

Evaluation Brief EB17
Selinda Research Associates, Inc.
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== DRAFT ==

July 2008 On-Site Testing
of TAT Markers, MT & TAT Waysides, and Time Zero Portal Area

Introduction

This brief summarizes the results of three days of on-site formative evaluation of the *Trail of Time*. We tested eight wayside panels, one temporary sign, two viewing tubes, one portal icon with two panels, the entire *Time Accelerator Trail* segment, the first 300 million years of the *Main Trail*, and the transition area between the two trail segments.

Data collectors: Vicki Mills, Jake McDemott, Steve Semken, Ryan Crow, Eric Gyllenhaal, Deborah Perry, Karl Karlstrom, Laurie Crossey, Marcella Wells, Monica Pineda, Jessica Lopez Pearce.

Dates: Trails installed Saturday and Sunday, July 19 & 20; data collected Monday through Wednesday, July 21 through 23; trail de-installed Wednesday, July 23.

Acronyms: Previously, the two segments of the *Trail of Time* were referred to as the MT (Main Trail) and the TAT (Time Accelerator Trail). In this document, based partially on the results of the formative evaluation, we are replacing TAT with *Million Year Trail* (MYT), and MT with *Deep Time Trail* (DTT). Unless specified otherwise, both MYT and DTT refer to just the markers; TOT (Trail of Time) is used to refer to the combined MYT, DTT, and all accompanying waysides and activities (in other words, the whole thing); and WIS is the Wayside Integration Strip along the top of all waysides.

General Results: There was strong evidence that The Trail continues to come together nicely. As during the previous site visit, many visitors used the trail in intended ways, and used the waysides to help them make sense of things. Hands on activities and experiences continued to work well for the most part. The sample rocks and viewing tubes attracted visitors' attention, and were often a useful "starting point." They also provided engaging sensory (both tactile and visual) experiences for many visitors.

Many people continued to be confused about the two trails and were having a difficult time figuring out their relationship to one another. Another on-going challenge is that some visitors thought that "not much happened" during the gaps and spacing between the interpretive signs.

Primary Recommendation:

As we were pulling together the recommendations for this evaluation brief, we quickly realized that many of them had to do with consistency and formatting. Now that we have tested various layouts/looks for the wayside panels, our primary recommendation is for the development team to come up with a draft **design layout template** for the waysides. This should not be highly polished, and it should not be so detailed that it specifies font size, color palette, etc. Rather it should suggest things like the type of heading (see #2 below); the desire to include one or two activities on each wayside, each beginning with a highlighted *action word*; a general design for the Wayside Integration Strip; the use of read-at-a-glance text; a sample wayside panel layout; etc. After being tested, this template would then be revised and become the standard for all future design/development work.

Additional General Recommendations:

1. Revise the Wayside Integration Strip. This strip has evolved into a major organizing element for each of the DTT and MYT waysides. Because it is such an integral interpretive element, the general layout/design needs to be finalized.
 - a. Make it more recognizable as the trail along which visitors are walking.
 - b. On every panel have it include the entire *Trail of Time*, with both the MYT and DTT.
 - c. Test the final version off-site.
2. Start each panel with an event, i.e. something about the date at which visitors are standing. Decide on a standard format for the title/heading of each wayside panel, and then be consistent. Here are some examples of possible different formats.

<i>chapter heading</i>	<i>main message</i>	<i>event*</i>
Uplift & Erosion	Without uplift there would be no Grand Canyon.	70 million years ago this whole area was at sea level.
Canyon Cutting	It took 6 million years to carve the Canyon.	6 million years ago the Canyon began to be formed.
Native Peoples	People have been at Grand Canyon for 10,000 years	10,000 years ago people first arrived in the Canyon.

* During this round of on-site testing, we found a number of visitors who still had a difficult time reconciling their notions of the *Trail of Time* as a timeline (i.e. a line with specific important dates highlighted), the *Trail of Time* as a nature trail (i.e. a walk with some points of interest), and the *Trail of Time* as what it is (i.e. a line with geologic concepts that can be roughly associated with certain times). Because of this, our tentative recommendation is to go with an event-based title/heading for each wayside panel. Before making a final decision however, it will be important to see how this plays out with all the TOT wayside panels.

