2—FAULTS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
2.1—Faults (vertical, subvertical, reverse, or unspecified offset or orientation); shear zones; minor faults				
2.1.1	Fault—Certain		*lineweight .375 mm*	Use nonspecific, non-ornamented faults when character or sense of offset of fault is unknown; use also on small-scale maps to show regional fault patterns. If character or sense of offset is known and if scale allows, use various types of ornamented faults to indicate relative motion.
2.1.2	Fault—Approximately located		*4.0 mm* *H-8* *1.0 mm*	
2.1.3	Fault—Approximately located, queried	??		
2.1.4	Fault—Inferred		*1.5 mm* *H-8* *1.0 mm*	
2.1.5	Fault—Inferred, queried	??		
2.1.6	Fault—Concealed		*.5 mm* *H-8* *.5 mm*	
2.1.7	Fault—Concealed, queried	??		
2.1.8	Fault—Showing name	GOLDEN FAULT	GOLDEN FAULT *H-8*	Place symbol ornamentation where observation was made.
2.1.9	Fault—Showing dip where known	*15* *90*	*15* *HI-6* *tick lineweight .15 mm* *90* *1.75 mm* *1.75 mm*	Dip value indicates a measured dip direction and magnitude; add 90 if necessary for clarity.
2.1.10	Fault—Showing direction and plunge of lineation where known	*65*	*arrow lineweight .15 mm* *3.0 mm* *65* *HI-6* *20°* *1.5 mm*	Tick without dip value indicates general direction of dip.
2.1.11	Fault—Tick shows direction of dip of fault; arrow shows direction of lineation on fault			Arrow shows lineation on fault surface; tick and arrow may be combined to show dip and lineation at one locality.
2.1.12	Fault—Showing relative motion: U, upthrown block; D, downthrown block	U D	U *H-8* D	Use U/D on normal faults when ball and bar not used.
2.1.13	Fault—Showing relative motion in cross section: A, away from observer; T, toward observer	A T	A *H-8* T	Use A/T on strike-slip faults in cross section.
2.1.14	Normal fault on small-scale maps—Tick on downthrown side		*hachure lineweight .175 mm* *lineweight .25 mm* *.75 mm*	Usually reserved for maps at scales of 1:1,000,000 or smaller.
2.1.15	Graben on small-scale maps—Ticks on downthrown side	G	G *H-7*	
2.1.16	Reverse fault on small-scale maps—R on upthrown block	R	R *H-7*	
2.1.17	Shear zone		*3.75 mm* *lineweight .15 mm* *60°* *1.75 mm*	Use S-shaped symbols to indicate trend of mylonite or other linear shear zones; spacing may be varied to show intensity of shear. Width of zone may vary.
2.1.18	Zone of sheared rock within fault, type 1		*pattern 405-K (at ~45° to trend on map)*	
2.1.19	Zone of sheared rock within fault, type 2		*pattern 401-K*	Patterns may overprint other units or be used as map units alone; add contacts when shear zones have well-defined boundaries.
2.1.20	Zone of sheared rock around fault		*pattern 401-K*	
2.1.21	Minor inclined fault—Showing strike and dip	*80*	*HI-6* *80* *tick lineweight .2 mm* *1.375 mm* *5.5 mm* *lineweight .375 mm*	Use to show minor faults observed in outcrop in terrain where they cannot be traced elsewhere.
2.1.22	Minor vertical or near-vertical fault—Showing strike		*2.5 mm*	

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
	2.2—Normal faults			
2.2.1	Normal fault—Certain		1.0 mm; .875 mm diameter; tick lineweight .15 mm; lineweight .375 mm	Ball and bar on downthrown block. Place ball and bar along fault to indicate general character of fault segment, not necessarily at a specific locality where an observation was made. Ball and bar symbol is preferred over U/D notation; do not mix both types on same map. Ball and bar may be combined with strike-slip arrows to show oblique offset. In cross section, use paired arrows (used for strike-slip faults in map view) to show normal offset.
2.2.2	Normal fault—Approximately located		4.0 mm; H-8; 1.0 mm	
2.2.3	Normal fault—Approximately located, queried			
2.2.4	Normal fault—Inferred		1.5 mm; H-8; 1.0 mm	
2.2.5	Normal fault—Inferred, queried			
2.2.6	Normal fault—Concealed		.5 mm; H-8; .5 mm	
2.2.7	Normal fault—Concealed, queried			
	2.3—Strike-slip faults			
2.3.1	Strike-slip fault, right-lateral offset—Certain		lineweight .375 mm; arrow lineweight .2 mm; 5.25 mm	Arrows show relative motion. Place arrows along fault to indicate general character of fault segment, not necessarily at a specific locality where an observation was made. Use paired, not single, arrows whenever possible. Strike-slip arrows may be combined with ball and bar symbol to show oblique offset. In cross section, use A/T notation to show strike-slip offset. Paired arrows may also be used in cross section to show normal or thrust offset.
