Name: _____

Wear: sensible shoes sun protection (hat, …) pants (some brambles) Bring: water snack Optional: camera binoculars

OPTIONAL to hand
this in as part of your homework packet

Salt Lake County's Changing Surface
(Geologic Features of Salt Lake County)
Field Trip, Friday, July 9, 2010

The purpose of this field trip is for you to practice recognizing geologic features and geologic processes of Salt Lake County.
Specifically, I want you to see:

- local features such as the slope of the land
- regional features especially the mountain / valley relationship
- evidence of earthquake processes (faults on the east and west sides of the valley)
- evidence of Lake Bonneville
- evidence of erosion and deposition by glaciers.

COMPLETE THIS ASSIGNMENT as best you can as we drive it. The more you complete the more you'll be able to use it. FEEL FREE to return it TO ME AT THE END OF THE COURSE (note the check list on the big envelope you'll turn in), but **returning it to me is optional**.

Begin:	Hillsdale Elementary School, 3275 West 3100 South
Stop #1:	Wasatch fault, 400 South and 1100 East.
Stop #2:	Bonneville shoreline along Wasatch Boulevard.
Stop #3:	Little Cottonwood Canyon vista.
Stop #4:	Along the West Valley fault zone
End:	Hillsdale Elementary School.

Route of the field trip

Hillsdale… East on 3100 South to Redwood Road.
ALTERNATIVE #1–preferable. North to 2100 South, East to 700 East
ALTERNATIVE #2–second choice. South to 3500 South, East to 700 East
North on 700 East to 400 South.
East on 400 South (which becomes 500 South) to 1300 East.
North on 1300 East to 400 South.
West on 400 South to Fault line Park. STOP 1

North on 1000 East to 300 South.
East on 300 South to 1300 East.
South on 1300 East to 500 South.
East and south on Foothill Drive to I-215
South on I-215. Exit at 4500 South
Cross to the east side of the freeway and continue south on Wasatch Blvd to Gun Club Road (6475 South).
Turn left, east, on to Gun Club Road at 6457 South to the Gun Club. STOP 2.

From the Gun Club, return to Wasatch Boulevard. South to 9600 South (continue on Wasatch Boulevard at intersection to La Caille restaurant).
At 9600 South and Little Cottonwood Road, turn west into parking lot.
STOP #3.

West on 9600 South to I-15
North on I-15 to I-215
West on I-215 to Redwood Road exit.
North on Redwood Road to 4100 South.
West on 4100 South to 3200 West.
North on 3200 West to 3835 South.
East on 3835 South to Granger LDS Stake parking lot. STOP #4.

Leave the parking lot, turn left (east) onto 3835 South for a short block.
North (left) on Market Street, 2790 West for one block to 3785 South.
West (left) on 3785 South, (go one block to 2855 West = American Drive).
North (right) on 2855 West = American Drive paralleling the fault.
West (left) at 3650 South = Lancer Way (to 3200 West).
North (right) on to 3200 West (to Hillsdale Elementary).
END of field trip.

First exercise... to be completed either at the beginning or end of the field trip.

Evidence of the West Valley fault system, Hillsdale Elementary.... 3100 South and 3200 West

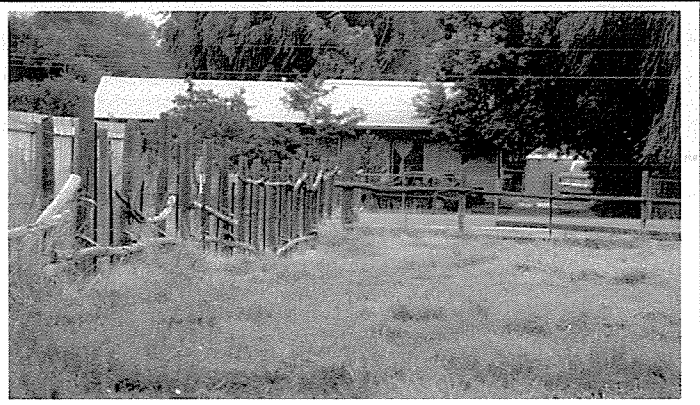


Photo from east side of Hillsdale Elementary looking east.

Note how the fence follows the topography.

Look at the land surface: there is a flat area in the foreground, a step down (the fault), and a lower flat area in the background. Which direction does the fault run?

