

APPENDIX B
STRUCTURAL MAPPING DATA SHEETS AND PHOTOGRAPHS

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location

Date

Day	Month	Year
8	11	2008

Inspector(s)

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	78	304	1	1	3	1	-	2	2	6	8	2	5		
2	72	356	3	1	3	1	-	2	2	6	8	2	5		
2	70	312	1	1	3	1	-	2	2	6	8	2	5		
2	82	247	3	0	3	1	-	2	2	4	6	2	4		
2	80	240	3	0	3	1	-	2	2	8	10	2	4		
2	86	71	3	0	3	1	-	2	2	6	8	2	4		
2	75	257	3	0	3	1	-	2	2	6	8	2	4		
2	80	64	3	0	3	1	-	2	2	4	6	2	4		
2	68	360	2	2	2	1	-	2	2	8	10	2	na		
2	62	360	2	2	2	1	-	2	2	8	10	2	na		
2	62	352	3	0	3	1	-	2	2	6	8	2	4		
2	85	056	4	0	na	na	-	2	2	8	10	2	5		
2	70	184	1	2	3	1	-	2	2	6	8	2	na		
2	68	180	1	2	3	1	-	2	2	10	12	2	na		
2	60	250	3	0	3	1	-	2	2	8	10	2	4		
2	60	338	3	0	3	1	-	2	2	10	12	2	4		
2	35	018	4	0	3	1	-	2	2	8	10	2	3		
2	30	025	4	0	3	1	-	2	2	8	10	2	3		
2	22	022	4	0	3	1	-	2	2	4	6	2	3		
2	25	010	4	0	3	1	-	2	2	4	6	2	3		
2	30	012	4	0	3	1	-	2	2	4	6	2	3		
2	25	020	4	0	3	1	-	2	2	4	6	2	3		
2	24	030	4	0	3	1	-	2	2	2	4	2	3		
2	23	015	4	0	3	1	-	2	2	4	6	2	3		
2	40	268	1	1	3	1	-	2	2	6	8	2	na		
2	50	264	1	1	3	1	-	2	2	6	8	2	na		
2	48	264	1	1	3	1	-	2	2	4	6	2	na		
2	58	255	1	1	3	1	-	2	2	4	6	2	3		
2	60	254	1	1	3	1	-	2	2	10	12	2	3		
2	60	256	1	1	3	1	-	2	2	14	16	2	3		

- Type**
- 0. Fault zone
 - 1. Fault
 - 2. Joint
 - 3. Cleavage
 - 4. Schistosity
 - 5. Shear
 - 6. Fissure
 - 7. Tension Crack
 - 8. Foliation
 - 9. Bedding

- Aperture Width**
- 1. Very Tight (<0.1 mm) < 0.004 in
 - 2. Tight (0.1-0.25 mm) 0.004 - 0.01 in
 - 3. Partly open (0.25-0.5 mm) 0.01 - 0.02 in
 - 4. Open (0.5-2.5 mm) 0.02 - 0.1 in
 - 5. Moderately wide (2.5-10mm) 0.1 - 0.4 in
 - 6. Wide (> 10 mm) > 0.4 in
 - 7. Very wide (1-10 cm) 0.4 - 4 in
 - 8. Extremely wide (10-100 cm) 4 in - 3.3 ft
 - 9. Cavernous (> 1 m) > 3.3 ft

- Nature of Infilling**
- 1. Clean
 - 2. Surface Staining
 - 3. Non-cohesive
 - 4. Inactive clay or clay matrix
 - 5. Swelling clay or clay matrix
 - 6. Cemented
 - 7. Chloride, talc, or gypsum
 - 8. Calcite

- Termination**
- 0. Neither end visible
 - 1. One end visible
 - 2. Both ends visible

- Spacing**
- 1. Extremely close spacing < 20 mm < 0.8 in
 - 2. Very close spacing 20 - 60 mm 0.8 - 2.4 in
 - 3. Close spacing 60 - 200 mm 2.4 - 8.0 in
 - 4. Moderate spacing 200 - 600 mm 8.0 in - 2.0 ft
 - 5. Wide spacing 600 - 2,000 mm 2.0 - 6.6 ft
 - 6. Very wide spacing 2,000 - 6,000 mm 6.6 - 20.0 ft
 - 7. Extremely wide spacing > 6,000 mm > 20.0 ft

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

- Water Flow (open)**
- 0. The discontinuity is very tight and dry; water flow along it does not appear possible.
 - 1. The discontinuity is dry with no evidence of water flow.
 - 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 - 3. The discontinuity is damp but no free water is present.
 - 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 - 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)

- Water Flow (filled)**
- 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely
 - 7. The filling materials are damp, but no free water is present.
 - 8. The filling materials are wet, occasional drops of water.
 - 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 - 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

- Persistence**
- 1. Very low persistence < 1 m < 3.3 ft
 - 2. Low persistence 1 - 3 m 3.3 - 10 ft
 - 3. Medium persistence 3 - 10 m 10 ft - 33 ft
 - 4. High persistence 10 - 20 m 33 - 66 ft
 - 5. Very high persistence > 20 m > 66 ft

- Surface roughness**
- 1. Rough
 - 2. Smooth
 - 3. Polished
 - 4. Slickensided
- Surface shape**
- 1. Stepped
 - 2. Undulating
 - 3. Planar

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ Magnetic Declination is 18 Degrees East

Location

Date

Day	Month	Year
8	11	2008

Inspector(s)

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2		80	60	4	0	3	1	-	2	2	6	8	2	4	
2		82	60	4	0	3	1	-	2	2	4	6	2	4	
2		78	55	4	0	3	1	-	2	2	4	6	2	4	
2		82	64	4	0	3	1	-	2	2	4	6	2	4	
2		88	64	4	0	3	1	-	2	2	6	8	2	4	
2		88	60	4	0	3	1	-	2	2	8	10	2	4	
2		84	58	4	0	3	1	-	2	2	6	8	2	4	
2		88	63	4	0	3	1	-	2	2	4	6	2	4	
2		88	062	4	0	3	1	-	2	2	4	6	2	4	
2		88	064	4	0	3	1	-	2	2	6	8	2	4	
2		80	324	3	1	3	1	-	2	2	8	10	2	3-4	
2		68	330	3	1	3	1	-	2	2	10	12	2	3-4	
2		82	334	3	1	3	1	-	2	2	10	12	2	3-4	
2		72	320	3	1	3	1	-	2	2	6	8	2	3-4	
2		75	325	3	1	3	1	-	2	2	8	10	2	3-4	
2		72	333	3	1	3	1	-	2	2	6	8	2	3-4	
2		56	320	3	1	3	1	-	2	2	6	8	2	3-4	
2		60	324	3	1	3	1	-	2	2	8	10	2	3-4	
2		52	330	3	1	3	1	-	2	2	6	8	2	3-4	
2		58	324	3	1	3	1	-	2	2	4	6	2	3-4	
2		78	334	3	1	3	1	-	2	2	4	6	2	3-4	
2		82	168	3	1	3	1	-	2	2	4	6	2	3-4	
2		22	018	4	0	3	1	-	2	2	4	6	2	5	
2		20	025	4	0	3	1	-	2	2	4	6	2	5	
2		23	030	4	0	3	1	-	2	2	4	6	2	5	
2		20	040	4	0	3	1	-	2	2	4	6	2	5	
2		28	034	4	0	3	1	-	2	2	4	6	2	5	
2		28	032	4	0	3	1	-	2	2	4	6	2	5	
2		30	046	4	0	3	1	-	2	2	4	6	2	5	

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	<p>Surface shape</p> <p>1. Stepped</p> <p>2. Undulating</p> <p>3. Planar</p>

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1376+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	54	308	4	0	3	1	-	2	2	4	6	2	4		
2	62	298	4	0	3	1	-	2	2	4	6	2	4		
2	62	288	4	0	3	1	-	2	2	2	4	2	4		
2	68	307	4	0	3	1	-	2	2	2	4	2	4		
2	68	210	4	0	3	1	-	2	2	4	6	2	4		
2	68	214	4	0	3	1	-	2	2	4	6	2	4		
2	80	274	4	0	3	1	-	2	2	4	6	2	4		
2	62	290	4	0	3	1	-	2	2	4	6	2	4		
2	62	294	4	0	3	1	-	2	2	4	6	2	4		
2	76	073	2	1	-	-	-	2	3	4	6	2	4		
2	75	070	2	1	-	-	-	2	3	2	4	2	4		
2	78	068	2	1	-	-	-	2	3	2	4	2	4		
2	62	055	2	1	-	-	-	2	3	2	4	2	4		
2	54	055	2	1	-	-	-	2	3	4	6	2	4		
2	50	048	2	1	-	-	-	2	3	4	6	2	4		
2	50	050	2	1	-	-	-	2	3	4	6	2	4		
2	62	065	2	1	-	-	-	2	3	6	8	2	4		
2	62	314	4	0	3	1	-	2	3	4	6	2	4		
2	60	314	4	0	3	1	-	2	3	4	6	2	4		
2	52	305	4	0	3	1	-	2	3	4	6	2	4		

- | | | | | | | | |
|---|--|---|---|---|---|--|---|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>< 0.004 in
0.004 - 0.01 in
0.01 - 0.02 in
0.02 - 0.1 in
0.1 - 0.4 in
> 0.4 in
0.4 - 4 in
4 in - 3.3 ft
> 3.3 ft</p> | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <ul style="list-style-type: none"> S1 Very soft clay S2 Soft Clay S3 Firm clay S4 Stiff clay S5 Very stiff clay S6 Hard clay R0 Extremely weak rock R1 Very weak rock R2 Weak rock R3 Medium strong rock R4 Strong rock R5 Very strong rock R6 Extremely strong rock | <p>Mpa
< 0.025
0.025-0.05
0.05-0.10
0.10-0.25
0.25-0.50
>0.50
0.25-1.0
1.0-5.0
5.0-25
25-50
50-100
100-250
>250</p> <p>Psf
500 psf
500-1,000 psf
1,000-2,000 psf
2,000-5,000 psf
5,000-10,000 psf
>10,000 psf
36 - 145 psi
145 - 725 psi
725 - 3,625 psi
3,625 - 7,250 psi
7,250 - 14,500 psi
14,500 - 36,250 psi
> 36,250 psi</p> | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry; water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>< 1 m
1 - 3 m
3 - 10 m
10 - 20 m
> 20 m</p> <p>< 3.3 ft
3.3 - 10 ft
10 ft - 33 ft
33 - 66 ft
> 66 ft</p> | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Spacing</p> <ul style="list-style-type: none"> 1. Extremely close spacing 2. Very close spacing 3. Close spacing 4. Moderate spacing 5. Wide spacing 6. Very wide spacing 7. Extremely wide spacing | <p>< 20 mm
20 - 60 mm
60 - 200 mm
200 - 600 mm
600 - 2,000 mm
2,000 - 6,000 mm
> 6,000 mm</p> <p>< 0.8 in
0.8 - 2.4 in
2.4 - 8.0 in
8.0 in - 2.0 ft
2.0 - 6.6 ft
6.6 - 20.0 ft
> 20.0 ft</p> | | |

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Location

Date

Day	Month	Year
26	9	2008

Inspector(s)