3. Introduce a new type of interpretive panel to be used as (physical and limited conceptual) orientation. So far, there are just three locations identified:
 - a. at 1st MYT scale change (i.e. 1s to 10s)
 - b. at Time Zero Portal transition between MYT and DTT
 - c. at intersection of Headquarters Trail and DTTPurpose/content for each of these locations should be discussed.
4. The large chunks of rock continue to be a big draw. Keep them! Include direction to *Touch me!*. We tried “Please touch” and “Touch me” and found that some respondents read “Please touch” as “Please do not touch.”
5. The viewing tubes are also a big draw, but they need significant testing to make sure they work for visitors rather than frustrating visitors.
6. Come up with a wayside panel layout that doesn’t rely on a black text strip with white lettering. On some MYT waysides there was one (or sometimes two) black strip(s) with white lettering. The text in these strips was rarely seen or noticed by visitors.
7. Any time there is a piece of rock and accompanying text on the sign, the rock and text **MUST** be right next to each other.
8. Whenever possible, have MYT waysides at distinctly different times, e.g. not 10, 1,000, 10,000 or 20,000 and 200,000. Rather e.g. at 20ya (It’s about time); 10,000 (Native peoples); 15,000 (Climate); 200,000 (Restless Region).
9. One of the strengths of the *Trail of Time* proposal was its strong commitment to ethnogeology concepts. We are concerned that this is getting lost in the shuffle, and encourage the team to consider adding an additional wayside panel(s) perhaps along the MYT, that addresses this important goal of the project.
10. At some point (sooner rather than later?) a proofreader needs to be brought in to ensure that all numbers with more than three digits have a/some comma(s).

Recommendation for Next Steps for evaluation:

We are suggesting four remaining evaluation studies for the *Trail of Time* project:

1. **Off-site testing of the revised design template including WIS.** This could take place this fall, and would require rough mocked-up (not polished) versions of two sample full-scale wayside panels. We would test the effectiveness of the new WIS, as well as the general layout, but not test any other specific panel elements. We would use both critical review and testing with respondents.
2. **Off-site testing of all wayside panels that have not yet been tested.** This could take place as soon as the beginning of 2009 and would require full-scale mocked up (not polished) versions of the 8-10 (?) wayside panels yet to be developed. We would use both critical review and testing with respondents.
3. **On-site rapid prototyping.** This would be our final on-site testing and we would use a strategy known as rapid-prototyping. During rapid prototyping a team (consisting of an evaluator and a content person) works on a single fully mocked up wayside panel on-site during a concentrated period of time, usually 2-3 hours. During that time, visitors are observed and interviewed and on-the-spot revisions are made. The changes are tested with more visitors, and necessary changes made. This iterative process continues until the panel is as effective as possible. In this scenario we would have 3-4 teams working in 2-3 hour blocks of time over a period of 3 consecutive days at the rim, allowing us to do final testing/revising of approximately 18-24 wayside panels. This study could take place as early as the spring of 2009 and would require full-size mockups of all panels to be tested, and approximately 5-10 meters of trail markers laid out on either side of each wayside.
4. **Final summative evaluation.** This would take place about 2-6 months after the trail is completed and open to the public. The summative evaluation would consist of unobtrusive observations, participant observations, and depth interviews and would examine the visitor experience as they walk the trail, and as they engage with the waysides.

The remainder of this evaluation brief focuses on specific recommendations for each wayside/interpretive area.

Time Zero Portal Area

The *Time Zero Portal Area* is comprised of an *Icon/Rock Column* with accompanying *Portal Panel*, a *Magic Meter Inset* including trail insets to connect the two trails, and a *Magic Meter Panel*. The purpose of this area is to serve as a gateway to the *Million Year Trail* (MYT) for those traveling west-to-east, and to the *Deep Time Trail* (DTT) for those traveling east-to-west.



Time Zero Portal area looking west:
original set up
(Note: 6My wayside is 6 meters past the portal area)



...and later, looking east:
with canyon wayside removed and carpet cut
(Note: DTT on left; MYT on right)

Icon/Rock Column:

The purpose of the *Icon/Rock Column* is to (a) provide an aesthetically pleasing entrance/exit/presence to various sections of the Trail of Time, (b) effectively and aesthetically hold a *Portal Panel* welcoming folks to different sections of the trail, and (c) subtly convey the idea of three groups of Grand Canyon rock types.

