3.0 FINDINGS

3.1 Introduction

Most of the trenches revealed very clear exposures of generally fine-grained sandstones, siltstones, and mudstones of the Puente Formation, a body of sediment that formed at the bottom of the sea about 7 million years ago.[13] Figure 3 shows an example of an exposure of unfaulted layers in a representative trench wall. In this case, the beds slope gently and uniformly from right to left, and thin dark mudstone beds alternate with thin light fine-grained sandstone beds. Bedding this fine is common and, where present, enables recognition of faults with no more than a few millimeters of bedding separation. Where the trenches exposed thicker beds or contacts that were not as sharp, separations across faults were resolved commonly with centimeter resolution (Appendix B).

Figure 4 shows the locations of the trenches. Their total, combined length is just under 6,000 feet (1,830 meters). Of the six longest trenches, four run roughly parallel to the southern and northern boundaries of the property (First, Colton and Temple Streets), and two run parallel to the western and eastern boundaries of the property (Toluca and Boylston Streets, and Beaudry Avenue). These and many smaller trenches reveal precisely and directly the locations of faults that break the geologic strata underlying the site. The trenches also reveal clearly that, in general, the bedrock dips 30 to 50 degrees to the south throughout the site.

3.2 Summary of Fault Locations and Sizes

The Belmont property is devoid of faults west of Boylston Street, except for a minor, likely inactive one that runs nearly parallel to and about 200 feet from Toluca Street, the western boundary of the property (Figure 5). The two faults suggested by geophysical exploration to traverse this area (the blue bands labeled A and B in Figure 5) do not crop out at the surface and appear not to exist at all.

The largest fault zone on the property runs nearly parallel to and just east of Boylston Street. This fault zone ranges in width from 50 feet (15 meters) in the south to 150 feet (46 meters) in the north. It extends under the proposed multi-purpose Room and the existing Administrative Center building and Academy House 1. The fault zone may continue northward between Trench 7 and Boylston Street, or step over to become the fault zone exposed in Trench 8. Motion across this fault is principally left-lateral strike-slip. That is, the block west of the fault has moved principally southward relative to the block east of the fault.

A few other, lesser faults diverge southward from this fault zone. Of these, a few very minor ones project through Academy House 2. Others aim toward Academy House 4 and the Triple Gym. Thick man-made fill precluded ECI from determining whether or not they actually run beneath these buildings. Regardless, none of these faults continue all the way through Academy House 4 or the Triple Gym, since they are not exposed in Trench 6, which runs along the east side of the buildings.

3.2.1 Three Categories of Faults

The faults exposed on the property differ greatly in "size," that is, in the degree to which they disrupt the geologic layers or strata. If all these faults were active, we would assess their potential for disruption of the buildings by evaluating their size. Hence, there is a need to classify them by size. We have grouped the faults exposed at the site into three categories, based on our estimate of their size. Each of these categories is described further below, from smallest to largest.

Category C faults (depicted by **green lines** in Plate 1, and Figure 5 and subsequent figures) are the most minor of the faults identified during this investigation. In the trench exposures, we could match geologic layers across the Category C faults, with most layers displaying no more than 1.5 feet of vertical (dip-slip) separation. All the faults exposed in Trench 5 between the 455- and 495-foot station marks (Figure 6B) and the one in Figure 7C are Category C faults.

Category B faults (depicted by **orange lines** in the figures and Plate 1) are faults characterized by differences in the thickness and/or orientation of individual beds from one side of the fault to the other (for example, several faults in Trench 9 between the 18- and 30-foot station marks – see Figure 8, and the fault in Figure 7B). Due to these differences, we were not able to match the beds across the fault. However, the geologic units on both sides of the fault are sufficiently similar that it is clear that the total amount of separation on these faults is not major. The total amount of separation on the Category B faults is less than that of the Category A faults.

Category A faults (colored **red** in the figures and Plate 1) show separations so large that the strata on one side of the fault do not match those on the opposite side. Large changes in the nature of the sediments (for example from massive sandstone on one side of the fault to thinly bedded siltstone on the other) are common across these faults. Many faults in the principal fault zone fall into this category; for example, consider the red colored faults in Trench 5 between the 213- and 248-foot station marks (Figure 6A). The fault in Figure 7A is also in the A category. We estimate that the total amount of offset on the Category A faults is tens to hundreds of feet.