2.3.2	Strike-slip fault, right-lateral offset—Approximately located		4.0 mm; H-8; 1.0 mm	
2.3.3	Strike-slip fault, right-lateral offset—Approximately located, queried			
2.3.4	Strike-slip fault, right-lateral offset—Inferred		1.5 mm; H-8; 1.0 mm	
2.3.5	Strike-slip fault, right-lateral offset—Inferred, queried			
2.3.6	Strike-slip fault, right-lateral offset—Concealed		.5 mm; H-8; .5 mm	
2.3.7	Strike-slip fault, right-lateral offset—Concealed, queried			
2.3.8	Strike-slip fault, left-lateral offset—Certain		lineweight .375 mm; arrow lineweight .2 mm; 5.25 mm	Arrows show relative motion. Place arrows along fault to indicate general character of fault segment, not necessarily at a specific locality where an observation was made. Use paired, not single, arrows whenever possible. Strike-slip arrows may be combined with ball and bar symbol to show oblique offset. In cross section, use A/T notation to show strike-slip offset. Paired arrows may also be used in cross section to show normal or thrust offset.
2.3.9	Strike-slip fault, left-lateral offset—Approximately located		4.0 mm; H-8; 1.0 mm	
2.3.10	Strike-slip fault, left-lateral offset—Approximately located, queried			
2.3.11	Strike-slip fault, left-lateral offset—Inferred		1.5 mm; H-8; 1.0 mm	
2.3.12	Strike-slip fault, left-lateral offset—Inferred, queried			
2.3.13	Strike-slip fault, left-lateral offset—Concealed		.5 mm; H-8; .5 mm	
2.3.14	Strike-slip fault, left-lateral offset—Concealed, queried			

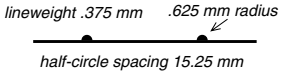
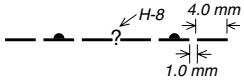
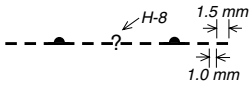
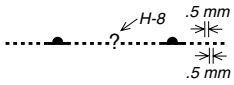
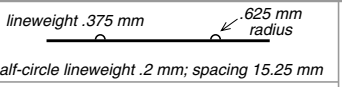
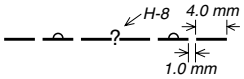
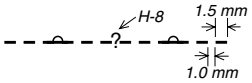
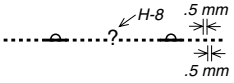
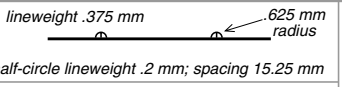
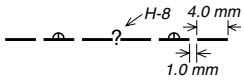
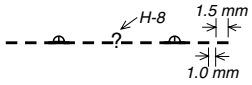
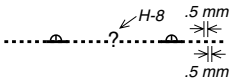
2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
	2.4—Thrust faults			
2.4.1	Thrust fault, 1st generation—Certain		lineweight .375 mm; 60°; 1.75 mm; sawtooth spacing 15.25 mm	Sawteeth on upper (tectonically higher) plate. Sawteeth indicate general character of fault; they are not placed at specific locality where an observation was made. Do not vary size or spacing of sawteeth to indicate different types or generations of faulting (see below). Strike-slip arrows may be combined with sawteeth to show oblique offset. In cross section, use paired arrows (used for strike-slip faults in map view) to show thrust offset.
2.4.2	Thrust fault, 1st generation—Approximately located		H-8; 4.0 mm; 1.0 mm	
2.4.3	Thrust fault, 1st generation—Approximately located, queried			
2.4.4	Thrust fault, 1st generation—Inferred		H-8; 1.5 mm; 1.0 mm	
2.4.5	Thrust fault, 1st generation—Inferred, queried			
2.4.6	Thrust fault, 1st generation—Concealed		.5 mm; H-8; .5 mm	
2.4.7	Thrust fault, 1st generation—Concealed, queried			
2.4.8	Thrust fault, 2nd generation—Certain		60°; lineweight .375 mm; 1.75 mm; sawtooth lineweight .2 mm; spacing 15.25 mm	Sawteeth on upper (tectonically higher) plate. Use to indicate another type or generation of thrust fault when more than one is shown on map.
