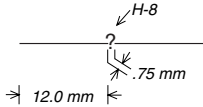
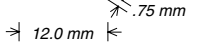
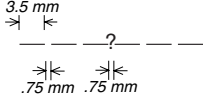
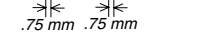
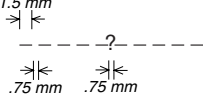
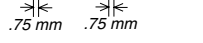
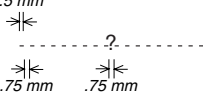
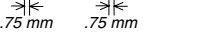
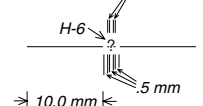
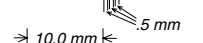
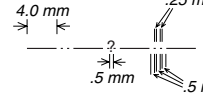
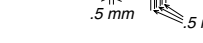
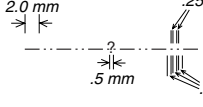
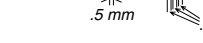
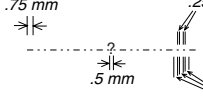
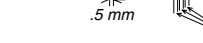
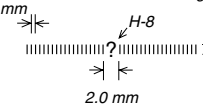
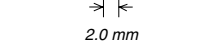
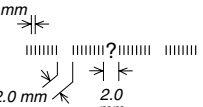
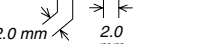
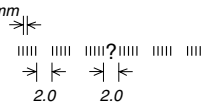
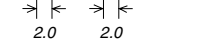
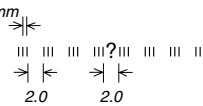
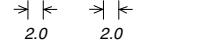


1—CONTACTS, KEY BEDS, AND DIKES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.1—Contacts				
1.1.1	Contact—Identity and existence certain, location accurate	_____	lineweight .15 mm 	
1.1.2	Contact—Identity or existence questionable, location accurate	_____?		
1.1.3	Contact—Identity and existence certain, location approximate	_____	3.5 mm 	
1.1.4	Contact—Identity or existence questionable, location approximate	_____?	.75 mm .75 mm 	
1.1.5	Contact—Identity and existence certain, location inferred	_____	1.5 mm 	
1.1.6	Contact—Identity or existence questionable, location inferred	_____?	.75 mm .75 mm 	
1.1.7	Contact—Identity and existence certain, location concealed	_____	.5 mm 	
1.1.8	Contact—Identity or existence questionable, location concealed	_____?	.75 mm .75 mm 	
1.1.9	Internal contact—Identity and existence certain, location accurate	_____	lineweight .15 mm 25 mm H-6 	Use to delineate individual debris flows, landslide blocks, alluvial fans, etc., within the same geologic map unit.
1.1.10	Internal contact—Identity or existence questionable, location accurate	_____?	10.0 mm .5 mm 	
1.1.11	Internal contact—Identity and existence certain, location approximate	_____	4.0 mm 25 mm 	
1.1.12	Internal contact—Identity or existence questionable, location approximate	_____?	.5 mm .5 mm 	
1.1.13	Internal contact—Identity and existence certain, location inferred	_____	2.0 mm 25 mm 	
1.1.14	Internal contact—Identity or existence questionable, location inferred	_____?	.5 mm .5 mm 	
1.1.15	Internal contact—Identity and existence certain, location concealed	_____	.75 mm 25 mm 	
1.1.16	Internal contact—Identity or existence questionable, location concealed	_____?	.5 mm .5 mm 	
1.1.17	Gradational contact—Identity and existence certain, location accurate		.4 mm hachure lineweight .15 mm H-8 	Use to indicate a gradual or continuous lithologic change from one geologic map unit to another.
1.1.18	Gradational contact—Identity or existence questionable, location accurate	?	2.0 mm 	
1.1.19	Gradational contact—Identity and existence certain, location approximate		.4 mm 	
1.1.20	Gradational contact—Identity or existence questionable, location approximate	?	2.0 mm 2.0 mm 	
1.1.21	Gradational contact—Identity and existence certain, location inferred		.4 mm 	
1.1.22	Gradational contact—Identity or existence questionable, location inferred	?	2.0 mm 2.0 mm 	
1.1.23	Gradational contact—Identity and existence certain, location concealed		.4 mm 	
1.1.24	Gradational contact—Identity or existence questionable, location concealed	?	2.0 mm 2.0 mm 	