The rock column is beautiful! There were no indications that anyone had trouble with the design of this icon, and some suggestions that it will work well. We don't know yet if most visitors will recognize it as a cross section of the canyon (although this may not be important) as we tested this with only a few visitors. Those we did test it with indicated that they got it.

Recommendations:

1. Have less of the Grand Canyon Supergroup face exposed. Visitors tend to be quite literal, and while some may not recognize the portal as a cross section of the canyon, those that do will likely misinterpret the visual presence of the Supergroup as they walk the trail, as well as the relationship between the horizontal layers and the Supergroup. In fact, this is a great place to (subtly) reinforce the idea that there is a lot of Supergroup but you can't actually see much of it most of the time.
2. Keep the icon where it is, but bump out the trail to relieve congestion by allowing visitors to walk all around it and to get out of the main traffic area to enjoy it. We found that at times this portal area became very congested, thereby almost guaranteeing that other folks would blast on through without stopping. Visitors will need full access to the portal so they can feel the rocks, and walk around the portal, all without blocking the trail.
3. Continue testing/revising prototypes of this area on-site until it works well for visitors.



original version



revised version with much of the text removed

Portal Panel:

The purpose of this panel is to (a) congratulate/welcome people; and (b) clearly explain the purpose of each trail segment. The size/shape of the panel seemed to work well, but the text/graphics need to be revised. We tested various versions eliminating more and more text (see revised version) and found that the portal needed to primarily welcome visitors as well as congratulate them, and also orient them to where they were along the rim.

Recommendations:

1. Congratulate first; welcome second. Visitors need to be first congratulated for what they have accomplished and then oriented to what's ahead. In other words, flip the two top sections in the original version. The revised version (with Congratulations on the left) is correct.
2. Include a *You Are Here* map on all portals, with the entire *Trail of Time* clearly laid out, and distances marked, e.g. .5 miles to YOS; 1.5 miles to Grand Canyon Village; .75 miles to Headquarters Trail. [These are **not** the right distances.]
3. Include a drawing of the visitor group and girl walking the trail on all portals. We found many visitors copying the behavior of the girl, even little ones who were unable or didn't take the time to read. Don't mess with this drawing too much other than making it a little more polished. The perspective is good, the spacing is good, people noticed it. Be vigilant about flipping the drawing on each portal panel as necessary to make sure the girl/trail is oriented correctly. Both of the examples above are correct
4. Reduce/revise text on panel. Keep it simple, conversational, and read-at-a-glance-able. Suggestions for this portal in particular (West-to-East), but applicable to most other portals as well:
 - a. Congratulations! You just walked the *Deep Time Trail*, a timeline that covers 2 billion years of Grand Canyon geology.
 - b. Welcome! You are entering the *Million Year Trail*, a timeline that will show how much happened in just the last one million years. Note: be sure to include the word "timeline" as this served an important orienting function for visitors.
 - c. Include a very brief explanation of the MYT, e.g. This timeline squeezes one million years into 140 meters. Walk all the way back to the year you were born and think about all that happened before your time.
 - d. That's all. On all portals eliminate the instructions on how to use the trail, to pick up a guide, to look at the Magic Meter panel, etc. Keep it simple, conversational, and read-at-a-glance-able.



version 1 original



version 2 with carpet cut



version 3 with lines to markers

Magic Meter Inset:

The purpose of the *Magic Meter Inset* is to convey that the first meter of the *Deep Time Trail* (DTT) encompasses the entire *Million Year Trail* (MYT).

The *Magic Meter Inset* (i.e. the first meter of the *Deep Time Trail*) promises to be an important component of the *Time Zero Portal Area*, but its usefulness has yet to be confirmed. We observed many visitors looking at it, standing on it, and discussing it – even one dad with two young sons who hunkered down, pointing to TODAY and pinching their fingers together to show how much of human history is represented – but interviews were inconclusive about what folks were taking away.

Various treatments for helping visitors make the transition between the two trails were tried with not much success. Most respondents did not readily recognize that the first meter of the DTT encompasses the entire MYT. We did find that when arrows were added (see version 3 above) many visitors (mostly children) would walk along the MYT, take a sharp right turn when they reached the end of the MYT, cross the pavement, and take a sharp left turn to continue walking along the DTT.