___ North - south;
___ East - west;
___ Other.

Walk around the corner onto 3200 West. Look at the same topography from the west.

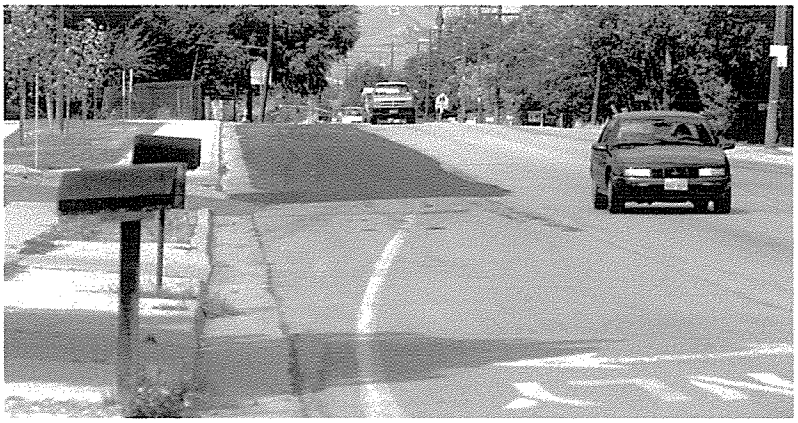
Which side of the fault has dropped down?

____ east side.

____ west side.

How much higher is the upper side from the lower side? _____ feet.

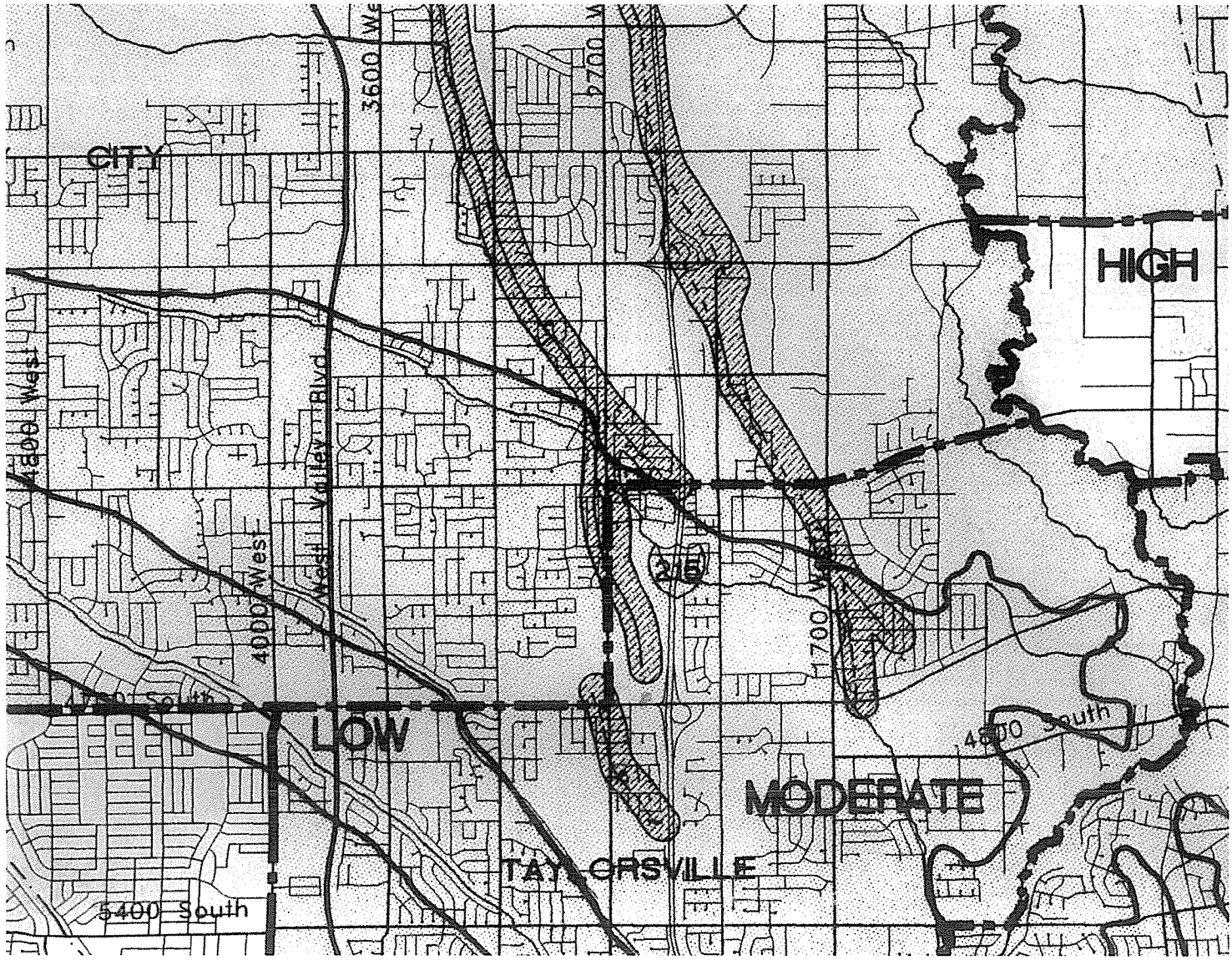
Think about the Basin and Range extension and the faults associated with the valleys and the mountains. Is the down-side of the fault on the side that you would expect it to be on, the valley side? ____ Yes, ____ No.