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	74	332	4	0	3	1	-	2	2	4	6	2	4		
2	72	326	4	0	3	1	-	2	2	4	6	2	4		
2	82	340	4	0	3	1	-	2	2	4	6	2	4		
2	84	333	4	0	3	1	-	2	2	4	6	2	4		
2	72	330	4	0	3	1	-	2	2	6	8	2	4		
2	76	332	4	0	3	1	-	2	2	4	6	2	4		
2	68	331	4	0	3	1	-	2	2	2	4	2	4		
2	74	332	4	0	3	1	-	2	2	4	6	2	4		
2	82	341	4	0	3	1	-	2	2	6	8	2	4		
2	30	072	1	1	3	1	-	2	2	8	10	2	5		
2	28	080	1	1	3	1	-	2	2	8	10	2	5		
2	42	072	1	1	3	1	-	2	2	6	8	2	5		
2	28	062	1	1	3	1	-	2	2	6	8	2	5		
2	32	095	1	1	3	1	-	2	2	6	8	2	5		
2	34	092	1	1	3	1	-	2	2	6	8	2	5		
2	38	065	1	1	3	1	-	2	2	4	6	2	5		
2	42	088	1	1	3	1	-	2	2	10	12	2	5		
2	86	095	1	2	-	-	-	2	2	4	6	2	4		
2	80	092	1	2	-	-	-	2	2	4	6	2	4		
2	88	095	1	2	-	-	-	2	2	4	6	2	4		
2	88	101	2	0	-	-	-	2	2	4	6	2	5		
2	88	102	2	0	-	-	-	2	2	4	6	2	5		
2	84	096	2	0	-	-	-	2	2	4	6	2	5		
2	70	248	2	0	-	-	-	2	2	4	6	2	5		
2	70	235	2	0	-	-	-	2	2	4	6	2	5		
2	70	245	2	0	-	-	-	2	2	4	6	2	5		
2	88	245	2	0	-	-	-	2	2	4	6	2	5		
2	68	055	2	0	-	-	-	2	2	4	6	2	5		
2	88	095	2	0	-	-	-	2	2	2	4	2	5		
2	84	240	2	0	-	-	-	2	2	2	4	2	5		

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1369+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **1**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	78	330	4	0	3	1	-	2	2	8	10	2	5		
2	72	330	4	0	3	1	-	2	2	4	6	2	5		
2	72	333	4	0	3	1	-	2	2	8	10	2	5		
2	72	330	4	0	3	1	-	2	2	10	12	2	5		
2	72	346	4	0	3	1	-	2	2	10	12	2	5		
2	80	330	4	0	3	1	-	2	2	8	10	2	5		
2	72	335	4	0	3	1	-	2	2	8	10	2	5		
2	76	333	4	0	3	1	-	2	2	6	8	2	5		
2	74	332	4	0	3	1	-	2	2	4	6	2	5		
2	20	108	3	0	3	1	-	2	2	6	8	2	5		
2	20	110	3	0	3	1	-	2	2	4	6	2	5		
2	22	104	3	0	3	1	-	2	2	4	6	2	5		
2	23	111	3	0	3	1	-	2	2	4	6	2	5		
2	30	090	3	0	3	1	-	2	2	8	10	2	5		
2	22	118	3	0	3	1	-	2	2	10	12	2	5		
2	24	105	3	0	3	1	-	2	2	4	6	2	5		
2	22	106	3	0	3	1	-	2	2	6	8	2	5		
2	86	255	2	0	2	1	-	2	2	4	6	2	4		
2	82	258	2	0	2	1	-	2	2	4	6	2	4		
2	88	260	2	0	2	1	-	2	2	4	6	2	4		
2	80	104	2	0	2	1	-	2	2	4	6	2	4		
2	80	090	2	0	2	1	-	2	2	4	6	2	4		
2	82	084	2	0	2	1	-	2	2	6	8	2	4		
2	84	255	2	0	2	1	-	2	2	6	8	2	4		
2	88	238	2	0	2	1	-	2	2	4	6	2	4		
2	68	252	2	0	2	1	-	2	2	6	8	2	4		
2	88	260	2	0	2	1	-	2	2	6	8	2	4		
2	62	244	2	0	2	1	-	2	2	4	6	2	4		

- | | | | | | | | | |
|---|--|---|---|---|--|---|--|---|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p> | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <ul style="list-style-type: none"> S1 Very soft clay S2 Soft Clay S3 Firm clay S4 Stiff clay S5 Very stiff clay S6 Hard clay R0 Extremely weak rock R1 Very weak rock R2 Weak rock R3 Medium strong rock R4 Strong rock R5 Very strong rock R6 Extremely strong rock | <p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p> | <p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p> | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry; water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p> | <p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p> | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Spacing</p> <ul style="list-style-type: none"> 1. Extremely close spacing 2. Very close spacing 3. Close spacing 4. Moderate spacing 5. Wide spacing 6. Very wide spacing 7. Extremely wide spacing | <p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p> | <p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p> | |

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ Magnetic Declination is 18 Degrees East

Location
1370+25

Date
26 9 2008

Inspector(s)
B. Fisher, R. Beyer

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	48	350	2	0	3	2	-	2	2	2	6	8	2	2	
2	48	340	2	0	3	2	-	2	2	2	4	6	2	2	
2	40	335	2	0	3	2	-	2	2	2	4	6	2	2	
2	42	346	2	0	3	2	-	2	2	2	2	4	2	2	
2	52	335	2	0	3	2	-	2	2	2	2	4	2	2	
2	52	350	2	0	3	2	-	2	2	2	10	12	2	2	
2	38	360	2	0	3	2	-	2	2	2	8	10	2	2	
2	52	340	2	0	3	2	-	2	2	2	8	10	2	2	
2	54	337	2	0	3	2	-	2	2	2	8	10	2	2	
2	52	346	2	0	3	2	-	2	2	2	8	10	2	2	
2	88	220	4	0	-	-	-	2	2	2	1	3	2	3	
2	86	215	4	0	-	-	-	2	2	2	8	10	2	3	
2	86	004	4	0	-	-	-	2	2	2	8	10	2	3	
2	70	035	4	0	-	-	-	2	2	2	6	8	2	3	
2	78	040	4	0	-	-	-	2	2	2	6	8	2	3	
2	84	213	4	0	-	-	-	2	2	2	4	6	2	3	
2	88	225	4	0	-	-	-	2	2	2	6	8	2	3	
2	78	040	4	0	-	-	-	2	2	2	4	6	2	3	
2	88	040	4	0	-	-	-	2	2	2	4	6	2	3	
2	80	045	4	0	-	-	-	2	2	2	10	12	2	3	
2	78	040	4	0	-	-	-	2	2	2	6	8	2	3	
2	80	275	3	0	-	-	-	2	2	3	2	4	2	6	
2	80	280	3	0	-	-	-	2	2	3	4	6	2	5	
2	88	288	3	0	-	-	-	2	2	3	2	4	2	5	
2	88	100	3	0	-	-	-	2	2	3	2	4	2	5	
2	88	286	3	0	-	-	-	2	2	3	4	6	2	5	
2	72	110	3	0	-	-	-	2	2	3	2	4	2	5	
2	88	102	3	0	-	-	-	2	2	3	2	4	2	5	
2	88	103	3	0	-	-	-	2	2	3	4	6	2	5	
2	86	286	3	0	-	-	-	2	2	3	4	6	2	5	

- Type**
- Fault zone
 - Fault
 - Joint
 - Cleavage
 - Schistosity
 - Shear
 - Fissure
 - Tension Crack
 - Foliation
 - Bedding
- Aperture Width**
- Very Tight (<0.1 mm)
 - Tight (0.1-0.25 mm)
 - Partly open (0.25-0.5 mm)
 - Open (0.5-2.5 mm)
 - Moderately wide (2.5-10mm)
 - Wide (> 10 mm)
 - Very wide (1-10 cm)
 - Extremely wide (10-100 cm)
 - Cavernous (> 1 m)
- Termination**
- Neither end visible
 - One end visible
 - Both ends visible
- Surface roughness**
- Rough
 - Smooth
 - Polished
 - Slickensided
- Persistence**
- Very low persistence
 - Low persistence
 - Medium persistence
 - High persistence
 - Very high persistence
- Surface shape**
- Stepped
 - Undulating
 - Planar

- Nature of Infilling**
- Clean
 - Surface Staining
 - Non-cohesive
 - Inactive clay or clay matrix
 - Swelling clay or clay matrix
 - Cemented
 - Chloride, talc, or gypsum
 - Calcite
- Termination**
- Neither end visible
 - One end visible
 - Both ends visible
- Spacing**
- Extremely close spacing
 - Very close spacing
 - Close spacing
 - Moderate spacing
 - Wide spacing
 - Very wide spacing
 - Extremely wide spacing

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

- Water Flow (open)**
- The discontinuity is very tight and dry; water flow along it does not appear possible.
 - The discontinuity is dry with no evidence of water flow.
 - The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 - The discontinuity is damp but no free water is present.
 - The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 - The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)
- Water Flow (filled)**
- The filling materials are heavily consolidated and dry; significant flow appears unlikely
 - The filling materials are damp, but no free water is present.
 - The filling materials are wet, occasional drops of water.
 - The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 - The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1372+25

Date
26 9 2008

Inspector(s)
B. Fisher, R. Beyer

page of page
1 2

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	88	268	4	0	3	1	-	2	2	6	8	2	2		
2	87	102	4	0	3	1	-	2	2	8	10	2	2		
2	87	90	4	0	3	1	-	2	2	8	10	2	2		
2	87	84	4	0	3	1	-	2	2	6	8	2	2		
2	88	254	4	0	3	1	-	2	2	12	14	2	2		
2	88	90	4	0	3	1	-	2	2	10	12	2	2		
2	80	270	4	0	3	1	-	2	2	14	16	2	2		
2	88	85	4	0	3	1	-	2	2	8	10	2	2		
2	88	090	4	0	3	1	-	2	2	8	10	2	2		
2	88	092	4	0	3	1	-	2	2	8	10	2	2		
2	35	212	2	1	4	1	-	2	2	6	8	2	5		
2	35	206	2	1	4	1	-	2	2	8	10	2	5		
2	28	200	2	1	4	1	-	2	2	6	8	2	5		
2	30	209	2	1	4	1	-	2	2	10	12	2	5		
2	40	165	2	1	4	1	-	2	2	12	14	2	5		
2	38	215	2	1	4	1	-	2	2	14	16	2	5		
2	40	188	2	1	4	1	-	2	2	16	18	2	5		
2	36	184	2	1	4	1	-	2	2	10	12	2	5		
2	40	214	2	1	4	1	-	2	2	14	16	2	5		
2	42	200	2	1	4	1	-	2	2	8	10	2	5		
2	52	325	4	0	4	1	-	2	2	10	12	2	5		
2	52	318	4	0	4	1	-	2	2	10	12	2	5		
2	64	215	4	0	4	1	-	2	2	6	8	2	5		
2	70	294	4	0	4	1	-	2	2	8	10	2	5		
2	50	320	4	0	4	1	-	2	2	8	10	2	5		
2	50	350	4	0	4	1	-	2	2	4	6	2	5		
2	48	340	4	0	4	1	-	2	2	4	6	2	5		
2	57	298	4	0	4	1	-	2	2	8	10	2	5		
2	65	314	4	0	4	1	-	2	2	8	10	2	5		
2	20	065	3	1	3	1	-	2	2	4	6	2	6		

- Type**
- 0. Fault zone
 - 1. Fault
 - 2. Joint
 - 3. Cleavage
 - 4. Schistosity
 - 5. Shear
 - 6. Fissure
 - 7. Tension Crack
 - 8. Foliation
 - 9. Bedding
- Aperture Width**
- 1. Very Tight (<0.1 mm)
 - 2. Tight (0.1-0.25 mm)
 - 3. Partly open (0.25-0.5 mm)
 - 4. Open (0.5-2.5 mm)
 - 5. Moderately wide (2.5-10mm)
 - 6. Wide (> 10 mm)
 - 7. Very wide (1-10 cm)
 - 8. Extremely wide (10-100 cm)
 - 9. Cavernous (> 1 m)
- Surface roughness**
- 1. Rough
 - 2. Smooth
 - 3. Polished
 - 4. Slickensided
- Persistence**
- 1. Very low persistence
 - 2. Low persistence
 - 3. Medium persistence
 - 4. High persistence
 - 5. Very high persistence
- Surface shape**
- 1. Stepped
 - 2. Undulating
 - 3. Planar

