Questions for the GG103 Wai‘anae trip

The Wai‘anae mountain range is the eroded remnant of the old shield volcano that makes up the western half of O‘ahu. Wai‘anae literally means *mullet water*, presumably a reference to good mullet fishing here. Place name definitions and ‘ōlelo no‘eau (legends or sayings) come from *Place Names of Hawaii* by Pukui, Elbert, and Mookini, and from *Sites of Oahu* by Sterling and Summers. “Ka lā kapakahī ma Wai‘anae” - the one-sided (or lopsided) sun of Wai‘anae, refers to the fact that the mountains are high on the east, so the sun mainly shines from the west.

Your assignment is to answer the questions that follow. More importantly, at each place that we stop, look at the orientation of the rock layers. Are they horizontal (indicating intra-caldera lavas)? Are they dipping (indicating flank lavas)? Are there any dikes (indicating a rift zone)? Indicate the orientations on the first copy of the map. By the end of the day you’ll have enough information to complete a structural map of the old Wai‘anae volcano.

**Stop #1 (Kapolei District Park)**  Literally, Kapolei means beloved Kapo – one of Pele’s sisters. An old chant for games (like a jump rope rhyme) names lots of places on O‘ahu, and starts at Kapolei.

1. Look at the overall shape of the Wai‘anae mountains. Can you imagine what it might have looked like before all the erosion? Was it a shield volcano?

2. From here you can see some scoria cones, including Pu‘u Pālailai (*the young lai fish*) and Pu‘u Makakilo (*observing eyes*). Does it seem as if these cones are clustered in one part of Wai‘anae volcano?

**Stop #2 (near Kahe (flow) power station)**

1. Check out the orientation of lava flows in the hills nearby.

**Stop #3 (Lualualei Navy Rd.)**  Lualualei either means flexible lei – a cryptic reference to flexible lines of warriors who were able to surround an enemy army during an ancient battle, or it means spared beloved one – referring to a story about the family of a King’s servant. The family faces punishment by death because the servant is suspected of having accidentally worn the King’s loincloth. The king decides that the accidental wearing didn’t occur, and spares the family. A child born later into the family was named the spared beloved one (Lualualei) to commemorate the happy outcome.

1. Check out the orientation of lavas in Pu‘u o Hulu Uka and Heleakalā. *Pu‘u o Hulu* ( uka and kai combined) was a chief. He was in love with one of a pair of twins named Mā‘ili‘ili, but he couldn’t ever tell which twin was which. He and the twins were all changed into mountains, so he still sits there, trying to distinguish between the two. Literally, *Pu‘u o Hulu* means Hulu’s hill, and Mā‘ili‘ili means lots of little stones. Heleakalā sounds like the name of the famous crater on Maui, Haleakalā, but it is different. Heleakalā means where the sun is snared, a reference to the fact that its summit blocks the sun in many nearby places.

2. Take a look at the rocks in the road cut (sadly, now mostly covered by shot-crete). Do they look like basalt?

What kind of rocks are these and how did they get here?

**Stop #4 (Kaukama Rd.)**

1. What type of lava flows are these? In general what is their orientation?
2. Are all the rocks here lava flows?

**Stop #5 (Mā‘ili (pebbly) Beach Park)**

1. Here you can check out lava flow orientations in Pu‘u Mā‘ili‘ili, Pu‘u o Hulu Kai, and use the bathroom.

**Stop #6 (Mauna Kūwale (mountain standing alone) - about an hour and a half hike)**

There is said to be a burial cave somewhere near the top of Mauna Kūwale, on the side facing Kolekole Pass.

1. Do you think these lowest flows had high viscosities and/or yield strengths? Why?

2. From up at the top, orient yourself and your map, and then check out the orientations of the flows everywhere you can see them, including those in the top part of Mauna Kūwale, in Pu‘u Pāhe‘ehe‘e (slippery hill), in Pu‘u Mā‘ili‘ili, and in the W. walls of Wai‘anae Valley.

3. Look to the northeast towards the back of Lualualei valley. You can’t see them from here, but the flows in the back of the valley are sloping northeast towards Schofield. The low place along the back of the valley is Kolekole (raw, scarred) Pass. Just towards us from there is Pu‘u Ka‘īlio (hill of the dog). It has some very prominent layers in it but these are not lava flows. Instead, they are old layers of talus (rock rubble that piles up at the base of a cliff and slopes away from the cliff). Kolekole is a prominent pass through the Wai‘anae mountains. Today it is controlled by the military. In olden times, it is where armies from opposite sides of the Wai‘anae mountains would commonly meet and fight. The results of their fights were commonly raw, scarred flesh, hence the name.

4. At the base of the last climb to the top of Mauna Kūwale, check out the OFB (outrageous feldspar basalt).

**Stop #7 (Kāneana (Kāne’s cave)).**

There are many stories about Kāneana, including that it is the way Pele gets from Kaua‘i to O‘ahu, that it was (still is?) the home of a shark goddess, and that it is the place where a shark-man demi-god named Nanaue used to drag his human victims to be eaten.

1. What are the nearly-vertical rock bodies above and around the cave?

2. On your map, draw their orientation.

3. Look off to the west towards Ka‘ena (the heat) Point. Can you tell which way the rocks that make up the point are dipping? If so, indicate it on the map.

4. Take a close look at the rocks that make up the walls of the cave. Can you see any pāhoehoe flows? Can you see any ‘a‘ā flows? About how thick is each flow?

5. Up in the walls of the cave, can you see any rocks that look totally out of place? If you were told that they’re there naturally, how would you explain them?

6. Walk along the highway back towards ‘Ōhikilōlō Valley about 200 m and look up at the dark-colored flat rock face. What do you think this is? If spelled ‘Ōhikilōlō, the place name means crazy sand-crab, a reference to sand-crabs that run erratically on the beach. If spelled ‘Ōhikilolo, the place name means pried-out brains, as in particular ceremonies (such as at a canoe launching) where animal brains were eaten.
At home:
Transfer all your field symbols to the clean copy of the map. See if you can reconstruct the old Wai‘anae volcano. Show where the different major structures (rift zones, caldera, flanks) used to be. About how much of the original volcano remains? If the answer isn’t “the whole thing”, where might the rest be?