

KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 95-76

Self-guided Geology Field Trips in the

Topeka Area

by

Will Gilliland

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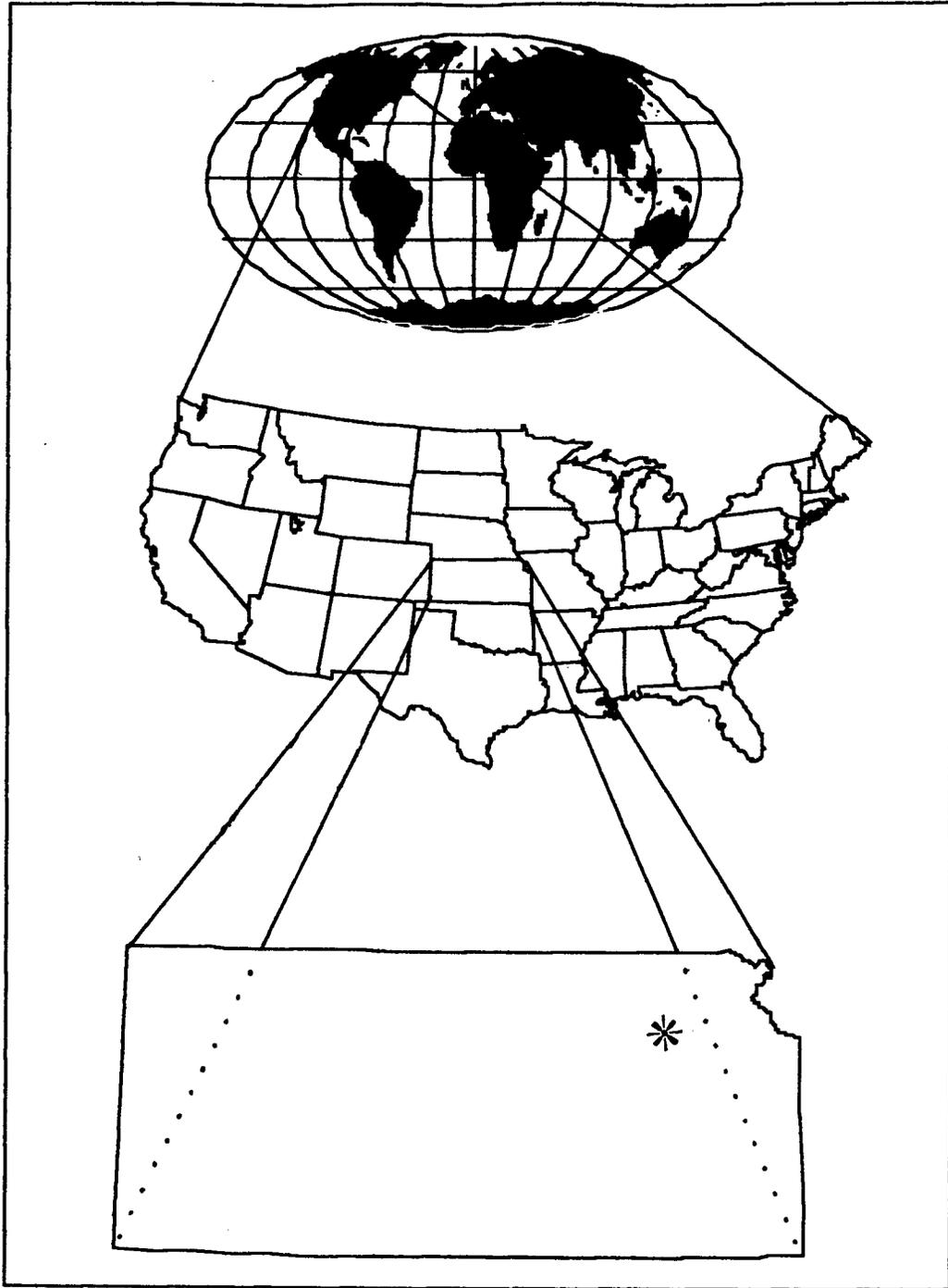
KANSAS GEOLOGICAL SURVEY

1930 Constant Avenue

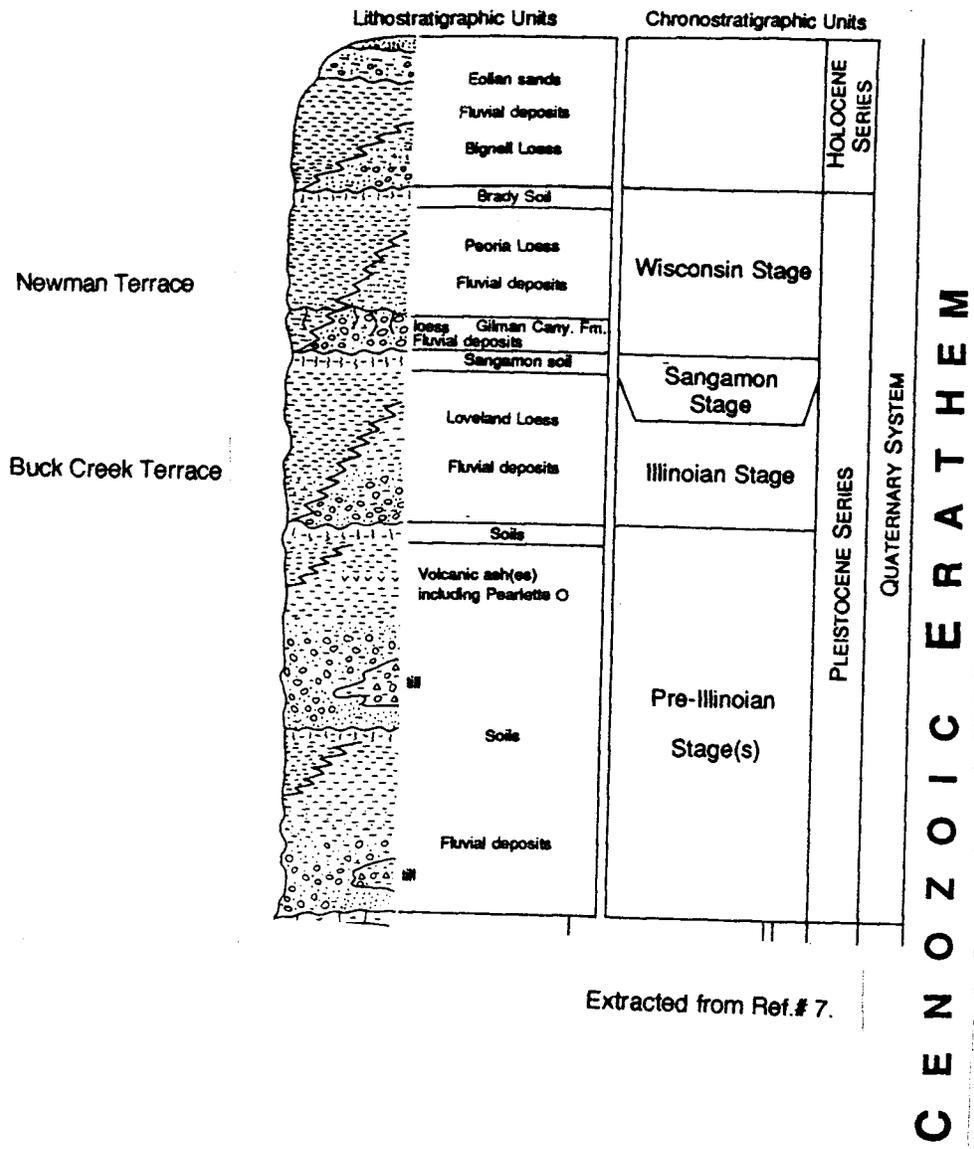
University of Kansas

Lawrence, KS 66047

EARTH REVEALED



SELF-GUIDED
GEOLOGY
FIELD
TRIPS
IN THE
TOPEKA
AREA



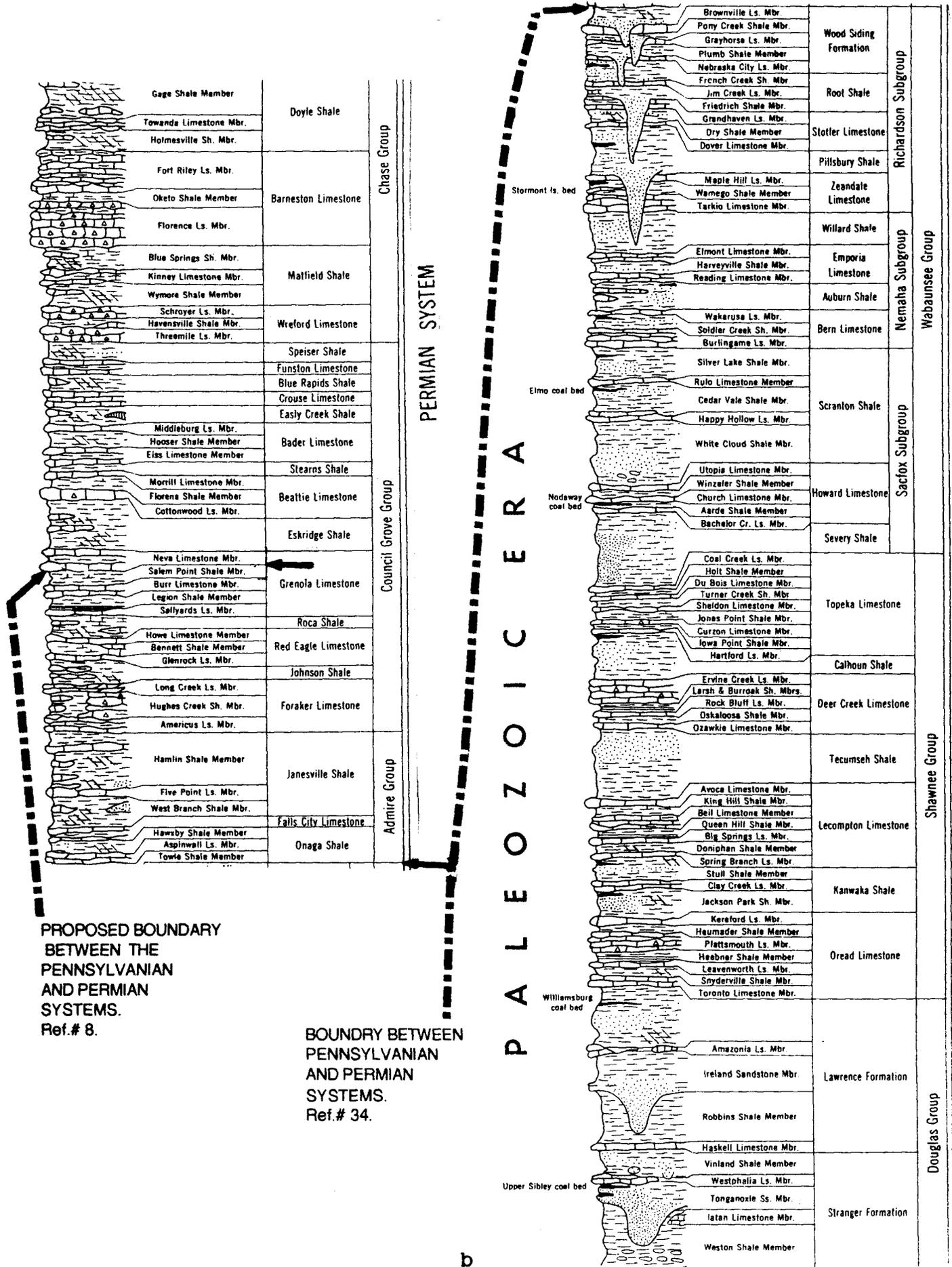
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EXPLANATION

- | | | | |
|--|--|---|---|
|  Reddish color (used as overlay on other symbols) |  Black shale |  Bentonite |  Dolomitic limestone |
|  Soil |  Calcareous shale |  Opaline sandstone |  Dolomite |
|  Unconsolidated silt and clay |  Chalk |  Limestone |  Cherty dolomite |
|  Sand and gravel, conglomerate, or "mortar beds" |  Shale with concretions |  Cross-bedded limestone |  Shaly dolomite |
|  Sandstone or sand |  Glaucinite |  Oolitic limestone |  Sandy dolomite |
|  Undifferentiated sandstone or siltstone |  Underclay |  Cherty limestone |  Gypsum or anhydrite |
|  Siltstone |  Coal or lignite |  Shaly limestone |  Salt |
|  Cross-bedded sandstone or siltstone |  Volcanic ash |  Sandy limestone |  Igneous and metamorphic rocks |
|  Shale or claystone |  Unconformity | | |
- a

Drafted by Sharon Hagen and Larry Hensiek

Extracted from Ref. # 34.



PROPOSED BOUNDARY
BETWEEN THE
PENNSYLVANIAN
AND PERMIAN
SYSTEMS.
Ref. # 8.

BOUNDARY BETWEEN
PENNSYLVANIAN
AND PERMIAN
SYSTEMS.
Ref. # 34.

b

Introduction:

This set of seven self-guided geology field trips was produced as a supplement to the Washburn University, Department of Physics and Astronomy, Educational Television Course, Earth Revealed, Fall Semester, 1995. It is a revision and expansion of three such field trips developed to supplement the same course in 1992.

Students enrolled in the Earth Revealed course are not required to take these trips. However, the trips do provide additional information about the geology of Topeka and the surrounding area.

References used to develop each field trip are listed, by number, at the end of the field trip. These numbers refer to the alphabetical, by author, list of references at the end of the field trip guide. If you wish more information on the geology or history of the field trip area, use these references as a starting point.

To reduce the over all length of the text, I have used the following abbreviations for the names of formations and members: Formation, Fm.; Member, Mbr.; Limestone, Ls.; Shale, Sh.; & Sandstone, Ss. The Stratigraphic Column can be used to keep track of the position of the many rock units, and their relative ages.

If you do collect any specimens, be sure to obtain permission before entering any privately owned land and check to make sure there are no restrictions on collection on specific public lands. I have been informed that on interstate highways, stopping on the highway or shoulder is limited to emergency only.

ACKNOWLEDGMENTS:

I would like to thank the following individuals for their assistance in the development of these field trips:

James Gilliland for his assistance in the development of the first trips in 1992.

Doug Helmke, Brent Turney, Bob Dennis, Brett Bunger, Ken Kopp, & Mark Jennings, Environmental Scientists, Division of Water Resources, Kansas Department of Agriculture, for their suggestions, corrections, and proofreading of the various drafts.

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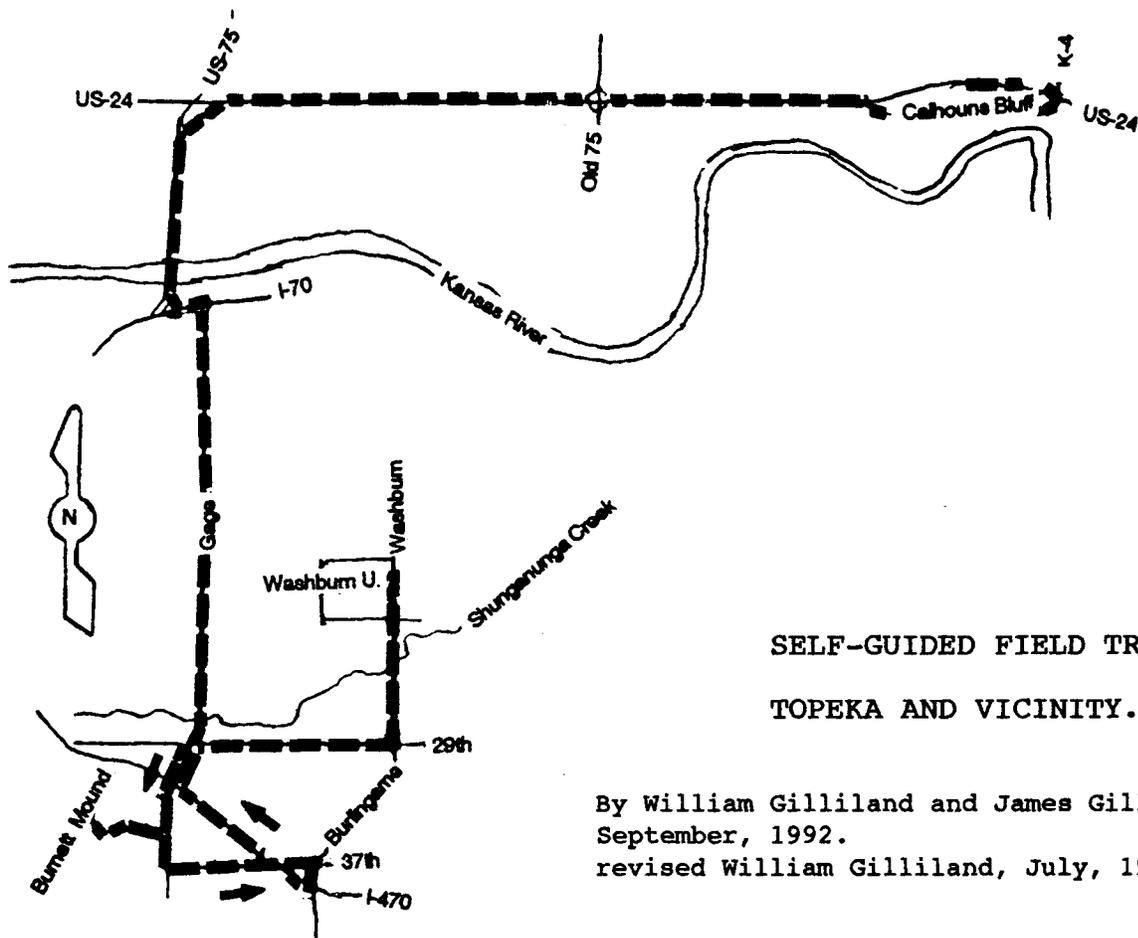
Dr. Darrell Parnell, Chairman, Department of Physics and Astronomy, Washburn University for his support and encouragement.