- Nature of Infilling**
- 1. Clean
 - 2. Surface Staining
 - 3. Non-cohesive
 - 4. Inactive clay or clay matrix
 - 5. Swelling clay or clay matrix
 - 6. Cemented
 - 7. Chloride, talc, or gypsum
 - 8. Calcite
- Termination**
- 0. Neither end visible
 - 1. One end visible
 - 2. Both ends visible
- Spacing**
- 1. Extremely close spacing
 - 2. Very close spacing
 - 3. Close spacing
 - 4. Moderate spacing
 - 5. Wide spacing
 - 6. Very wide spacing
 - 7. Extremely wide spacing

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|-----------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 |
| S6 Hard clay | >0.50 | >10,000 |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 |
| R2 Weak rock | 5.0-25 | 725 - 3,625 |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 |
| R4 Strong rock | 50-100 | 7,250 - 14,500 |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 |
| R6 Extremely strong rock | >250 | > 36,250 |

- Water Flow (open)**
- 0. The discontinuity is very tight and dry: water flow along it does not appear possible.
 - 1. The discontinuity is dry with no evidence of water flow.
 - 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 - 3. The discontinuity is damp but no free water is present.
 - 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 - 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)
- Water Flow (filled)**
- 6. The filling materials are heavily consolidated and dry: significant flow appears unlikely
 - 7. The filling materials are damp, but no free water is present.
 - 8. The filling materials are wet, occasional drops of water.
 - 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 - 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1374+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	78	184	1	1	3	1	-	2	2	12	14	2	3		
2	78	342	1	1	3	1	-	2	2	10	12	2	3		
2	80	348	1	1	3	1	-	2	2	8	10	2	3		
2	75	360	1	1	3	1	-	2	2	8	10	2	3		
2	78	174	1	1	3	1	-	2	2	12	14	2	3		
2	80	350	1	1	3	1	-	2	2	14	16	2	3		
2	78	155	1	1	3	1	-	1	2	10	12	2	3		
2	82	332	1	1	3	1	-	1	2	8	10	2	3		
2	78	325	1	1	3	1	-	1	2	8	10	2	3		
2	82	195	1	1	3	1	-	1	2	6	8	2	3		
2	88	260	1	1	3	1	-	1	2	12	14	2	3		
2	80	280	1	1	3	1	-	1	2	10	12	2	3		
2	85	260	1	1	3	1	-	1	2	10	12	2	3		
2	88	262	1	1	3	1	-	1	2	8	10	2	3		
2	88	070	1	1	3	1	-	1	2	10	12	2	3		
2	78	074	1	1	3	1	-	1	2	10	12	2	3		
2	78	086	1	1	3	1	-	1	2	8	10	2	3		
2	82	266	1	1	3	1	-	1	2	8	10	2	3		
2	85	086	1	1	3	1	-	1	2	10	12	2	3		
2	82	075	1	1	3	1	-	1	2	8	10	2	3		
2	12	304	2	0	3	1	-	2	2	8	10	2	3		
2	10	264	2	0	3	1	-	2	2	8	10	2	3		
2	03	230	2	0	3	1	-	2	2	6	8	2	2		
2	20	040	2	0	3	1	-	2	2	6	8	2	2		
2	22	050	2	0	3	1	-	2	2	6	8	2	2		
2	08	015	2	0	3	1	-	2	2	8	10	2	2		
2	08	348	2	0	3	1	-	2	2	4	6	2	2		
2	10	053	2	0	3	1	-	2	2	14	16	2	2		
2	18	030	2	0	3	1	-	2	2	6	8	2	2		
2	54	078	2	1	3	1	-	2	2	10	12	2	2		

- Type**
- 0. Fault zone
 - 1. Fault
 - 2. Joint
 - 3. Cleavage
 - 4. Schistosity
 - 5. Shear
 - 6. Fissure
 - 7. Tension Crack
 - 8. Foliation
 - 9. Bedding
- Aperture Width**
- 1. Very Tight (<0.1 mm)
 - 2. Tight (0.1-0.25 mm)
 - 3. Partly open (0.25-0.5 mm)
 - 4. Open (0.5-2.5 mm)
 - 5. Moderately wide (2.5-10mm)
 - 6. Wide (> 10 mm)
 - 7. Very wide (1-10 cm)
 - 8. Extremely wide (10-100 cm)
 - 9. Cavernous (> 1 m)
- Termination**
- 1. Rough
 - 2. Smooth
 - 3. Polished
 - 4. Slickensided
- Persistence**
- 1. Very low persistence
 - 2. Low persistence
 - 3. Medium persistence
 - 4. High persistence
 - 5. Very high persistence
- Surface roughness**
- 1. Very low persistence
 - 2. Low persistence
 - 3. Medium persistence
 - 4. High persistence
 - 5. Very high persistence
- Surface shape**
- 1. Stepped
 - 2. Undulating
 - 3. Planar

- Nature of Infilling**
- 1. Clean
 - 2. Surface Staining
 - 3. Non-cohesive
 - 4. Inactive clay or clay matrix
 - 5. Swelling clay or clay matrix
 - 6. Cemented
 - 7. Chloride, talc, or gypsum
 - 8. Calcite
- Termination**
- 0. Neither end visible
 - 1. One end visible
 - 2. Both ends visible
- Spacing**
- 1. Extremely close spacing
 - 2. Very close spacing
 - 3. Close spacing
 - 4. Moderate spacing
 - 5. Wide spacing
 - 6. Very wide spacing
 - 7. Extremely wide spacing

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

- Water Flow (open)**
- 0. The discontinuity is very tight and dry; water flow along it does not appear possible.
 - 1. The discontinuity is dry with no evidence of water flow.
 - 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 - 3. The discontinuity is damp but no free water is present.
 - 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 - 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)
- Water Flow (filled)**
- 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely
 - 7. The filling materials are damp, but no free water is present.
 - 8. The filling materials are wet, occasional drops of water.
 - 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 - 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1375+10

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	84	302	1	1	3	1	-	2	2	8	10	2	3		
2	70	135	1	1	3	1	-	2	2	8	10	2	3		
2	78	295	1	1	3	1	-	2	2	6	8	2	3		
2	73	300	1	1	3	1	-	2	2	6	8	2	3		
2	54	325	1	1	3	1	-	2	2	6	8	2	3		
2	82	106	1	1	3	1	-	2	2	14	16	2	3		
2	80	132	1	1	3	1	-	2	2	6	8	2	3		
2	52	315	1	1	3	1	-	2	2	8	10	2	3		
2	52	320	1	1	3	1	-	2	2	6	8	2	3		
2	45	305	1	1	3	1	-	2	2	6	8	2	3		
2	68	300	1	1	3	1	-	2	2	8	10	2	3		
2	50	310	1	1	3	1	-	2	2	6	8	2	3		
2	50	304	1	1	3	1	-	2	2	4	6	2	3		
2	86	222	2	0	-	-	-	2	2	6	8	2	4		
2	85	200	2	0	-	-	-	2	2	8	10	2	4		
2	82	184	2	0	-	-	-	2	2	8	10	2	4		
2	82	202	2	0	-	-	-	2	2	14	16	2	4		
2	78	218	2	0	-	-	-	2	2	16	18	2	4		
2	78	220	2	0	-	-	-	2	2	18	20	2	4		
2	52	198	1	1	-	-	-	1	2	16	18	2	3		
2	62	235	1	1	-	-	-	1	2	12	14	2	3		
2	72	225	1	1	-	-	-	1	2	10	12	2	3		
2	64	197	1	1	-	-	-	1	2	10	12	2	3		
2	84	216	1	1	-	-	-	1	2	12	14	2	3		
2	20	068	2	1	3	1	-	2	2	10	12	2	4		
2	20	088	2	1	3	1	-	2	2	10	12	2	4		
2	10	055	2	1	3	1	-	2	2	6	8	2	4		
2	20	083	2	1	3	1	-	2	2	8	10	2	4		
2	22	073	2	1	3	1	-	2	2	8	10	2	4		
2	18	058	2	1	3	1	-	2	2	10	12	2	4		

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location

Date

Day	Month	Year
26	9	2008

Inspector(s)

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Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	40	194	3	1	3	1	-	2	2	8	10	2	-		
2	40	192	3	1	3	1	-	2	2	8	10	2	-		
2	38	178	3	1	3	1	-	2	2	10	12	2	-		
2	40	180	3	1	3	1	-	2	2	8	10	2	-		
2	44	195	3	1	3	1	-	2	2	10	12	2	-		
2	42	178	3	1	3	1	-	2	2	10	12	2	-		
2	42	203	3	1	3	1	-	2	2	8	10	2	-		
2	42	170	3	1	3	1	-	2	2	8	10	2	-		
2	32	200	3	1	3	1	-	2	2	10	12	2	-		
2	32	004	3	1	3	1	-	2	2	8	10	2	-		
2	82	056	3	1	3	1	-	2	2	8	10	2	-		
2	72	055	3	1	3	1	-	2	2	10	12	2	-		
2	70	050	2	0	3	1	-	2	2	8	10	2	-		
2	62	070	2	0	3	1	-	2	2	8	10	2	-		
2	62	059	2	0	3	1	-	2	2	6	8	2	-		
2	80	045	2	0	3	1	-	2	2	8	10	2	-		
2	76	040	2	0	3	1	-	2	2	10	12	2	-		
2	64	057	2	0	3	1	-	2	2	10	12	2	-		
2	62	053	2	0	3	1	-	2	2	8	10	2	-		
2	68	049	2	0	3	1	-	2	2	6	8	2	-		
2	70	320	3	0	-	-	-	2	3	4	6	2	-		
2	70	315	3	0	-	-	-	2	3	4	6	2	-		
2	53	300	3	0	-	-	-	2	3	8	10	2	-		
2	58	304	3	0	-	-	-	2	3	10	12	2	-		
2	54	288	3	0	-	-	-	2	3	10	12	2	-		
2	62	302	3	0	-	-	-	2	3	10	12	2	-		
2	53	292	3	0	-	-	-	2	3	8	10	2	5		
2	56	296	3	0	-	-	-	2	3	6	8	2	5		
2	52	296	3	0	-	-	-	2	3	6	8	2	5		
2	80	070	3	0	-	-	-	2	3	6	8	2	5		

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	<p>Surface shape</p> <p>1. Stepped</p> <p>2. Undulating</p> <p>3. Planar</p>