3.3 Direction of Slip on the Faults.

The trench exposures allowed ECI to determine that the direction of slip for many of the faults is primarily left-lateral – that is, the blocks separated by the fault have moved sideways past one another. If you were standing on one block, and looking across the fault, the block on the other side of the fault would have moved to your left. In one case, (Trench 5, Fault 23), we observed scratches (the geologic term is "slickensides") on a fault plane that were horizontal. These scratches indicate that motion on the fault was horizontal.

A more common indication of horizontal motion is the near-vertical (90 degree) dip of the faults. The dips of lateral (strike-slip) faults are commonly vertical or nearly so, whereas faults dominated by thrusting or other vertical slippage commonly dip at angles of 60 degrees or less.

If we assume that the near-vertical dip of the faults is an indicator that the faults have slipped horizontally, then it is possible to use another attribute of the faults to determine whether the slip has been left- rather than right-lateral. Across most of the faults, the east side appears to be down-dropped relative to the west side. For beds that dip south, as nearly all those on the BLC property do, horizontal motion can produce this effect only if the slippage is left- rather than right-lateral. Figure 9 illustrates how this occurs. The beds in the figure dip away from the reader (to the south). They have been dislocated along a vertical left-lateral fault. A trench (the green plane in the figure) cut through the left-laterally offset beds reveals an exposure of the bed that has an apparent vertical offset in which the bed on the left (east) is lower than the bed on the right (west).

The prevalence of left-lateral slip at the BLC site is also supported by details within the most pronounced of the fault zones. On the left side of the fault zone in Trench 5 (Figure 6, around the 190- to 210-foot station marks), the beds on the left (east) are steeper than those on the right (west). This is the pattern one would expect if south-dipping beds were dragged left-laterally next to the fault zone.

3.4 Estimate of Total Slip on the Faults in 3 Million Years

Before we can assess the amount of slip that might occur on a particular fault during a single future earthquake, we need to estimate the total amount of slip on that fault that has accumulated during its entire period of activity. This period might be as long as 3 million years and represents hundreds or thousands of individual earthquakes. For the very minor, Category C ("green") faults, this is more simple, because the separation of individual beds across these faults is measurable in the trench walls.

To assist the structural engineering analysis being conducted, ECI first attempted to determine the exact offset across Fault 30 in Trench 5 by mapping the variations in thickness across the fault in three dimensions. Figure 10 illustrates the results of this analysis. By shaving back the bedrock at this fault about an inch (2 centimeters) at a time and measuring the thickness variations of a particular bed on both sides of the fault, we attempted to find patterns in the thickness variations that could be matched across the fault. The results of this analysis were inconclusive, but a minimum total offset of less than 2 inches (4 centimeters) is possible, as indicated by the blue arrows in Figure 10.

The direct method described above is far too time-consuming to use on each Category C (green) fault. Hence, another method was utilized to estimate the amount of total slip on the other faults. This method involved the reasonable assumption that slip on the faults is either purely vertical or purely horizontal. If it is purely vertical, then the separations measured in the trench walls equal the offset. If, as is more likely, the slip is nearly purely horizontal (left-lateral), then simple geometry can be used to calculate the horizontal offset from the amount of vertical separation in the exposure, according to this equation:

Tangent (dip angle of bedding) = vertical separation / horizontal offset (see Figure 9C).

This equation was applied to several fault measurements made in Trenches 2, 3, 5, 6, 7, 12, 13, and 14. The results of these calculations are shown on Table 1 below. The last two columns in

This equation was applied to several fault measurements made in Trenches 2, 3, 5, 6, 7, 12, 13, and 14. The results of these calculations are shown on Table 1 below. The last two columns in Table 1 show the total estimated left-lateral slip for a representative sampling of the faults. Calculated total left-lateral slip on these faults ranges from 0.1 foot (3 cm) to nearly 7 feet (1.75 meters). Notice that the small Category C faults in Trenches 5 and 6 that project toward Academy House 2 (see Plate 1 for location) have calculated total horizontal slips of only 0.03 to 0.79 feet (1 to 20 centimeters). These values are representative of total offsets for the other Category C faults as well. The value obtained in this way for fault 5-30 is about three times as large as the value that may be indicated by the direct measurement discussed above and shown in Figure 10. Given that the measurement made directly for fault 5-30 is considered a minimum value, the two methods yield roughly consistent results.