Looking west on 3100 South.

Human disturbances, a canal, and its banks complicate the landscape. Even so, do you see approximately where the fault crosses the road?

____ Yes ____ No



from Salt Lake County Public Works, Planning Division, Surface rupture and liquefaction potential special studies areas, Salt Lake County.

Based on your observations, does the fault clip Hillsdale Elementary?

_____ Yes _____ No

Begin field trip:
Hillsdale Elementary School
3100 South and 3200 West Elevation: 4250 feet above sea level (4240 ft a.s.l.)
Head east on 3100 South to Redwood Road.

Teaching moment: Notice the slope and shape of the land.

Imagine you're on a bicycle... would you be coasting? braking? or pedaling?

Gear:	brake	coast	high (easy)	medium	low (grunting)	walk
check one						

Note at least two local landforms.... (within a couple hundred feet of the road).

1) _____

2) _____

Would you build a basement if you built a house here? ___ Yes, ___ No
At what depth is the water table? ____ feet
Evidence: _____

Why is this area so flat? _____
What geologic environment(s) shape such a flat surfaces and how do you think this surface became flat?

_____.

What would the sediments / soils be like here? (check below.)
_____ big stones; _____ gravely; _____ sandy; _____ clayey.

For the rest of the trip... I'll keep asking the same information, check the box.

What was it like here during much of Lake Bonneville time?

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta of a river into Lake Bonneville	lake shore... beach of Lake Bonneville	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

...d Redwood Road: Elevation: 4245 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Head east on ... South (until 700 East).
Cheer when we cross the Jordan River. Elevation of river: 4230 ft a.s.l.

Note how straight the channel is... _____ natural? or _____ un-natural?

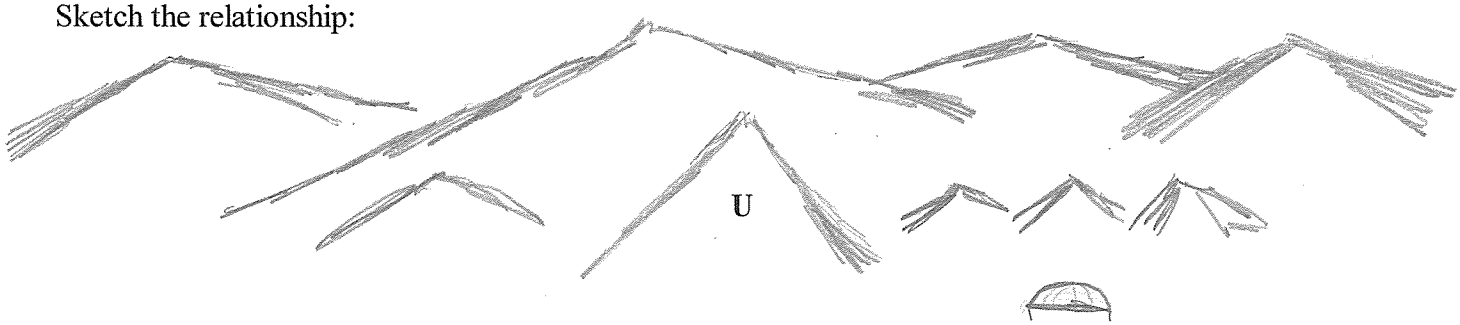
What does the water look like? _____ clear, _____ cloudy, _____ brown.