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location

Date

Day	Month	Year
26	9	2008

Inspector(s)

page of page
 of

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2		80	074	3	0	-	-	-	2	3	6	8	2	5	
2		78	075	3	0	-	-	-	2	3	4	6	2	5	
2		75	076	3	0	-	-	-	2	3	4	6	2	5	
2		75	074	3	0	-	-	-	2	3	4	6	2	5	
2		78	078	3	0	-	-	-	2	3	4	6	2	5	
2		62	002	3	0	3	1	-	2	2	8	10	2	-	
2		78	354	3	0	3	1	-	2	2	10	12	2	-	
2		80	345	3	0	3	1	-	2	2	6	8	2	-	
2		62	014	3	0	3	1	-	2	2	6	8	2	-	
2		60	354	3	0	3	1	-	2	2	6	8	2	-	
2		70	354	3	0	3	1	-	2	2	6	8	2	-	
2		72	010	3	0	3	1	-	2	2	6	8	2	-	
2		54	354	3	0	3	1	-	2	2	4	6	2	-	
2		55	355	3	0	3	1	-	2	2	2	4	2	-	
2		78	075	1	0	-	-	-	2	3	2	4	2	4	
2		72	070	1	0	-	-	-	2	3	4	6	2	4	
2		62	066	1	0	-	-	-	2	3	6	8	2	4	
2		88	080	1	0	-	-	-	2	3	6	8	2	4	
2		80	046	1	0	-	-	-	2	3	4	6	2	4	
2		72	046	1	0	-	-	-	2	3	4	6	2	4	
2		54	056	1	0	-	-	-	2	3	6	8	2	4	
2		44	020	2	1	4	1	-	2	2	8	10	2	-	
2		50	010	1	1	4	1	-	2	2	8	10	2	5	
2		48	010	1	1	4	1	-	2	2	4	6	2	5	
2		58	020	1	1	4	1	-	2	2	8	10	2	5	
2		60	016	1	1	4	1	-	2	2	4	6	2	5	
2		42	018	1	1	4	1	-	2	2	6	8	2	5	
2		48	012	1	1	4	1	-	2	2	4	6	2	5	

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1382+75

Date
 Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	85	250	2	0	-	-	-	2	2	8	10	2	4		
2	80	258	2	0	-	-	-	2	2	8	10	2	4		
2	85	258	2	0	-	-	-	2	2	6	8	2	4		
2	82	250	2	0	-	-	-	2	2	6	8	2	4		
2	88	254	2	0	-	-	-	2	2	8	10	2	4		
2	88	244	2	0	-	-	-	2	2	8	10	2	4		
2	70	260	2	0	-	-	-	2	2	6	8	2	4		
2	80	254	2	0	-	-	-	2	2	8	10	2	4		
2	78	255	2	0	-	-	-	2	2	12	14	2	4		
2	80	244	2	0	-	-	-	2	2	8	10	2	4		
2	88	234	2	0	-	-	-	2	2	6	8	2	4		
2	86	245	2	0	-	-	-	2	2	12	14	2	4		
2	88	250	2	0	-	-	-	2	2	12	14	2	4		
2	22	115	2	0	3	1	-	2	2	10	12	2	3		
2	22	106	2	0	3	1	-	2	2	8	10	2	3		
2	25	103	2	0	3	1	-	2	2	8	10	2	3		
2	24	132	2	0	3	1	-	2	2	12	14	2	3		
2	23	120	2	0	3	1	-	2	2	8	10	2	3		
2	23	090	2	0	3	1	-	2	2	8	10	2	3		
2	24	106	1	1	3	2	-	2	2	8	10	2	2		
2	18	136	1	1	3	2	-	2	2	12	14	2	2		
2	20	145	1	1	3	2	-	2	2	10	12	2	2		
2	25	134	1	1	3	2	-	2	2	12	14	2	2		
2	48	322	1	1	3	1	-	1	2	14	16	2	3		
2	48	338	1	1	3	1	-	1	2	10	12	2	3		
2	62	310	1	1	3	1	-	1	2	10	12	2	3		
2	38	300	1	1	3	1	-	1	2	12	14	2	3		
2	44	315	1	1	3	1	-	1	2	10	12	2	3		
2	38	340	1	1	3	1	-	1	2	8	10	2	3		
2	42	335	1	1	3	1	-	1	2	8	10	2	3		

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|---|---|--|---|----------------------------|--------------|------------|-----------------------|--------------|--------------|------------------|---------------|--------------|---------------------|--------------------|-----------------|-----------------|----------------|--------------|----------------------|------------------------|---------------|---------------------------|-------------------|-----------|---|--------------|--------|-------------|-----------------------|-------|---------------|----------------|--------|----------------|---------------------|---------|-----------------|--------------------------|------|----------|--|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>< 0.004 in
 0.004 - 0.01 in
 0.01 - 0.02 in
 0.02 - 0.1 in
 0.1 - 0.4 in
 > 0.4 in
 0.4 - 4 in
 4 in - 3.3 ft
 > 3.3 ft</p> | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <table border="0"> <tr><td>S1 Very soft clay</td><td>Mpa < 0.025</td><td>Psf 500</td></tr> <tr><td>S2 Soft Clay</td><td>0.025-0.05</td><td>500-1,000</td></tr> <tr><td>S3 Firm clay</td><td>0.05-0.10</td><td>1,000-2,000</td></tr> <tr><td>S4 Stiff clay</td><td>0.10-0.25</td><td>2,000-5,000</td></tr> <tr><td>S5 Very stiff clay</td><td>0.25-0.50</td><td>5,000-10,000</td></tr> <tr><td>S6 Hard clay</td><td>>0.50</td><td>>10,000</td></tr> <tr><td>R0 Extremely weak rock</td><td>0.25-1.0</td><td>36 - 145</td></tr> <tr><td>R1 Very weak rock</td><td>1.0-5.0</td><td>145 - 725</td></tr> <tr><td>R2 Weak rock</td><td>5.0-25</td><td>725 - 3,625</td></tr> <tr><td>R3 Medium strong rock</td><td>25-50</td><td>3,625 - 7,250</td></tr> <tr><td>R4 Strong rock</td><td>50-100</td><td>7,250 - 14,500</td></tr> <tr><td>R5 Very strong rock</td><td>100-250</td><td>14,500 - 36,250</td></tr> <tr><td>R6 Extremely strong rock</td><td>>250</td><td>> 36,250</td></tr> </table> | S1 Very soft clay | Mpa < 0.025 | Psf 500 | S2 Soft Clay | 0.025-0.05 | 500-1,000 | S3 Firm clay | 0.05-0.10 | 1,000-2,000 | S4 Stiff clay | 0.10-0.25 | 2,000-5,000 | S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 | S6 Hard clay | >0.50 | >10,000 | R0 Extremely weak rock | 0.25-1.0 | 36 - 145 | R1 Very weak rock | 1.0-5.0 | 145 - 725 | R2 Weak rock | 5.0-25 | 725 - 3,625 | R3 Medium strong rock | 25-50 | 3,625 - 7,250 | R4 Strong rock | 50-100 | 7,250 - 14,500 | R5 Very strong rock | 100-250 | 14,500 - 36,250 | R6 Extremely strong rock | >250 | > 36,250 | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry: water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) |
| S1 Very soft clay | Mpa < 0.025 | Psf 500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S6 Hard clay | >0.50 | >10,000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R2 Weak rock | 5.0-25 | 725 - 3,625 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R4 Strong rock | 50-100 | 7,250 - 14,500 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| R6 Extremely strong rock | >250 | > 36,250 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>< 1 m
 1 - 3 m
 3 - 10 m
 10 - 20 m
 > 20 m</p> | <p>< 3.3 ft
 3.3 - 10 ft
 10 ft - 33 ft
 33 - 66 ft
 > 66 ft</p> | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Surface shape</p> <ul style="list-style-type: none"> 1. Stepped 2. Undulating 3. Planar | <p>Spacing</p> <table border="0"> <tr><td>1. Extremely close spacing</td><td>< 20 mm</td><td>< 0.8 in</td></tr> <tr><td>2. Very close spacing</td><td>20 - 60 mm</td><td>0.8 - 2.4 in</td></tr> <tr><td>3. Close spacing</td><td>60 - 200 mm</td><td>2.4 - 8.0 in</td></tr> <tr><td>4. Moderate spacing</td><td>200 - 600 mm</td><td>8.0 in - 2.0 ft</td></tr> <tr><td>5. Wide spacing</td><td>600 - 2,000 mm</td><td>2.0 - 6.6 ft</td></tr> <tr><td>6. Very wide spacing</td><td>2,000 - 6,000 mm</td><td>6.6 - 20.0 ft</td></tr> <tr><td>7. Extremely wide spacing</td><td>> 6,000 mm</td><td>> 20.0 ft</td></tr> </table> | 1. Extremely close spacing | < 20 mm | < 0.8 in | 2. Very close spacing | 20 - 60 mm | 0.8 - 2.4 in | 3. Close spacing | 60 - 200 mm | 2.4 - 8.0 in | 4. Moderate spacing | 200 - 600 mm | 8.0 in - 2.0 ft | 5. Wide spacing | 600 - 2,000 mm | 2.0 - 6.6 ft | 6. Very wide spacing | 2,000 - 6,000 mm | 6.6 - 20.0 ft | 7. Extremely wide spacing | > 6,000 mm | > 20.0 ft | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry: significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). | | | | | | | | | | | | | | | | |
| 1. Extremely close spacing | < 20 mm | < 0.8 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Very close spacing | 20 - 60 mm | 0.8 - 2.4 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Close spacing | 60 - 200 mm | 2.4 - 8.0 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Moderate spacing | 200 - 600 mm | 8.0 in - 2.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Wide spacing | 600 - 2,000 mm | 2.0 - 6.6 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Very wide spacing | 2,000 - 6,000 mm | 6.6 - 20.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Extremely wide spacing | > 6,000 mm | > 20.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ Magnetic Declination is 18 Degrees East

Location
1385+00

Date

Day	Month	Year
26	9	2008

Inspector(s)
B. Fisher, R. Beyer

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1 of 2

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	70	027	1	0	4	3	-	1	2	8	10	2	5		
2	75	270	1	1	-	-	-	1	2	8	10	2	5		
2	70	277	1	1	-	-	-	1	2	8	10	2	5		
2	30	268	1	1	-	-	-	1	2	12	14	2	3		
2	38	275	1	1	-	-	-	1	2	10	12	2	3		
2	48	265	1	1	-	-	-	1	2	14	16	2	3		
2	26	265	1	1	-	-	-	1	2	12	14	2	3		
2	42	273	1	1	-	-	-	1	2	8	10	2	3		
2	42	250	1	1	-	-	-	1	2	14	16	2	3		
2	74	292	2	0	-	-	-	1	2	14	16	2	3		
2	75	305	2	0	-	-	-	1	2	14	16	2	3		
2	80	284	2	0	-	-	-	1	2	12	14	2	3		
2	75	288	2	0	-	-	-	1	2	12	14	2	3		
2	62	310	2	0	-	-	-	1	2	12	14	2	3		
2	88	272	2	0	-	-	-	1	2	12	14	2	3		
2	85	273	2	0	-	-	-	1	2	10	12	2	3		
2	88	269	2	0	-	-	-	1	2	10	12	2	3		
2	88	278	2	0	-	-	-	1	2	10	12	2	3		
2	88	078	2	0	-	-	-	1	2	8	10	2	3		
2	85	227	1	1	3	1	-	1	2	12	14	2	4		
2	70	205	1	1	3	1	-	1	2	12	14	2	4		
2	88	200	1	1	3	1	-	1	2	12	14	2	4		
2	85	228	1	1	3	1	-	1	2	14	16	2	4		
2	82	198	1	1	3	1	-	1	2	14	16	2	4		
2	82	224	1	1	3	1	-	1	2	14	16	2	4		
2	80	210	1	1	3	1	-	1	2	18	20	2	4		
2	24	258	1	1	3	1	-	1	2	18	20	2	4		
2	55	328	3	0	2	1	-	2	2	8	10	2	4		
2	60	328	3	0	2	1	-	2	2	8	10	2	4		
2	38	208	1	0	2	1	-	1	2	6	8	2	3		

- | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|---|---|----------------------------|---------|----------|-----------------------|------------|---------------|------------------|-----------------|--------------|---------------------|--------------|------------------|-----------------|----------------|--------------|----------------------|------------------|---------------|---------------------------|-----------------|-----------|---|--------|--------------------|---------|---------------------|------|--------------|--|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <table style="width: 100%; border: none;"> <tr> <td>Mpa</td> <td>Psf</td> </tr> <tr> <td>< 0.025</td> <td>500 psf</td> </tr> <tr> <td>0.025-0.05</td> <td>500-1,000 psf</td> </tr> <tr> <td>0.05-0.10</td> <td>1,000-2,000 psf</td> </tr> <tr> <td>0.10-0.25</td> <td>2,000-5,000 psf</td> </tr> <tr> <td>0.25-0.50</td> <td>5,000-10,000 psf</td> </tr> <tr> <td>>0.50</td> <td>>10,000 psf</td> </tr> <tr> <td>0.25-1.0</td> <td>36 - 145 psi</td> </tr> <tr> <td>1.0-5.0</td> <td>145 - 725 psi</td> </tr> <tr> <td>5.0-25</td> <td>725 - 3,625 psi</td> </tr> <tr> <td>25-50</td> <td>3,625 - 7,250 psi</td> </tr> <tr> <td>50-100</td> <td>7,250 - 14,500 psi</td> </tr> <tr> <td>100-250</td> <td>14,500 - 36,250 psi</td> </tr> <tr> <td>>250</td> <td>> 36,250 psi</td> </tr> </table> | Mpa | Psf | < 0.025 | 500 psf | 0.025-0.05 | 500-1,000 psf | 0.05-0.10 | 1,000-2,000 psf | 0.10-0.25 | 2,000-5,000 psf | 0.25-0.50 | 5,000-10,000 psf | >0.50 | >10,000 psf | 0.25-1.0 | 36 - 145 psi | 1.0-5.0 | 145 - 725 psi | 5.0-25 | 725 - 3,625 psi | 25-50 | 3,625 - 7,250 psi | 50-100 | 7,250 - 14,500 psi | 100-250 | 14,500 - 36,250 psi | >250 | > 36,250 psi | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry; water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) |
| Mpa | Psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| < 0.025 | 500 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.025-0.05 | 500-1,000 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.05-0.10 | 1,000-2,000 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.10-0.25 | 2,000-5,000 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25-0.50 | 5,000-10,000 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| >0.50 | >10,000 psf | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25-1.0 | 36 - 145 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0-5.0 | 145 - 725 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5.0-25 | 725 - 3,625 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25-50 | 3,625 - 7,250 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50-100 | 7,250 - 14,500 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100-250 | 14,500 - 36,250 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| >250 | > 36,250 psi | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Spacing</p> <table style="width: 100%; border: none;"> <tr> <td>1. Extremely close spacing</td> <td>< 20 mm</td> <td>< 0.8 in</td> </tr> <tr> <td>2. Very close spacing</td> <td>20 - 60 mm</td> <td>0.8 - 2.4 in</td> </tr> <tr> <td>3. Close spacing</td> <td>60 - 200 mm</td> <td>2.4 - 8.0 in</td> </tr> <tr> <td>4. Moderate spacing</td> <td>200 - 600 mm</td> <td>8.0 in - 2.0 ft</td> </tr> <tr> <td>5. Wide spacing</td> <td>600 - 2,000 mm</td> <td>2.0 - 6.6 ft</td> </tr> <tr> <td>6. Very wide spacing</td> <td>2,000 - 6,000 mm</td> <td>6.6 - 20.0 ft</td> </tr> <tr> <td>7. Extremely wide spacing</td> <td>> 6,000 mm</td> <td>> 20.0 ft</td> </tr> </table> | 1. Extremely close spacing | < 20 mm | < 0.8 in | 2. Very close spacing | 20 - 60 mm | 0.8 - 2.4 in | 3. Close spacing | 60 - 200 mm | 2.4 - 8.0 in | 4. Moderate spacing | 200 - 600 mm | 8.0 in - 2.0 ft | 5. Wide spacing | 600 - 2,000 mm | 2.0 - 6.6 ft | 6. Very wide spacing | 2,000 - 6,000 mm | 6.6 - 20.0 ft | 7. Extremely wide spacing | > 6,000 mm | > 20.0 ft | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). | | | | | | | |
| 1. Extremely close spacing | < 20 mm | < 0.8 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Very close spacing | 20 - 60 mm | 0.8 - 2.4 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. Close spacing | 60 - 200 mm | 2.4 - 8.0 in | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. Moderate spacing | 200 - 600 mm | 8.0 in - 2.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. Wide spacing | 600 - 2,000 mm | 2.0 - 6.6 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. Very wide spacing | 2,000 - 6,000 mm | 6.6 - 20.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. Extremely wide spacing | > 6,000 mm | > 20.0 ft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1386+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **1**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	42	237	3	0	-	-	-	1	2	18	20	2	-		
2	52	260	3	0	-	-	-	1	2	14	16	2	-		
2	60	250	3	0	-	-	-	1	2	12	14	2	-		
2	58	248	3	0	-	-	-	1	2	14	16	2	-		
2	68	239	3	0	-	-	-	1	2	14	16	2	-		
2	68	320	2	0	3	1	-	1	2	14	16	2	4		
2	70	310	2	0	3	1	-	1	2	14	16	2	4		
2	70	320	2	0	3	1	-	1	2	12	14	2	4		
2	72	320	2	0	3	1	-	1	2	14	16	2	4		
2	64	317	2	0	3	1	-	1	2	10	12	2	4		
2	60	310	2	0	3	1	-	1	2	14	16	2	4		
2	80	085	2	0	4	1	-	1	2	14	16	2	4		
2	76	090	2	0	4	1	-	1	2	12	14	2	4		
2	88	265	2	0	4	1	-	1	2	8	10	2	4		
2	88	080	2	0	4	1	-	1	2	10	12	2	4		
2	60	258	2	0	4	1	-	1	2	10	12	2	4		
2	60	254	2	0	4	1	-	1	2	10	12	2	4		
2	85	094	2	0	4	1	-	1	2	10	12	2	4		
2	78	256	2	0	4	1	-	1	2	8	10	2	4		
2	88	256	2	0	4	1	-	1	2	8	10	2	4		
2	85	282	3	0	-	-	-	2	2	8	10	2	5		
2	88	290	3	0	-	-	-	2	2	8	10	2	5		
2	88	292	3	0	-	-	-	2	2	8	10	2	5		
2	82	110	3	0	-	-	-	2	2	12	14	2	5		
2	86	290	3	0	-	-	-	2	2	10	12	2	5		
2	16	095	1	1	-	-	-	1	2	14	16	2	3		
2	28	108	1	1	-	-	-	1	2	6	8	2	3		
2	28	090	1	1	-	-	-	1	2	8	10	2	3		
2	26	075	1	1	-	-	-	1	2	8	10	2	3		
2	40	095	1	1	-	-	-	1	2	14	16	2	3		

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1387+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
	1	62	176	8	0	0.5"	CL	-	2	2	6	8	7		Fault (F-103) Lean Clay Infilling
	2	70	170	3	0	3	1	-	2	2	12	14	2	3	
	2	65	172	3	0	3	1	-	2	2	8	10	2	3	
	2	68	157	3	0	3	1	-	2	2	4	6	2	3	
	2	70	170	3	0	3	1	-	2	2	4	6	2	3	
	2	74	174	3	0	3	1	-	2	2	6	8	2	3	
	2	74	168	3	0	3	1	-	2	2	4	6	2	3	
	2	78	175	3	0	3	1	-	2	2	8	10	2	3	
	2	64	192	3	0	3	1	-	2	2	8	10	2	3	
	2	42	346	3	0	4	3	-	2	2	12	14	2	6	
	2	48	323	3	0	4	3	-	2	2	12	14	2	6	
	2	48	320	3	0	4	1	-	1	2	14	16	2	3	
	2	48	320	3	0	4	1	-	1	2	12	14	2	3	
	2	32	354	3	0	4	1	-	1	2	14	16	2	3	
	2	42	345	3	0	4	1	-	1	2	12	14	2	3	
	2	68	284	2	0	3	1	-	2	2	10	12	2	3	
	2	78	394	2	0	3	1	-	2	2	14	16	2	3	
	2	70	306	2	0	3	1	-	2	2	12	14	2	3	
	2	84	265	2	0	3	1	-	2	2	10	12	2	3	
	2	62	273	1	0	-	-	-	1	2	14	16	2	3	
	2	64	274	1	0	-	-	-	1	2	14	16	2	3	
	2	72	274	1	0	-	-	-	1	2	12	14	2	3	
	2	70	276	1	0	-	-	-	1	2	10	12	2	3	
	2	74	282	1	0	-	-	-	1	2	12	14	2	3	
	2	86	075	1	0	-	-	-	1	2	8	10	2	3	
	2	88	260	1	0	-	-	-	1	2	6	87	2	3	
	2	68	270	1	0	-	-	-	1	2	8	10	2	3	
	2	85	076	1	0	-	-	-	1	2	8	10	2	3	
	2	70	200	2	0	3	-	-	1	2	14	16	2	4	
	2	60	220	1	1	3	2	-	1	2	14	16	2	3	

- Type**
0. Fault zone
 1. Fault
 2. Joint
 3. Cleavage
 4. Schistosity
 5. Shear
 6. Fissure
 7. Tension Crack
 8. Foliation
 9. Bedding

- Aperture Width**
1. Very Tight (<0.1 mm)
 2. Tight (0.1-0.25 mm)
 3. Partly open (0.25-0.5 mm)
 4. Open (0.5-2.5 mm)
 5. Moderately wide (2.5-10mm)
 6. Wide (> 10 mm)
 7. Very wide (1-10 cm)
 8. Extremely wide (10-100 cm)
 9. Cavernous (> 1 m)

- Termination**
- < 0.004 in
 - 0.004 - 0.01 in
 - 0.01 - 0.02 in
 - 0.02 - 0.1 in
 - 0.1 - 0.4 in
 - > 0.4 in
 - 0.4 - 4 in
 - 4 in - 3.3 ft
 - > 3.3 ft

- Nature of Infilling**
1. Clean
 2. Surface Staining
 3. Non-cohesive
 4. Inactive clay or clay matrix
 5. Swelling clay or clay matrix
 6. Cemented
 7. Chloride, talc, or gypsum
 8. Calcite

- Termination**
0. Neither end visible
 1. One end visible
 2. Both ends visible

- Spacing**
1. Extremely close spacing < 20 mm < 0.8 in
 2. Very close spacing 20 - 60 mm 0.8 - 2.4 in
 3. Close spacing 60 - 200 mm 2.4 - 8.0 in
 4. Moderate spacing 200 - 600 mm 8.0 in - 2.0 ft
 5. Wide spacing 600 - 2,000 mm 2.0 - 6.6 ft
 6. Very wide spacing 2,000 - 6,000 mm 6.6 - 20.0 ft
 7. Extremely wide spacing > 6,000 mm > 20.0 ft

Compressive Strength of Infilling

- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 psf |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

Water Flow (open)

0. The discontinuity is very tight and dry; water flow along it does not appear possible.
1. The discontinuity is dry with no evidence of water flow.
2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
3. The discontinuity is damp but no free water is present.
4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.
5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)

Water Flow (filled)

6. The filling materials are heavily consolidated and dry; significant flow appears unlikely
7. The filling materials are damp, but no free water is present.
8. The filling materials are wet, occasional drops of water.
9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).
10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

- Persistence**
1. Very low persistence < 1 m < 3.3 ft
 2. Low persistence 1 - 3 m 3.3 - 10 ft
 3. Medium persistence 3 - 10 m 10 ft - 33 ft
 4. High persistence 10 - 20 m 33 - 66 ft
 5. Very high persistence > 20 m > 66 ft

- Surface roughness**
1. Rough
 2. Smooth
 3. Polished
 4. Slickensided
- Surface shape**
1. Stepped
 2. Undulating
 3. Planar