Some of the small faults east of the principal minor fault trend toward buildings. For example, several Category C (green) faults in Trench 5 and one in Trench 6 project toward Academy House 2. A few other Category C (green) and Category B (orange) faults in Trenches 3, 13, and 14 trend toward other buildings. A second method must be employed for estimating the total offset under the buildings for these faults. The lack of faults in all but the southern end of Trench 6 shows that none of these faults continues through Academy Houses 3 and 4 or the Triple Gym.

We can use these observations to estimate the total offset of the faults that project beneath Academy House 2. Studies have shown that offsets on faults typically increase or decrease at a rate no greater than about one hundredth of the distance along the fault. Accordingly, about 100 feet from the tip of a fault, offset is commonly about one foot. If we assume that the faults seen in Trench 5 (Plate 1) pass beneath Academy House 2, about 30 feet to the north, displacement across the faults might either increase or decrease by as much as about 0.30 feet each. Therefore, potential maximum offset for the faults at the south edge of Academy House 2 can be estimated conservatively at 0.8, 0.3, 0.5, and 0.5 feet, respectively for faults 5-30, 31, 32 and 33. These displacements are unlikely to increase farther north under the building, because none of the faults in Trench 12 and 13 appear to connect with Faults 5-30 through 34.[14]

A similar extrapolation of increasing slip yields an estimated total slip of 0.4 feet for Fault 5-27, and 0.5 feet for Fault 5-29 at the intersection of these faults with the south wall of Academy House 2. Since these faults may connect with the easternmost Category A (red) and Category B (orange) faults in Trenches 12 and 13 (Plate 1), we might conservatively assume that slip continues to increase northwestward beneath the building. This yields a value for total left-lateral slip of about 1.1 feet for fault 5-27, and 1.2 feet for fault 5-29 at the western end of the north wall of Academy House 2.

Data are too sparse to project with a high degree of certainty most of the minor faults in Trenches 3 and 14 to Academy Houses 3 and 4 and the Triple Gym. However, these faults are similar in appearance to those that trend toward Academy House 2, so we will assume that our estimations of total slip on these are similar to those.

Estimation of the total slip on the larger faults is more uncertain. The 50-foot width of the largest zone (Figure 6A) and its high degree of disruption suggest that total displacement could well be a

Table 1. Estimated Strike-slip and Dip-slip Displacements Calculated from Fault and Bedding Geometry and Apparent Separation Measured in Trench Exposures

Nearby Buildings	Trench #	Fault #	Strike of Fault	Station (ft), Log #	Strike of bedding (degrees)	Dip of bedding, south (degrees)	Dip of bedding (radians)	Angle between strike of bedding and fault plane (degrees)	Angle between strike of bedding and fault plane (radians)	Apparent Dip (radians)	Measured dip-slip separation (ft.)	Calculated pure strike-slip separation (ft.)	Calculated pure strike-slip separation (cm)
	1	1	N8W	-320, -5	N70W	27	0.47	62	1.08	0.42	0.6	**1.33***	**34***
	1	2	N33E	-320, -5	N70W	27	0.47	77	1.34	0.46	1	**2.01***	**51***
	2	1	N4E	651, 9	N78W	34	0.59	82	1.43	0.59	0.5	**0.75**	**19**
	2	2	N20E?	884, 12	N86E	37	0.65	66	1.15	0.60	0.2	**0.29**	**7**
Admin. Building	4	1	N13W	5, 1	N83W	41	0.72	70	1.22	0.68	0.1	**0.12**	**3**
Acad. 1	5	3	N40E	201, 5	N77W	42	0.73	63	1.10	0.68	0.3	**0.37**	**9**
West edge of Academy #2	5	24	N12E	297, 4	N81E	33	0.58	69	1.20	0.55	0.1	**0.16**	**4**
	5	25	N12E	297, 4	N81E	33	0.58	69	1.20	0.55	0.1	**0.16**	**4**
	5	26	N12E	297, 4	N81E	33	0.58	69	1.20	0.55	0.1	**0.16**	**4**
	5	27	N22E	307, 4	N81E	33	0.58	59	1.03	0.51	0.05	**0.09**	**2**
	5	28	N9E	309, 4	N81E	33	0.58	72	1.26	0.55	0.2	**0.32**	**8**
	5	29	N27E	312, 4	E-W	42	0.73	63	1.10	0.68	0.15	**0.19**	**5**
Center of Academy #2	5	30	N1E	456, 2	N86E	36	0.63	85	1.48	0.63	0.33	**0.46**	**12**
	5	31	N23W	466, 2	N86E	36	0.63	71	1.24	0.60	0.02	**0.03**	**1**
	5	32	N28W	468, 2	N86E	36	0.63	66	1.15	0.59	0.1	**0.15**	**4**
	5	33	N14W	484, 2	N84W	33	0.58	70	1.22	0.55	0.1	**0.16**	**4**
	5	34	N10W	493, 2	N84W	33	0.58	74	1.29	0.56	0.2	**0.32***	**8***
Acad. 2	6	1	N8W	10, 1	N83E	24	0.42	87	1.52	0.42	0.35	**0.79**	**20**
	7a	1	~N30 W	26, 1	N84W	16	0.28	54	0.94	0.23	0.7	**3.02**	**77**
	7a	3,4	N5-	32, 1	N84W	16	0.28	54	0.94	0.23	1.6	**6.90**	**175**