2.4.9	Thrust fault, 2nd generation—Approximately located		H-8; 4.0 mm; 1.0 mm	
2.4.10	Thrust fault, 2nd generation—Approximately located, queried			
2.4.11	Thrust fault, 2nd generation—Inferred		H-8; 1.5 mm; 1.0 mm	
2.4.12	Thrust fault, 2nd generation—Inferred, queried			
2.4.13	Thrust fault, 2nd generation—Concealed		.5 mm; H-8; .5 mm	
2.4.14	Thrust fault, 2nd generation—Concealed, queried			
2.4.15	Thrust fault, 3rd generation—Certain		60°; lineweight .375 mm; 1.75 mm; sawtooth lineweight .2 mm; spacing 15.25 mm	Sawteeth on upper (tectonically higher) plate. Use to indicate a third type or generation of thrust fault when more than two are shown on map.
2.4.16	Thrust fault, 3rd generation—Approximately located		H-8; 4.0 mm; 1.0 mm	
2.4.17	Thrust fault, 3rd generation—Approximately located, queried			
2.4.18	Thrust fault, 3rd generation—Inferred		1.5 mm; H-8; 1.0 mm	
2.4.19	Thrust fault, 3rd generation—Inferred, queried			
2.4.20	Thrust fault, 3rd generation—Concealed		.5 mm; H-8; .5 mm	
2.4.21	Thrust fault, 3rd generation—Concealed, queried			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
	2.5—Overturned thrust faults			
2.5.1	Overturned thrust fault, 1st generation—Certain		1.75 mm; 60°; lineweight .375 mm; .5 mm; 30°; 2.0 mm; sawtooth spacing 15.25 mm	Bars on upper (tectonically higher) plate; sawteeth in direction of dip. Bars and sawteeth indicate general character of fault; they are not placed at specific locality where an observation was made. Do not vary size or spacing of bars and sawteeth to indicate different types or generations of faulting (see below). Strike-slip arrows may be combined with bars and sawteeth to show oblique offset. In cross section, use paired arrows (used for strike-slip faults in map view) to show thrust offset.
2.5.2	Overturned thrust fault, 1st generation—Approximately located		H-8; 4.0 mm; 1.0 mm	
2.5.3	Overturned thrust fault, 1st generation—Approximately located, queried			
2.5.4	Overturned thrust fault, 1st generation—Inferred		1.5 mm; H-8; 1.0 mm	
2.5.5	Overturned thrust fault, 1st generation—Inferred, queried			
2.5.6	Overturned thrust fault, 1st generation—Concealed		.5 mm; H-8; .5 mm	
2.5.7	Overturned thrust fault, 1st generation—Concealed, queried			
2.5.8	Overturned thrust fault, 2nd generation—Certain		1.75 mm; 60°; lineweight .375 mm; .5 mm; 30°; 2.0 mm; sawtooth lineweight .2 mm; spacing 15.25 mm	Bars on upper (tectonically higher) plate; sawteeth in direction of dip. Use to indicate another type or generation of overturned thrust fault when more than one is shown on map.
2.5.9	Overturned thrust fault, 2nd generation—Approximately located		4.0 mm; H-8; 1.0 mm	
2.5.10	Overturned thrust fault, 2nd generation—Approximately located, queried			
2.5.11	Overturned thrust fault, 2nd generation—Inferred		1.5 mm; H-8; 1.0 mm	
2.5.12	Overturned thrust fault, 2nd generation—Inferred, queried			
2.5.13	Overturned thrust fault, 2nd generation—Concealed		.5 mm; H-8; .5 mm	
2.5.14	Overturned thrust fault, 2nd generation—Concealed, queried			
2.5.15	Overturned thrust fault, 3rd generation—Certain		1.75 mm; 60°; lineweight .375 mm; .5 mm; 30°; 2.0 mm; sawtooth lineweight .2 mm; spacing 15.25 mm	Bars on upper (tectonically higher) plate; sawteeth in direction of dip. Use to indicate a third type or generation of overturned thrust fault when more than two are shown on map.
2.5.16	Overturned thrust fault, 3rd generation—Approximately located		H-8; 4.0 mm; 1.0 mm	
2.5.17	Overturned thrust fault, 3rd generation—Approximately located, queried			
2.5.18	Overturned thrust fault, 3rd generation—Inferred		1.5 mm; H-8; 1.0 mm	
2.5.19	Overturned thrust fault, 3rd generation—Inferred, queried			
2.5.20	Overturned thrust fault, 3rd generation—Concealed		.5 mm; H-8; .5 mm	
2.5.21	Overturned thrust fault, 3rd generation—Concealed, queried			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
	2.6—Detachment faults			
2.6.1	Detachment fault, type 1, 1st generation—Certain			Half-circles on upper (tectonically higher) plate. Half-circles indicate general character of fault; they are not placed at specific locality where an observation was made. Do not vary size or spacing of half-circles to indicate different types or generations of faulting (see below). In cross section, use paired arrows (used for strike-slip faults in map view) to show low-angle normal offset.