Any errors that you find are my responsibility, as author, and I would appreciate being informed of such errors.

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SELF-GUIDED FIELD TRIP 1
TOPEKA AND VICINITY.

By William Gilliland and James Gilliland,
September, 1992.
revised William Gilliland, July, 1995.

The starting point is located in the parking lot south of Stoffer Hall, Washburn University. The parking lot is constructed at the contact between the Pennsylvanian Period, Severy Shale Formation, and the material transported into the area by the Quaternary Period, Kansan Glaciers. The hill to the west and north of this area is covered with "glacial drift," while the slopes to the south and east are shale bedrock.

Look around the campus and see if you can spot the distinctive pink-red-purple boulders of "Sioux Quartzite." The surface exposures of this Precambrian Age rock are to be found in southeastern South Dakota, northwestern Iowa, Minnesota and adjoining states. These large boulders were transported from those sources to northeastern Kansas by the continental glaciers.

Trip miles

- 0.0 Stoffer Hall parking lot, turn east (left).
- 0.1 Washburn Ave. turn south (right).
- 0.7 Tributary to Shunganunga Creek. Shunga Glen Park is located on the Newman Terrace.
- 0.9 Shunganunga Creek. The Shunga Trail now crosses under the bridge. This bike and hiking trail extends from west of Fairlawn Rd. to Topeka Ave., with plans to extend it on to the east part of Topeka. The steep banks of the creek indicate that stream is currently cutting downward.
- 1.3 Watch for large Sioux Quartzite erratic on the right.
- 1.5 29th St., turn west (right). These hills are composed of the |Scranton Sh. Fm.
|Howard Ls. Fm.
- 2.1 Sunnymede Ct. Big Shunga Park on north (right)
Note the meander scars or low areas winding across the park. This was the course of Shunganunga Creek some time before 1950, when the USGS Topeka Quadrangle Topographic Map was printed. The weathering processes and mass wasting has reduced the old stream channel to the present gently sloped low areas.
- 2.3 South Branch Shunganunga Creek. The Brookwood Plaza on Newman Terrace.

- 2.5 Oakley Ave. The hill ahead of you is composed of glacial drift piled on top of the Pennsylvanian Age bedrock.
- 2.7 The buildings on the north side of 29th were built on gravel pits that were one of the best places to look for Lake Superior Agates in the area. Watch for glacial erratics used for landscaping on the right. The buildings ahead of you on the south side replace those destroyed by the 1966 tornado, which crossed this area heading toward Washburn University.
- 3.0 Gage Blvd. Turn southwest (left). You are in luck, the reconstruction of this part of Gage Blvd. is now complete. You are driving on Scranton Sh.Fm.
- 3.5 I-470.
- 3.8 35th St. Turn west (right). You are now driving up through the Scranton Sh.Fm.
- 4.1 Skyline Dr. Turn west (right).
- 4.2 Skyline Park entrance, turn south (left). Follow the road around to the north parking area. Watch for the storm cellar on the left side. It is for protection of the "Storm Watchers," one of whom was caught in the 1966 tornado.
- 4.8 Parking lot, Burnett Mound, older name Knox's Knob.
This parking lot is located on top of a 5 million gallon storage tank for the Topeka city water system. It is connected to another 5 million gallon steel storage tank, at the same elevation, on the north face of the mound. They help to supply the southwestern part of the city with water and to maintain the pressure in the system. Walk to the top of Burnett Mound and look at how the city of Topeka has spread all around this high point. There are even new houses on the ridge to the southwest. Your elevation is approximately 1140 feet above mean sea level. The limestone blocks you are standing on are the erosional remains of the Reading Ls.Mbr. of the Emporia Ls.Fm. This limestone and the rock layers below it were once continuous over the area where Topeka stands today. The rocks were weathered, slowly removed by erosion and transported away by streams and rivers. Not so long ago in geological time, during the "Ice Ages," glacial ice advanced into this area, reshaped it and covered much of northeast Kansas with rock and soil brought here from as far away as the Canadian Shield. While glacial ice occupied the area to the North, the prior-existing "Kansas River" was pushed south around the ice to the present Wakarusa River valley. Look to the east at the long north-south hill. This is the same hill of "glacial drift" that you crossed on 29th St. The hill extends from Shunganunga Creek, across I-470 to South of 37th St. before Pennsylvanian Age bedrock is exposed by erosion of Colly Creek. One interpretation of this ridge of glacial material is that a glacial lake was formed west and north of Burnett Mound as glacial ice pushed against the mound. When the ice dam failed, a large amount of material deposited in the lake was carried out by the rush of water. Some was deposited in the channel cut into the glacial ice by the water (forming the ridge you see today, which is called by some an "esker") and much more was deposited by the water to the Southeast, to form the flat area on which Forbes Airfield was constructed. Think about this theory and see how well it explains the features you will see on this field trip and on other trips.
The grave of Chief Burnett was moved from this mound to a location near the north end of the West Fork Flood Detention Dam, when the water storage tank was built. You might enjoy learning more about this colorful Indian Chief, who lived just down the hill along Shunga Creek. Check the Washburn or Topeka Libraries for more information. Return to your car and drive back to the intersection of 35th & Gage Blvd.
- 5.8 35th St and Gage Blvd., turn south (right). Elevation approximately 970'.
- 6.1 37th St., turn east (left). The Scranton Sh.Fm. is exposed in the road cut of this small hill. Note the next hill as you cross the small stream valley. You will drive back onto the "glacial drift" hill. The Sioux Quartzite boulders uncovered when the houses are built are used in many of the yards for decoration.
- 6.9 Valley of the South Branch of Shunganunga Creek. On the south side of 37th St., you can see a dam. This is a flood detention dam, designed to trap flood flows and release water at a lower flow over a period of time to reduce flooding in the urban area downstream. Development in this area is on the alluvium of the creek.
- 7.0 South Branch Shunganunga Creek.

- 7.4 Burlingame Rd., turn south (left). Just northeast of this intersection strip mines (Capital Strip Mines) removed the Nodaway Coal. It was part of the Pauline Mining District.
- 7.5 Entry ramp to I-470, turn west (right).
- 7.6 Stop on the shoulder of the entry ramp and look at the road cut on the right. The layers are:
- | | |
|---------------|------------------|
| Howard Ls.Fm. | Winzeler Sh.Mbr. |
| | Church Ls.Mbr. |
| | Aarde Sh.Mbr. |
| | Nodaway Coal |
- Severy Sh.Fm.
- Yes, that dark gray platy looking shale isn't shale, but is coal. Take a look to be sure. At this location you can find fossils and minerals among the rocks.
- 7.8 South Branch Shunganunga Creek
- 8.2-8.5 Glacial drift hill. Yes, you have seen this hill before. Look at the material that you can see through the grass in the road cut.
- 8.7 Exit to Gage Blvd., take ramp to the right.
- 9.0 Gage Blvd., turn northeast (right).
- 9.5 Shunganunga Creek, the Nodaway Coal is said to be exposed in the stream bank downstream of the bridge and two small strip mines were located upstream in the north-facing bluff. This was the south end of the Topeka Mining District.
- 9.6 The higher area ahead of you is the Newman Terrace. This elevated surface formed when the creek flowed at a higher elevation than it does today. Terraces are less likely to flood than is the floodplain.
- 10.8 17th St. When construction was started on the new addition to the Faith Lutheran Church, drill holes found a 90' deep stream channel filled with glacial material. This resulted in a change in plans for the foundation and a higher total cost of the project. A geological investigation at an early planning stage might have reduced the necessity of changes in the plans and associated cost overrun.
- 11.5 Ward Creek. This creek and Martin Creek have been extensively modified to protect the urban areas that have covered their valleys.
- 11.9-12.4 Gage Park. In the early days of Topeka, coal was mined from the Nodaway Coal, first by a shaft mine, then at a later time by two small strip mines. At one time the old strip mines were filled with water and one was used for a swimming lake until replaced by the current swimming pool. The last trace of the second strip mine is the lake in the Topeka Zoo. Coal is still found in this area when excavations are made for sewers and buildings. This area was part of the Topeka Mining District which had up to 11 mines or pits.
- 12.6 Hayden High School on left, was moved to this new campus from 8th St. north of the State Capitol.
- 13.0 I-70 entry ramp, follow it under I-70 and turn right to get on I-70 Westbound.
- 13.5 US-75 & K-4, turn north (right).
- 13.8 Kansas River. About 1/2 mile downstream of the bridge, on the south bank of the river, are two concrete towers. These are the intake structures for water for the City of Topeka. Note the dike on the north side of the river that protects the low area (floodplain) from minor floods. However, in times of a major floods, water will cover this broad valley from the south bluff to almost the north valley wall. 1951 was such a major flood and it destroyed the old Brickyard Bridge which had been in line with Gage Blvd. The use of the floodplain to the west of the road for soccer fields is a very good idea. The playing fields will not suffer as much damage from flooding as will buildings. The industrial park on the east side of the road requires expensive dikes to protect the buildings and their contents. Those dikes are built with your tax dollars. The 1993 flood was contained by the Topeka dike system, therefore, economic considerations must be included in any decision on how the land is used.
- 14.6 The railroad tracks are about at the edge of the Newman Terrace.
- 14.9 US-24 exit, turn right so that we will enter US-24 eastbound.
- 15.8 Meander scar from north to south across the highway. The shallow lake(oxbow lake) is the filled-in remains of an old channel of the Kansas River. It was the channel some

time prior to the 1903 flood. Note the difference in size of the meander scar at this location compared with the meander scar at mile 2.1, along 29th St. Approximately 2 miles north was the Menoken Mining District, which was strip mined for the Nodaway Coal.

- 17.4-17.5 Sand and gravel pit on south (right). This pit was created by removing a mixture of sand, gravel & water. The sorted sand & gravel was used for construction and the pit remains. You can tell where the surface of the groundwater is in this part of the valley, because it is exposed in the pit.
- 18.3 Old channel of Soldier Creek. This channel was changed by man to divert Soldier Creek along the north side of the river valley to reduce flooding in North Topeka.
- 18.4 Cloverleaf interchange with old US-75. In the 1951 flood this interchange was above water, but the roadways in all four directions were covered by water. The Jayhawk Jr. Motel to the southeast was covered almost to the roof line.
- 19.7 Pin Oak Motel on right. At least one car has run into the north side of the motel. I can think of less extreme wake-up calls.
- 19.9 Approximately 7 miles northeast was the Kilmer Mining District where the Nodaway Coal was strip mined along Muddy Creek.
- 20.0 This overpass was constructed for the the A. T. & S.F. Railroad. This line has been abandoned and removed.
- 20.4 Indian Creek and Soldier Creek channel.
- 20.5 Calhoun Bluff Rd., turn right (south then east). Watch to see if this road is open. Construction may close it at times.
- 21.2 Note road cuts on north (left) side of the road. These cuts expose the Calhoun Sh.Fm. Needless to say it was described and named at exposures in this area. Watch for construction in this area, the Oakland Expressway will cross over this road and into cuts in the bluff.
- 22.2 US-24 - K-4 interchange. The old town site of Calhoun was in this area, but it lost out to other towns and disappeared. Go under US-24 to the entry ramp westbound.
- 22.3 Entry ramp westbound.
- 22.5 US-24 westbound.
- 22.6 Note the beginning of road cuts that expose the rock layers up to the top of Calhoun Bluff, this old river landmark is capped with glacial drift. These limestone and shale layers were described in the Topeka area and makeup the Topeka Ls.Fm. Many of these layers contain fossils of sea life present in the warm shallow seas of the Pennsylvanian Period. Some layers contain more fossils than do others. The most common fossils will be various shellfish. Watch for new exposures as construction progresses for the Oakland Expressway.

This is the end of the first field trip. Make your own way home from here, or start Field Trip No. 5 from this area.

FIELD TRIP REFERENCE NUMBERS:

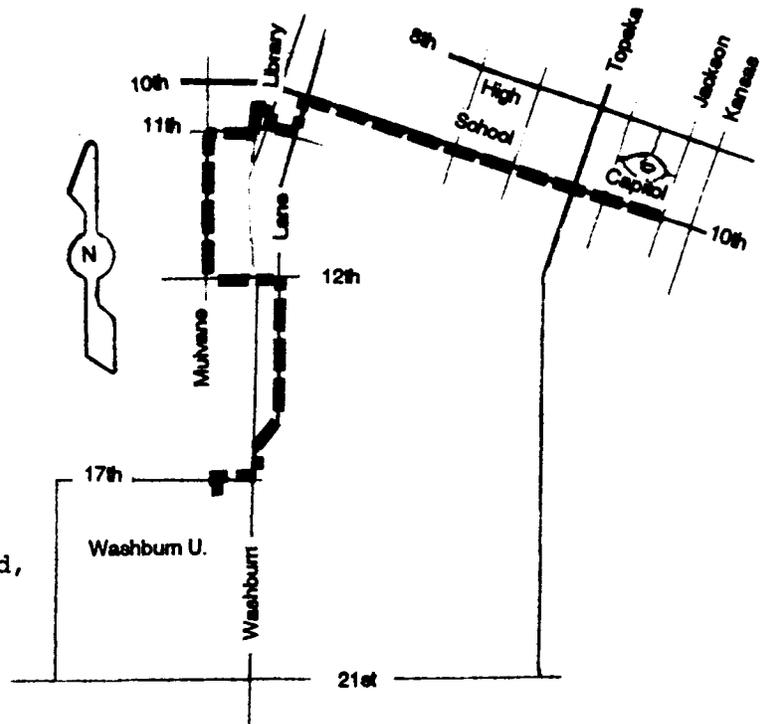
1, 7, 9, 15, 18, 19, 20, 21, 28, 30D, 30E, & 34.

SELF-GUIDED FIELD TRIP 2

BUILDING MATERIALS IN TOPEKA.

- Part A Washburn University to Downtown.
- Part B Walking Tour of Downtown and the Capitol (about 10 blocks).
- Part C Another Walking Tour of the Downtown Area (about 18 blocks).

By William Gilliland and James Gilliland,
September, 1992.
revised William Gilliland, July, 1995.



PART A

Trip mile

- 0.0 Stoffer Hall, South parking lot. Your elevation is approximately 960 feet above sea level.
Look around the campus at the different styles of construction of the limestone buildings. To the south is the old Fieldhouse; note the coursed ashlar (rectangular blocks of equal height) construction. To the southwest is Carnegie Hall, constructed of larger blocks producing a much different appearance. Now compare these buildings with the cut stone panels of Bennett Computer Center west of the parking lot. Stoffer Hall on the north side combines the cut stone and broken stone shapes. Needless to say, limestone is a major building material produced in Kansas. Leave parking lot by east exit and turn east (left).
- 0.05 Turn left (north) into the East and North parking lots of Stoffer Hall. Note the pink boulders. What are they?
- 0.15 West end of the parking lot. Note the large pink-purple boulder in the southwest corner. If you stop and take a close look at it, you will find white pebbles in the rock. This is a metaconglomerate. It started out as a stream-deposited sand with white quartz gravel in it. Once buried by other sediments, it was changed into a conglomerate by cementation, then extreme heat and pressure changed it into a metamorphic rock. All this took place somewhere to the northeast of what we now call Topeka. Erosion exposed the metamorphic rock and glacial ice transported it to this area. Due to people liking unusual rocks, these rocks were gathered and used in construction and decoration. A good example is the rock wall along the north edge of campus on 17th St. Stretching from Mulvane Ave. to Jewell Ave., the rock wall contains about all the possible colors of the "Sioux Quartzite," pink-red-purple; and if you look closely, a few other types of metamorphic rock. You would have to go at least 450 miles to the northeast to find the nearest outcrops.
- 0.2 17th St., turn east (right).
- 0.3 Washburn Ave., turn north (left). Follow the street around the curves to Lane, still northbound. The streets you will be driving on are made of concrete, brick, or asphalt, all of which are made of materials from the Earth. So is most of your car, including the gas. Street curves to right and connects into Lane St.
- 0.9 12th St. turn west (left). The Lane Chapel CME Church on the southeast corner is constructed of an interesting mix of different colored limestones, shaped Sioux Quartzite blocks, and brick.