10W

Table 1 (Continued)

Nearby Buildings	Trench #	Fault #	Strike of Fault	Station (ft), Log #	Strike of bedding (degrees)	Dip of bedding, south (degrees)	Dip of bedding (radians)	Angle between strike of bedding and fault plane (degrees)	Angle between strike of bedding and fault plane (radians)	Apparent Dip (radians)	Measured dip-slip separation (ft.)	Calculated pure strike-slip separation (ft.)	Calculated pure strike-slip separation (cm)
Acad. 1	12	1	N5W	45, 1	N89W	37	0.65	84	1.47	0.64	1.8	**2.40**	**61**
Acad. 2	12	7	N40W	123, 2	N80E	35	0.61	60	1.05	0.55	0.35	**0.58**	**15**
Acad. 2	12	8	N40W	130, 2	N80E	35	0.61	60	1.05	0.55	0.1	**0.16**	**4**
Acad. 2	13	1	N20W	4, 1	N74E	33	0.58	86	1.50	0.57	0.5	**0.77***	**20***
Acad. 4	14	1	N40E	50, 1	N88W	45	0.79	42	0.73	0.59	0.5	**0.75**	**19**
	14	3	N22W	12, 1	N89E	46	0.80	69	1.20	0.77	0.5	**0.52**	**13**
Acad. 4	14	4a	N10E	54, 1	E-W	64	1.12	80	1.40	1.11	0.2	**0.10***	**3***
Acad. 4	14	4b	N10W	54, 1	E-W	64	1.12	80	1.40	1.11	0.2	**0.10***	**3***
Acad. 4	14	4c	N30W	54, 1	E-W	64	1.12	60	1.05	1.06	0.2	**0.11***	**3***

Nearby Buildings	Trench #	Fault #	Strike of Fault	Station (ft), Log #	Strike of bedding (degrees)	Dip of bedding, south (degrees)	Dip of bedding (radians)	Angle between strike of bedding and fault plane (degrees)	Angle between strike of bedding and fault plane (radians)	Apparent Dip (radians)	Measured lateral separation (ft.)	Calculated pure vertical separation (ft.)	Calculated pure vertical separation (cm)
Acad. 2	3	4	N59W	1088, 1	N35E	54	0.94	94	1.64	0.94	0.3	0.41	10
Acad. 2	3	5	N61W	1090, 1	N35E	54	0.94	96	1.68	0.94	0.2	0.27	7

*Right lateral offsets because these faults show west-side-down separation

3.5 Activity of the Faults

California law forbids the operation of schools located on "active" faults, which the State defines as "faults that have had surface displacement within Holocene time (about the last 11,000 years), hence constituting a potential hazard to structures that might be located across it."[15] Lawmakers chose this age limit because geologists advised them that faults that had not moved over this great length of time are extremely unlikely to rupture the surface in the next century or so.