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1388+00

Date
Day: **26** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	52	224	2	0	4	1	-	2	2	8	10	2	3		
2	44	220	2	0	4	1	-	2	2	4	6	2	3		
2	40	235	2	0	3	1	-	2	2	8	10	2	3		
2	40	240	2	0	3	1	-	2	2	6	8	2	3		
2	40	235	2	0	3	1	-	2	2	8	10	2	3		
2	38	195	2	0	3	1	-	2	2	6	8	2	3		
2	38	204	2	0	3	1	-	2	2	4	6	2	3		
2	38	210	2	0	3	1	-	2	2	6	8	2	3		
2	37	230	2	0	3	1	-	2	2	8	10	2	3		
2	26	233	2	0	3	1	-	2	2	6	8	2	3		
2	50	246	2	0	3	1	-	2	2	6	8	2	3		
2	54	325	2	1	3	1	-	2	2	4	6	2	4		
2	40	325	2	1	3	1	-	2	2	4	6	2	4		
2	44	325	2	1	3	1	-	2	2	4	66	2	4		
2	38	318	2	1	3	1	-	2	2	4	6	2	4		
2	44	320	2	1	3	1	-	2	2	6	8	2	4		
2	44	314	2	1	3	1	-	2	2	8	10	2	4		
2	40	320	2	1	3	1	-	2	2	6	8	2	4		
2	40	310	2	1	3	1	-	2	2	4	6	2	4		
2	84	274	1	1	-	-	-	2	2	8	10	2	4		
2	86	110	1	1	-	-	-	2	2	10	12	2	4		
2	84	098	1	1	-	-	-	2	2	4	6	2	4		
2	84	265	1	1	-	-	-	2	2	4	6	2	4		
2	82	107	1	1	-	-	-	2	2	4	6	2	4		
2	80	304	1	1	-	-	-	2	2	4	6	2	4		
2	82	120	1	1	-	-	-	2	2	6	8	2	4		
2	83	280	1	1	-	-	-	2	2	6	8	2	4		
2	76	280	1	1	-	-	-	2	2	6	8	2	4		
2	88	105	1	1	-	-	-	2	2	8	10	2	4		
2	80	275	1	1	-	-	-	2	2	6	8	2	4		

<p>Type</p> <p>0. Fault zone</p> <p>1. Fault</p> <p>2. Joint</p> <p>3. Cleavage</p> <p>4. Schistosity</p> <p>5. Shear</p> <p>6. Fissure</p> <p>7. Tension Crack</p> <p>8. Foliation</p> <p>9. Bedding</p>	<p>Aperture Width</p> <p>1. Very Tight (<0.1 mm)</p> <p>2. Tight (0.1-0.25 mm)</p> <p>3. Partly open (0.25-0.5 mm)</p> <p>4. Open (0.5-2.5 mm)</p> <p>5. Moderately wide (2.5-10mm)</p> <p>6. Wide (> 10 mm)</p> <p>7. Very wide (1-10 cm)</p> <p>8. Extremely wide (10-100 cm)</p> <p>9. Cavernous (> 1 m)</p>	<p>< 0.004 in</p> <p>0.004 - 0.01 in</p> <p>0.01 - 0.02 in</p> <p>0.02 - 0.1 in</p> <p>0.1 - 0.4 in</p> <p>> 0.4 in</p> <p>0.4 - 4 in</p> <p>4 in - 3.3 ft</p> <p>> 3.3 ft</p>	<p>Nature of Infilling</p> <p>1. Clean</p> <p>2. Surface Staining</p> <p>3. Non-cohesive</p> <p>4. Inactive clay or clay matrix</p> <p>5. Swelling clay or clay matrix</p> <p>6. Cemented</p> <p>7. Chloride, talc, or gypsum</p> <p>8. Calcite</p>	<p>Compressive Strength of Infilling</p> <p>S1 Very soft clay</p> <p>S2 Soft Clay</p> <p>S3 Firm clay</p> <p>S4 Stiff clay</p> <p>S5 Very stiff clay</p> <p>S6 Hard clay</p> <p>R0 Extremely weak rock</p> <p>R1 Very weak rock</p> <p>R2 Weak rock</p> <p>R3 Medium strong rock</p> <p>R4 Strong rock</p> <p>R5 Very strong rock</p> <p>R6 Extremely strong rock</p>	<p>Mpa</p> <p>< 0.025</p> <p>0.025-0.05</p> <p>0.05-0.10</p> <p>0.10-0.25</p> <p>0.25-0.50</p> <p>>0.50</p> <p>0.25-1.0</p> <p>1.0-5.0</p> <p>5.0-25</p> <p>25-50</p> <p>50-100</p> <p>100-250</p> <p>>250</p>	<p>Psf</p> <p>500 psf</p> <p>500-1,000 psf</p> <p>1,000-2,000 psf</p> <p>2,000-5,000 psf</p> <p>5,000-10,000 psf</p> <p>>10,000 psf</p> <p>36 - 145 psi</p> <p>145 - 725 psi</p> <p>725 - 3,625 psi</p> <p>3,625 - 7,250 psi</p> <p>7,250 - 14,500 psi</p> <p>14,500 - 36,250 psi</p> <p>> 36,250 psi</p>	<p>Water Flow (open)</p> <p>0. The discontinuity is very tight and dry; water flow along it does not appear possible.</p> <p>1. The discontinuity is dry with no evidence of water flow.</p> <p>2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.</p> <p>3. The discontinuity is damp but no free water is present.</p> <p>4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.</p> <p>5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)</p>	<p>Water Flow (filled)</p> <p>6. The filling materials are heavily consolidated and dry; significant flow appears unlikely</p> <p>7. The filling materials are damp, but no free water is present.</p> <p>8. The filling materials are wet, occasional drops of water.</p> <p>9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).</p> <p>10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).</p>
<p>Persistence</p> <p>1. Very low persistence</p> <p>2. Low persistence</p> <p>3. Medium persistence</p> <p>4. High persistence</p> <p>5. Very high persistence</p>	<p>< 1 m</p> <p>1 - 3 m</p> <p>3 - 10 m</p> <p>10 - 20 m</p> <p>> 20 m</p>	<p>< 3.3 ft</p> <p>3.3 - 10 ft</p> <p>10 ft - 33 ft</p> <p>33 - 66 ft</p> <p>> 66 ft</p>	<p>Surface roughness</p> <p>1. Rough</p> <p>2. Smooth</p> <p>3. Polished</p> <p>4. Slickensided</p>	<p>Termination</p> <p>0. Neither end visible</p> <p>1. One end visible</p> <p>2. Both ends visible</p>	<p>Spacing</p> <p>1. Extremely close spacing</p> <p>2. Very close spacing</p> <p>3. Close spacing</p> <p>4. Moderate spacing</p> <p>5. Wide spacing</p> <p>6. Very wide spacing</p> <p>7. Extremely wide spacing</p>	<p>< 20 mm</p> <p>20 - 60 mm</p> <p>60 - 200 mm</p> <p>200 - 600 mm</p> <p>600 - 2,000 mm</p> <p>2,000 - 6,000 mm</p> <p>> 6,000 mm</p>	<p>< 0.8 in</p> <p>0.8 - 2.4 in</p> <p>2.4 - 8.0 in</p> <p>8.0 in - 2.0 ft</p> <p>2.0 - 6.6 ft</p> <p>6.6 - 20.0 ft</p> <p>> 20.0 ft</p>	

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ Magnetic Declination is 18 Degrees East

Location
1389+00

Date
 Day: **25** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **1**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	65	255	1	2	3	1	-	1	2	14	16	2	1		
2	58	280	1	2	3	1	-	1	2	14	16	2	1		
2	65	264	1	2	3	1	-	1	2	12	14	2	1		
2	20	254	1	2	3	1	-	1	2	12	14	2	1		
2	15	200	1	2	3	1	-	1	2	8	10	2	1		
2	15	324	1	2	3	1	-	1	2	10	12	2	1		
2	50	332	1	2	3	1	-	1	2	12	14	2	1		
2	35	347	1	2	3	1	-	1	2	10	12	2	1		
2	38	335	1	2	3	1	-	1	2	14	16	2	1		
2	40	140	1	2	3	1	-	1	2	10	12	2	1		
2	78	210	2	0	3	1	-	1	2	14	16	2	5		
2	68	315	2	0	3	1	-	1	2	16	18	2	5		
2	25	280	1	1	3	1	-	1	2	14	16	2	3		
2	28	250	1	1	3	1	-	1	2	16	18	2	3		
2	75	265	1	0	-	-	-	1	2	18	20	2	4		
2	75	120	1	0	-	-	-	1	2	18	20	2	5		
2	22	264	1	1	3	1	-	1	2	16	18	2	3		
2	30	245	1	1	3	1	-	1	2	16	18	2	3		
2	45	270	1	1	3	1	-	1	2	18	20	2	3		
2	66	060	1	0	-	-	-	1	2	18	20	2	3		
2	52	260	1	0	-	-	-	1	2	18	20	2	3		
2	52	250	1	0	-	-	-	1	2	18	20	2	3		
2	50	322	1	0	3	1	-	1	2	16	18	2	3		
2	70	35	1	0	3	1	-	1	2	16	18	2	3		
2	60	265	1	0	3	1	-	1	2	16	18	2	3		
2	56	270	1	1	3	1	-	1	2	16	18	2	2		
2	88	225	1	1	3	1	-	1	2	16	18	2	2		
2	62	254	1	1	3	1	-	1	2	16	18	2	2		
2	50	268	1	1	3	1	-	1	2	16	18	2	2		

- | | | | | | | | |
|---|--|---|---|---|---|--|---|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>< 0.004 in
0.004 - 0.01 in
0.01 - 0.02 in
0.02 - 0.1 in
0.1 - 0.4 in
> 0.4 in
0.4 - 4 in
4 in - 3.3 ft
> 3.3 ft</p> | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <ul style="list-style-type: none"> S1 Very soft clay S2 Soft Clay S3 Firm clay S4 Stiff clay S5 Very stiff clay S6 Hard clay R0 Extremely weak rock R1 Very weak rock R2 Weak rock R3 Medium strong rock R4 Strong rock R5 Very strong rock R6 Extremely strong rock | <p>Mpa
< 0.025
0.025-0.05
0.05-0.10
0.10-0.25
0.25-0.50
>0.50
0.25-1.0
1.0-5.0
5.0-25
25-50
50-100
100-250
>250</p> <p>Psf
500 psf
500-1,000 psf
1,000-2,000 psf
2,000-5,000 psf
5,000-10,000 psf
>10,000 psf
36 - 145 psi
145 - 725 psi
725 - 3,625 psi
3,625 - 7,250 psi
7,250 - 14,500 psi
14,500 - 36,250 psi
> 36,250 psi</p> | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry; water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>< 1 m
1 - 3 m
3 - 10 m
10 - 20 m
> 20 m</p> | <p>< 3.3 ft
3.3 - 10 ft
10 ft - 33 ft
33 - 66 ft
> 66 ft</p> | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Spacing</p> <ul style="list-style-type: none"> 1. Extremely close spacing 2. Very close spacing 3. Close spacing 4. Moderate spacing 5. Wide spacing 6. Very wide spacing 7. Extremely wide spacing | <p>< 20 mm
20 - 60 mm
60 - 200 mm
200 - 600 mm
600 - 2,000 mm
2,000 - 6,000 mm
> 6,000 mm</p> <p>< 0.8 in
0.8 - 2.4 in
2.4 - 8.0 in
8.0 in - 2.0 ft
2.0 - 6.6 ft
6.6 - 20.0 ft
> 20.0 ft</p> | |