MORE ON THE JORDAN RIVER
If there are 7 blocks to the mile and the eastern edge of development in Salt Lake Valley is 42nd east and the western side is about 126th west... how many miles across is the valley? _____ miles

Assume the Jordan River is at 7th West
How close to the center of the valley is the Jordan River? _____

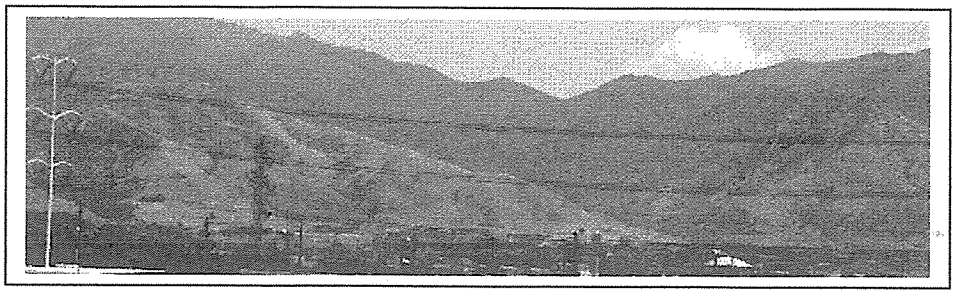
What will be the lowest point on our field trip? _____

LOOK AROUND YOU AT THE VISTAS... if it isn't too hazy
Look for the "U" of U Mountain...
See the prominent high shoreline of Lake Bonneville.
Where is it with respect to the "U"?
Sketch the relationship:



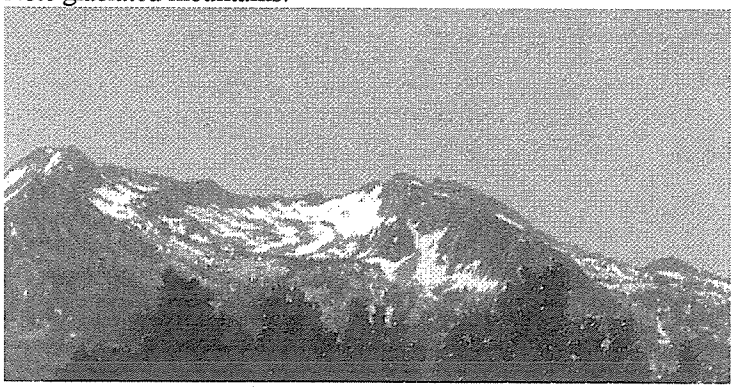
Note skyline to the east, north and south as we drive along.
Spot where glaciers once were (and where they'll be again). What is your clue?

Vista views:

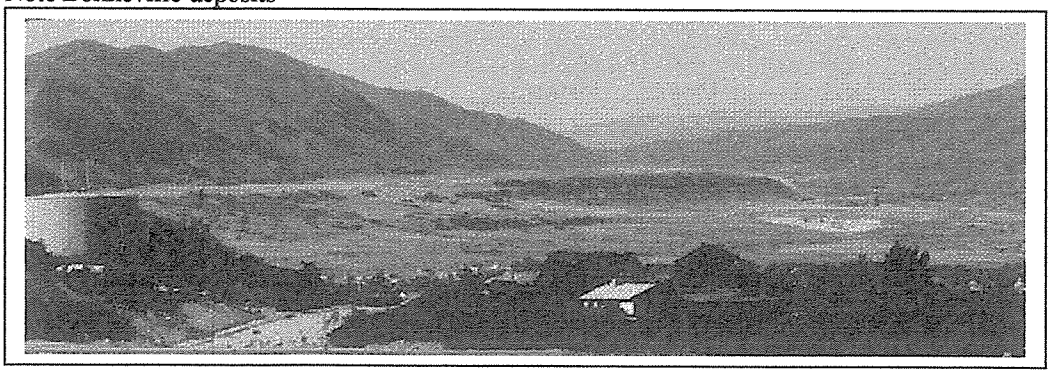


Vista looking north east
From 3200 West. Note the
Patterns of residential
Development. Note the "U" of "U" Mountain.
Where is the uppermost shoreline of former Lake Bonneville with respect to the "U"?