- 1.1 Mulvane St., turn north (right). As you turn the corner, note the use of glacial material in construction of the porch of the second house on the west side.
- 1.3 School and church on left constructed of brick, with limestone trim, over large blocks of limestone. School on right is brick with "concrete trim?" Yep.
- 1.4 11th St., turn east (right). How well is the brick retaining wall along the school weathering?
- 1.5 Horne St., Turn north (left) to the drive nearest the Topeka-Shawnee County Public Library. Turn right into the parking lot.
- 1.6 The Library building is limestone with an interesting rock in front. Stop and take a close look at the large section of agatized wood. This form of petrified wood appears to have come from Triassic Age sediments in Arizona, possibly near the Petrified Forest National Park. Would you believe that at one time people wanted to grind logs like this up and make sandpaper?
Exit parking lot from east side, turn south (right).
11th St., turn east (left).
- 1.7 Lane St., turn north (left).
- 1.8 10th St. turn east (right). Do the directions seem to be a little off from north and south? Look at 10th St. behind you. It makes a bend. This is because the downtown area of Topeka does not set square with the rest of the world. When the founders of the townsite of Topeka first laid out the town, they used a cheap compass that did not indicate the correct directions. The town was established before the error was noted, and has been cockeyed ever since. All the surrounding streets make some sort of a bend to connect with Downtown.
- 2.1 Topeka High School. Note the massive brick construction with limestone trim (Gothic elements). They don't build the same way today. The fancy flag pole on the east side (Polk St.) is a mast from the USS Constitution (Old Ironsides). I'll let you research to find out how that ended up in Topeka.
- 2.3 Watch for Tyler St. On the southeast corner is a classic Southwestern style restaurant covered with stucco. Would you believe that it was once an auto repair shop?
- 2.5 Topeka Ave. The Docking State Office Building is on the northeast corner. It is constructed of cut Cottonwood Limestone panels over a first floor of granite panels. Just a reminder: the cement, steel, rock, and glass all came from the Earth. If you stop at this building, look at the size and patterns of the crystals in the granite.
- 2.6 Harrison St. On your left is the State Capitol, the portion of the dome near you was damaged in the 1966 tornado. Can you tell which panels were repaired? They treated the repaired portion with acid to form secondary copper minerals to blend with the older weathered roofing. We will talk more about construction of the Capitol on the first walking tour.
On the right is the Kansas Judicial Center. What type of rock was used in its construction? How does this granite compare with that on the Docking Building? Limestone columns and upper floors are of Cottonwood Limestone. Each floor extends beyond the one below it. Makes a nice porch. "Fountain of Justice" on the north side was funded by a local organization.
- 2.7 Jackson St. The end of the driving portion of the field trip. Find a parking place (it may be difficult during the week) then return to the corner of 10th & Jackson St. to start either of the walking tours. Your elevation is approximately 950 feet. The material you have been driving over, all the way from Washburn University, is "glacial drift" deposited by the Kansan Age (Ice Age) glaciers.

PART B Walking tour. About 10 blocks.

Starting at the corner of 10th & Jackson St.
120 W 10th St.

The Kansas State Historical Society occupied the G.A.R. Memorial Building on the northeast corner. It is now being converted to other State offices, as the Historical Society has moved to the Museum on West 6th St.

President William Howard Taft laid the corner stone on September 27, 1911. Constructed of Georgia marble over a dull finished black and white granite, this building is worth a close look at the carvings above the south entry. Then take a walk inside to see a completely different look in Georgia marble.

Exit to Jackson St. and walk north (right). Note how the same granite is also used in the next building.

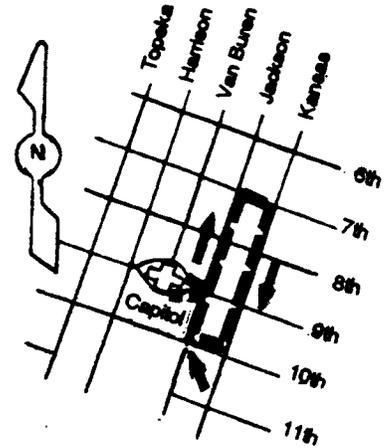
900 S Jackson St.

The Landon State Office Building (former AT&SF Building). Above the granite, note the limestone then brick construction. Look for fossils in the limestone blocks as you walk to the north side of the building on 9th St. Look at the window ledges of the first floor. The jagged lines eroded as slots are called "stylolites." They are surfaces formed in the solid rock by "pressure solution," which removes the mineral calcite and leaves the insoluble clays behind. These weaker zones are attacked by the weathering processes and become easy to see. Look at some of the window ledges on the west side. Are the stylolites as easy to find? The microclimate on the north side of the building results in more severe weathering to the limestone than on the west side.

State Capitol.

Cross Jackson and follow the south sidewalk around to near the south steps. Look at the east wing of the Capitol, now look at the south wing. Can you see any difference in the way that the surfaces of the walls have weathered? The wings were constructed at different times. The east wing was built with Fort Riley Limestone from near Junction City. The rest of the Capitol was built of Cottonwood Limestone from the Flint Hills. Note the rougher look of the Ft. Riley Ls. as compared with that of the Cottonwood Ls. Which do you think is weathering better? Note the large granite blocks used in the foundation and the granite steps. Why did they use granite in the steps? Because it has harder minerals and does not wear down as fast as limestone. Look above the south steps, see how limestone blocks were left protruding from the wall. This was for carvings that were never completed. Enter the Capitol by the doors under the steps. Go to the northeast corner of the Rotunda and look at the display of different marbles (A-N) used in construction of the Capitol. Enjoy your visit to the Capitol and see how many of the different marbles you can find around the building. The display at the northwest corner of the Rotunda shows information about building the Capitol and other material used in it. The information desk has a nice little book, "Kansas Capitol Square," for sale, which has a lot of information about the construction of the Capitol and the material used in it.

Exit the Capitol under the east steps, take time to look at the limestone blocks under the steps and how the surface was finished. These stones have been protected from weathering since the steps were built. Now look at the blocks on the outer walls that have been exposed to the weather. Are the surfaces as sharp and clear as under the steps? Can you see places where the blocks have been repaired? This wing was the first part constructed. What does that tell you about the rate at which limestone will weather? The stone used in construction was taken from near the weathered edge of the outcrops and as a result has been more affected by the weathering; renovation and restoration is now being undertaken to improve the condition of the exterior of



- the building. In 1995 the work has been directed to the southeast part. Now follow the east Drive and cross to the northeast corner of 9th & Jackson, walk north (left).
- 812 S Jackson St.
The Southwestern Bell Telephone Building is mostly constructed of brick. Note how the walls are curved into the sidewalk. Two granites have been used for decoration, the upper granite is finished both with a polished and dull surface to provide a contrast in appearance.
- 800 S Jackson St.
Mercantile Bank of Topeka. Look at the polished slabs of granite. In places you can find pockets of larger size crystals, which indicate slower cooling rates. You can also find places where the granite was fractured and filled with crystals at a later date. What minerals do you find in this granite? Are feldspars and quartz the only minerals present? Look at the river gravel that was used to surface the sidewalk. Most of it is brown, weathered chert. It takes a very long time to weather chert to this color of brown. Is the sidewalk surface remaining intact? The loss of surface may be due to the use of deicing material in the winter, which causes the surface to spall off. Do you think that the columns are carved stone or man-made material? They are man-made concrete with marble chips in them, how is that for a combination?
- 204 W 8th St.
On the northwest corner of the intersection is the Church of the Assumption complex. Constructed mostly of brick, it does feature some excellent examples of carved and turned limestone trim. The complex includes the church, living quarters and schools. Most is still in use, except the old Hayden High School (moved to a campus on Gage Blvd.). The present church was constructed in 1923, on the site of a 1882 church that had replaced a church built in 1862.
- 714 S Jackson St.
Cut limestone blocks over granite. Note the lighter color of minerals in this granite as compared with 800 S. Jackson.
- 700 S Jackson St.
Jayhawk Towers. Look at the limestone. Can you see any fossils in the stone? If this limestone were weathered for a long time, the fossils would be exposed on the surface and would be called a fossil hash (mixture of many broken-up fossils). Cross Jackson to the southeast corner.
- 701-703 S Jackson St.
Insurance Building. Look at the limestone along the North side on 7th St. Can you identify some of the fossils exposed in the limestone? You might find corals, brachiopods, algae, pelecypods, bryozoa, and others. Walk east along 7th St. to Kansas Ave.
- 112 W 7th St.
This brick and limestone building has a Grecian look. The limestone columns here are not made of the full drum shape, as were the ones at the Capitol. These are only half drums.
- 633 S Kansas Ave.
Was the old Kresge Store, constructed in 1926, a brick Spanish-style emporium.
- 701 S Kansas Ave.
Columbian Bank opened in 1927 as Central National Bank. This building is made of limestone with a milled surface. How are these columns different from the ones you saw at the Merchants National Bank? These are carved from limestone.
- 700 S Kansas Ave.
Capitol Federal Savings. White marble chips in concrete with blue tile accents.
- 705-707 S Kansas Ave.
Brick and granite. Note the good color and crystals in the granite.
- 717 S Kansas Ave.
Crosby Place. We hope that they don't take this building down. Gray Labradorite. Look at the surface of the stone. Note the play of colors in the crystals of feldspar. This form of plagioclase feldspar is noted for the way the light plays within the surface of the material. The gem variety is called Moonstone.

725-727 S Kansas Ave.

Serpentized Marble. The green color is due to the formation of serpentine in the metamorphic process that formed the marble. Of limestone construction, the Davies Building was built in 1888. Wolf's Jewelry was an occupant from 1899 until the 1980s? Washburn Law School held classes here from 1911-1913.

729 S Kansas Ave.

Sorry, but Russell Stover candy is no longer sold here. Glass mirrors made of materials from the Earth.

735 S Kansas Ave.

Dark Labradorite with the same play of colors you saw at 717 S Kansas.

8071/2 S Kansas Ave.

Brick & Tile. Tile, like brick, is made from clay and shale by heating it to the point it becomes a ceramic material. Building has been converted into a micro-brewery/ restaurant.

821 S Kansas Ave.

White marble with a gray pattern over black granite.

818 S Kansas Ave.

Western Resources, old KP&L Building. Cottonwood Limestone.

820 S Kansas Ave.

Dig the granite north wall shared with 818 Kansas.

830 S Kansas Ave.

Commerce Bank-Kansas Towers. Granite lower floor with carved limestone trim and brick upper floors. The building style can best be seen from the south side. The canopy on the west side has embossed metal tiles on the under side.

835 S Kansas Ave.

Built in 1902 as the Smith Bldg. It has been covered on the north wall with Gunnite (or Shotcrete) to protect and seal the wall. Note patches. South Romanesque side entrances are its best feature. Now unoccupied.

901 S Kansas Ave.

Mill's Building, Topeka's first steel framed building, 1911. Note the pattern of crystals in the granite. You can find flow patterns formed as the partly crystallized mush moved about. Some parts of the granite fractured and filled with later crystals. Different stone was used around the windows. What is it? It may have started as limestone, because you can find a few fossils of shellfish in it.

900-904 S Kansas Ave. and others down the block.

Note the unused windows that have been filled in with assorted material.

906 S Kansas Ave.

The granite used in facing this building does not have the flow patterns seen in that used on 901 S Kansas Ave. The even size of crystals and distribution of minerals indicate that little movement took place in the magma as it cooled and crystallized.

912 S Kansas Ave.

Look at the colorful brecciated marble on the front of this store. It was formed by fracturing of the rock and recementation in place. The white and black marble in the entry is said to be imported from France. Can you find the place where the marble was damaged by the 1966 tornado and repaired with gray Labradorite?

915-915B S Kansas Ave.

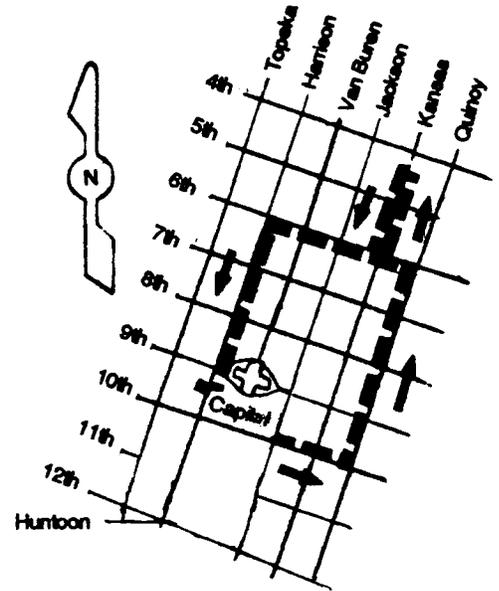
Ceramic tile for decoration. Does this look like the clay you once played with? If you cross the street, you can get a better view of the decorations on the front of the second story.

Walk to the end of the block and turn west (right). We are now returning to the starting point of the walking tour. You have only seen a few of the many materials used to build Topeka. Consider taking the other walking tour, or seeking out the materials and identifying them on your own.

PART C Walking tour.

About 18 blocks.

- Starting at the corner of 10th & Jackson St., walk east along 10th St.
- 1000 S Kansas Ave., Landmark Plaza.
The building on the southeast corner was damaged in the 1966 tornado. It was gutted and completely reconstructed. It is now apartments for elderly persons. White "chat" and brown crushed rock fragments provide the contrasting colors.
- 934 S Kansas Ave.
Food Court. Constructed of brick with a tan surface glaze.
- 105 E 10th St.
Taco-Tico. Southwestern style with stucco finish. Can you guess their food style?
- 11th St. & Quincy St.
A 2 million gallon concrete water tower, constructed in 1943, when structural steel was difficult to obtain due to WW II. 1 million gallons in the foundation and another in the upper tank.
- 120 E 10th St.
Scott Bldg. (Kansas Board of Education). Note the use of two patterns of tile. Turn north (left) on Quincy.
- 920 S Quincy St.
Santa Fe Plaza. This the headquarters of the railroad of that name. This concrete structure replaced the old 10 floor office at 900 S Jackson, which is now the Landon State Office Bldg.
- 917 S Quincy St.
Coronado Parking. Brick with green crushed rock in concrete panels. What is the shape of the panels?
- 909 S Quincy St.
Meade Insurance. Rough limestone and wood for a rustic look.
- 104 E 9th St.
Kansas Towers-Commerce Bank. The carved limestone trim with brick over granite panels at the street level. Now look at the brick on the east side. Does it match the front sides? Why spend money on the sides the public wouldn't see (unless other buildings are removed)?
- 823 S Quincy St.
Southwestern Bell, two color brick.
- 820 S Quincy St.
Columbian Title Bldg. Light brick and limestone.
- 800 S Quincy St.
Central National Bank. A round building with slender columns, glass walls, and limestone in concrete panels.
- 110 E 8th St.
Thacher Bldg. Constructed of limestone in 1888.
- 116 E 8th St.
California Mission style, this building butted against the Dickinson Theater which suffered the fate of many buildings in Downtown Topeka and became a parking lot. The



- east wall has been covered with Shotcrete or Gunitite to protect and seal it from the weather. When it was constructed against another building, they did not plan on the wall being exposed to the weather.
- Look at the east side of the Thatcher Bldg. Note the mixed construction of brick, limestone and modifications which fill in windows and doors. The iron end plates (stars, etc.) are the ends of rods that run through the building and hold it together.
- Entire East side of the 700 block Quincy St.
Topeka Preforming Arts Center and Municipal Building. Constructed of Cottonwood Limestone.
- 723 S Quincy St.
Civic Center Parking-Capitol Federal Auto Tellers. Concrete, light brick, and blue glazed brick.
- 707 S Quincy St.
Crushed white marble in concrete.
- 635 S Quincy St.
Stucco finish with brick trim.
- 629 S Quincy St.
Steel and glass remodeling to front of building. I wonder what the front used to look like.
- 200 E 7th St.
Shawnee County Courthouse. Red granite panels on the lower portion with limestone upper floors. Note flow patterns of the crystals in the granite.
- 615 S Quincy St.
Park & Shop Garage. Just plain old poured concrete, but to make up for it, they used shaped bricks with concrete in the sidewalk.
- 607 S Quincy St.
Back wall is limestone, but the bricks are textured by raking in a zigzag when they are still soft.
The sidewalk near the corner of 6th shows that the tiles have not weathered well. The treatments in the winter to remove ice might cause the problem or even tracking of salt up from the street might be a cause. How would you go about finding out what caused the problem?
- North side of 6th St. at Quincy St.
Townside Plaza, glass and concrete....!
Turn west (left) along 6th St.
- 119 E 6th St.
Limestone below window, glass window, marble chips in concrete, steel over the door and a brick 2nd floor. What didn't get used?
- 115 E 6th St.
Large steel "I" beam over window with rosettes on the ends of the rods through the building. Historical preservation award in 1990.
- 600 S Kansas Ave.
Fidelity State Bank. Large rounded gravel with smaller pebbles in between set in concrete panels. Flat concrete panels upper floors. Walk around to the west side and look at the places where secondary copper minerals have stained below the bronze brackets.
Walk north along Kansas Ave.
- 534 S Kansas Ave.
Bank IV Bldg. and parking garage, made of marble chips in concrete panels and columns.
- 424 S Kansas Ave.
Downtown Post Office and Federal Court House
Massive limestone blocks and columns have been used in this building. The limestone panels used around the windows and doors have not weathered as well as the blocks. Note the areas where the panels have had cracks and surface failures repaired. The limestone panels contain many coral fossils and have also been used inside the building. Enter the west doors and note the condition of the limestone where it is

protected from the weather. These polished slabs show many different forms of corals. See how many you can find. In the lobby you can see how tile and marble inlay has been used in the floor and dark marble as door trim. Just a quick note, the Federal Government does not appreciate taking samples of their walls or floor.

