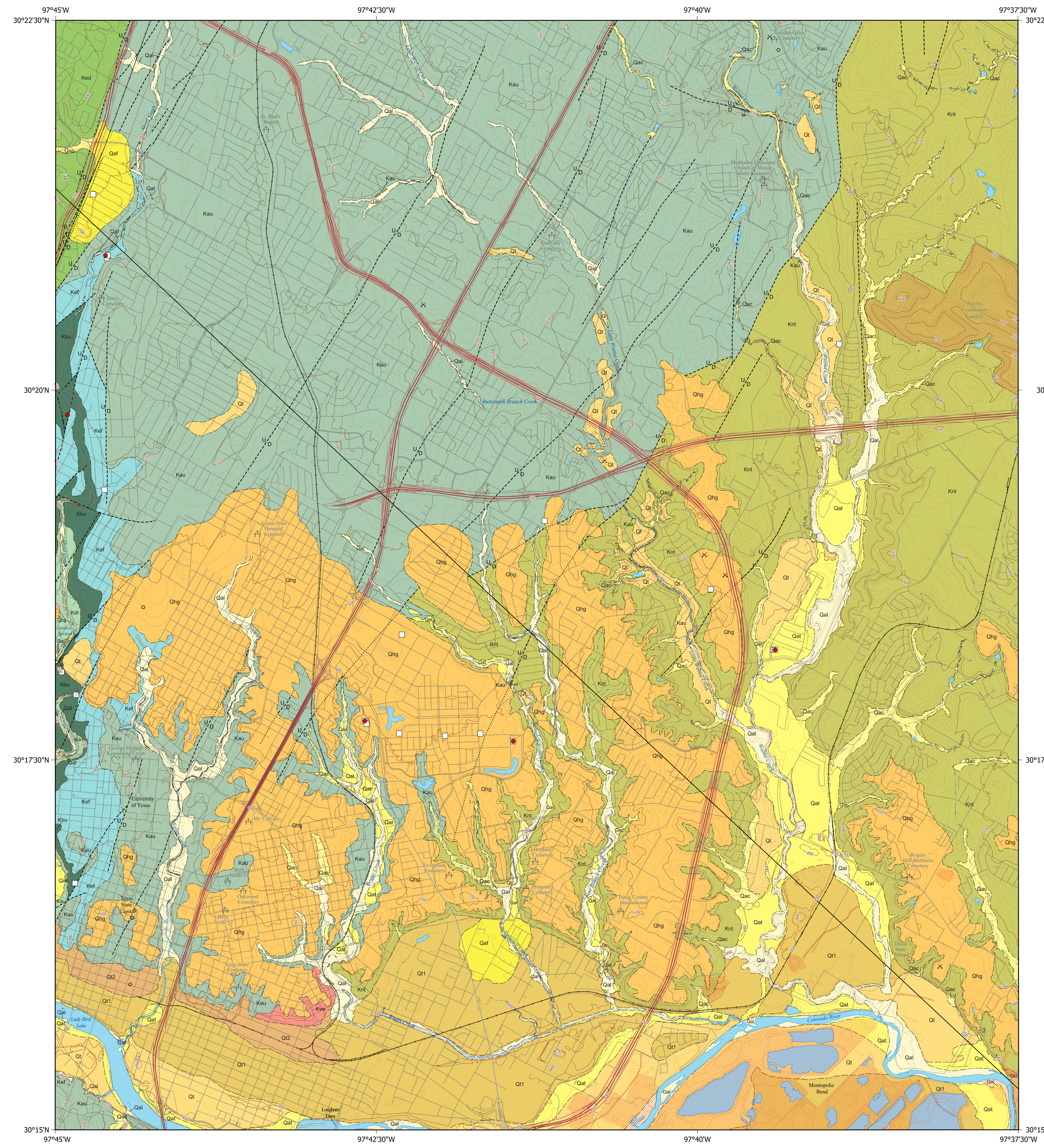
BUREAU OF ECONOMIC GEOLOGY
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THE UNIVERSITY OF TEXAS AT AUSTIN

In cooperation with the State of Texas Advanced Resource Recovery (STARR) Program and the U.S. Geological Survey National Cooperative Geologic Mapping Program under STATEMAP award number G24AC00508, 2024