Note glaciated mountains:



Note Bonneville deposits



At 300 West and 3300 South: Elevation: 4235 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Notice the changes of gradient we experience.

At 3300 South and State Street Elevation: 4245 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

At 3300 South and 700 East Elevation: 4275 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn left from 3300 South and head north on 700 East.

At 700 East and 1700 South Elevation: 4285 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

As we pass Liberty Park... try to picture the area with no development ... no houses, no roads, some trees, and where is the drainage?

At 700 East and 1300 South Elevation: 4268 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

such as drainage of Red Butte canyon?
Cheer when we cross it... think real subtle. Where does the slope change?

Liberty Park is an emergency flood control facility. Imagine what it looked like here in the floods of the 1980s (1983-84).

_____.

Look north (along 700 East) to the Avenues:

Note: the two decidedly different geologically controlled landscapes:
- rolling topography, smooth landscape, lots of houses and vegetation, versus
- steeper topography, dissected by gullies, covered by grassland

The features are both hillslope-process and lake related:
- below: draped by sediments of Lake Bonneville below.
- above: hillslope features unchanged by Lake Bonneville.

At 700 East and 400 South: Elevation: 4320 ft a.s.l.

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

At 700 East and 400 South: Elevation: 4320 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn right, head east on 400 South.

At 800 East and 400 South: Elevation: 4340 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

What's ahead?

_____

Note how 400 South swings to 500 South... why?

_____.

At 400 South and 1000 East Elevation: 4410 feet a.s.l.
Cheer as we cross the Wasatch fault...

Gear:	brake	coast	high	medium	low	walk
check one						

Turn left, north, from 500 South onto 1300 East.

At 500 South and 1300 East: Elevation: 4575 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn left, west, from 1300 East onto 400 South.

At 1300 East and 400 South: Elevation: 4575 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Note the changes in elevation as we head west on 400 South:

At 400 South and 1100 East: Elevation: 4500 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

STOP #1: Fault line park...
Wasatch fault story.
Lake Bonneville story.

Write me a couple comments about your feelings, reactions to what I've been teaching you about this site:

Comments about Wasatch fault:

Comments about Lake Bonneville:

Faultline Park: Elevation: 4460 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn right, north, from 400 South onto 1000 East.

At 400 South and 1000 East Elevation: 4410 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn right, east, from 1000 East onto 300 South.

Cheer when we cross the Wasatch fault.

At 300 South and 1100 East Elevation: 4450 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn right, south, from 300 East onto 1300 East.

At 1300 East and 300 South Elevation: 4550 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn left, east, from 1300 East onto Foothill Drive.

At Foothill Drive and Rice Stadium Elevation: 4640 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

At Foothill Drive and the VA Hospital: Elevation: 4750 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

Cheer when we cross the drainage of Red Butte canyon under Foothill Drive.
(I want you to become more aware of the topography that was here before construction covered it over. A "topo" (topographic) map of your school's neighborhood has this sort of information for your neighborhood.)

At Foothill Drive and Sunnyside Drive (900 South) Elevation: 4750 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Cheer when we cross the drainage of Emigration canyon under Foothill Drive.

Foothill Drive runs along at about an elevation of 4780 ft a.s.l.
Wasatch Drive runs along at about an elevation of 4900 ft a.s.l.

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

Foothill Drive and 2100 South Elevation: 4800 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Foothill Drive from 2000 South to 2200 South:
I don't expect you to recognize every feature we cross. This hump we are crossing is a fan of debris coming out of the relatively small but steep canyon to the east. I hope you can see it now that I've pointed it out to you.

Head south on I-215.

Crossing Parley's Canyon:
IMPORTANT GEOLOGIC FEATURE (and much of it is missing)
Note the canyon.
Note the sediments on both sides of the canyon... elevation 4800 ft a.s.l.
Think about how Parleys drainage looked when Lake Bonneville was here... Where was the creek? Where did it dump its sediments?

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

As we drive south on I-215, note the geologic features of Salt Lake County:
contrast the Wasatch Range with the Oquirrh Mountains
look for features of Lake Bonneville

shorelines
deltas from canyons
look for erosional features
look for depositional features.

Exit I-215 at 4500 South.
Take Wasatch Boulevard south.