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1390+00

Date
Day: **25** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	52	330	3	1	3	1	-	1	2	6	8	2	3		
2	42	340	1	1	3	1	-	2	2	4	6	2	5		
2	56	330	2	1	3	1	-	2	2	4	6	2	4		
2	52	328	3	1	3	1	-	2	2	4	6	2	5		
2	60	335	3	1	3	1	-	2	2	4	6	2	5		
2	56	334	3	1	3	1	-	2	2	2	4	2	5		
2	48	337	3	1	3	1	-	2	2	4	6	2	5		
2	48	335	3	1	3	1	-	2	2	2	4	2	5		
2	45	340	3	1	3	1	-	2	2	4	6	2	5		
2	36	215	3	0	3	1	-	2	2	8	10	2	4		
2	48	222	3	0	3	1	-	2	2	8	10	2	4		
2	55	216	3	0	3	1	-	2	2	6	8	2	4		
2	45	212	3	0	3	1	-	2	2	10	12	2	4		
2	38	220	3	0	3	1	-	2	2	12	14	2	4		
2	28	204	3	0	3	1	-	2	2	8	10	2	4		
2	50	206	4	0	4	1	-	1	2	12	14	2	4		
2	35	198	4	0	3	1	-	1	2	10	12	2	3		
2	50	205	4	0	3	1	-	1	2	8	10	2	3		
2	40	225	4	0	3	1	-	1	2	12	14	2	3		
2	88	260	2	0	-	-	-	2	2	8	10	2	4		
2	88	260	2	0	-	-	-	2	2	8	10	2	4		
2	86	264	2	0	-	-	-	2	2	8	10	2	4		
2	82	274	2	0	-	-	-	2	2	8	10	2	4		
2	82	262	2	0	-	-	-	2	2	8	10	2	4		
2	65	268	1	1	-	-	-	2	2	8	10	2	5		
2	85	072	1	1	-	-	-	2	2	10	12	2	5		
2	55	230	1	1	-	-	-	2	2	8	10	2	5		
2	70	255	1	1	-	-	-	2	2	10	12	2	5		
2	50	115	1	1	-	-	-	2	2	10	12	2	5		
2	88	255	1	1	-	-	-	1	2	12	14	2	5		

- | | | | | | | | |
|---|--|---|---|---|---|--|---|
| <p>Type</p> <ul style="list-style-type: none"> 0. Fault zone 1. Fault 2. Joint 3. Cleavage 4. Schistosity 5. Shear 6. Fissure 7. Tension Crack 8. Foliation 9. Bedding | <p>Aperture Width</p> <ul style="list-style-type: none"> 1. Very Tight (<0.1 mm) 2. Tight (0.1-0.25 mm) 3. Partly open (0.25-0.5 mm) 4. Open (0.5-2.5 mm) 5. Moderately wide (2.5-10mm) 6. Wide (> 10 mm) 7. Very wide (1-10 cm) 8. Extremely wide (10-100 cm) 9. Cavernous (> 1 m) | <p>< 0.004 in
0.004 - 0.01 in
0.01 - 0.02 in
0.02 - 0.1 in
0.1 - 0.4 in
> 0.4 in
0.4 - 4 in
4 in - 3.3 ft
> 3.3 ft</p> | <p>Nature of Infilling</p> <ul style="list-style-type: none"> 1. Clean 2. Surface Staining 3. Non-cohesive 4. Inactive clay or clay matrix 5. Swelling clay or clay matrix 6. Cemented 7. Chloride, talc, or gypsum 8. Calcite | <p>Compressive Strength of Infilling</p> <ul style="list-style-type: none"> S1 Very soft clay S2 Soft Clay S3 Firm clay S4 Stiff clay S5 Very stiff clay S6 Hard clay R0 Extremely weak rock R1 Very weak rock R2 Weak rock R3 Medium strong rock R4 Strong rock R5 Very strong rock R6 Extremely strong rock | <p>Mpa
< 0.025
0.025-0.05
0.05-0.10
0.10-0.25
0.25-0.50
>0.50
0.25-1.0
1.0-5.0
5.0-25
25-50
50-100
100-250
>250</p> <p>Psf
500 psf
500-1,000 psf
1,000-2,000 psf
2,000-5,000 psf
5,000-10,000 psf
>10,000 psf
36 - 145 psi
145 - 725 psi
725 - 3,625 psi
3,625 - 7,250 psi
7,250 - 14,500 psi
14,500 - 36,250 psi
> 36,250 psi</p> | <p>Water Flow (open)</p> <ul style="list-style-type: none"> 0. The discontinuity is very tight and dry; water flow along it does not appear possible. 1. The discontinuity is dry with no evidence of water flow. 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining. 3. The discontinuity is damp but no free water is present. 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow. 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high) | <p>Water Flow (filled)</p> <ul style="list-style-type: none"> 6. The filling materials are heavily consolidated and dry; significant flow appears unlikely 7. The filling materials are damp, but no free water is present. 8. The filling materials are wet, occasional drops of water. 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min). 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high). |
| <p>Persistence</p> <ul style="list-style-type: none"> 1. Very low persistence 2. Low persistence 3. Medium persistence 4. High persistence 5. Very high persistence | <p>< 1 m
1 - 3 m
3 - 10 m
10 - 20 m
> 20 m</p> | <p>< 3.3 ft
3.3 - 10 ft
10 ft - 33 ft
33 - 66 ft
> 66 ft</p> | <p>Surface roughness</p> <ul style="list-style-type: none"> 1. Rough 2. Smooth 3. Polished 4. Slickensided | <p>Termination</p> <ul style="list-style-type: none"> 0. Neither end visible 1. One end visible 2. Both ends visible | <p>Spacing</p> <ul style="list-style-type: none"> 1. Extremely close spacing 2. Very close spacing 3. Close spacing 4. Moderate spacing 5. Wide spacing 6. Very wide spacing 7. Extremely wide spacing | <p>< 20 mm
20 - 60 mm
60 - 200 mm
200 - 600 mm
600 - 2,000 mm
2,000 - 6,000 mm
> 6,000 mm</p> <p>< 0.8 in
0.8 - 2.4 in
2.4 - 8.0 in
8.0 in - 2.0 ft
2.0 - 6.6 ft
6.6 - 20.0 ft
> 20.0 ft</p> | |

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location

Date

Day	Month	Year
25	9	2008

Inspector(s)

page of page
 of

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	76	295	3	0	4	1	-	1	2	14	16	2	3		
2	86	275	3	0	4	1	-	1	2	14	16	2	3		
2	82	304	3	0	4	1	-	1	2	14	16	2	3		
2	88	275	3	0	4	1	-	1	2	16	18	2	3		
2	84	115	3	0	4	1	-	1	2	18	20	2	3		
2	88	305	3	0	4	1	-	1	2	14	16	2	3		
2	82	296	3	0	4	1	-	1	2	12	14	2	3		
2	82	110	3	0	4	1	-	1	2	14	16	2	3		
2	88	290	3	0	4	1	-	1	2	12	14	2	3		
2	68	215	2	1	3	2	-	1	2	12	14	2	5		
2	70	215	2	1	3	2	-	1	2	12	14	2	5		
2	68	212	3	0	3	1	-	1	2	12	14	2	3		
2	74	215	3	0	3	1	-	1	2	12	14	2	3		
2	65	205	3	0	3	2	-	1	2	14	16	2	3		
2	62	220	2	1	2	1	-	1	2	12	14	2	5		
2	74	207	2	1	2	1	-	1	2	14	16	2	5		
2	82	360	1	1	4	1	-	1	2	12	14	2	3		
2	48	218	3	0	4	1	-	1	2	10	12	2	5		
2	52	222	3	0	4	1	-	1	2	10	12	2	5		
2	70	195	3	0	3	1	-	1	2	10	12	2	5		
2	52	176	3	0	3	1	-	1	2	10	12	2	5		
2	78	325	2	0	3	2	-	1	2	12	14	2	5		
2	52	315	2	0	3	2	-	1	2	12	14	2	5		
1	48	220	5	0	0.25' - 0.50'	CL		2	2					Fault at 1392+20 - Lean Clay Infilling	
2	52	195	2	0	3	2	-	1	2	10	2	5	-		
2	52	175	3	0	3	1	-	1	2	10	2	5	-		
2	36	78	3	0	3	1	-	1	2	16	2	4	-		
2	50	85	3	0	3	1	-	1	2	16	2	4	-		
2	46	110	3	0	3	1	-	1	2	16	2	4	-		
2	50	98	3	0	3	1	-	1	2	16	2	4	-		

- Type**
0. Fault zone
 1. Fault
 2. Joint
 3. Cleavage
 4. Schistosity
 5. Shear
 6. Fissure
 7. Tension Crack
 8. Foliation
 9. Bedding

- Aperture Width**
1. Very Tight (<0.1 mm) < 0.004 in
 2. Tight (0.1-0.25 mm) 0.004 - 0.01 in
 3. Partly open (0.25-0.5 mm) 0.01 - 0.02 in
 4. Open (0.5-2.5 mm) 0.02 - 0.1 in
 5. Moderately wide (2.5-10mm) 0.1 - 0.4 in
 6. Wide (> 10 mm) > 0.4 in
 7. Very wide (1-10 cm) 0.4 - 4 in
 8. Extremely wide (10-100 cm) 4 in - 3.3 ft
 9. Cavernous (> 1 m) > 3.3 ft

- Nature of Infilling**
1. Clean
 2. Surface Staining
 3. Non-cohesive
 4. Inactive clay or clay matrix
 5. Swelling clay or clay matrix
 6. Cemented
 7. Chloride, talc, or gypsum
 8. Calcite

- Termination**
0. Neither end visible
 1. One end visible
 2. Both ends visible

- Spacing**
1. Extremely close spacing < 20 mm < 0.8 in
 2. Very close spacing 20 - 60 mm 0.8 - 2.4 in
 3. Close spacing 60 - 200 mm 2.4 - 8.0 in
 4. Moderate spacing 200 - 600 mm 8.0 in - 2.0 ft
 5. Wide spacing 600 - 2,000 mm 2.0 - 6.6 ft
 6. Very wide spacing 2,000 - 6,000 mm 6.6 - 20.0 ft
 7. Extremely wide spacing > 6,000 mm > 20.0 ft

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 psf |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

- Water Flow (open)**
0. The discontinuity is very tight and dry; water flow along it does not appear possible.
 1. The discontinuity is dry with no evidence of water flow.
 2. The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 3. The discontinuity is damp but no free water is present.
 4. The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 5. The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)

- Water Flow (filled)**
6. The filling materials are heavily consolidated and dry; significant flow appears unlikely
 7. The filling materials are damp, but no free water is present.
 8. The filling materials are wet, occasional drops of water.
 9. The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 10. The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

- Persistence**
1. Very low persistence < 1 m < 3.3 ft
 2. Low persistence 1 - 3 m 3.3 - 10 ft
 3. Medium persistence 3 - 10 m 10 ft - 33 ft
 4. High persistence 10 - 20 m 33 - 66 ft
 5. Very high persistence > 20 m > 66 ft

- Surface roughness**
1. Rough
 2. Smooth
 3. Polished
 4. Slickensided
- Surface shape**
1. Stepped
 2. Undulating
 3. Planar