Return to Kansas Ave. and walk north to the mid-block crosswalk.

400 S Kansas Ave.
Pebbles in concrete panels with glass walls.
Cross Kansas Ave. to the west side.

423-425 S Kansas Ave.
North wall has been covered with Shotcrete (Gunnite) to seal and protect the wall. These buildings are still occupied. The rest of the buildings to the north have been converted to a parking lot.

427-433 S Kansas Ave.
These older buildings not occupied. We will just have to wait to see if they join the fate of the other buildings as a parking lot. There use to be a marker on these buildings (427-429 called "Old Constitution Hall") as a meeting place for the legislature, while the first Wing of the Capitol was being built.

435 S Kansas Ave.
Brick building was constructed as the German-American Bank on the site of an earlier Kansas National Bank.

503 S Kansas Ave.
New England Bldg., tan & buff limestone with limestone trim, brick upper floors. Has contained State Offices among other things. Currently not occupied.

515 S Kansas Ave.
Black marble & concrete.

535 S Kansas Ave.
Site of former National Bank of Topeka. Building was imploded in June 1995. Watch progress on construction of next building to occupy the site. A marker is set in the sidewalk at the northwest corner of 6th St. & Kansas Ave. for the "Topeka Stockade" (a fort). Turn west (left) along the south side of 6th St.

107 W 6th St.
Dark granite, which contains blobs of finer grained rock and dark crystals. Which would indicate a more rapid rate of cooling? I hope you said the smaller crystals.

112-114 W 6th St.
Columbian Bldg. The limestone front now painted red, has brick side walls. Constructed in 1888 as the Knox Building, it is on the National Register. 1888 seemed to be a good year for construction in Topeka.

200 W 6th St.
Dark brick KPL Bldg., a much different look from the Columbian Bldg.

211 W 6th St.
Red brick with a broken edge for texture.

214 W 6th St.
Limestone with carvings of Statue of Liberty.

213 W 6th St.
More brick with broken edge for texture.

Corner of 6th St. & Van Buren St.
Building on southeast corner is constructed of brown field stone. South on Van Buren is the north doors of the Capitol with a carved State Seal. North on Van Buren are found the twin towers of St. Joseph's Catholic Church, brick and limestone, they were completed about 1900.

515-521 S Van Buren St.
Apartment building in brick and limestone. Common construction in late 1880's, like the brownstones of Philadelphia, Boston & New York.

6th Street between Van Buren St. and Harrison St.
The south of 6th St. was not always parking lots. Your view of the Capitol was once obstructed by the old steam power plant.

418 W 6th St. Located west of Harrison St. on the north side.

Limestone Greer House, built in the 1860's by Judge Greer, may be the oldest surviving stone house in Topeka.

6th St. & Harrison St.

1st United Methodist Church. In the telephone book their address is given as 6th & Topeka. Limestone block construction with limestone trim.

Walk south along Harrison St.

7th St. & Harrison St.

SB Academy, brick with limestone panels above. Note how blocks have been used in the south wall to control sun light.

700 S Harrison St.

SBA Bldg. Constructed of limestone. Note the carved window trim. Weathering of "stylolites" has produced zigzag patterns on limestone surfaces. These are formed in limestone or marble by pressure solution in the rock and allows entry of water to speed the weathering processes.

320 W 8th St.

Masonic Grand Lodge Bldg. Constructed of limestone in 1916. Check the west side for fossils that include sections of horn corals, large Fenestrella bryozoa, and sections of Archimedes. You can also find stylolites that have been enlarged by weathering. On the 8th St. steps you can find the steps stained by secondary copper minerals from the fixtures.

817 S Harrison St.

First Presbyterian Church. Limestone construction, note the different style from that you saw in the 1st United Methodist Church. The bell tower has large bells exposed on the top. North wall shows newer construction as indicated by the lighter limestone which has not yet weathered to match the original stone. In some reconstruction work chemicals are used to match the newer material with the original.

Northwest corner of the Capitol grounds.

The base for the Statue of Liberty is limestone blocks. Note the advanced weathering of the blocks on the north side.

Walk along Harrison St. to the walkway that leads directly to the south steps of the Capitol.

Between the flower beds is a historical marker discussing the Capitol with a map of the grounds on the other.

900 Block S Harrison St.

Docking State Office Bldg. Red granite on the first floor with Cottonwood Limestone panels above. The carved historical scenes by Bernard Frazier, accent the ends of three wings. If you have time, you might cross Harrison and observe the patterns of crystals in the granite. Inside the lobby floor is dark gray slate, and walls are marble with large patches of white calcite. Special arrangements can be made, ahead of time, for tours of the observation deck, with an outstanding view of the Capitol, and a wide view across Topeka. If you go down to the first basement, you will find the elevator lobby has the same marble as the walls of the first floor. Take the hallway to the north end of the building and you can take the tunnel from the northeast corner of the basement, under Harrison St., to the Capitol. If you take that route, you can tell when you reach the old basement of the Capitol, by the very large stone blocks that hold it up. Take a close look at how the stones were shaped and the lines of drill holes, still visible, where the stones were split apart. However, with the many coats of paint you can't tell what type of stone they are. The original foundation for the east wing was a sandstone that did not hold together. It is said that it cost as much to remove the poor foundation as it cost to put it in place. If you don't get lost, you can come out on the first floor by way of a very narrow door that opens behind the old elevator. Explore the Capitol Building, if you have time.

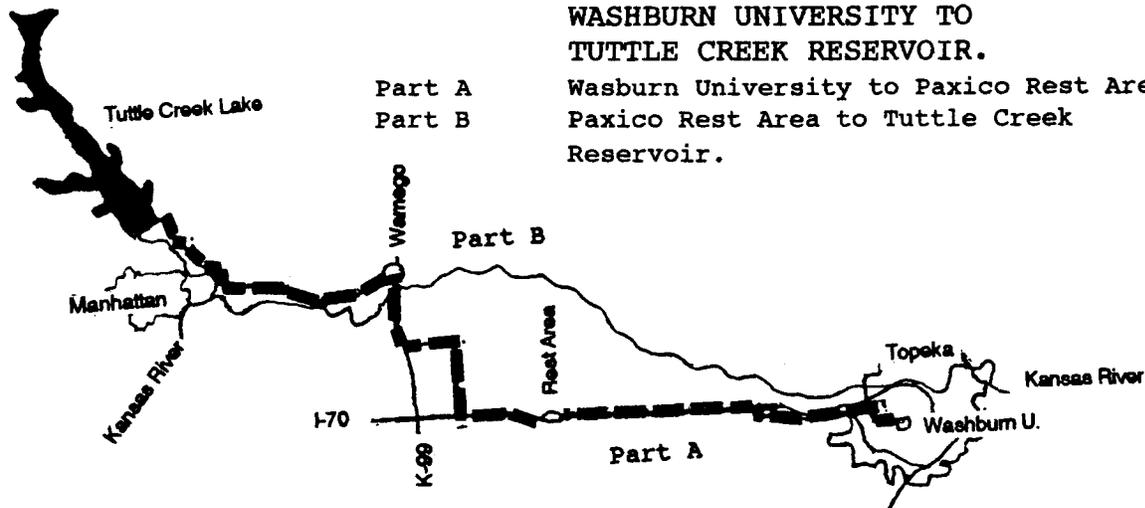
FIELD TRIP REFERENCE NUMBERS:

3, 15, 17, 19, 28, 29, 30E, & 32.

SELF-GUIDED FIELD TRIP 3

WASHBURN UNIVERSITY TO TUTTLE CREEK RESERVOIR.

Wasburn University to Paxico Rest Area.
Paxico Rest Area to Tuttle Creek
Reservoir.



By William Gilliland and James Gilliland, October, 1992.
revised by William Gilliland, July, 1995.

Start Stoffer Hall, South Parking Lot

Trip Miles.

- 0.0 Stoffer Hall, South parking lot. Leave east drive of parking lot, turn left (east).
- 0.05 Turn left (north into Stoffer Hall east & north parking lots). Note pink "Sioux Quartzite" boulders.
- 0.2 17th St. turn left (west).
The wall of glacial erratics (pink-red-purple) illustrate most of the possible colors of the Sioux Quartzite to be found in this area. Glacial ice brought this material into the Topeka area from the northeast, where the nearest surface outcrops are about 450 miles away. The rocks began as Precambrian age stream-deposited sands and gravels that lithified into sandstone and conglomerate, which were then metamorphosed by heat and pressure into quartzite and metaconglomerates.
As you proceed west you will drive over glacial deposits and Pennsylvanian age Scranton Sh.Fm.
- 1.3 Note the limestone house on the north side.
- 1.4&
- 1.6 Churches constructed of, or finished with, limestone.
- 1.6 Gage Blvd. Glacial deposits up to 90 feet thick fill a buried stream valley in this area. Located during expansion of one of the churches. The till increased cost of construction.
- 2.1 Limestone house on north side. Note different limestones used in the gate posts.
- 2.3 Entry into Mt. Hope Cemetery; note the use of the brown limestone.
- 2.6 Fairlawn Rd. Turn right (north). Elevation 1028 feet above mean sea level. 2.5 miles southeast is Burnett Mound, top elevation 1140'. The mound is topped by the Reading Limestone Member of the Emporia Ls.Fm.
- 3.2 Note the use of the Sioux Quartzite boulders on the west side of the road.
- 3.4 Flood storage pond on west side of road. It collects runoff from heavy rains and releases lower flows to the stream over time to reduce flooding downstream.
- 3.6 10th St. turn left (west).
- 4.2 Glacial drift in road cut over Scranton Sh.Fm.
- 4.6 Wanamaker Rd.
- 5.2 Limestone fence on south side of road and dinosaur greeter.
- 5.6 Urish Rd. road cuts are in the Scranton Sh.Fm.

23.0 Vera Rd. The Wood Siding Fm. is in the cut east of Vera Rd. The Wood Siding Fm. was considered the top or youngest formation of the Pennsylvanian System in Kansas. This was based upon the theory that a major erosion event marked the end of the Pennsylvanian and was represented in Kansas by sandstones, which were deposited in stream channels eroded into, and in some cases, through the Wood Siding Fm. These sandstones were called "Indian Cave Sandstone." More recent studies have found that the "Indian Cave Sandstone" was not one major erosion event, but was a series of erosion surfaces that occurred at different times. This makes it very difficult to call it a boundary. Studies of fossils in the area of Russia where the Permian System was first described seem to indicate that the boundary between the Pennsylvanian and Permian should be located higher in the stratigraphic section. You will see the rock layers now proposed as the new boundary in the spillway at Tuttle Creek Dam. The upper part of the east cut contains the fossil Bivalve *Orthomyalina*. Note the coal in ditch bank on the northwest side of the intersection. It appears to be the Loron Coal of the French Creek Sh.Mbr. Root Sh.Fm. The coal was formed in a swamp near sea level, with about 10' of plant material needed to make about 1' of coal. When the sea covered the swamp, shellfish called Brachiopods lived on the mud bottom and were preserved in the shale layer just above the coal.

23.1 Return to I-70 west-bound.

24.2 Exit left into Roadside Park.

24.4 Rest Stop. It was rebuilt in 1993-95.

If you would like to take the drive to the left, it will take you to the upper parking lot from where you can hike to the top of the hill. The upper service area is in the Hughes Creek Sh.Mbr. In the hike to the top of the hill, you will climb through the Foraker Ls.Fm., Johnson Sh.Fm., and part of the Red Eagle Ls.Fm. The view from the top starts with the mass of hills to the south, which are composed of Pennsylvanian and Permian age sedimentary rock layers. Just to the north is the valley of Mill Creek, which stretches east-west through this area. The hills north of the valley are Pennsylvanian and Permian rocks covered by glacial material and younger deposits of silt and sand. At one time, Mill Creek did not turn eastward at Paxico, but ran northeast toward the present location of St. Marys. Glacial ice overran the early Kansas River Valley and almost reached to your present location. The river and other streams that were blocked by the glacial ice filled their valleys with lakes until water overtopped divides between valleys and flowed around the glacier. This east-west portion of Mill Creek was the ice marginal channel cut by waters flowing from Mill Creek to Dry Creek (near Maple Hill). Water from the Dry Creek Lake then spilled over the hills to the valley of Mission Creek. As the glacier retreated northward, the Kansas River reoccupied most of its prior valley. However, Mill Creek did not do so. Just think of how much different the view from this hill would have been during the Kansan Glacial Period. The glacier would have been several hundred feet thick with a heavy coating of rock, sand and soil that it was transporting. However, there may have been enough snow cover for one and all to "Ski Kansas".

End of Part A.

Return to lower parking area to continue on Part B. Pick-up mileage at 24.4.

PART B Paxico Rest Area to Tuttle Creek Reservoir.

- 24.4-24.6 Enter I-70 West-bound.
- 25.8 Snokomo Creek.
- 27.4 Road cut Hughes Creek Sh.Mbr.
- 27.7 Mill Creek.
- 28.1 Exit 333 for Paxico and Fields of Fair.
- 28.6 Spring Creek.
- 30.8 Paw Paw Creek.
- 31.0 Take Exit 330 (McFarland) to right.
- 31.1 Turn north (left).
- 32.2 Paw Paw Creek again.
- 32.4 Watch for glacial material in the pastures and road gravel.
- 32.7 Road cut Red Eagle Ls.Fm., note glacial drift.
- 34.0 Road cut Cottonwood Ls.Mbr. of the Beattie Ls.Fm., note the chert (flint) nodules, siliceous material that gives its name to the hills around you (Flint Hills).
- 34.1 Note the old quarry west of the road. Cottonwood Ls. was removed from this quarry. Most of the Kansas Capital Building was constructed of Cottonwood Ls. from the Flint Hills. The hills that you will be driving over for the next three miles will be covered with glacial drift.
- 34.6 Turn west (left).
- 34.7 The limestone in the road is an outcropping of the Crouse Ls.Mbr. of the Bader Ls.Fm.
- 35.4 Concentration of glacial drift.
- 35.7 Bader Ls.Fm. exposed.
- 36.1 Road to the south (left). The ditch along the east side of this road contains smaller size glacial drift. Much of the material appears to have come from the area of the Great Lakes and the Canadian Shield.
- 37.1 K-99, turn northward (right). You have descended through a number of limestone and shale layers and are now in the Grenola Ls.Fm. As you drive northward in this area, the exposed layers will not be identified. If you are interested, you can track the formations and members from the stratigraphic log.
- 37.7 Note the pink glacial erratics on the hillside east of the highway. This area has an exceptional concentration of erratics.
- 39.9 Old quarry and highway mixing strip on left side of the highway (west), in the Foraker Ls.Fm. If you have time, stop and look at the limestone layers. Why do they appear to rise toward the west? The dip that we talked about at mile 13.0, was downward to the northwest; here the dip is toward the east. Why?
This site is on the east flank of the Nemaha Ridge, which is a buried mountain range that stretches from in Nebraska across Kansas and into Oklahoma. In the Mississippian Period, a fault zone became active along the east side of the Nemaha Mountains, and a series of long narrow blocks were raised and began to erode. In some places, the same rock layers are displaced as much as 4000 feet, from remains on top of the Nemaha to existing layers in the Forest City Basin to the east. The mountains were eroded and then covered by marine and land sediments of younger ages. At different times, the old mountain range has pushed up a bit more and has bent the younger layers across it into an anticline. Some up warped layers have trapped oil and gas, resulting in a series of productive fields aligned with the buried Nemaha Ridge. However, it also is a weak zone along the faults on the east side, where a number of historic earthquakes have occurred. Only a few miles to the northwest of this location was the epicenter of the April 24, 1867, earthquake, the strongest ever recorded in Kansas. It was related to movement along the fault zone under the Kansas River Valley.
- 39.4 Entering the Kansas River Valley.
- 39.8 Highway K-18, this follows the south side of the river valley to Manhattan.
- 40.0 Note the irrigation system on the west(left) side of the road.
- 40.2 Scarp between the higher Buck Creek Terrace and the Newman Terrace. If you look back, you can see just how sharp a scarp it is. The terraces were formed when the Kansas River flowed at a higher elevation than it does today. Down cutting of the river has

left the remains of the terraces above most of the active valley processes. The terraces are named for locations within the valley where they were first described. On another field trip, east of Topeka, the terraces are discussed in more detail. The Newman Terrace is only a little above the present floodplain, but it may go for several years before a flood is large enough to spread out over it.

