposits and beach sands and gravels.

Over time, the isostatic rebound caused the land to rise northward in this area as the Hudson Lobe retreated further north. With the retreat of the ice sheet and the drop in base level associated with the drainage of Lake Albany the Normans Kill began to incised the valley into the floor of former lake Albany, forming the modern Normans Kill Valley. Deposits within this valley have undergone immense deformation due to erosion and remobilization caused by landslides (rotational failures) since their deposition. These rotational failures and fluvial processes have eroded out sediments and exposed the Normanskill shale within the Normans Kill Valley, with its largest exposure directly beneath the NYS Route 32 bridge in Albany. Many industries in the areas have remobilized or even removed the surficial sediment from the area for grading and building commercial and residential areas and structures, thus creating areas of artificial fill (Af) throughout the quadrangle. Vast areas of wetlands (Hw) have formed within the sand plain since the deposition of the aeolian sands and some silts due to their proximity between these dunes throughout the quadrangle. Downcutting by streams have deposited vast areas of alluvium (Ha) from previously deposited sediments throughout the quadrangle, the largest of which can be found within the Normans Kill Valley and the vast floodplain of the Hudson River.

Lastly, future mapping in this area could determine if there are any deposits of diamicton within the entirety of the Normans Kill Valley and where the exact bedrock/glaciolacustrine contact is under the I-90/NYS Route 32 bridges.

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DESCRIPTION OF MAP UNITS

Holocene

Af — **Artifical Fill (Af)**
Surficial sediment composed of coarse/fine and or crushed rock anthropogenically transported and used for construction purposes.

Ha — **Stratified silt, sand and gravel (Ha)**
Sorted and stratified silt, sand, and gravel, deposited by rivers and streams. May include cobbles and boulders. Inferred as post-glaical alluvium and includes modern channel, over-bank and fan deposits

Hw — **Wetland Deposit (Hw)**
Peat, muck, marl, silt, clay or sand deposited in association with wetland environments. Various sediments can be present at transitional boundaries from one facies to another

Pleistocene

Plsc — **Silt and Clay (Psc)**
Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deepwater settings of glacial lakes. May include marl, rythmites, and varves.

Ps — **Stratified Sand (Ps)**
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments.

Pics — **Cobbles to Sand (Pics)**
Stratified ice contacted deposits, variable coarse-grained sediment consisting of boulders to sand size particles. Inferred to be deposited along an ice-margin. May include, interbedded coarse lenses of gravel and clast supported diamictons (flow tills).

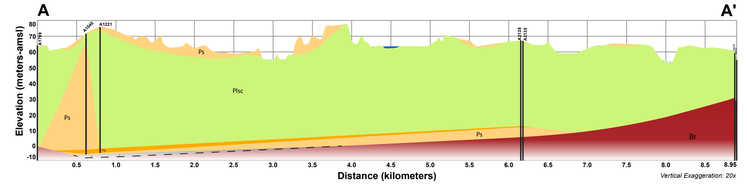
Psg — **Stratified sand and gravel (Psg)**
Well-sorted and stratified sand and gravel. May include cobbles and boulders. Inferred to be delta, fan or lag deposits in glacial channels or near ice margins.

Pd — **Diamicton (Pd)**
An admixture of unsorted sediment ranging from clay to boulders. Generally matrix supported, massive and clast-rich.

Pre-Pleistocene

Br — **Bedrock (Br)**
Non-glacially derived, rock, pre-Pleistocene in age. Areas mapped as bedrock may have up to a meter of glacial drift (till, sand, silt) mantling the rock surface in some locations.

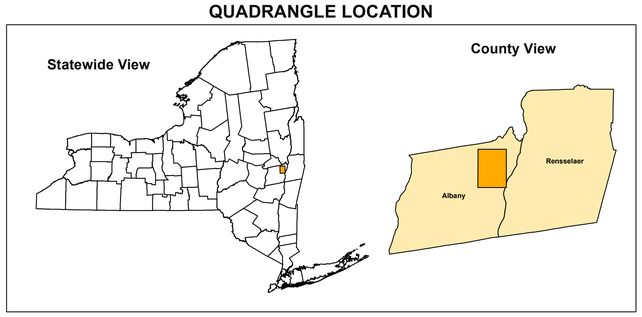
CROSS-SECTION A-A'



SYMBOLS

- Streets
- Highways
- Railroads
- Airport Runway
- County Line
- Water Bodies
- Streams
- Contours
- Cross-Section Line
- NYSGS Soil Sample Location
- NYSGS Borehole Location
- NYSDEC Water Well Location
- NYSDOT Boring Location
- NYSDEC Oil & Gas Well Location
- NYS Thruway Boring Location
- Drumlins
- Ice Margin

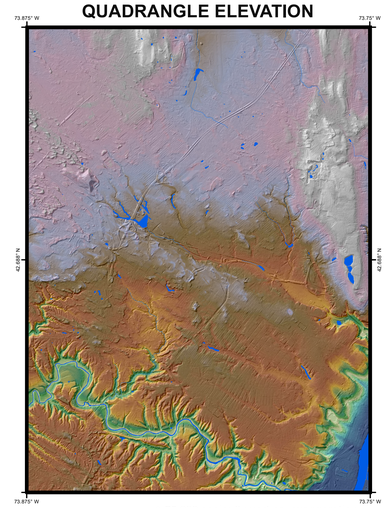
QUADRANGLE LOCATION



ADJOINING QUADRANGLES

Schenectady	Niskayuna	Troy North
Voorheesville	**Albany**	Troy South
Clarksville	Delmar	East Greenbush

QUADRANGLE ELEVATION



Feet-amsl
0 — 450

1:75,000 scale; 2x vertical exaggeration

Shaded relief generated from Capital District 2-meter and the 2000 NYS 10-meter lidar data sets.

New York State Museum Map & Chart No. 128

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