BEDROCK UNITS

QUATERNARY

Unit	Description
Qal	**Qal—Quaternary alluvium**: Areas of active sedimentation and recurrent overbank deposition of channels and adjacent floodplains, along the Colorado River and tributary stream courses. These deposits comprise unconsolidated sand, gravel, silt, and clay, and may also include dark brown clay-loam soil cover approximately 3 ft thick.
Qac	**Qac—Quaternary alluvium and colluvium**: Stream channel and floodplain deposits along valley bottoms and adjacent slope-wash and colluvial deposits from valley sides; these processes are mainly expressed as narrow, elongated headwater drainageways with concave-upward cross sections. Materials consist of unconsolidated silt, clay, and some admixed gravel with local bedrock exposures along cut banks of streams; thicknesses are estimated to range from 5 to 15 ft.
Qaf	**Qaf—Quaternary alluvial fan**: Wedge of alluvium and colluvium comprised of sand, silt, clay, and gravel sediments; deposited in a fan-shape from a point source by streams leaving a confined channel course and entering an unconfined environment, like a valley plain or a flat, broad fluvial terrace.
Qat	**Qat—Quaternary alluvium and terrace**: Low-lying alluvium deposits adjacent and slightly elevated from active channel reaches (Qal); includes channel, over-bank (floodplain) deposits and adjacent low flat-lying alluvial terraces that may receive occasional active sedimentation, and includes scroll bars where ridge and swale topography is visible on DEM. This unit is composed of unconsolidated sand, gravel, silt, and clay, which may periodically be reworked by active meandering of the Colorado River and south-flowing tributaries or drainages. Estimated thickness ranges from 10 ft to 20 ft thick. The unit may include dark brown clay-loam soil cover, 3-6 ft thick.
Qt	**Qt—Quaternary alluvial terrace, undivided**: Sand, gravel, silt, and clay, unconsolidated to weakly cemented by caliche; low-relief, relatively flat and gently sloping terrain elevated above active floodplain/channel units (Qal and Qat); commonly includes dark brown clay-loam soil 3-6 ft thick. This unit includes low terrace deposits of the Colorado River, and undivided terraces along streams and tributaries on the Austin East Quadrangle. Along the Colorado River floodplain scrolls/swales are seen as soil-filled features visible on aerial imagery and DEM with muted topographic expression and relief up to about 10 ft; total thickness of map unit ranges up to 60 ft estimated from drillers logs on the Colorado River terraces. Elevated up to 35 ft from river.
Qt1	**Qt1—Quaternary terrace 1**: Sand, gravel, silt, and clay, unconsolidated to weakly cemented by caliche; distinct terrace level with eroded and sloped edges of upland surface; may be vegetated with presence of post oaks, common to terrace deposits (Hill, 1901); elevated up to 55 ft above the modern Colorado River channel.
Qt2	**Qt2—Quaternary terrace 2**: Sand, gravel, silt, and clay, unconsolidated to weakly cemented by caliche; distinct terrace level with eroded, sloped and dissected edges of upland surface; may be vegetated with presence of post oaks, common to terrace deposits (Hill, 1901); elevated up to 65 ft above the modern Colorado River channel.
Qhg	**Qhg—Quaternary high alluvial gravel**: Admixed gravel, silt and clay; poorly sorted and loosely consolidated to weakly cemented by caliche. Gravel clasts consist of chert, vein quartz, and limestone pebbles and cobbles derived from uplands of the Hill Country, Edwards Plateau, Llano Uplift, and beyond. Soil cover consists of stony clay, but slope wash of soil and poorly consolidated substrate obscures contacts. The gravel substrate may provide shallow (perched) groundwater resources as well as local aggregate for road metal. otal thickness is highly variable and estimated to be as much as 40 ft thick or more in the Mueller development (the former site of the Austin airport).