Recommendations:

1. Consider adding MYT events. Harkening back to earlier versions of the bronze strip—but making it more visitor-friendly and conversational—include each of the wayside events directly on the *Magic Meter Inset*. For example: 200,000ya volcanoes & earthquakes; 130,000ya colder climate cycle; 80,000ya warmer climate cycle; 12,000ya colder climate cycle; 10,000ya people arrived in Grand Canyon; 100 years ago Powell explored; today you were born. The challenge with this recommendation is that this is too much information to include on a panel of this size and still have visitors able to read it.
2. Continue experimenting with different versions of trail markings to help visitors make the connection between the two trails. We may find that a subtle and aesthetic approach may work best (e.g. something like version 2 above), with the assumption that most visitors will see it as decoration – if they see it at all – but a few will actually “get it.” This is a do-no-harm strategy as opposed to a particularly effective strategy; i.e. it’s likely that the folks who do “get it” are those who would have gotten it anyway, and we aren’t helping those folks who really need it. One of the dangers of a more instructional approach (such as in version 3) is that it looks like – as one visitor put it – “a science fair project.”



original 1a



original 1b



revised version 2

Magic Meter Panel:

The purpose of the *Magic Meter Panel* is to complement the *Magic Meter Inset* by providing a narrative/graphic explanation that the first meter of the *Deep Time Trail* (DTT) encompasses the entire *Million Year Trail* (MYT).

There was general consensus that the original treatment (1a and 1b above) were not effective at communicating to visitors that the first meter of the DTT encompasses the entire MYT. Different treatments were tried—including (a) removing the panel entirely (see *Magic Meter Inset* version 2 above) and (b) replacing it with a low-to-the-ground orientation panel (revised version 2 above) – but the challenge remains. It seems clear that a panel is needed in this area to draw people's attention and ideally help them connect the two trails. The low-to-the-ground version has the most promise, but it still needs some work.

Recommendations:

1. Design a new low-to-the-ground panel for on-site testing (a spin-off of revised version 2 above) that includes the following text:
 - a. All that happened in the last million years is squeezed into the first meter of the Deep Time Trail.
 - b. Walk this way ← to feel how long 2 billion years is.
 - c. Walk this way → to see what happened in the last one million years.
 - d. Perhaps even do a graphic representation of the word **squeezed**, where the letters are squooshed in – but still readable.
 - e. In the middle of the panel include a (smaller than life?) photograph of the *Magic Meter Inset*.

Million Year Trail Waysides



version 1



version 2

Temporary Sign:

The purpose of this is to serve as an entry/welcome to the Million Year Trail until a permanent portal is designed. Some time was spent tweaking the wording on this sign.

Recommendations:

1. Consolidate and clarify the text so that it (a) welcomes people to the entire *Trail of Time*, and then divides that experience into the two sections: MYT, and DTT.
2. Include a *You Are Here* map, but make sure it is consistent with Park maps. Also make sure the map includes the entire *Trail of Time*, with the two sections clearly identifiable.
3. Suggested text:
 - a. Welcome to the Trail of Time! (1.2 miles total; 2.0 kilometers)
 - b. Walk the Million Year Trail (.2 miles; 140 meters) to see how much happened in the last million years.
 - c. Then walk the Deep Time Trail (1 mile; 1.8 kilometers) through 1,840 million (almost 2 billion) years of Grand Canyon geology.
 - d. Remove shaded arrow with text.
 - e. See additional recommendations for *Time Zero Portal Panel* (page 5).



It's About Time:

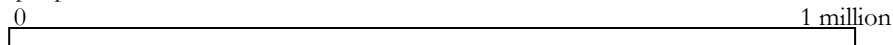
The purpose of this panel is to introduce the *Million Year Trail* and help visitors prepare for the shift from personal to historical to pre-historical to geologic time scales.

Recommendations:

1. Move this panel from 10ya to 20ya. We quickly discovered that the original location (10 meters from the *Temporary Sign*) caused too much congestion at the entrance to the MYT, resulting in many visitors by-passing the *Temporary Sign*, the *It's About Time* wayside, or both.
2. Redesign the panel.
 - a. Put the timeline closer to the bottom and then explain a bit more about it, for example something like the following. (The long rectangle would be similar to the current WIS.)