Geologists commonly determine whether or not a fault is active by two methods: 1) They look for expression of dislocations in the ground surface, and 2) by examining young soils or sediment overlying the fault. In the first case, an active fault with a sufficient amount of young disruption will show up in the local landforms as a small step or alignment of steps in the topography. Unfortunately, the topography of the Belmont site and surrounding property has a long history of modification associated with historical development. Nonetheless, we searched vintage aerial photographs that might reveal evidence for youthful faulting. Figure 11, for example, is a stereographic pair of photographs that show the site in 1941. With a stereoscope, one can see the site in three dimensions, as it appeared on the date the photos were taken. Unfortunately, even at this early date, the surface is disrupted and it remains ambiguous whether or not the faults had produced recognizable disruptions of the natural surface. Nor do other vintage stereographic aerial photo pairs, taken in 1948 and 1941, enable us to resolve this question (see Appendix C).

Finding young soil or sediment across the fault is another, more reliable way, to determine whether or not a fault has been active in the past 11,000 years. If the soil or sediments are not disrupted, then the fault has not ruptured since formation of the soil or deposition of the sedimentary layer. Conversely, if the materials are broken by the fault, the latest fault movement has occurred subsequent to formation of the soil or deposition of the sediment. Geologists use a variety of methods, such as radiocarbon analysis or the degree of soil development, to determine the age of the soils and strata, and thereby, the age of last motion of the fault.

Although it is quite unlikely that all, or even most, of the faults breaking bedrock on the property are active, determination of this is not possible onsite. This is due to the fact that almost all of the young soil or layers that used to overlie these faults were stripped off during grading either for oil recovery early in the past century, or during construction of the BLC a few years ago. Without tracing the faults off site and excavating undisturbed exposures, the age of last rupture cannot be determined. The lack of undisturbed, young soils and sediment in the vicinity of the faults precludes us from determining whether or not the faults are active. All that can be determined with certainty is that the faults at the BLC have ruptured after deposition of the ancient sands, silts and clays that make up the bedrock beneath the site. These strata of the Puente Formation were deposited in a deep ocean basin about 7 millions years ago.[16] Then, about 3 million years ago the Los Angeles region began to contract and buckle up, forming the hills and basins that form the present landscape.[17] Thus, all the thrust faults in the Los Angeles region are less than about 3 million years old.

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3.6 Estimation of Slip per Earthquake on the Faults

Since it is not possible to determine on site that the faults have been inactive over the past 11,000 years, a very conservative assumption is that the faults are active. Based on this assumption, an estimate of the amount of slip likely to occur on each of the three categories of faults identified at the site, including the main fault zone, needs to be calculated.

Slippage on most of these faults has likely accrued incrementally, during numerous ancient earthquakes. For the larger faults, their total slip has likely accumulated during hundreds, if not thousands of individual events. If one assumes that a fault has been active throughout the entire 3 million years of the current cycle of north-to-south squeezing of the Los Angeles region, the total offset across the fault might well have accumulated during 750 to 6,000 individual earthquakes.[18] ECI believes the total offset across the main fault to be less than about 400 feet and probably less than 100 feet. If one further assumes that such offsets accrued in 750 to 6,000 events, one can divide the offset values by the number of rupture events to get the average offset per event. The range of values calculated this way for the main fault ranges from approximately 0.2 to 6.4 inches (0.5 to 16 cm). If one takes a more conservative approach, assuming that the fault zone has been slipping only during the past million years, average slip per event on the order of about 0.6 to 19.2 inches (1.5 to 50 cm) would result.

These estimates of slip per earthquake on the main fault through the site are quite reasonable. Vertical offset across the Coyote Pass escarpment, a much more topographically prominent secondary structure atop the Elysian Park thrust system that lies 0.7 miles south of the Belmont property appears to be 24 to 33 inches (60 to 85 centimeters) per event.[19]

If the smaller faults on the BLC property are also assumed to be active, they would produce much smaller offsets than the main fault during a single large earthquake. At Trenches 5 and 6, we established total offsets ranging from 0.03 to 0.79 feet (1 to 20 centimeters) for those lesser faults that project toward Academy House 2 (Table 1). Because these are lesser faults, they are much less likely to have slipped during hundreds to thousands of earthquakes in the past 3 million years. Nonetheless, they are likely to have ruptured during many earthquakes. If we assume that they have broken in 100 separate events, then the average offsets per event range from 0.0003 to 0.0079 feet (0.01 to 0.2 centimeters).