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1393+00

Date
Day: **25** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
2	70	300	2	0	4	1	-	1	2	10	12	2	2		
2	82	254	2	0	4	3	-	2	2	8	12	2	2		
2	88	266	2	0	4	3	-	2	2	14	16	2	2		
2	78	355	1	2	4	1	-	1	2	14	16	2	2		
2	88	310	1	1	4	2	-	1	2	14	16	2	3		
2	80	255	2	0	3	2	-	1	2	14	16	2	3		
2	80	255	2	0	3	2	-	1	2	14	16	2	4		
2	88	255	2	0	3	2	-	1	2	14	16	2	4		
2	86	254	2	0	3	2	-	1	2	14	16	2	4		
2	84	252	2	0	3	2	-	1	2	8	10	2	4		
2	60	226	3	0	3	1	-	1	2	12	14	2	5		
2	70	234	3	0	3	1	-	1	2	12	14	2	5		
2	62	244	3	0	3	1	-	1	2	12	14	2	5		
2	72	137	3	0	3	1	-	1	2	14	16	2	5		
2	84	314	3	0	3	1	-	1	2	14	16	2	5		
2	88	320	3	0	3	1	-	1	2	16	18	2	5		
2	88	325	3	0	3	1	-	1	2	10	12	2	5		
2	86	322	3	0	3	1	-	1	2	10	12	2	5		
2	82	220	3	1	3	1	-	2	2	10	12	2	5		
2	82	219	1	1	3	1	-	1	2	14	16	2	4		
2	82	015	1	2	2	1	-	1	2	10	12	2	4		
2	62	294	2	0	3	2	-	1	2	12	14	2	3		
2	70	312	2	0	3	2	-	1	2	12	14	2	3		
2	40	150	3	0	3	2	-	1	2	12	14	2	4		
2	60	236	3	1	3	1	-	1	2	10	12	2	3		
2	60	248	3	1	3	1	-	1	2	10	12	2	3		
2	60	257	3	1	3	1	-	1	2	10	12	2	3		
2	57	254	3	1	3	1	-	1	2	10	12	2	3		
2	88	187	2	1	3	1	-	1	2	14	16	2	3		
2	32	084	1	2	3	1	-	1	2	10	12	2	3		

- Type**
- Fault zone
 - Fault
 - Joint
 - Cleavage
 - Schistosity
 - Shear
 - Fissure
 - Tension Crack
 - Foliation
 - Bedding
- Aperture Width**
- Very Tight (<0.1 mm)
 - Tight (0.1-0.25 mm)
 - Partly open (0.25-0.5 mm)
 - Open (0.5-2.5 mm)
 - Moderately wide (2.5-10mm)
 - Wide (> 10 mm)
 - Very wide (1-10 cm)
 - Extremely wide (10-100 cm)
 - Cavernous (> 1 m)
- Surface roughness**
- Rough
 - Smooth
 - Polished
 - Slickensided
- Persistence**
- Very low persistence
 - Low persistence
 - Medium persistence
 - High persistence
 - Very high persistence

- Nature of Infilling**
- Clean
 - Surface Staining
 - Non-cohesive
 - Inactive clay or clay matrix
 - Swelling clay or clay matrix
 - Cemented
 - Chloride, talc, or gypsum
 - Calcite
- Termination**
- Neither end visible
 - One end visible
 - Both ends visible
- Spacing**
- Extremely close spacing
 - Very close spacing
 - Close spacing
 - Moderate spacing
 - Wide spacing
 - Very wide spacing
 - Extremely wide spacing

- Compressive Strength of Infilling**
- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

- Water Flow (open)**
- The discontinuity is very tight and dry; water flow along it does not appear possible.
 - The discontinuity is dry with no evidence of water flow.
 - The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
 - The discontinuity is damp but no free water is present.
 - The discontinuity shows seepage, occasional drops of water, but no continuous flow.
 - The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)
- Water Flow (filled)**
- The filling materials are heavily consolidated and dry; significant flow appears unlikely
 - The filling materials are damp, but no free water is present.
 - The filling materials are wet, occasional drops of water.
 - The filling materials show signs of outwash, continuous flow of water (estimate l/min).
 - The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

Discontinuity Survey Data Sheet

Reference: FHWA-HI-99-007



General Information

GPS Coord: Northing: _____ Easting: _____ **Magnetic Declination is 18 Degrees East**

Location
1476+25

Date
Day: **25** Month: **9** Year: **2008**

Inspector(s)
B. Fisher, R. Beyer

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1 of **2**

Nature and Orientation of Discontinuity

Chainage or Depth	Type	Dip	Dip Direction	Persistence	Termination	Aperture Width	Nature of Filling	Strength of Filling	Surface Roughness	Surface Shape	Minimum JRC	Maximum JRC	Water Flow	Spacing	Remarks
8	8	60	262	4	0	-	-	-	2	3	2	4	2	1	
8	8	56	260	4	0	2	1	-	2	3	2	4	2	2	
8	8	56	264	4	0	2	2	-	2	2	8	10	2	2	
8	8	70	272	1	2	2	2	-	2	3	2	4	2	2	
8	8	72	278	1	1	3	2	-	2	2	4	6	2	2	
8	8	64	278	4	0	4	1	-	2	2	4	6	2	3	
8	8	48	256	2	1	2	2	-	2	2	8	10	2	2	
8	8	56	264	2	1	3	1	-	2	2	8	10	2	3	
8	8	50	272	4	0	3	2	-	2	2	8	10	2	3	
8	8	62	272	5	0	3	2	-	2	2	6	8	2	2	
8	8	60	270	4	0	6	2	-	2	3	2	4	2	2	
8	8	58	274	5	0	3	2	-	2	2	4	6	2	2	
8	8	62	274	5	0	3	2	-	2	2	4	6	2	2	
8	8	52	266	5	0	3	1	-	2	2	2	4	2	2	
8	8	58	267	5	0	3	2	-	2	2	8	10	2	2	
8	8	58	262	5	0	3	2	-	2	2	4	6	2	3	
8	8	60	274	5	0	6	1	-	2	1	8	10	2	3	
8	8	62	272	5	0	3	2	-	2	1	6	8	2	2	
8	8	62	272	5	0	3	2	-	2	1	6	8	2	2	
2	2	38	128	2	1	2	2	-	2	2	8	10	2	2	
2	2	38	142	1	1	3	1	-	2	2	6	8	2	3	
2	2	38	145	2	1	3	1	-	2	1	6	8	2	3	
2	2	40	140	2	1	3	1	-	2	2	6	8	2	3	
2	2	45	164	2	0	6	1	-	2	1	12	14	2	4	
2	2	32	172	2	0	2	1	-	2	2	6	8	2	3	
2	2	32	172	2	0	2	1	-	2	2	6	8	2	3	
2	2	40	148	2	0	3	1	-	2	2	4	6	2	2	
2	2	32	164	2	1	3	1	-	1	2	16	18	2	3	
2	2	50	137	2	1	4	2	-	2	2	6	8	2	3	
2	2	50	150	2	1	4	2	-	2	2	6	8	2	3	

- Type**
- Fault zone
 - Fault
 - Joint
 - Cleavage
 - Schistosity
 - Shear
 - Fissure
 - Tension Crack
 - Foliation
 - Bedding

- Aperture Width**
- Very Tight (<0.1 mm) < 0.004 in
 - Tight (0.1-0.25 mm) 0.004 - 0.01 in
 - Partly open (0.25-0.5 mm) 0.01 - 0.02 in
 - Open (0.5-2.5 mm) 0.02 - 0.1 in
 - Moderately wide (2.5-10mm) 0.1 - 0.4 in
 - Wide (> 10 mm) > 0.4 in
 - Very wide (1-10 cm) 0.4 - 4 in
 - Extremely wide (10-100 cm) 4 in - 3.3 ft
 - Cavernous (> 1 m) > 3.3 ft

- Nature of Infilling**
- Clean
 - Surface Staining
 - Non-cohesive
 - Inactive clay or clay matrix
 - Swelling clay or clay matrix
 - Cemented
 - Chloride, talc, or gypsum
 - Calcite

- Termination**
- Neither end visible
 - One end visible
 - Both ends visible

- Spacing**
- Extremely close spacing < 20 mm < 0.8 in
 - Very close spacing 20 - 60 mm 0.8 - 2.4 in
 - Close spacing 60 - 200 mm 2.4 - 8.0 in
 - Moderate spacing 200 - 600 mm 8.0 in - 2.0 ft
 - Wide spacing 600 - 2,000 mm 2.0 - 6.6 ft
 - Very wide spacing 2,000 - 6,000 mm 6.6 - 20.0 ft
 - Extremely wide spacing > 6,000 mm > 20.0 ft

Compressive Strength of Infilling

- | | | |
|--------------------------|-------------|---------------------|
| S1 Very soft clay | Mpa < 0.025 | Psf 500 psf |
| S2 Soft Clay | 0.025-0.05 | 500-1,000 psf |
| S3 Firm clay | 0.05-0.10 | 1,000-2,000 psf |
| S4 Stiff clay | 0.10-0.25 | 2,000-5,000 psf |
| S5 Very stiff clay | 0.25-0.50 | 5,000-10,000 psf |
| S6 Hard clay | >0.50 | >10,000 psf |
| R0 Extremely weak rock | 0.25-1.0 | 36 - 145 psi |
| R1 Very weak rock | 1.0-5.0 | 145 - 725 psi |
| R2 Weak rock | 5.0-25 | 725 - 3,625 psi |
| R3 Medium strong rock | 25-50 | 3,625 - 7,250 psi |
| R4 Strong rock | 50-100 | 7,250 - 14,500 psi |
| R5 Very strong rock | 100-250 | 14,500 - 36,250 psi |
| R6 Extremely strong rock | >250 | > 36,250 psi |

Water Flow (open)

- The discontinuity is very tight and dry; water flow along it does not appear possible.
- The discontinuity is dry with no evidence of water flow.
- The discontinuity is dry but shows evidence of water flow, i.e. rust staining.
- The discontinuity is damp but no free water is present.
- The discontinuity shows seepage, occasional drops of water, but no continuous flow.
- The discontinuity shows a continuous flow of water. (Estimate l/min and describe pressure i.e. low medium, high)

Water Flow (filled)

- The filling materials are heavily consolidated and dry; significant flow appears unlikely
- The filling materials are damp, but no free water is present.
- The filling materials are wet, occasional drops of water.
- The filling materials show signs of outwash, continuous flow of water (estimate l/min).
- The filling materials are washed out locally; considerable water flow along out-wash channels (estimate l/min and describe pressure, i.e. low, medium, high).

- Persistence**
- Very low persistence < 1 m < 3.3 ft
 - Low persistence 1 - 3 m 3.3 - 10 ft
 - Medium persistence 3 - 10 m 10 ft - 33 ft
 - High persistence 10 - 20 m 33 - 66 ft
 - Very high persistence > 20 m > 66 ft

Surface roughness

- Rough
- Smooth
- Polished
- Slickensided

Surface shape

- Stepped
- Undulating
- Planar



Sector VIII, westbound station 1360+00



Sector VIII, westbound station 1361+50



Sector VIII, westbound station 1362+75



Sector IX, westbound station 1363+75



Sector IX, westbound station 1365+00



Sector IX, westbound station 1365+75



Sector X, westbound station 1367+00



Sector X, westbound station 1368+00



Sector X, westbound station 1369+00



Sector X, westbound station 1370+25



Sector X, westbound station 1372+25



Sector X, westbound station 1373+00



Sector X, westbound station 1374+00



Sector X, westbound station 1375+10



Sector XI, westbound station 1378+25



Sector XII, westbound station 1382+75



Sector XII, westbound station 1384+00



Sector XII, westbound station 1385+00



Sector XII, westbound station 1386+00



Sector XII, westbound station 1387+00



Sector XII, westbound station 1388+00



Sector XII, westbound station 1389+00



Sector XII, westbound station 1390+00



Sector XII, westbound station 1391+00



Sector XII, westbound station 1392+00



Sector XII, westbound station 1393+00



Sector XII, westbound station 1394+00



Sector XVIII, westbound station 1476+25