This end has room
for people

This end squeezes lots of
time into a short distance



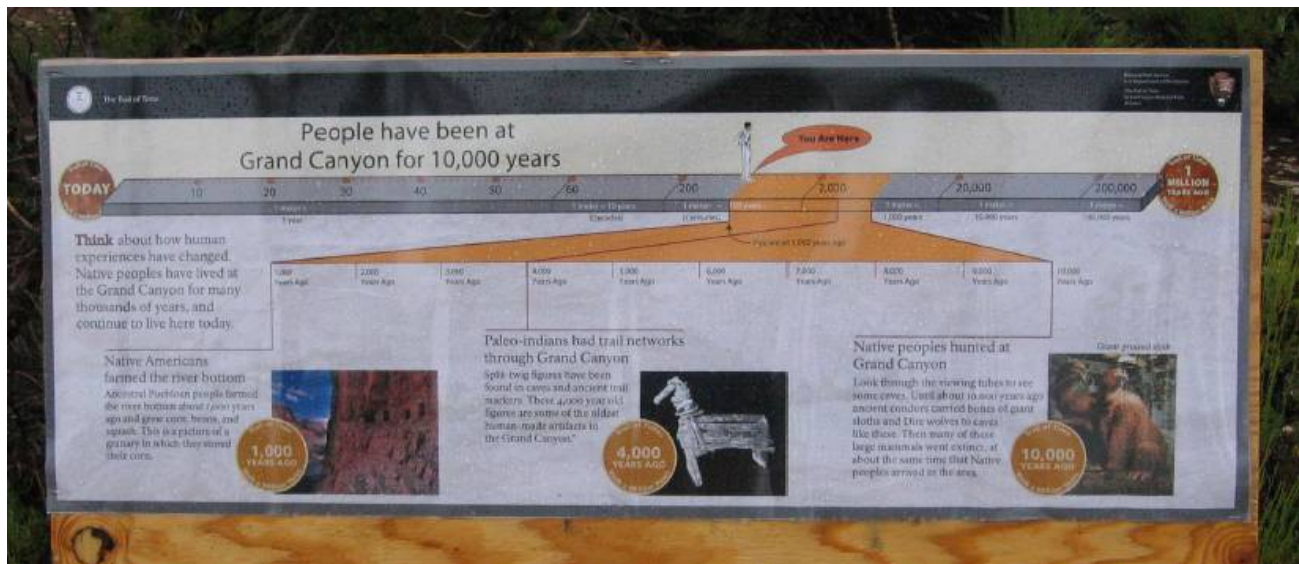
You and your parents' time
(find your birthday)

Historic
times

Prehistoric
humans

Geologic
time

- b. Add explanatory text : We stretch out time at the beginning so you can find your birthday. We squeeze time down at the end so you can see what happened without walking a million steps. The trail is short enough so you can see all that happened; but long so you can feel how much time has passed
 - c. Retain the stack-of-quarters analogy if possible; include a stylized illustration showing a stack of quarters from the bottom to the top of the GC. Suggested text: IMAGINE a million. A stack of 1 million quarters would be as high as the canyon is deep.
 - d. Flesh out (slightly) the birthday activity. We found many respondents who experienced a “so what” phenomenon when they didn’t know what they were supposed to do after they found their birthdays. Suggested text: Find your birthday. As you walk the trail, think of all that happened before you were born.
 - e. Delete both *Time's Linear Progression* and *Think of Time's Cycles*. Replace with:
 - i. TALK about time as you walk the trail.
 1. 10s – Your birthday is probably less than 10 decades ago.
 2. 100s – John Wesley Powell explored the Grand Canyon about 100 years ago.
 3. 1,000s – Ancient peoples farmed the river bottom here about 1,000 years ago.
 4. 10,000 – It was much colder and wetter here tens of thousands of years ago.
 5. 100,000 – Volcanoes erupted here hundreds of thousands of years ago.
 6. 1,000,000 – The Colorado River began cutting the GC about 6 million years ago.
3. This is one wayside panel that would not adhere to the *Start each panel with an event* convention recommended in the General Recommendations on page 2 above.



Native Peoples:

The purpose of this panel is to place humans in the Grand Canyon and to have them serve as an example of historical and pre-historical times.