At Wasatch Boulevard and 4500 South Elevation: 4900 ft a.s.l

Gear:	brake	coast	high	medium	low	walk
check one						

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

As we drive south on Wasatch Boulevard, look for shorelines to the east (above you), to the west across the valley, and to the south at Draper and Point of the Mountain. Note the golf course below us. What was this before it was a golf course?

_____

Turn left, east, onto Gun Club Road at 6457 South to the Gun Club.

Note boulders... Where did they come from? _____

If it is after 5 PM we will stop at the bottom of the hill, otherwise we'll drive up the hill and to the Gun Club.
Note hill.

Gear:	brake	coast	high	medium	low	walk
check one						

Stop #2: Gun Club
(And thanks to the gun club for letting us on to their property.) Elevation: 5200 ft a.s.l.

Note the enormous Bonneville delta coming from... Big Cottonwood Canyon

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

Think about your school:
Estimate its elevation with respect to Lake Bonneville:

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

Here at the Gun Club:
Sketch on plastic the view to the south.
At Faultline Park we had one big story: the fault zone.
At Big Cottonwood we have two big stories: the fault zone and a delta complex of Lake Bonneville.

Look east... into the canyon.
What does Big Cottonwood Canyon look like? Sketch it.
Later we'll compare it to Little Cottonwood Canyon.

Return to Wasatch Boulevard. Note the sediment layers of sand and gravel in the gravel pit. Where did this material come from?

_____

Continue south on Wasatch Boulevard.

Wasatch Boulevard and Big Cottonwood Creek: Elevation: 4880 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

MAGNIFICENT GEOLOGIC FEATURE(S) COMING UP
If you have your earthquake map... note faults on map.
Note fault zone as we drive.
Note lake levels that the homes are built on.
Note how lake features are faulted.
This roadway was not excavated that much!

At 7800 South and Wasatch Boulevard Elevation: 5070 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Continue right, south, on Wasatch Boulevard (La Caille turn off).

At intersection... Elevation: 5100 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

BUS should pause along here.
What do you see? Give me two or three phrases...

_____

_____

This is a great place for a tree farm ... not a school. (Note boulders.)
going down:

Gear:	brake	coast	high	medium	low	walk
check one						

going up:

Gear:	brake	coast	high	medium	low	walk
check one						

STOP #3. Little Cottonwood Road - 9600 South and Wasatch Blvd.
Little Cottonwood Canyon vista:
Sketch on plastic the view to the southeast.

Fault features
Glacial features
Lake features

Sketch on plastic the view to the southeast.

- At Faultline Park we had one big story: the fault zone.
- At Big Cottonwood we had two big stories: the fault zone and a delta complex of Lake Bonneville.
- At Little Cottonwood we have three big stories: the fault zone, Lake Bonneville features, and glacier-features (moraines).

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

At intersection of Wasatch Boulevard and Little Cottonwood Road (south side)
Elevation: 5200 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