The calculated offsets per earthquake are slightly higher if one allows the amount of slip to increase northward, as discussed in the previous section. In this case, we obtain the following numbers by dividing the total offset by 100 events:

- Fault 5-27 at the western edge of the south wall of Academy 2: 0.004 ft (0.12 cm).
- Fault 5-27 at the western edge of the north wall of Academy 2: 0.011 ft (0.34 cm).
- Fault 5-29 at the western edge of the south wall of Academy 2: 0.005 ft (0.15 cm).
- Fault 5-29 at the western edge of the north wall of Academy 2: 0.012 ft (0.36 cm).
- Fault 5-30 at the south wall of Academy 2: 0.0076 ft (0.23 cm)
- Fault 5-31 at the south wall of Academy 2: 0.0063 ft (0.19 cm)
- Fault 5-32 at the south wall of Academy 2: 0.0045 ft (0.14 cm)
- Fault 5-33 at the south wall of Academy 2: 0.0045 ft (0.14 cm), and

- Fault 6-1 at the east wall of Academy 2: 0.012 ft (0.36 cm)

Figure 14 illustrates these estimates for left-lateral offsets per event beneath Academy House 2 for each of the individual fault zones identified as extending beneath the building. The combined offset-per-event for the fault zone comprised by faults 5-27 and 5-29 resolves to 0.009 ft (0.27 cm) at the southwest wall of the building, and 0.023 ft (0.7 cm) at the northwest wall. The combined offset-per-event for the entire 30-foot-wide fault zone that includes faults 5-30 to 5-33 resolves to 0.023 feet (0.7 cm).

Some of the minor faults exposed in Trenches 3 and 14 trend toward the other buildings. We cannot extrapolate these faults with any confidence into Academy Houses 3 and 4 and the Triple Gym, because the closest exposures of those faults are quite far from those buildings. In these cases, the most reasonable conclusion is that faults that might pass beneath these buildings would experience offsets similar in magnitude to those we have calculated for the faults that likely pass beneath Academy House 2.

3.7 Faults on the Western Leg of the BLC Property

Only one fault zone (faults 1-1 through 1-4) on the BLC site is mantled by a remnant of soil. This is the only fault zone about which we have any direct information about its recency of activity. Faults 1-1 through 1-4 form a 4-foot-wide zone of disrupted bedrock about 200 feet from the western boundary of the property (Plate 1 and Appendix B1-6). The faults are nearly vertical, so slip on these faults has probably been primarily horizontal (that is, strike-slip). The sense of vertical separation is opposite that of most of the faults on the property, so we cannot readily assume that the sense of strike-slip has been left-lateral. If there is a left-lateral component of slip, there must also be a significant component of vertical slip, with the east side moving up relative to the west side. Regardless of the sense of slip across the fault, beds match across the fault zone, and each fault plane is narrow. Thus it seems unlikely that total slip on the fault has been more than a few feet.

Overlying the fault zone is a clayey soil of the sort that is commonly used to determine whether a fault has moved in the past 11,000 years. The degree of soil formation suggests that it has been forming for at least many thousands of years. However, the upper part of the soil has been stripped away and disturbed, so a proper, quantitative determination of its age was not possible. Furthermore, the base of the soil has an indentation at the fault zone that is hard to interpret. It appears that this indentation is not related to fault movement, but we cannot rule out the possibility of fault disturbance with complete certainty. Even so, we encountered no evidence of faulting within the soil. The preponderance of the evidence from this exposure indicates that the fault zone (faults 1-1 through 1-4) is likely inactive.

There is only one other fault in the vacant area west of the buildings, Fault 2-1 (Plate 1). This fault is a Category C (green) fault, with about 0.5 feet of vertical separation, down to the east (see Log in Appendix B2-7). The fault appears only in the lower half of the trench and clearly dies out upward against a stratigraphic bed. This upward truncation most likely indicates that total offset across the fault is less than a foot. Table 1 shows an estimate of 0.75 feet. If this accrued in 100 events, the average slip per event would be 0.0075 feet (0.23 centimeters).

- The very minor, 4-foot-wide fault zone about 200 feet from the western edge of the property (Faults 1-1 through 1-4) is likely inactive, judging from the lack of fracturing in the overlying soil.

- The minor fault 2-1 does not continue to the surface and is likely to experience only about 0.0075 feet (0.19 centimeter) of left-lateral slip per earthquake.

- It is our judgment that the entire property west of the existing buildings has negligible exposure to future fault rupture.