41.0-

- 42.7 This portion of the highway was damaged in the floods of 1951 and 1993. As you drive along, note the basins on each side of the road with trees growing around them and some containing water. In 1951, flows were concentrated at these points washing the road out and scouring out pits as much as 70 feet deep. In 1993, the flood waters once again washed out the road in some of the same places. Can you still see evidence of the 1993 flood in the buildings and fields?
- 42.8 Kansas River. If the flows are normal, you will be able to see sand bars. Look at Wamego ahead of you. Is it on the floodplain or is it on one of the terraces? The location on the terrace protects the town from most flooding events.
- 43.0 RR tracks.
- 43.1 Old US Highway 24. Turn east(right).
- 43.3 Entry into Wamego City Park, north(left) side of street. Note the Old Dutch Windmill, which was moved to this location and restored to working condition. However, they now use electric motors to drive the works to grind grain. Note how glacial erratics have been used around the park. Across the street to the south is a plant to produce sand and gravel from the river alluvium. This material is used of most of the local construction. If you have driven around the park, return to the south entry and start your mileage at 43.3 again.
- 43.3 Turn west on old US-24.
- 43.5 K-99(Lincoln St.). Cross and follow old US-24 West.
- 43.8 Note the use of glacial erratics in house foundation on southwest corner.
- 44.1 Follow old US-24 around curve to left(south).
- 45.1 Note limestone house on top of hill to right.
- 45.5 Kansas River Valley. The farms ahead of you are located on terraces above the threat of frequent flooding. However, that doesn't say that they will never be flooded.
- 46.0 Note the limestone layer in the hill above the road. This is the Tarkio Ls.Mbr. of the Zeandale Ls.Fm. If you look at the fossils in the rock, you will notice that they are the same as those in the rock near Topeka at mile 11.9. If it were not for the uplifting by the Nemaha Ridge, this layer would be far down below the surface in this area. However, now it has been raised to the surface and has been quarried along this bluff for many years. Watch this layer as you drive westward.
- 46.1 Loess in north (right) road cut. Loess is wind-blown silt, in this case from the Kansas River valley. A good old Kansas dust storm will deposit this type of material.
- 46.3 &
- 46.8 Tarkio Ls.Mbr. in road cuts.
- 47.6 Creek.
- 48.0 Sand Creek (the first one).
- 48.6 Creek.
- 48.7 Tarkio Ls.Mbr. in road cut.
- 49.1 Well weathered Tarkio Ls.Mbr. in road cut.
- 49.3 Kansas River on south (left) and Tarkio Ls.Mbr. in cut on right.
The Kansas River in this reach is flowing along the course of the old ice marginal channel. The old river valley is still buried by glacial material under the hills to the north of your location. The lake that was located behind the ice dam at this point is called Glacial Lake Kaw and reached beyond Junction City to the west. Lake deposits high on the river valley walls look much like loess, but do not have the columnar structure that you see in the loess deposits.
- 49.5 Tarkio Ls.Mbr. at road level.
- 49.9 City limits of St. George. Town was once noted for its water from Blackjack Springs, named for the WW I general.
- 50.6 Blackjack Creek. Any guess on where that name came from?

- 51.6 Flush Rd. The annual Flush Picnic was always a good place for starving college students to eat good home cooking.
- 53.4 Swamp on right side of road.
- 53.7 Sand Creek (yes, another one) flowing in right ditch. Swamps in this area have been drained for farming. Where do you think all the sand came from? Source is the old glacial filled valley. Old townsite of Swamp Angel to left (south).
- 54.1 US-24, turn west (left).
- 55.1 Green Valley Rd. turn north (right).
- 55.9 Elbo Creek. Yes, Elbo Lake is located upstream on this stream.
- 56.9 Turn west (left). Bedrock in this area is the Foraker Ls.Fm.
- 57.6 Creek.
- 57.9-58.4 Bedrock exposed as you drive up and over the hill from Janesville Sh.Fm. up to the Grenola Ls.Fm.
- 58.0 Road to Pottawatomie County State Lake No.2.
- 58.4 Valley of the Big Blue River. Follow the road around to the right (north).
- 58.7 Loess in road cut on right. Note the vertical columnar structure. This material was blown up from the valley of the Big Blue River.
- 60.8 Hughes Creek Sh. Mbr. This side hill cut is a good location to collect marine fossils. Note the location of this shale above the level of the river. Compare this location with the location of the Hughes Creek Sh.Mbr. in the spillway of Tuttle Creek Lake.
- 61.1 Cedar Creek. This area was flooded in 1993. Can you see any evidence of that flood? The mobile home park on the right was mostly flooded.
- 61.3 Turn right. The bridge across the Big Blue River may not be repaired yet from damage it received in the 1993 flood. The people have to drive over or under the dam to get to Manhattan.
- 62.5 Grenola Ls.Fm. in road cuts. Watch for the "Limited Service Spillway" on the left. The Corps of Engineers does not like to use the term "Emergency Spillway." They claim that the spillways are designed to be used.
- 62.7 Turn west (left) and park in the parking lot or drive north toward the gates and park overlooking the spillway. There is now a steel stairway down into the spillway. Before the release of 60,000 cubic feet of water per second through this spillway, it was somewhat of a sloped grassed surface with motorcycle trails across it. Most of the erosion occurred in about 17 days in 1993. Take time to look at the exposed rock layers. You can use the attached stratigraphic column to identify the rock units. Please note that you must have a Federal permit to dig fossils out of the rocks. However, the last report was that you could still collect material that was loose on the surface. Play it safe and check with a Ranger before collecting. Note the location of the Hughes Creek Sh.Mbr. at the bottom at water level. Is this another example of dip? Yes it is.
Return to road and pickup mileage at 62.7.
- 62.7 Turn north (left)
- 63.2 K-13, turn west (left) Watch for displaced rock layers in the road cut on the right. This would indicate the presence of a fault (a fracture in rocks that displaces layers)
- 63.4 Tuttle Creek Dam Limited Service Spillway. Is it full of water or dry today?
- 63.6 Turn right into the north parking lot. Drive back to the east end of the lot and use the interpretative sign to help you spot the faults located in the east side of the spillway. The section exposed is from the Grenola Ls.Fm. up to the Crouse Ls.Fm. The main fault is a normal fault (caused by tension) with the hanging wall moving downward in relation to the foot wall. The Cottonwood Ls.Mbr. of the Beattie Ls.Fm. is about 6 feet below the road level. Look northward along the Cottonwood Ls.Mbr. to where it is cut by the fault, now find the Cottonwood Ls.Mbr. on the north side of the fault. The bottom of the Cottonwood Ls.Mbr. is almost level with the top of the Neva Ls.Mbr. of the Grenola Ls.Fm. on the south side of the fault. The sign indicates about 23 feet of vertical displacement has occurred. The fault has not moved in a very long time and appears to be inactive.

The Neva Ls.Mbr. of the Grenola Ls.Fm. is now proposed as the oldest rock layer of the Permian System in Kansas. This would make the Salem Point Sh. Mbr. the youngest rock layer of the Pennsylvanian System. This boundary is proposed, at this time. This is the end of this field trip. You will have to find your own way back to Topeka by one of the several interesting Flint Hills roads, such as K-13 with connections to other roads, US-24, K-177 and I-70, or any other combination you might choose.

If you would like more information about the rock layers in the spillway, contact the Department of Geology at Kansas State University. They have prepared a guide for the Spillway. They are located in Thompson Hall at the southeast corner of the main campus in Manhattan.

FIELD TRIP REFERENCE NUMBERS:

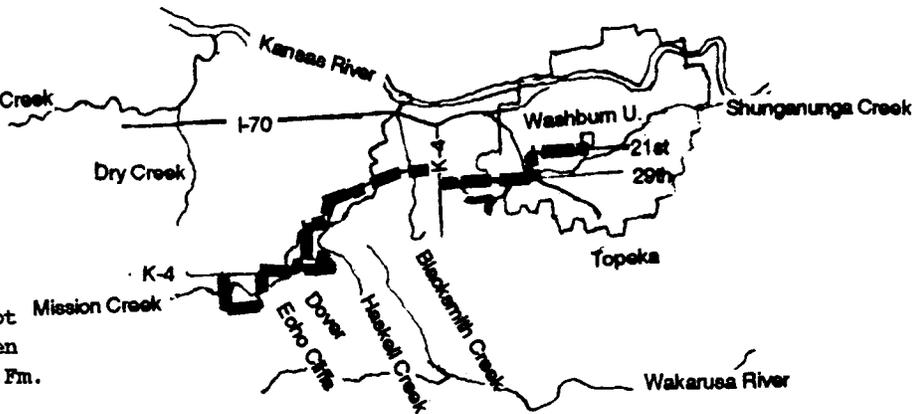
1, 2, 5, 6, 7, 8, 9, 12, 13, 15, 18, 19, 21, 22, 25, 26, 27,
30B, 30C, 30E, 30F, 31, & 34.

SELF-GUIDED FIELD TRIP 4

WASHBURN UNIVERSITY TO ECHO CLIFFS.

by William Gilliland,
July, 1995.

Starting point is the south parking lot of Stoffer Hall. The parking lot is constructed on the contact between the glacial drift and the Severy Sh.Fm. You will be driving over the Severy Sh.Fm. for the next 1.4 miles.



Mile

- 0.0 East exit of parking lot. Turn west (right) to Mulvane, turn south (left).
- 0.1 Petro Health Center and Lee Arena. Note the earth-bem construction for energy efficiency.
- 0.25 Durow Dr. Turn west (right)
South of the softball fields is a dam constructed along 21st St. This dam is designed to catch storm runoff and limit the rate of release of water to the stream to reduce the chance for flooding in the housing area downstream.
- 0.5 Football practice fields to the right and Falley Field (baseball) on the left.
- 0.6 Jewell Ave. Turn south (left).
There is another retention dam to the southwest.
- 0.7 21st St. turn west (right)
- 1.4 Oakley Ave. Entry to Kansas Neurological Institute (Old Winter VA Hospital) approximate contact with Howard Ls.Fm.
- 1.6 Arnold Ave. Entry into Colmery - O'Neil VA Hospital, contact with Scranton Sh.Fm.
- 2.8 Contact with glacial material in hill ahead of you. It is part of a blanket deposit that has not yet been eroded away. Topeka West High School sets on this material northwest of the intersection with Fairlawn Rd.
- 2.9 Fairlawn Rd. Turn south (left)
Fairlawn Plaza, on the southwest corner, is located partly on glacial material and partly on Scranton Sh.Fm.
- 3.6 Crestview Park on the left is part of a green belt along the Shunganunga Creek. Mostly it is on the Newman Terrace because the current floodplain is so small. This type of development along the streams reduces damage caused by flooding. It also gives some green relief to the urban areas.
- 3.75 Shunganunga Creek. A hiking and bike path crosses under Fairlawn Rd by way of the stream bridge. The path now extends from west of Fairlawn to Topeka Ave. Note Burnett Mound to the southeast with a water storage tank on the north face. Another field trip takes you to the top for a view over Topeka.
- 3.9 29th St. Turn west (right).
- 4.0 I-470
- 4.2 Shunganunga Creek. As you reach the traffic light at Arrowhead Rd., you will return to the Scranton Sh.Fm.
- 4.8 Glacial material caps the ridge ahead of you.
- 4.9 Wanamaker Rd. This area has had rapid development as a business area. The roads have not always kept pace with development, and as a result, road construction often causes major headaches.
- 5.1 Crest of glacial ridge.
- 5.2 South (left) of 29th St. is a cut in the side of the ridge that exposes the glacial deposits. The red colored material has been weathered and oxidized (soil forming processes), while the gray-colored material is unweathered.

- Just south of your present location is the West Branch Flood Detention Dam that was built to reduce flooding by Shunganunga Creek. Construction of the dam for Lake Sherwood has reduced, somewhat, the necessity for this structure. Chief Burnett was buried on Burnett Mound, but his grave was moved to the north end of the Detention Dam when the city built the first 5 million gallon water storage tank on the mound.
- 5.6 Unnamed tributary to Shunganunga Creek.
 - 5.9 Urish Rd. The hill ahead of you will take you up to the Willard Sh.Fm. with glacial material capping it. Note the development of houses on the right and the retirement complex on the left. The schools in this area have a hard time keeping pace with the increase in population.
 - 7.0 Lake Vaquero. A development lake that often has problems relating to excess nutrients (from lawns and fields) that encourage algae to bloom. This is a common problem with such lakes. The people want to get away from everyone else for their own patch of shore, and bring on problems with landscaping efforts. Problems can be controlled, but everyone must be willing to make the effort to do so.
 - 7.5 A pump station for a Rural Water District.
 - 7.9 Auburn Rd. Turn north (right). You are driving over the Willard Sh.Fm. on the divide between the drainage of Shunganunga Creek and Blacksmith Creek.
 - 8.4 K-4. Turn west (left).
 - 9.2 Tributary to Blacksmith Creek that is cut into the Emporia Ls.Fm. This creek may have been part of the spillway between the Mission Creek Valley and Shunganunga Creek when Mission Creek was blocked by the Kansan Glacier. K-4 follows this old glacial spillway to Mission Creek.
 - 9.6 Blacksmith Creek. Elmo Coal of the Cedar Vale Sh.Mbr. was mined in the Crossdale-Blacksmith Creek Mining District (from K-4 downstream to near I-70) by shafts and drifts in the hillsides; and from an unnamed coal in the Wamego Sh.Mbr. in the Upper Blacksmith Creek Mining District from a single 1/2-acre strip pit south of 45th St.
 - 9.9 Hays Rd. on south (left) side. Large glacial erratics are in the pasture to the southwest of this intersection. On the east side of Hays Rd. (0.1 mile South) is a large mass of Tarkio Ls.Mbr. of the Zeandale Ls.Fm, directly on top of the Emporia Ls.Fm., with about 40 feet of Willard Sh.Fm. missing. When there is something odd about the way units of rock layers occur, geologists try to figure out what it is and how it occurred. In this case, it is proposed in the Kansas Geological Survey Bulletin No. 175 Part 2, that the Kansan Glacier pushed a block of Tarkio Ls. from some place to the north, on top of an existing outcrop of Emporia Ls. Take a look at these two limestones, the glacial material is present in the cracks in the Tarkio and possibly between the limestone layers; do you agree with that theory? If you do not agree, then propose your own theory that explains how these rock units occur together and what happened to the Willard Sh. If you have made this stop, return to K-4 and continue west.
 - 11.3 Newman Terrace.
 - 11.6 Mission Creek. Cut in to the Newman Terrace deposits.
 - 11.8 Buck Creek Terrace.
 - 12.1 K-4 curves south (left). On Auburn Sh.Fm. on the valley wall, the road will drop back down on the Buck Creek Terrace.
 - 12.5 Mission Valley Ranch, road curves west (right).
 - 12.3 Leave terrace material for valley slope, Emporia Ls.Fm.
 - 14.0 Tributary to Mission Creek, curve to south (left).
 - 14.1 Zeandale Ls.Fm. in road cuts.
 - 14.8 Back to Buck Creek Terrace, road curves west (right).
 - 15.1 Limestone barn on left.
 - 15.3 Haskell Creek joins Mission Creek just to the south. When the glaciers had advanced further to the south, Shunganunga Creek was covered and the Mission Creek Valley filled until water spilled over the divide, via Haskell Creek, and drained into the North Fork of the Wakarusa River.
 - 15.8 Limestone sign, glacial erratics, and road curves south (left).
 - 15.9 Power line crossing.