Recommendations:

1. Remove the picture of the sloth. It attracted attention, but detracted from the main message about people. Replace it with a drawing of native peoples arriving in the area.
2. Do away with the large orange triangle. It confused far more visitors than it helped.
3. Add a fourth photograph/text paragraph: a montage of people at the Grand Canyon today. Some respondents thought that Native Americans no longer live in the area. Alternatively put together a photo collage with different people/events/times labeled so that the sign become less linear in design.
4. Add a point on the timeline for Powell – but don't add a whole photograph/paragraph of text as the panel will become too busy, and his explorations are covered in detail elsewhere. Alternatively, include him in the photo collage described in #3 above.
5. Revise text.
 - a. Suggested heading: 10,000 years ago people first arrived at Grand Canyon.
 - b. Eliminate the paragraph of text to the far left of the panel. Replace it with: "People have been at Grand Canyon for 10,000 years." This paragraph was rarely read by respondents and it takes up quite a bit of real estate.
 - c. Rewrite each of the paragraphs making them more conversational in tone, and making sure there is a clear connection between the photograph, the text, the panel's main message, and the Trail's Big Idea. The connection to human culture was a strong draw for many respondents, but the relationship between the photos and text is not clear. For example, Paleo-Indians having trail networks vs a 4,000 year old stick figure. Suggest replacing the heading to something like: Paleo-Indians made split-twigg figures. Then the text: These 4,000 year old figures have been found in caves throughout the region. They are some of the oldest human-made artifacts in the Grand Canyon.
6. Eliminate the cave viewing tube. Respondents had a very difficult time locating the caves using the tubes. In addition, they often misinterpreted the focus on the caves to mean that Native Americans lived in caves here. Finally, they often went back and forth across the trail between the tube and the panel, creating a traffic jam. If the tube pointed at something directly related to humans in the Canyon, the tube might be worth keeping in this location, but as it is, it is only very indirectly related to the project's Big Idea or the main message of this panel.



panel with travertine



close up of panel

Cycles & Climate Change:

The purpose of this panel is to introduce an example of a geologic time scale so that visitors will further their understanding of and appreciation for deep time.

Recommendations:

1. Heading/title: 'This one is a challenge because there isn't an event that happened at 20,000ya...or maybe there is....Or maybe it's moving this panel to 15,000 ya....then we could say 15,000 years ago it was wetter and colder here.'
2. Remove the "predict" when it will get wetter and colder again. It was not an effective activity.
3. Keep/expand the "graph" with photos. Remove the up/down arrow to the left. Label the top of the graph with "warmer/drier times"; the bottom with "cooler, wetter times". Include a medallion with TODAY at the left hand side of "graph". Maybe add an instruction to "Imagine how long each climate cycle is." or walk ← to x,000ya to when it started getting warmer and drier in the GC; and walk → to x,000ya to when it was warmer and drier in the GC.
4. Remove the section on tree rings as it confuses people. (1) It makes them think the piece of travertine is wood, and (2) they don't know that the reason you see tree rings is because of climate changes, and (3) it confuses human times with geologic times.
5. Have a photograph of the piece of travertine with arrows pointing to "growth bands" and explaining e.g. ice age, or warmer & drier climate; wetter & cooler climate. Then underneath say "These rocks form from spring waters like Havasu Creek shown [in the photos] above/below." Alternatively include two photos of travertine, one of a sprint, and one closer of a rock in place labeled "raw travertine, uncut, and unpolished."
6. Make sure the hunk of travertine is next to the part of the sign where it talks about it.
7. Remove all references to interglacial, and Ice Age – some visitors think glaciers were here. Instead use wet/dry hot/cool language.
8. Make a link from climate change to carving of the canyon. For example, "The Canyon eroded faster when the climate was wet and river levels were higher."
9. Move "graph" to left of panel; travertine to the right.
10. Consider an activity for this panel. "Predict when it will get wetter and colder" was not effective. Perhaps something like "Find evidence of wetter and colder times in the travertine." The activity should focus on the past and not the future.



panel with basalt



close up of panel

Earthquakes & Volcanoes:

The purpose of this panel is to introduce another example of a geologic time scale so that visitors will further their understanding of and appreciation for deep time.