CRETACEOUS

Unit	Description
Knt	**Ktn—Taylor/Navarro Groups, undivided**: The dominant constituent of this unit (which consists only of Taylor Group within the boundaries of the Austin East quadrangle) is claystone with variable calcareous content, and local thin siltstone partings. Constituent formations include the Sprinkle Clay, the Pecan Gap chalk (probably more aptly termed "marl") and Bergstrom Formation. These members are difficult to distinguish, owing to poor exposures and overall similarities of substrate properties. Within the Austin area, the combined units that contain the Taylor/Navarro Groups comprise more than 1,200 ft of substrate beneath the Blackland Prairie terrain (Barnes, 1974; Young, 1977). This stratigraphic sequence represents open-marine environments that received long-term influx of volcanic ash along with terrigenous clay weathered from marine muds transported from the continental uplands. Volcanic ash deposits are altered to form montmorillonite, which is the main type of clay minerals common to this unit. These substrates and their weathered surface soils are notorious for engineering problems (low strength, high shrink-swell, low permeability, high erodibility, and high corrosion potential). Thick, dark-brown clay soils, 6 to 9-ft thick constitute prime agricultural land, typical of the Blackland Prairies of Central Texas.
Kau	**Kau—Austin Group, undivided.** This unit comprises parts of seven formations that consist mostly of earthy, compact limestone, local chalk intervals, and marly horizons. Units include Atco Formation, Vinson Chalk, Jonah Formation, Dessau Chalk, the combined Burditt and Pflugerville Formations, and the McKown Member that forms an atoll of durable limestone along the flanks of Pilot Knob volcano (Young and Woodruff, 1985). This undivided unit covers more than half the Austin East Quadrangle if the unit's subcrop area beneath the Quaternary high gravels is included. Otherwise, the Austin Group makes up roughly one-third of the map area. Those bedrock units typically comprise chalky limestone that is fairly easily excavated but is a stable foundation material. It is locally interbedded by weathered intervals of volcanic ash. This area of the map is cut by several faults of the Balcones system such that an undisturbed section of bedrock is difficult to ascertain. Estimated thickness of the Austin Group plus the interbedded volcanic ash deposits is approximately up to 400 ft in this area.
Kva	**Kva—Pilot Knob Ash**: This complex includes the ash deposits and local explosive vents derived from the Pilot Knob marine volcano. Thicknesses are highly variable. The altered deposits of volcanic ash (Kva) form low-lying landscapes that are readily sculpted by surface streams. The material is weak and exhibits moderate plasticity. Surficial soils are typically thick and are amenable to cultivation.
Kef	**Kef—Eagle Ford Formation**: This map unit consists of highly plastic clay, stiff clay shale with calcareous partings, and an interval of limestone flags interbedded with bentonitic clay. The unit consists of four informal members: Pepper Shale (unctuous clay considered by Young, 1977 as "the least stable rock unit in Texas"); Cloice Member, Bouldin Flags, and South Bosque Member. otal thickness is approximately 37 ft.
Kbu	**Kbu—Buda Limestone.** This unit ranges in thickness between 25 ft of resistant limestone that composes the upper part of the stratigraphic section, and which overlies about 20 to 30 ft of nodular, friable "marly" limestone. The unit exhibits good foundation stability except on slopes where clays of the underlying Del Rio Formation are eroded to undermine the overlying limestone section.
Kdr	**Kdr—Del Rio Clay:** This unit consists of about 75 ft of highly plastic claystone that exhibits low strength, high shrink-swell, high corrosion potential, and high erodibility. Slope stability problems are especially daunting where overlying Buda Limestone is undercut on sloping ground.
Ked	**Ked—Edwards Limestone:** This prominent unit consists of extensive outcrops of resistant (locally friable) limestone and dolomitic strata that may be dissolved to form karst openings, thus providing significant porosity for the Edwards aquifer. South of the Colorado River in the Austin area the unit is subdivided into two members: The basal Kainer Formation and the overlying Person Formation. Combined thickness in west Austin is about 350 ft.

MAP SYMBOLS

(Not all map symbols may appear on this sheet)

- Water: river, ponds, and water-filled excavated pits
- Engineered waterway: includes streams with artificially stabilized banks, cemented drainages, or excavated and stabilized ditches rerouting stream courses
- Dam
- Disturbed land: significant change to surface topography; includes grading, excavation and mining pits and tailing piles
- Contact (distinct)
- Contact (approximate)
- Fault (distinct)
- Fault (inferred)
- Fault (concealed)
- Stream (intermittent)
- Fluvial escarpments: A steep slope or cut bank created by fluvial processes
- Elevation (ft); contour interval 10 ft.
- Roads
- Railroad
- A——A′ Cross-section line
- Expressway
- Local Road
- Secondary Highway
- Parks: city, county, and state park boundaries of geologic interest, and cemetery boundaries
- Cemetery
- Time-domain electromagnetic sounding
- Passive seismic measurement
- Strike and dip
- Spring
- Abandoned Gravel Pit
- State Water Well

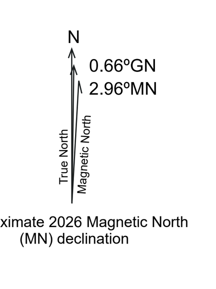
Period	Epoch	Time (ka)	Map Units	Formation, Group, or Division	
Quaternary	Holocene	0	Qal	Alluvium	Surficial deposits
			Qac	Alluvium and colluvium	
			Qat	Alluvium and terrace	
			Qt	Alluviual terrace	
			Qt1	Alluvial terrace complex 1	
		~12	Qt2	Alluvial terrace complex 2	
	Pleistocene	~2,600	Qhg	High alluvial gravel	
Cretaceous	Upper	~66	Knt	Taylor-Navarro Groups, undivided	Bedrock units
			Kau	Austin Group, undivided	
			Kva	Pilot Knob Tuff	
			Kef	Eagle Ford	
			Kbu	Buda	
		~100	Kdr	Del Rio	
	Lower	~143	Ked	Edwards Group	