- 16.1 Mission Creek. Road cut in Zeandale Ls.Fm. just south of the bridge. Road will top out in the Pillsbury Sh.Fm.
Field trip #3 pointed out Dry Creek as the glacial spillway that carried water across the divide from the glacial lake in Mill Creek to the Mission Creek valley. That spillway is located west in Wabaunsee County.
- 17.1 K-4 curves on to west (right). Take gravel road left to 53rd St.
17.2 53rd St., turn east (left).
17.8 Photogenic barn on right.
17.9 Tributary to Haskell Creek. Zeandale Ls.Fm.
18.3 Y-intersection with Davis Rd. turn south (right). Haskell Creek is just to your left.
18.8 57th St., turn west (right). The Dover Ls.Mbr. of the Stotler Ls.Fm. was described and named for exposures in this area.
- 19.0 &
19.4 Sandstone in road cuts. Cross-bedded sandstones was deposited in erosion channels during the Pennsylvanian Period. You will learn more about these deposits at a later stop.
19.5 Water tower on right.
19.6 Windmill on left.
20.0 Limestone house on right, edge of Dover. The town appears to sit on the Buck Creek Terrace.
20.2 Dover Church.
20.3 Rejoin K-4. You will follow it west. On the southwest corner is located the Dover I.O.O.F. Hall, constructed in 1898, downstairs has been a grocery store since 1909. If you have the time stop, enjoy an old country store that is everything to the community.
20.4 Sage Inn on left side. Built some time between 1865 & 1878, depending on whom you ask. Now operated as a Bed & Breakfast.
20.45 Mission Creek
20.5 Small limestone house.
20.8 From Buck Creek Terrace onto glacial material.
20.9 Wabaunsee County line.
21.0 Driving over section from Pillsbury Sh.Fm. up to Root Sh.Fm.
21.8 Just northwest of this area, it was reported in 1939 that farmers were digging coal for their own use. It appears to be the Nyman Coal of the Pillsbury Sh.Fm.
21.9 Turn south (left) on gravel road. You will drop off the bedrock of the valley wall onto glacial material, then Buck Creek Terrace, down to Newman Terrace deposits.
22.9 Echo Cliffs. The park is maintained by the Dover Grange.
The sandstone cliff that you see on the other side of Mission Creek has attracted people since the area was first settled. It was featured in the poster of the 100th anniversary of the Kansas Geological Survey, and has who knows how many pictures taken of it? This sandstone represents two different periods of erosion of stream valleys and their subsequent filling with sediments. It has been significant in the geological history of Kansas, because the younger of the two erosion cycles was considered for some time to be an erosional boundary between the Pennsylvanian and Permian periods. This was a boundary, thought to be marked with the "Indian Cave Sandstone," where geologists could point to a spot and say that one side was Pennsylvanian and the other was Permian. Well, geological thinking changes with the acquisition of more information. Additional studies of the "Indian Cave Sandstone" found that it was not one, but many different erosion events spanning a significant bit of time. Therefore, it was not a good boundary between two periods of time. Here at Echo Cliffs, two streams cut valleys into the sediments along about the same trend. The first was part of the Plumb Sh.Mbr. of the Wood Siding Fm. It may have cut as deep as the Tarkio Ls.Mbr. of the Zeandale Ls.Fm. Sea level rose and the valley was filled with an assortment of materials. Here you see mostly fine sand. The sea covered the area several times and an assortment of marine and terrestrial deposits were laid down. The land became elevated again and a new stream carved a valley

parallel to the first stream valley, in places eroding the prior valley fill. This valley is related to the Towle Sh.Mbr of the Onaga Sh.Fm., in places it cuts into the valley fill of the Plumb Sh.Mbr. You may be able to tell which sandstone belongs to which valley, by the large amount of carbon and iron staining on the bedding planes of the younger fill.

With such a good landmark to as Echo Cliffs for geologists to bring students to, you would think they would leave well enough alone, but if we apply the Scientific Method we must change our theories to account for new data. As a result of new information about fossils found in Russia near where the Permian System was first described, the boundary between the Pennsylvanian and Permian, in Kansas, is proposed to be raised to the base of the Neva Ls.Mbr. of the Grenola Ls.Fm. You can see this rock layer in the spillway of Tuttle Creek Reservoir on Field Trip # 3.

So much for lecture, now back to the field trip.

After your visit to Echo Cliffs, return to the road and pick up the mileage at 22.9.

- 22.9 Bridge over Mission Creek. As you drive up the curving road to the top of the hill, you will climb up in the stratigraphic section from the Wood Siding Fm. into the Onaga Sh.Fm.
- 23.3 Top of hill, just below the Falls City Ls.Fm.
- 23.5 Turn west (right), on the northwest corner is a limestone school house that has been converted into a home.
- 23.8 Lomis Creek. The rock that looks like concrete in the road ditch and along the east side of the creek, downstream of the bridge, is a basal conglomerate that was formed from deposits of local stream gravels deposited along the bottom and sides of the younger of the two valley fills exposed at Echo Cliffs.
- 24.1 Ruin of an old limestone house on left side. I wonder what stories can be told of this family farm?
The next 1/2 mile is a curving scenic Flint Hills road over the Wood Siding and Onaga Sh. Fm's.
- 24.6 Massasoit Creek. Newman Terrace again.
- 25.0 Turn north (right)
- 25.1 Tributary to Mission Creek.
- 25.4 Buck Creek Terrace.
- 25.5 Mission Creek cut into Newman Terrace.
- 25.8 Glacial material.
- 26.2 Wood Siding Fm.
- 26.5 K-4. This is the end of this field trip. If you turn to the right, you can return to Topeka by way of Dover. If you have the time, there are many interesting country roads in this area to explore. Such as turning left and following K-4 to Eskridge and points beyond (the heart of the Flint Hills).

FIELD TRIP REFERENCE NUMBERS:

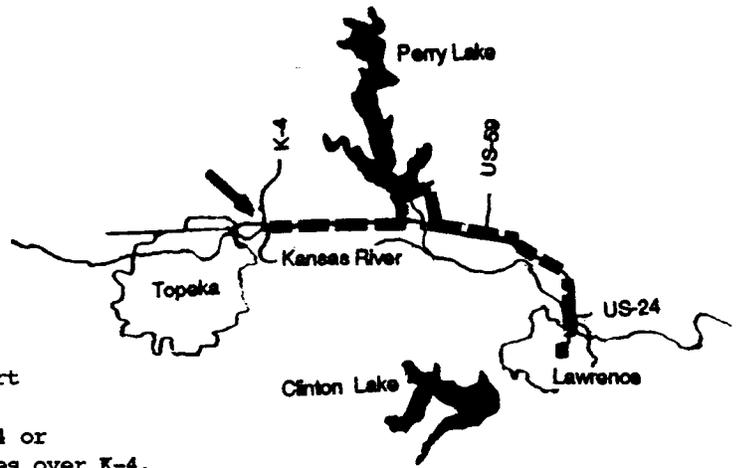
1, 7, 8, 11, 19, 20, 21, 22, & 34.

SELF-GUIDED FIELD TRIP 5

CALHOUNS BLUFF TO LAWRENCE ALONG THE KANSAS RIVER VALLEY.

by William Gilliland, July, 1995.

This field trip starts at the intersection of Highway US-24 and K-4. You can use all or part of Field Trip 1 to reach the starting point. Mileage can start from the entry ramp to US-24 or it can start from the point where US-24 crosses over K-4.



Mileage

- 0.0 Drive east on US-24. You are leaving Calhoun, Kansas. It was a small, pro-slavery settlement at the foot of Calhoun Bluff that was to be the county seat of Calhoun County (all of Shawnee Co. north of the Kansas River plus Jackson County). It lost out to Holton, and the county was reformed as Jackson Co. with part going into present Shawnee Co.
- 0.1 Jefferson County line. Little Muddy Creek, even though the Grantville Topographic map calls it Muddy Creek. You have entered the Kansas River Valley and are driving on the Newman Terrace. The railroad to your right is the Union Pacific.
- 0.6 Two wells on the right supply water for Rural Water District No. 1, Jefferson County. Water is produced from terrace material and river alluvium. The sedimentary deposits in river valleys are often important sources of groundwater.
- 1.1 Power line crossing highway.
- 1.6 Road to Grantville. Old US-24 used to run below Calhoun Bluffs and not over it. At that time, the highway also went through each of the small towns down the valley.
- 2.3 Muddy Creek. Yes, the correct one this time.
- 2.7 Center pivot irrigation system on the right.
- 3.0 Radio towers. They were for WREN Radio. I am not for sure what the current station is. One of the concrete wrens from the station is located in the small park at South Topeka Ave. & 12th St.
- 3.2 Drainage ditch. These ditches were constructed to drain water from flat wet area of the valley, called "Back Swamp" areas. Once they were drained, the land could be farmed on a regular basis.
- 3.7 Elm Creek.
- 4.1 Hamm's Grantville Quarries. Limestone from the Deer Creek Ls.Fm. is quarried and crushed to make material for construction. The limestone is covered by glacial outwash material that is removed to expose the allow operation of the quarry.
- 4.6 Prairie Creek. The hills that you will be driving through for the next 1.1 miles are mostly covered with sand that was washed out of the glacial material and partly filled a preexisting north-south trending stream valley.
- 5.7 Farm on the south (right) has springs that are fed by groundwater collecting in the sand deposits north of the highway.
- 6.1 Note how the river valley widens out ahead of you and the wide expanse of farm land that appears to cover most of the raised flat area.
- 6.4 Exit to K-237.
- 6.6 K-237. This highway will take you north to the Rock Creek State Park on Perry Lake.
- 7.1 Road south (right) to the town of Newman. This is where the Newman Terrace (mentioned at Mile 0.1), was first described and named. This wide flat area you have been driving on is the Newman Terrace. It is the first terrace above the current floodplain and appears to date from the Wisconsin Glacial Period. The terrace was formed as the floodplain when the Kansas River flowed at a high level. The terrace is only slightly eroded and the railroads and highways run along it to stay above most flooding and to avoid having to cut through hills, or bridge or fill across valleys.

- 7.3 End of 4-lane highway, watch out for other vehicles in the 2-lane portion.
- 9.1 Turn north (left) on the road to the Outlet Park at Perry Dam. You are still on the Newman Terrace until you reach the bend in the road ahead of you. The Perry Dam is the structure ahead and to the right of you. It is on the Delaware River and has just celebrated its 25th anniversary in 1995.
- 10.4 Thompsonville, at least the east end of it. The road to the west (left) will take you around and up the hill, to the road over the crest of the dam.
- 10.7 Drainage channel. Note the wells in the toe of the dam. They are standard practice to remove water from the foundation of the dam and help keep the downstream face of the dam dry and stable. Water is released into the drainage ditches. This road takes you along the downstream toe. If you want to try the upstream toe, you might need a different form of conveyance.
- 11.1 Outlet works into the Delaware River channel.
- 12.0 Road from the crest of the dam on the left. This road will also take you to the Corps of Engineers Information Center.
- 12.4 Limited Service Spillway (The Corps does not like to call them Emergency Spillway) releases water if the lake level exceeds a certain elevation. It is not controlled by any gates. Lecompton Ls.Fm.
- 12.7 Turn south (right). Note the name of the store. Tecumseh Sh.Fm.
- 13.0 Limestone house on right.
- 13.4 Limestone house of left.
- 14.0 Road on west (right).
- 14.2 Road cuts in glacial till.
- 14.4 Mt. Calvary Cemetery, then Perry Cemetery on left. Note that the gate posts have been constructed of Sioux Quartzite brought in by the glaciers.
- 15.0 Little Wild Horse Creek.
- 15.2 US-24 at Perry. Turn east (left).
- 15.4 Offices of Hamm's Quarries on left. In 1993, Hamm's constructed protection works around these offices, due to the potential for flooding. Even though Perry is on the Newman Terrace, the height of the flood and high flows from Lake Perry brought the area close to being flooded.
- 15.5 Road on left will take you up the valley of Little Wild Horse Creek.
- 15.6 Perry High School.
- 15.7 Road on south (right) will take you across the valley to Lecompton, which has historical sites of Constitution Hall and Lane University (where President Dwight D. Eisenhower's parents met).
- 16.5 Unnamed stream. This stream runs into an old oxbow meander south of the railroad. This is an abandoned channel of the Kansas River that has filled with sediment until it is now mostly dry. This meander was abandoned before Kansas became a State. You can tell because the county boundaries follow the river here. In other places the river has moved away from the county line and the official boundaries still follow the old channel. Think how much of a problem this might cause be if a river is used as a boundary between states or even countries?
- 17.0 The valley bluffs above you contain limestone, which have the potential to be mined to make construction material and agriculture lime (a soil treatment).
- 17.8 Historical Marker. South of this location, along the river, was a Kansa Indian Agency that was once run by Daniel Morgan Boone, a son of Daniel Boone.
- 18.4 Stone House Creek.
- 18.5 US-59 goes north, K-76 goes south to Williamstown (Billtown), on the northeast corner are wells for Jefferson County Rural Water District No. 7, to the northeast are limestone quarries in the river bluffs, and you have been on the Newman Terrace since Perry. Try saying all that in one breath!
- 18.9 Hamm's Williamstown Quarries.
- 19.4 Ditch to move water across farmland and keep it dry.
- 19.7 Underwood Cemetery on left.
- 19.9 Stream controlled by a ditch to keep the farms dry.

- 20.3 Highway curves to the right (south). Old Buck Creek School is located at this corner. Since the last creek, you have been driving on the Buck Creek Terrace. Note this is a raised area above the Newman Terrace, it is very eroded and you will drive off it just beyond this curve. The terrace was described and named here. Due to the extensive erosion of this terrace, it cannot be used for transportation routes. It is high enough above the present river level that it is not likely to flood. It was formed during the Illinoian Glacial Period.
- 21.1 Highway curves left, note quarry on hillside in front of you.
- 21.5 Buck Creek.
- 21.9 Location of Buck Creek (town / railroad siding ?)
- 22.2 Stream which runs into an abandoned meander channel. Douglas County is only a few yards south of you. This channel was occupied by the Kansas River when the boundary was established between the counties.
- 22.6 Piles of crushed limestone produced from the quarry, appear to be from Oread Ls.Fm.
- 22.8 Douglas County Line, the county line has come straight east from the old river channel to cross the highway. A road leads to the county landfill in an old quarry. Still driving on the Newman Terrace. South (right) you can see the Western Resources (KP&L) Lawrence Power Plant.
- 24.7 Midland Farm Store and junction with Douglas Co. #1040, watch your speed.
- 25.5 US-24 & 59 turn south (right). Note the Buck Creek Terrace to the east (left) beyond Mud Creek.
- 26.4 Recent alluvial material from this point until beyond the Kansas River.
- 26.7 Start 4-lane highway.
- 26.8 Maple Grove Cemetery.
- 26.85 US-24 turns east (left). The old Teepee building (old motel) on the south side of US-24 has a painted line marking the water level from the 1951 flood.
- 27.4 Kansas Turnpike bridge.
- 27.5 Entry to Turnpike on left and a retail outlet plaza to the right.
- 28.3 Union Pacific RR underpass.
- 28.5 Kansas River. Below the bridge is the Bowersock Mill & Power Co. Dam that is the only hydro-electric plant in Kansas. It was constructed in 1872-1874 to alleviate an energy crisis, resulting from all the firewood within a one day wagon trip of Lawrence being burnt. The seven low speed vertical water wheels and generators can deliver 300KW/hr. each, with a 17' head of water. The power was used by the mills and factories along the river front. Electrical power is still being sold to Western Resources. Downstream on the south bank are old factory buildings that have been converted into the Riverfront Mall. Floodwaters in 1993 almost made it up to the lower level.
- 28.8 6th St. turn west (right). You are on the Lawrence Fm. Any bets on where it was named?
- 28.85 Tennessee St., turn south (left). Note how Central Park has been developed along the stream. Geologic map of Douglas County indicates "Till and upland glacio-fluvial deposits"; or glacial material reworked by water.
- 29.2 Swimming pool.
- 29.3 9th St., turn west (right).
- 29.5 Mississippi St., turn south (left) and follow it onto the University Of Kansas campus. Note stadium on right and how the campus is built on and over Mt. Oread (the hill). Follow this road up the hill to the stop sign at the top, turn left.
- 30.5 Dyche Hall Natural History Museum. Find a parking place as best as you can. Parking is best on non-game Saturday mornings, Sundays, and outside of the usual school year. Open Monday - Saturday 10 AM - 5 PM, Sunday 12 - 5 PM. Displays related to geology and fossils in basement, wildlife diorama on main floor, and many other displays around the building. It is well worth taking time to explore it. Many other museums are found on the campus.