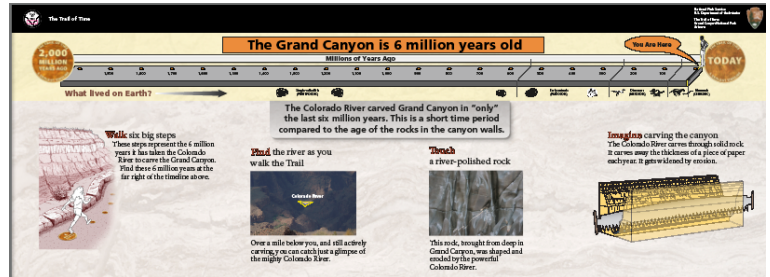
Recommendations:

1. Replace the volcano diagram with a similar “graph” as in *Cycles and Climate Change*, but with times of heavy volcanism vs times of quiet..... [Do volcano/earthquake times overlap? If so, the graph can depict “restless times.” If there isn’t a one-to-one correspondence, perhaps have overlapping “graphs” one depicting times of volcanism, and one depicting times of earthquakes.]
2. This wayside is somewhat problematic as (a) it’s not clear what the point is, and (b) it tended to reinforce visitors’ misconception that the GC was formed from big events like volcanoes and earthquakes (and glaciers!) The challenge here is that visitors overwhelmingly want to know what created the canyon. How do we convey the relatively minor role volcanoes and earthquakes have played at least compared to the river.
3. Heading/title: 200,000 years ago volcanoes and earthquakes were active in the area.
4. Some respondents tried to look in the hunk of basalt for pottery shards. We’re not sure what to recommend here. It would be a shame to lose this as it makes a nice human connection, and brings it back to a human time scale.
5. Remove the “Find the volcanic rocks” as some respondents started looking around on the ground.
6. There wasn’t very much for visitors to have a conversation about at this wayside. Is there a way to more directly connect three time scales: years, centuries, millennium and beyond?

Deep Time Trail Waysides



panel with basement rock



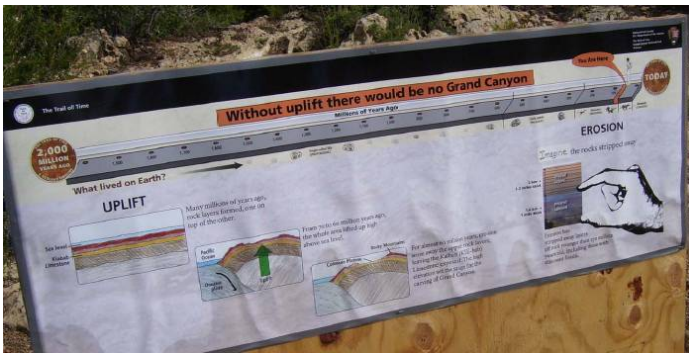
close up of panel

Canyon Carving:

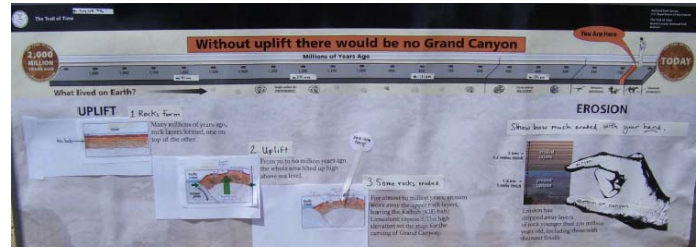
The purpose of this panel is to demonstrate the power of the Colorado River and showcase its role in the carving of the Grand Canyon.

Recommendations:

1. Heading/title: 6 million years ago the Colorado River began carving the Grand Canyon.
2. Remove the photo/text related to "Find the River" You can't see the river from here. Replace this with a viewing tube along the MYT as described previously.
3. Move "Walk six big steps..." to the right of the panel which is where someone would do it. Put "Touch a river-polished rock..." to the far left (and the rock there too), "Imagine carving the canyon..." in the middle. Alternatively, put the river-polished rock in the middle and "Imagine canyon carving" to the left.
4. Label the rock: River-polished rock. Remove the reference to basement rock as some respondents mistakenly thought that "basement rock is 6 million years old."



original version



first revised version

Uplift & Erosion:

The purpose of this panel is to explain that uplift and erosion helped set the stage for the formation of the Grand Canyon.