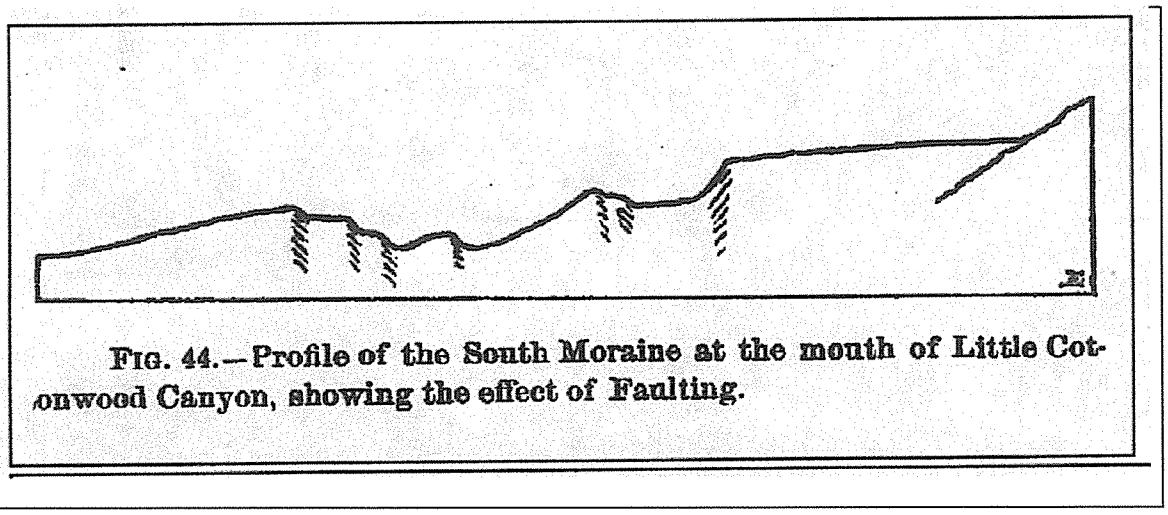


FIG. 44.—Profile of the South Moraine at the mouth of Little Cottonwood Canyon, showing the effect of Faulting.

Multiple scarps of the Wasatch fault zone, Little Cottonwood Canyon.
Sketch by G.K. Gilbert, in US Geological Survey Monograph 1, 1890, p. 347.

Continue west on Little Cottonwood Road - 9600 South.

Note boulder with graffiti... How did the boulder get here?

_____

Where do many of these rocks come from? _____

Any hypotheses on what kind of rock they are? _____

Your reasoning: _____

Little Cottonwood Road from 3000 East to 2700 East Elevation: 5100 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Little Cottonwood Road from 2600 East to 2500 East Elevation: 4800 ft. a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

At 9400 South and about 2000 East Elevation: 4780 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

9400 South from 1400 East to 1100 East Elevation: 4600 ft a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Follow Little Cottonwood Road... and it becomes 9000 South. Note gravel pit:

What was it like here during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

At 9000 South and 700 East. Elevation: 4517 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Turn north on 700 East to I-215 (via 900 East and Fort Union).

At 900 East and Fort Union Blvd. Elevation: 4445 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

Go west on I-215.

Cross the floodplain of the Jordan River.
Jordan River at I-215. Water elevation: 4260 feet a.s.l.

Exit at Redwood Road and proceed north.

At Redwood Road and 6000 South Elevation: 4340 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

At Redwood Road and 4700 South Elevation: 4295 feet a.s.l.

Gear:	brake	coast	high	medium	low	walk
check one						

What was it like during Lake Bonneville time?	lake bottom	sometimes above, sometimes below water	delta into lake	lake shore... beach	above the lake
Sediments	mud	mud, sand	silt, sand, mud	gravel, sand	rocky, steeper
check one					

Turn left, west, from Redwood Road onto 4100 South.
IMPORTANT GEOLOGIC FEATURE COMING UP!
SUBTLE Cheer when we cross one of the faults of the West Valley fault zone.
Watch topography... on the west side of the K-Mart, by Club Rendezvous.
This rise was once thought to be a shoreline of Lake Bonneville, but was reinterpreted to be a fault scarp. Trenching across the fault confirmed the displacement.

There is a west side and east side to the fault.

Which side dropped down? ____ east, or ____ west side.

Go over the viaduct at about 2200 West (do not cheer).

ANOTHER SUBTLE FAULT TRACE COMING UP!!
Watch the cars ahead of us.
CHEER as we cross another trace of the West Valley Fault system.

Turn right, north, on 3200 West (to 3835 South).
Turn right, east, on 3835 South (to the Granger LDS Stake parking lot).

STOP #4, if there is time.
Estimate the amount of displacement. Locate the fault trace.

Leave the parking lot turning left, east, onto 3835 South (go for a short block),
Turn left, north, on Market Street, 2790 West (go one block to 3785 South).
Turn left, west, on 3785 South, (go one block to 2855 West = American Drive).
Turn right, north, on 2855 West = American Drive and wind north, paralleling the fault. Catch glimpses of the fault to the west.
Turn left, west, at 3650 South = Lancer Way (to 3200 West).
In the process, cross the fault, again, CHEER.
Turn right, north, onto 3200 West (to Hillsdale Elementary).

On the way, look to the right of the bus. Where can you see the fault?

Location	Left of the bus?	Crossing the road?	Right of the bus?
3500 South			
Lemay Ave			
Mark Ave			
Lehi Ave			
Tess Ave			
the park			
3200 South			

End of field trip, Hillsdale Elementary.
If you didn't do the Hillsdale stop at the beginning, finish it now.
Turn this into me; I'll return it to you.