2.6.2	Detachment fault, type 1, 1st generation—Approximately located			
2.6.3	Detachment fault, type 1, 1st generation—Approximately located, queried			
2.6.4	Detachment fault, type 1, 1st generation—Inferred			
2.6.5	Detachment fault, type 1, 1st generation—Inferred, queried			
2.6.6	Detachment fault, type 1, 1st generation—Concealed			
2.6.7	Detachment fault, type 1, 1st generation—Concealed, queried			
2.6.8	Detachment fault, type 1, 2nd generation—Certain			Half-circles on upper (tectonically higher) plate. Use to indicate another type or generation of detachment fault when more than one is shown on map.
2.6.9	Detachment fault, type 1, 2nd generation—Approximately located			
2.6.10	Detachment fault, type 1, 2nd generation—Approximately located, queried			
2.6.11	Detachment fault, type 1, 2nd generation—Inferred			
2.6.12	Detachment fault, type 1, 2nd generation—Inferred, queried			
2.6.13	Detachment fault, type 1, 2nd generation—Concealed			
2.6.14	Detachment fault, type 1, 2nd generation—Concealed, queried			
2.6.15	Detachment fault, type 1, 3rd generation—Certain			Half-circles on upper (tectonically higher) plate. Use to indicate a third type or generation of detachment fault when more than two are shown on map.
2.6.16	Detachment fault, type 1, 3rd generation—Approximately located			
2.6.17	Detachment fault, type 1, 3rd generation—Approximately located, queried			
2.6.18	Detachment fault, type 1, 3rd generation—Inferred			
2.6.19	Detachment fault, type 1, 3rd generation—Inferred, queried			
2.6.20	Detachment fault, type 1, 3rd generation—Concealed			
2.6.21	Detachment fault, type 1, 3rd generation—Concealed, queried			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS	NOTES ON USAGE
	2.6—Detachment faults (continued)			
2.6.22	Detachment fault, type 2, 1st generation—Certain		*lineweight .375 mm* *1.25 mm* *hachure lineweight .25 mm; height 1.0 mm; spacing between hachure pairs 14.0 mm*	Hachures on upper (tectonically higher) plate. Hachures indicate general character of fault; they are not placed at specific locality where an observation was made. Do not vary size or spacing of hachures to indicate different types or generations of faulting (see below). In cross section, use paired arrows (used for strike-slip faults in map view) to show low-angle normal offset.
2.6.23	Detachment fault, type 2, 1st generation—Approximately located		*H-8* *4.0 mm* *1.0 mm*	
2.6.24	Detachment fault, type 2, 1st generation—Approximately located, queried			
2.6.25	Detachment fault, type 2, 1st generation—Inferred		*H-8* *1.5 mm* *1.0 mm*	
2.6.26	Detachment fault, type 2, 1st generation—Inferred, queried			
2.6.27	Detachment fault, type 2, 1st generation—Concealed		*H-8* *.5 mm* *.5 mm*	
2.6.28	Detachment fault, type 2, 1st generation—Concealed, queried			
2.6.29	Detachment fault, type 2, 2nd generation—Certain		*lineweight .375 mm* *1.25 mm* *box lineweight .25 mm; height 1.0 mm; spacing between boxes 14.0 mm*	Boxes on upper (tectonically higher) plate. Use to indicate another type or generation of detachment fault when more than one is shown on map.
2.6.30	Detachment fault, type 2, 2nd generation—Approximately located		*H-8* *4.0 mm* *1.0 mm*	
2.6.31	Detachment fault, type 2, 2nd generation—Approximately located, queried			
2.6.32	Detachment fault, type 2, 2nd generation—Inferred		*H-8* *1.5 mm* *1.0 mm*	
2.6.33	Detachment fault, type 2, 2nd generation—Inferred, queried			
2.6.34	Detachment fault, type 2, 2nd generation—Concealed		*H-8* *.5 mm* *.5 mm*	
2.6.35	Detachment fault, type 2, 2nd generation—Concealed, queried			
2.6.36	Detachment fault, type 2, 3rd generation—Certain		*lineweight .375 mm* *1.25 mm* *box lineweight .25 mm; height 1.0 mm; spacing between boxes 14.0 mm*	Boxes on upper (tectonically higher) plate. Use to indicate a third type or generation of detachment fault when more than two are shown on map.
2.6.37	Detachment fault, type 2, 3rd generation—Approximately located		*H-8* *4.0 mm* *1.0 mm*	
2.6.38	Detachment fault, type 2, 3rd generation—Approximately located, queried			
2.6.39	Detachment fault, type 2, 3rd generation—Inferred		*H-8* *1.5 mm* *1.0 mm*	
2.6.40	Detachment fault, type 2, 3rd generation—Inferred, queried			
2.6.41	Detachment fault, type 2, 3rd generation—Concealed		*H-8* *.5 mm* *.5 mm*	
2.6.42	Detachment fault, type 2, 3rd generation—Concealed, queried			