Major recommendation:

- Consider making this panel into two waysides, one at 60 million years ago and talking about erosion; one at 70 million years ago and talking about uplift.

Recommendations - Uplift:

- Heading/title: 70 million years ago this area was at sea level.
- Keep the text: Without uplift there would be no Grand Canyon. This sentence grabbed respondents' attention.
- For the first time many respondents were able to use the diagram to understand the concept of uplift and its role in the formation of the Grand Canyon. Content-check the three-step diagram and accompanying text – and tweak it, without making major revisions or adding complexity.
- Consider adding a 3-D map of the western United States with the Rocky Mountains, Colorado Plateau, and the Colorado River from its source to its sink.
- Test the new panel with visitors at the rim.

Recommendations - Erosion:

- Heading/title: 60 million years ago the dinosaur fossils started to disappear.
- Make the single diagram into a two- or three-step photo/diagram. We found that some visitors became confused with the single photo/diagram, either using two hands, and/or holding their hand up to the panel rather than the canyon, etc.
 - Suggested heading: *Imagine the rock that used to be here.*
 - “Measure the depth of the canyon” (graphic of hand). Accompanying text: “There used to be many more layers of rock here, stacked on top of each other. You are “holding” a mile of rock in your hand.”
 - “Measure the same amount of rock that used to be here” (graphic of hand).
 - “Imagine the rocks that are stripped away.”
 - Keep the sub-text: “Erosion has stripped away layers of rock younger than 270 million years old, including those with dinosaur fossils.”
- Get a high quality photograph of what people actually see from this spot. Label Kaibab Limestone, 270million years old.
- Test the new panel with visitors at the rim.



panel with viewing tubes and rock with fossils



close up of panel

Horizontal Layers:

The purpose of this panel is to help visitors become aware of the upper horizontal rock layers.

Recommendations:

1. Suggested heading/title: 270 million years ago this area was a tropical sea.
2. Consider various ways to reduce the amount of text/information on this panel.
3. Keep/refine the viewing tubes. These were a major activity for visitors at this wayside and when visitors were able to verify what they were looking at, they worked well. Unfortunately most visitors still had trouble figuring out what they were looking at, but this should be resolved when the tubes/labels are redesigned (see section on viewing tubes below.)
4. Shorten the text on the panel about the viewing tube views and move to labels that are on the tube posts.
5. Remove the mnemonic from this wayside panel as few visitors used it and it takes up scarce real estate, ultimately contributing to the complexity of the sign. It is important information but better placed in a walking guide and/or the park newspaper. Alternatively, re-design this section of the wayside to reduce the amount of information and clutter. The names, the years, the pronunciation, the relationship between the graphic and the photograph, and the specific role of the Kaibab Limestone in this section of the panel is too much.



prototype viewing tube at 150ya



prototype viewing tube at 270My

Viewing Tubes

The prototype viewing tubes were highly effective at drawing visitors in, and directing their attention, when they worked. Unfortunately because they were prototypes, they were pretty unstable and often frustrating for visitors, especially when they got out of whack, and/or when visitors couldn't tell if they had found what they were supposed to be seeing.

Recommendations:

1. Add a viewing tube at about 150 years ago to show the river and explain that John Wesley Powell was the first person to scientifically record the canyon (or something like that.) This is one of the few places where visitors can see the river, and most walk on by. The text on the prototype tube was not effective. It was too long for visitors to read at a glance, and it included instructions to look at the river at the end of the paragraph, long after visitors had already used the tube.
2. When designing the viewing tubes include a notched design so that the tube always slips into one of only two or three possible spots. Make sure each spot is clearly labeled, and make sure each tube is sufficiently evaluated so that it works for a variety of heights of visitors, both with and without wheelchairs.
3. Whenever text on a wayside panel references a tube, the tube and text must be located together. The text on the wayside at 270My above was on the right-hand side of the sign, far removed from the viewing tubes.
4. Introduce a new type of interpretive panel to label each of the viewing tubes that are not an integrated part of a wayside panel. These panels should include (a) brief read-at-a-glance interpretation to explain what people will see, e.g. "Tapeats Sandstone;" and (b) a *verification* photo with clear indication of what folks are supposed to see (see example below). These panels should be mounted right on the viewing tube post

Tapeats Sandstone