SCALE 1:24,000

0 1 2 3 KILOMETERS

0 1 2 3 MILES

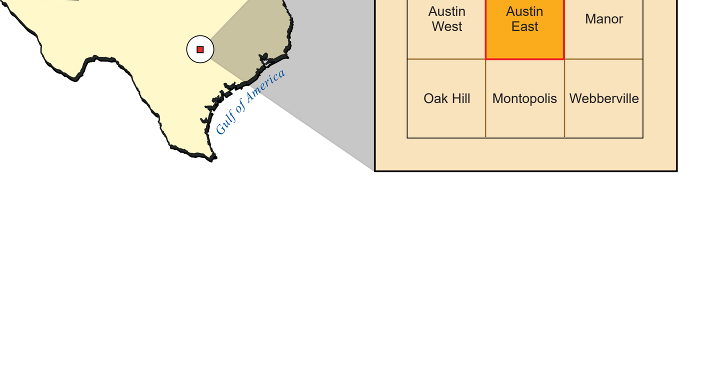
UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14N NAD 83
CONTOUR INTERVAL 10 FEET



Approximate 2026 Magnetic North (MN) declination

GEOLOGIC MAP OF THE AUSTIN EAST QUADRANGLE, TRAVIS COUNTY, TEXAS

Jennifer N. Morris, Charles M. Woodruff, Jr., and Benjamin A. Grunau
2025



REFERENCES

Barnes, V. E., Project Director, 1974, Austin Sheet: The University of Texas at Austin, Bureau of Economic Geology Geologic Atlas of Texas Austin Sheet, text to accompany map--reprinted 1995, map scale = 1:250,000.

Collins, E.W., 2008, Geologic map of the southeast part of the Austin, Texas, 30x60 Minute quadrangle; Central Texas population corridor encompassing Bastrop and Smithville: University of Texas at Austin, Bureau of Economic Geology, Miscellaneous Map No. 47, scale 1:100,000

Garner, L. E., and Young, K. P., 1976, Environmental geology of the Austin area: an aid to urban planning: The University of Texas at Austin, Bureau of Economic Geology, Report of Investigations No. 86, 39 p.

Garner, L. E., Young, K. P., Rodda, P. U., Dawe, G. L., and Rogers, M. A., 1976, Geologic map of the Austin area, Texas, in Garner, L. E., and Young, K. P., Environmental geology of the Austin area: an aid to urban planning: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 86, plate VII, scale 1:62,500.

Hill, R.T., 1901, Geography and geology of the Black and Grand Prairies, Texas: U.S. Geologic Survey, Twenty-First Annual Report, Part VII – Texas, 666 p.

Hill, R.T., and Vaughn, T.W., 1902, Austin Folio, Texas: U.S. Geological Survey, Geological atlas of the United States, Folio 76, Topographic map scale 1:125,000 (surveyed in 1894-1895)

Young, Keith, 1977, Rocks of the Austin area, in Student Geology Society, The University of Texas (Austin), Guidebook to the geology of Travis County, p. 52-67.

Young, Keith, 1972, Mesozoic History, Llano Region, p 41-46 in: Barnes, V.E., Bell, W.C., Clabaugh, S.E., Cloud, P.E., Jr., McGehee, R.V., Rodda, P.U., and Young, Keith: Geology of the Llano region and Austin area; Field Excursion, Guidebook Number 13, Bureau of Economic Geology, The University of Texas at Austin, 77 p.

Young, Keith and Woodruff, C.M., Jr., 1985, Austin Chalk in its type area—Stratigraphy and structure: Austin Geological Society, Guidebook 7, 88 p.

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The mapping of this quadrangle entailed analyses of aerial photographs, digital elevation models (DEMs), review of existing geologic maps, and field work. DEMs (at 1 m resolution) derived from lidar coverage of the quadrangle were obtained from the U.S. Geological Survey (USGS) of 2017 vintage. The topographic base (including elevation contours, roads, and railroads) was created from digital GIS files of the 2022 Austin East, Texas, 7.5-minute topographic quadrangle map, from the U.S. Geological Survey. Aerial photography included 0.6-m pixel, natural color, National Agriculture Imagery Program (NAIP) digital imagery from the Texas Natural Resources Information System (TNRIS) of 2024, 2022, and 2020 vintage, as well as digital historical imagery from 1940, 1958, 1987, and 1997 from the City of Austin.

This mapping included field observations of surficial deposits and outcrops, and collection of passive seismic and time-domain electromagnetic induction (TDEM) soundings Drillers logs, water wells, and petroleum-exploration wells available from the Texas Water Development Board (TWDB) online data bases provided information on depth and thickness of various units. Streams, river-shorelines and other waterbodies were mapped from NAIP 2024 aerial imagery. Cemetery locations were obtained from the Texas Historical Commission.

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