This is the end of this field trip. You might find interesting places or stores in the downtown area on your way home.

FIELD TRIP REFERENCE NUMBERS:

7, 10, 14, 23, 24, 27, 30A, 33, & 34.

SELF-GUIDED FIELD TRIP 6

SOUTHEAST LAKES: SHAWNEE, JIVARO, CLINTON, & LONE STAR.

by William Gilliland, August, 1995.



Starting point. Stoffer Hall North parking lot.

If you have time, look at the rocks that have been used in the gate posts of the stone wall along 17th St. Note the wide range of colors of the Sioux Quartzite, pink-red-purple. A few rocks have a greenish or gray-green color. Called "Greenstones," these are Precambrian basalts that were produced in oceans (possible as pillow lava) between small continental plates. As the small plates converged and were welded together to form the central portion of the Canadian Shield, the basalts were metamorphosed and serpentine minerals were produced. The presence of the serpentine minerals gives the rocks their greenish tint. Erosion exposed the metamorphosed basalts and Ice Age glaciers picked them up and transported them to northeast Kansas. Watch for the greenstones among other rocks in glacial deposits.

Mileage

- 0.0 Exit parking lot to 17th St., turn east (right).
- 0.1 Washburn Ave.
- 0.3 You have been driving over Severy Sh.Fm. As you start up this hill, you will be in the Topeka Ls.Fm. Glacial deposits extend from the northwest to cap this hill.
- 0.6 Western Ave. Northwest corner of Expo Center grounds. Topeka Ls.Fm.
- 0.7 Heritage Hall, the old limestone building across the parking lot. The large blocks of limestone in the walls contain fossil shellfish replaced with the mineral celestite.
- 0.8 Agriculture Hall. With Heritage Hall, these are some of the few buildings remaining from the old Mid America Fairgrounds. This was the fair that was operated in northeast Kansas to compete with the State Fair at Hutchinson. It lost out to Hutchinson and became the Shawnee County Fairgrounds until the Expo Center was constructed. Note the construction of Ag. Hall, in brick with tile trim; this same construction can also be seen in the old Gateway on the corner of Topeka Ave. On the north (left) on Tyler St. is a very large limestone building, looking something like a church, the former Crane Junior High School was constructed over the outcrop of the Topeka Ls.Fm. It is the current home of the Kansas Bureau of Investigation.
- 0.9 Topeka Ave. The old Mid America Fairgrounds Gateway is on the right and beyond it is a former city fire station, constructed with brick and limestone trim. You will be driving over glacial material from this intersection to the old RR tracks.
- 1.1 Kansas Ave.
- 1.2 Monroe School, now under management of the National Park Service. This was one of the schools involved with the Brown vs Topeka Board of Education suit.
- 1.25 & 1.3 Former location of RR tracks, this is part of an old industrial district that has seen better days. You will be driving on the Newman Terrace of Shunganunga Creek, with Cushinberry Park on the left. Note how 15th St. converges with 17th St. See Field Trip # 2 for information on why the Downtown area is not orientated north-south.
- 1.5 A T & SF RR overpass. This was the line that brought coal into Topeka from the Osage County coal fields in the early days of the operation of the Santa Fe Railroad. See Field Trip #7 for more information.
- 1.55 Shunganunga Creek. The bluff cut by the creek south of 17th St. exposes the lower part of the Topeka Ls.Fm. and the upper part of the Calhoun Sh.Fm.
- 1.6 Adams St. Turn south (right). You will be climbing through the formations exposed in the bluff of Shunganunga Creek and onto glacial material that caps the hills.

- 2.1 21st St. You are in the Topeka Ls.Fm. at this intersection.
- 2.6 25th St.
- 2.9 Top of the hill, glacial material over Howard Ls.Fm.
- 3.1 29th St. Severy Sh.Fm.
- 3.5 Limestone house on right. Glacial material over Howard Ls.Fm.
- 3.7 Adams Park on left.
- 4.1 37th St., turn east (right) Severy Sh.Fm. Jostens Publications on southeast corner. Your high school yearbook may have been printed there.
- 4.5 Back into the Howard Ls.Fm., glacial material capping hill to north of 37th.
- 4.7 Kansas Turnpike bridge. Severy Sh.Fm.
- 5.2 California Ave., valley ahead cuts down to the Topeka Ls.Fm., then 37th St. climbs back to the Severy Sh.Fm.
- 5.2 City limits, at this time. Such boundaries have a tendency to change.
- 5.6 Power line, back up to the Howard Ls.Fm. with a small cap of glacial material remaining.
- 6.1 West Edge Dr., turn north (left), Topeka Ls.Fm. Lake Shawnee is an attraction for the many houses along this area. Note the flower garden, a popular place for photography.
- 6.4 Power line again, yes the same one. Ball fields on right. A patch of glacial material caps the two higher hills in this area of the drive.
- 6.9 Pull off on the right to look at the spillway. As you walk close to the edge of the spillway, you should note that the upper portion is in the Topeka Ls.Fm., which is resistant to erosion by flows through the spillway. However, the underlying Calhoun Sh.Fm. can be easily removed by water and could allow the limestone to be undercut and destroyed. That is the reason for the concrete drop structure in the spillway. If it were not placed in the spillway, the level of Lake Shawnee might be some 20 feet or more below the current 958 feet above mean sea level.
Look downstream at the 29th St. bridge. It is constructed of limestone on concrete arches.
- 7.0 29th St. Turn east (right)
- 7.1 Lake Shawnee Dam across the Deer Creek valley. The first Deer Creek of today. The limestone riprap on the downstream face was placed by hand during the construction as a WPA project in the 1930's. The riprap is to reduce erosion to the downstream face.
- 7.6 Power line
- 8.0 Croco Rd. Water tower on southeast corner is to maintain water pressure in this area. The Lake Shawnee swimming beach is 0.3 mile south. You are on glacial material.
- 8.4 Topeka Ls.Fm.
- 8.7 Severy S.Fm.
- 9.0 Topeka Ls.Fm.
- 9.1 Pauline Rd.
- 9.3 Severy Sh.Fm.
- 9.6 Tecumseh Rd.
- 9.8-10.0 Topeka Ls.Fm.
- 10.1 Old limestone school, Decker School, 1881. Tecumseh Creek.
- 10.2 Start of Martin Marietta's old East Topeka Quarry. Main source of stone was the Deer Creek Ls.Fm. Though they may have taken out some Topeka Ls.Fm. from a few higher hills.
- 10.8 Start on Topeka Ls.Fm.
- 10.9 Curve left.
- 11.0 Curve back right.
- 11.2 Shawnee Heights Rd., turn south (right). As you travel south, you will drop as low in the stratigraphic section as the Deer Creek Ls.Fm. and climb back up as high as the Topeka Ls.Fm. See if you can track the different layers.
- 11.4 Tributary to Whetstone Creek.
- 12.2 Comanche Dr. to Lake Jivaro. This lake is a source of water for Rural Water District No. 8, Shawnee County.
- 12.5 37th St., Topeka Ls.Fm.

- 13.2 Shawnee Heights High School, Severy Sh.Fm.
- 13.3 Middle School.
- 13.5 45th St. turn east (right). A F & AM Lodge, constructed in 1917 of wood.
- 13.8 Nose of glacial material.
- 14.0 Zion Cemetery on left.
- 14.2 Old Watson Store on left, closed in the 1960's because it couldn't compete with Topeka where most people went to shop. It was too early for the convenience store boom. Old farmstead on right. Next 0.7 mile on glacial material.
- 14.5 Stanley Rd.
- 15.5 Stubbs Rd., YMCA, Camp Hammond down road to right. Down to the Severy Sh.Fm. & Deer Creek Ls.Fm.
- 15.6 Earth bermed-house on left. Will the cost of energy rise high enough to again warrant such conservation measures? Just think about the fact that more than 50% of the oil we are now using is imported.
- 15.9 Topeka Ls.Fm. with glacial material to the north.
- 16.0 View of the new Martin Marietta quarry. This is the land that Shawnee County purchased to protect the resource, limestone, from being covered by developments, then sold to Martin Marietta for a profit to the county taxpayers.
- 16.3 Deer Creek Ls.Fm. in road cuts.
- 16.4 Tributary to Deer Creek, cut into Tecumseh Sh.Fm. Have you wondered why the names of the formations and members sound so familiar? The names are selected from some geographic feature in the area where the unit is first described, such as a town, stream, or even a specific hill. If a unit should be given different names in different locations, the first name given is selected. There was a case in Kansas, where a limestone was described and named for Threemile Creek near Ft. Riley and a limestone described and named for Fourmile Creek near Council Grove. They were found to be the same limestone, but Threemile Limestone was named first. Watch for this cherty limestone layer when you travel through the Flint Hills.
- 16.5 Douglas County line. Entry into quarry on left.
- 16.9 Curve to right (south).
- 17.6 Deer in yard on left. I don't think they are fair game.
- 17.9 Curve to left (east). As you drop into the Deer Creek valley (yes, number 2), the road cuts are Deer Creek Ls.Fm. and Tecumseh Sh.Fm.
- 18.5 Road on right.
- 18.8 Leocompton Ls. Fm. in road cut.
- 18.9 Tributary to Deer Creek. Kanwaka Sh.Fm. next 0.6 mile.
- 19.3 Small stone barn
- 19.5 Road on left.
- 19.6 Tributary to Deer Creek, on Newman Terrace deposits.
- 19.7 Stull, Kansas.
- 19.9 Road on right will take you around the west and south sides of Lake Clinton.
- 20.0 Stull Cemetery, note remains of old stone church. Kanwaka Sh.Fm.
- 20.2 Drive on right has nice slabs of sandstone with ripple marks. If found in place, such ripple marks might be used to tell which way the water flowed, or in some case the direction the wind "blowed".
Next 3 miles will have the hills capped with Leocompton Ls.Fm. and the valleys are cut into the Kanwaka Sh.Fm.
- 23.5 Coon Creek, Newman Terrace deposits.
- 24.3 Buried channel in north (left) road cut. Note the fill in the channel slants downward to the east across the horizontal bedding of the Tecumseh Sh.Fm.
- 24.3 Tributary to Coon Creek.
- 24.6 US-40, turn east (right). Site of Kanwaka, which may have been named for the two rivers (Kansas & Wakarusa) that have a divide between their drainage basins along this ridge. Yes, you guessed it, the formation was described and named in this area.
- 25.0 RWD water tower on left. This hill and the next are capped with glacial till. Road is in the Leocompton Ls.Fm. and Kanwaka Sh.Fm.
- 26.5 Road to Lake Clinton. Turn south (right). Under construction in 1995. Kanwaka Sh.Fm

- 27.4 Cross Yankee Tank Run (creek).
- 28.3 Entry to Clinton State Park on right.
- 28.4 Corps of Engineers Headquarters. They have a nice natural history display.
- 28.5 Clinton Parkway on left. It connects to K-10 at the southern part of Lawrence.
- 28.65 North side of the limited service spillway.
- | | |
|--------------|---------------------|
| Oread Ls.Fm. | Plattsmouth Ls.Mbr. |
| | Heebner Sh.Mbr. |
| | Leavenworth Ls.Mbr. |
| | Snyderville Sh.Mbr. |
| | Toronto Ls.Mbr. |
- Lawrence Sh.Fm.
- |Williamsburg Coal bed
- 28.8 South side spillway.
- 28.95 North end of dam and road on left can take you below the dam.
- 29.35 Outlet works to Wakarusa River channel.
- 30.7 South end of Clinton Dam.
- 30.9 Top of hill, road cut on left. Snyderville Sh.Mbr. on top, follow section down hill.
- 31.0 Road crosses Toronto Ls.Mbr. The cut on the right exposes the Lawrence Sh.Fm. and the Upper and Lower Williamsburg Coal beds.
- 31.2 Buck Creek Terrace of Washington Creek and Wakarusa River. You will drive on this terrace until the village of Lone Star.
- 31.6 Turn south (right).
- 32.2 Wakarusa Valley School on left.
- 32.3 Road curves right (west).
- 33.6 Tributary to Washington Creek.
- 33.8 Road curves left (south).
- 34.3 Road curves right (west).
- 34.8 Lone Star Park Sign. Turn south (left).
- 35.4 Tributary to Washington Creek, village of Lone Star. They have problems with flooding when heavy rains occur on the drainage basin above them.
- 35.5 Stop sign. Turn right (southwest). Washington Creek bridge was ahead of you.
- 36.6 Tributary to Washington Creek.
- 37.6 Douglas County Highway # 10 joins from right.
- 37.8 Washington Creek bridge.
- 38.1 Lone Star Lake Dam. Constructed as a WPA project in the 1930's. Yes, like Lake Shawnee. Turn west (right) and cross the dam.
- 38.4 Park and look at this spillway. It is constructed in the Lawrence Sh.Fm. and the concrete protection has failed, resulting in the shale eroding and undercutting the structures until they fail. Much study has gone into how to repair the spillway. The problem is the cost; it will be very expensive. If it is not too wet, walk down into the channel below the spillway structure and look at the remains of portions of the spillway that have already failed.
- Now look at the exposure of the Lawrence Sh.Fm. The Lower Williamsburg Coal is exposed in the bank. You can check the shale layers just above it, to see if you can find carbon-film plant fossils. In some of the shale layers are ironstone nodules that can contain plant fossils and other fossil material. For a time you could see three fossilized tree trunks, still standing vertically in the west bank of the spillway, about 25 yards below the dam. The fragile fossils were washed out and destroyed, I believe during the floods of 1993. Check the bank above the coal layer, there might be additional such tree fossils exposed by slumping of the shale. Walk back to the upper end of the spillway and look along the face of the dam. See how the control tower for the outlet works is protected by the riprap of the dam. The control tower used to stand out from the dam with water all around it. In a very cold winter of the late 1970's, ice on the lake pushed the tower toward the dam until it

cracked and leaked. When the tower was repaired with a concrete collar, the dam was extended around it to protect from future ice damage.

This is the end of this field trip. If you have time, you might take the 5.4 mile drive around the lake. This is a good example of the development that took place around the smaller county lakes prior to the construction of the large federal reservoirs. You might check road cuts to see if you can find an exposure of the Upper Williamsburg Coal.

FIELD TRIP REFERENCE NUMBERS:

7, 15, 17, 19, 21, 23, 24, 28, 30A, & 34.

SELF-GUIDED FIELD TRIP 7

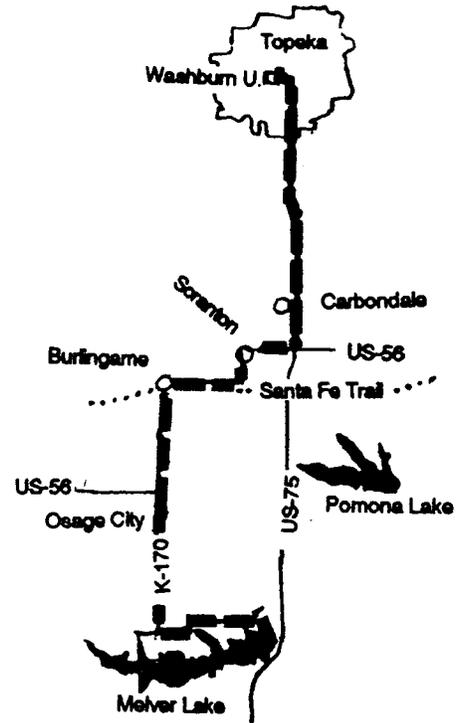
COAL FIELDS: WASHBURN UNIVERSITY TO MELVERN LAKE.

by William Gilliland, August, 1995.

This field trip starts in the east parking lot of Stoffer Hall. The parking lot is built on the Severy Sh.Fm. The mileage will start at the south exit of the lot near the pink Sioux Quartzite erratics.

Mileage

- 0.0 Exit parking lot, turn east (left).
- 0.05 Washburn Ave., turn south (right).
- 0.45 21st St., turn east (left). The Washburn View Plaza is located in the Topeka Ls.Fm.
- 0.6 Clay St., Newman Terrace.
- 0.9 Fillmore St. To the southeast (right) is Quinton Heights. The entire section of the Topeka Ls.Fm. is present with the Severy Sh.Fm. on top. This slope has been a favorite sledding spot for many years. Construction of a building for the Topeka School Board was modified to reduce impact to the slope, due to a major public outcry.
- 1.05 Shunganunga Creek. Note the very limited floodplain along the creek. The terrace takes up almost the entire valley floor. Just ahead on the left is the old Shawnee County Shop. Constructed of limestone it has been converted into a restaurant. In this case, with an auto shop theme. The recycling of buildings for newer uses can maintain a link with the history of a town that is lost with modern architectural designs.
- 1.2 Topeka Ave. and the Topeka Ls.Fm., turn south (right).
- 1.4 24th St. it will take you to the top of Quinton Heights slope.
- 1.7 27th St. If you take it East, it will become 25th St. on the other side of Kansas Ave. Streets did not line up quite right in that area. The Kansas National Guard and State Defense complex are along the left. Right are houses located along the Topeka Country Club golf course. Hill tops out in the Howard Ls.Fm.
- 2.2 29th St., as you travel south to the Wakarusa River, the geologic section will remain in the:
 - Glacial material
 - Scranton Sh.Fm.
 - Howard Ls.Fm.
 - Severy Sh.Fm.
- 2.9 Croix St. You are at the northwest corner of White Lakes Mall. This was the first large mall constructed in Topeka. It is located on a former golf course, and felt a very negative impact from the construction of other large malls. It is now gaining more occupants, and appears to be improving its retail position.
- 3.2 37th St. West and a little north was located the Capital Strip Mine that produced the Nodaway Coal. Glacial material caps the hill to the Southwest.
- 3.6 Entry to I-70, I-470 & the Kansas Turnpike.
- 3.9 Kansas Turnpike bridge.
- 4.2 A.T. & S.F. RR bridge. The line south to the coal fields of Osage County was the first one constructed by Santa Fe. Over that line came the coal that supplied the early expansion of this railroad from Topeka.



- 4.3 45th St., going left.
- 4.8 49th St., going right. This street will take you to that portion of the construction of the new US-75, where glacial material is being exposed. It is somewhat sorted and may represent glacial deposits that have been reworked by water. Some parts have been cemented into conglomerate by calcite deposited from groundwater.
- 5.8 57th St. at Pauline, also the entry into the portion of Forbes Field used by the Kansas Air National Guard. About 3/4 mile west is the area where the new US-75 is under construction. It is also a part of the same deposit of glacial material as is exposed at 41th St. In the same area were strip mines that produced from the Nodaway Coal. They were the south end of the Pauline Mining District. To the east is a very large flat area upon which the US Government constructed Forbes Air Base during WW II. This area is underlain by glacial material that might have been deposited by large flows of water, when a lake or lakes dammed by glacial ice broke through. In the next mile to the south, you will be driving over a tongue of glacial material that lines up with the long north-south hill of glacial material east of Burnett Mound. If you haven't guessed, the geology of areas at the margins of glacial advances can be very complex. Then, if you factor in a million years of weathering and erosion, you have to solve a geologic puzzle with pieces missing. If you are addicted to jigsaw or crossword puzzles, you can understand how geologists have to go about the process of solving the history of the Earth.
- 6.6 University Blvd., the north entry into Montara, the recycled military housing area.
- 7.0 Entry to Forbes Field, or the old base main gate. Kansas Department of Health and Environment occupies the old base hospital.
- 7.8 Montara Parkway, on right, the south entry to? You guessed it, Montara. On the left is the entry into the Heartland Park Raceway. Built in the 1980's, it is a booming business these days. Did you see the advertisements for auto parts on the telephone poles? Off glacial material and into the Howard Ls.Fm.
- 8.3 77th St. Severy Sh.Fm.
- 8.8 Williams Pipeline Co. transports gas from the El Dorado oil & gas fields to Kansas City. The El Dorado fields produce oil & gas from structures above the Nemaha Anticline (Ridge). Does that sound like something from the 3rd. Field Trip?
- 9.0 Pipelines pass under the highway. Some years back, one blew out and took out a section of road. Do you think that might have been the reason people didn't want the raceway extended over the pipelines?
- 9.4 85th St.
- 9.9 New US-75, take the turn to the left to enter the 4-lane highway going south.
- 10.4 93rd St. crosses under highway.
- 10.7 Road cuts expose the Topeka Ls.Fm.
- 11.3 Wakarusa River. This river valley carried a large amount of water when it was the drainage south of the Kansan Glaciers. As the water spilled from one glacial-blocked valley to another, it finally reached this drainage that could carry it on south of the ice. The floor of the valley is mostly Newman Terrace with the river cut into it. About two miles upstream, a large patch of Buck Creek Terrace is preserved.
- 11.5 101st St.
- 11.6 Valley wall, Calhoun Sh.Fm. at base. What formations will we traverse as the highway climbs the hill? You can find out from the stratigraphic column on page b.
- 12.4 Power line.
- 12.5 Osage County line. The Howard Ls.Fm. is on top of hill to left.
- 13.4 Section road under highway. Howard Ls.Fm. capping hill.
- 13.8 Top of hill.
- 14.4 Section road. Just west (right) of the highway is a swampy area. It is a mineral springs that was developed as the Merrill Springs Hotel, 1887-1915, with three stories, 38 rooms and a bath house. Building was razed in 1957. Such spas and "medicinal" spring waters were popular around the turn of the century.
- 14.6 Burys Creek. With its own Newman Terrace deposits. Cuts will be exposing Severy Sh.Fm. and Howard Ls.Fm.

- 15.7 Exit to right will take you to Main Street of Carbondale.
- 15.9 As you drive under Main St., look at the road cuts. This interchange was built in an old strip mine where the Nodaway Coal was removed. The trees and brush on the southeast corner are an example of how the unreclaimed pits look. This was the Carbondale Mining District, which was mostly strip mines because the coal was exposed, or close to the surface, at the outcrop of the Howard ls.Fm.; plus it was thick enough to be worth the effort and expense of mining. A few shaft mines were on the hill tops.
- 16.4 Section road under highway.
- 16.5-17.1 Strip-mined areas. You can find coal, shale, sandstone, limestone, hematite, limonite, marcasite, and other minerals all mixed together in the mine fills.
- 16.9 An eroded area on the east side of the highway that exposes the mine fill.
- 17.4 Section road over highway.
- 18.2 Take exit on right for US-56.
- 18.5 Turn west (right) on US-56.
- 18.6 Four Corners, old highway 75.
- 18.9 Tributary to Hundred and Ten Mile Creek. The Santa Fe Trail crossed the creek less than a mile south of here and the name came from being 110 miles from the start of the trail at Fort Osage, on the Missouri River. An old stage station is still near the crossing.
- 19.1 Half-section road.
- 20.3 Hundred and Ten Mile Creek. Newman Terrace deposits, while about 1 1/2 miles upstream can be found Buck Creek Terrace material.
- 20.7 Section road.
- 20.9 City limits of Scranton, a former coal boom town and coal company town; it now just hangs on. A few strip pits were to the southeast, but the dip of the rock layers had carried the Nodaway Coal deep enough that shaft mines were used. There appear to have been more than 30 mine shafts within one mile of the center of town. In the past many waste piles marked the shaft mines, however, the material could be used for fill and usually didn't cost anything, if hauled away. Therefore, you don't see the former visible evidence of mining activity.
- 21.1 Scranton High School was replaced by the Santa Fe Trail High School located about two miles east of old highway 75. It still serves as a school and is being expanded.
- 21.3 Curve left along RR tracks. One mine shaft was just beyond tracks and two were along the right side of the road.
- 21.5 Curve left. Main street. Convenience stores are coming to the small towns to replace the general stores.
- 21.8 Curve right.
- 21.9 Curve left. You are headed south again. Note how far it is to the city limits. This indicates how much Scranton has declined in population.
- 22.6 City limits.
- 23.5 Curve to west (right). The Santa Fe Trail joins the highway from the east at this point. It will run with US-56 to Burlingame. Burlingame was considered second only to Council Grove as an important place to get supplies and blacksmith work done.
- 24.0 Tributary to Dragoon Creek. Look to the left for a mine waste pile.
- 24.6 Section road.
- 24.7 Waste piles to right.
- 24.9 Waste pile near road on left.
- 25.2 Tributary to Switzler Creek. This somewhat flat area is eroded in the Scranton Sh.Fm.
- 25.6 Section road.
- 26.2 Waste pile left.
- 26.5 Tributary to Switzler Creek.
- 26.6 Section road, old Fostoria School location on left side. Fostoria was too small to compete as a town, when the coal boom ended.
- 27.0 Pond on left, anyone for a swim?
- 27.2 Waste pile to left.

- 27.7 Section road. Old mine shaft was on southwest corner. I have pointed out so many of the waste piles, in an attempt to give emphasis to your understanding of just how many mines there were. In this area they were digging about 100 feet for 12 to 22 inches of coal (average 15"). The Burlingame-Scranton Mining District had at least 50 mines.
- 28.1 "Curves." Yes, I said curves.
- 28.2 RR overpass, then Switzler Creek. Yes, it has a Newman Terrace. Burlingame is on the Buck Creek Terrace.
- 28.3 Limestone house on left.
- 28.6 Burlingame has center street parking. Perhaps Downtown Topeka should check on how it is done.
- 28.7 Turn south (left) on US-56. K-31 comes from west and joins to go south. Santa Fe Trail heads west and will rejoin US-56 before Council Grove.
- 28.8 Park on right.
- 29.1 Limestone house and retaining wall on right.
- 29.1 Abandoned A.T.&S.F. line to Harveyville.
- 29.7 Cemetery on left. Note the material in the gate posts. Is it native to this area? No, they would have had to bring the glacial erratics from the area north of the Wakarusa River.
- 29.9 &
- 30.1 Remains of a waste pile on left. Out of about 174 shaft mines in Osage County, only 6 were still operating in the fall of 1944. Two were located east of Burlingame, one was located northwest of Osage City, and three were located south of Burlingame. Of those mines, two were east of the highway at this point, and one was west of the highway at Mile 30.1.
- 30.7 School on right, Superior Dist.No.2, 1894. Old mine piles to southeast (left).
- 31.3 Curve to right. Buck Creek Terrace then down to Newman Terrace before stream.
- 31.8 Dragoon Creek. Note the pipeline crossing upstream (right). Burlingame gets water from Dragoon Creek just downstream.
- 32.4 Half-section road to left along Old Indian Treaty Boundary.
- 32.7 Leaving Newman Terrace for Scranton Sh.Fm. in valley wall.
- 32.8 Section road.
- 33.4 Look on left for a very old limestone building behind the farm house.
- 33.8 Power line crossing.
- 34.4 Half-section road to left, it goes to the site of Peterton, another coal town that is gone, except from the maps. It, like all the coal towns, was located along the railroad lines or highways because it was necessary to move the coal to market. In the parts of Osage County away from transportation routes, coal reserves still are unmined. The last mines operating sent coal over much of Kansas and as far west as Eastern Colorado by way of grain and cattle trucks returning from the Kansas City markets.
- 34.8 Smith Creek. Just a bit on Newman Terraces.
- 35.0 Waste pile to left.
- 35.5 US-56 curves to right, follow K-31 straight south.
- 35.8 American Cemetery on left, Union Cemetery on right.
- 35.9 St. Patricks Cemetery on right.
- 36.2 Road curving in from right, connection to US-56.
- 36.3 Mine site on right.
- 36.5 Mine sites on left. Yes, Osage City is also a coal town. I counted 35 mine shafts on the map within 1/2 mile of the intersection of K-31 & K-170. This area was, to say the least, undermined! Mine depths up to, or should I say down to, 120 feet.
- 36.8 Missouri Pacific RR.
- 37.1 K-31 turns to the east (left). You can mark your mileage here and take a small side trip to the Osage County Historical Society, Railroad & Mining Museum. It is 0.6 mile east in the old A.T. & S.F. RR Station, constructed in S.W. Spanish style in 1911-12. Open April 1 - September 30, Sat. & Sun. 1-4 PM. They have much material concerning history of county, railroads, and some about the coal mining. If you have taken the side trip, return to the corner and take K-170 south.

- 37.4 Osage County Fairgrounds.
- 37.8 Salt Creek. The lower areas have been used for ball fields. These uses are not as damaged by flooding as are homes. Newman Terrace with some Buck Creek Terrace just upstream.
- 38.4 A.T. & S.F. RR.
- 39.0 Osage City Reservoir on left, with golf course around it. Located on a tributary to Salt Creek.
- 39.5 Mine waste pile on left.
- 41.0 Road to Barclay, two miles west. It too was a coal town. This flat prairie is developed in the Scranton Sh.Fm.
- 41.35 Mute Creek, with Newman Terrace.
- 41.8 Cattle pens. When you get out in the wide open spaces, anything is good for an entry.
- 42.0 Power line.
- 43.0 Pump Station for Williams Brothers pipeline.
- 43.9 Section road.
- 44.7 K-170 curves to left. Several strip pits and a shaft mine were in the section on your left (west).
- 44.8 Turn on road to left, sign for Turkey Point Park. The trend of the coal mining areas you have been following today extended south of Melvern Lake (Marais des Cygnes River) and ended in the Arvonina Mining District, with 2 shaft mines and about 25 strip pits. You have followed the mining trend perpendicular to the dip of the rock layers and these are the same rock formations that can be found in the Topeka area or just west of Topeka. You have covered parts of two counties on this field trip. The rock layers extend northeast-southwest across the State of Kansas and some coal production has occurred in all the the counties along that trend.
- 45.0 Road cut in Scranton Sh.Fm.
The small stream valleys in the next mile will expose the Howard Ls.Fm.
- 45.9 Section road.
- 46.8 Road cuts exposing Severy Sh.Fm. The shale in these cuts produces large amounts of fossils. Each winter and each rain storm exposes more fossils as they weather out of the shale.
- 46.9 Road on right goes to Turkey Point Park. The flat shale area on the southeast corner produces many fossils; however, most are the Brachiopoda Neochonetes. These small flat shellfish fill a layer about one foot thick and almost exclude any other fossils from that zone. Take a look at that layer and try to visualize what the living conditions were, at the time the deposit formed. Look at other layers in the same shale and compare the fossils you find in them with the Neochonetes layer. Toward the East side of the flat area is a thin, straight line of tan to yellow shale. This marks the trace of a fault that has broken and displaced the layers allowing water to circulate through the shale, weathering it to a different color than its parent material. If you look in the cut across the road, in line with the fault, you can find it again. The cut on the north side also has many fossils, including the Neochonetes zone, just above road level. Try and identify the fossils you find and what type of living conditions they liked. This sort of information can help in the interpretation of the environment of deposition.
Now follow road as it curves to the north (left).
- 47.1 Pavement ends.
- 47.4 Road curves right, road cut exposes Topeka Ls.Fm.
- 47.55 Turkey Creek. I have seen Great Blue Herons fishing downstream of the road.
- 47.8 Entry into quarry on left, Topeka Ls.Fm.
- 47.9 Section road on left. Dark brown chert gravel you will see in the road cuts as you travel east are pre-Kansan stream gravels. They are mostly derived from erosion of the Flint Hills, by east flowing streams, which deposited material along their valleys. Later streams cut valleys at different locations and the old stream gravels were left capping some stream divides or as high terraces on the sides of the modern valleys. The dark brown color takes a very long period of weathering to develop, and the various gravels may be from different erosion cycles.

The next two miles you will drive along the contact between the Severy Sh.Fm. and the Topeka Ls.Fm.

- 48.7 Section road, Topeka Ls.Fm.
- 49.1 Cut in Severy Sh.Fm. Stream valley ahead will drop you down into the Calhoun Sh.Fm.
- 49.7 Section road.
- 49.8 Road cut in Topeka Ls.Fm.
- 50.4 Road cut in Topeka Ls.Fm. with a cap of pre-Kansan chert gravel. Some fossils can be found in these cuts.
- 50.7 Road paved.
- 50.8 Entry road to Eisenhower State Park. Mostly Calhoun Sh.Fm., but we will be working downward in the section.
- 52.3 Melvern Lake Road. Turn south (right)
- 52.7 Limited service spillway; remember, the Corps of Engineers doesn't like to use the word emergency any more. Exposure including stream, Leocompton Ls.Fm., & Kanwaka Sh.Fm.
- 53.1 Melvern Dam. It is a zoned, compacted, earth-filled structure.
- 54.3 Outlet works and Marais des Cygnes River channel.
- 54.7 End of dam.
- 54.9 Corps of Engineers Melvern Project Headquarters.
This is the end of this field trip. You can check here for information on other sights to see in the area, or you can take US-75 north to return to Topeka or south to reach I-35.

FIELD TRIP REFERENCE NUMBERS:

1, 4, 7, 16, 19, 21, 27, 28, 32, & 34.

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