1—CONTACTS, KEY BEDS, AND DIKES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.1—Contacts (continued)				
1.1.25	Unconformable contact—Identity and existence certain, location accurate			May be used to show paraconformities or disconformities. Not intended for use to show angular unconformities or nonconformities.
1.1.26	Unconformable contact—Identity or existence questionable, location accurate			
1.1.27	Unconformable contact—Identity and existence certain, location approximate			Boundary of geologic map unit is center line (solid or dashed), not "sine-wave"-style line.
1.1.28	Unconformable contact—Identity or existence questionable, location approximate			
1.1.29	Unconformable contact—Identity and existence certain, location inferred			
1.1.30	Unconformable contact—Identity or existence questionable, location inferred			
1.1.31	Unconformable contact—Identity and existence certain, location concealed			
1.1.32	Unconformable contact—Identity or existence questionable, location concealed			
1.1.33	Incised-scarp sedimentary contact—Identity and existence certain, location accurate. Hachures point downscarp			Use to show where a younger surficial geologic unit has been deposited on an erosional scarp that has been incised into an older surficial geologic unit.
1.1.34	Incised-scarp sedimentary contact—Identity or existence questionable, location accurate. Hachures point downscarp			
1.1.35	Incised-scarp sedimentary contact—Identity and existence certain, location approximate. Hachures point downscarp			
1.1.36	Incised-scarp sedimentary contact—Identity or existence questionable, location approximate. Hachures point downscarp			

*For more information, see general guidelines on pages A-i to A-v.

1—CONTACTS, KEY BEDS, AND DIKES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.2—Key beds				
1.2.1	Key bed—Identity and existence certain, location accurate		<i>lineweight .2 mm</i> 	Use to show key beds that are too narrow to map as an area at map scale. Add name of geologic map unit if more than one type of key bed is shown on map (see Section 1.4). May also be shown in color.
1.2.2	Key bed—Identity or existence questionable, location accurate			
1.2.3	Key bed—Identity and existence certain, location approximate			
1.2.4	Key bed—Identity or existence questionable, location approximate			
1.2.5	Key bed—Identity and existence certain, location inferred			
1.2.6	Key bed—Identity or existence questionable, location inferred			
1.2.7	Key bed—Identity and existence certain, location concealed			
1.2.8	Key bed—Identity or existence questionable, location concealed			
1.2.9	Clay bed—Identity and existence certain, location accurate		<i>lineweight .3 mm</i> <i>color 100% green</i> 	Use to show clay beds that are too narrow to map as an area at map scale. Add name if more than one type is shown on map (see Section 1.4). May also be shown in black or other colors.
1.2.10	Clay bed—Identity or existence questionable, location accurate			
1.2.11	Clay bed—Identity and existence certain, location approximate			
1.2.12	Clay bed—Identity or existence questionable, location approximate			
1.2.13	Clay bed—Identity and existence certain, location inferred			
1.2.14	Clay bed—Identity or existence questionable, location inferred			
1.2.15	Clay bed—Identity and existence certain, location concealed			
1.2.16	Clay bed—Identity or existence questionable, location concealed			
1.2.17	Bed of economically important commodity—Identity and existence certain, location accurate		<i>lineweight .3 mm</i> 	Use to show such economically important beds as gypsum, salt, bentonite, phosphate, or limestone that are too narrow to map as an area at map scale. Do not use to show coal beds (see Section 1.2, ref. nos. 1.2.25-40). Add name of commodity if more than one type is shown on map (see Section 1.4). May also be shown in color.
1.2.18	Bed of economically important commodity—Identity or existence questionable, location accurate			
1.2.19	Bed of economically important commodity—Identity and existence certain, location approximate			
1.2.20	Bed of economically important commodity—Identity or existence questionable, location approximate			
1.2.21	Bed of economically important commodity—Identity and existence certain, location inferred			
1.2.22	Bed of economically important commodity—Identity or existence questionable, location inferred			
1.2.23	Bed of economically important commodity—Identity and existence certain, location concealed			
1.2.24	Bed of economically important commodity—Identity or existence questionable, location concealed			

1—CONTACTS, KEY BEDS, AND DIKES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.2—Key beds (continued)				
1.2.25	Coal bed—Identity and existence certain, location accurate		lineweight .3 mm color 100% red HB-8 (100% red)	Use to show coal beds that are too narrow to map as an area at map scale. Add name if more than one type is shown on map (see Section 1.4). May also be shown in black or other colors.
1.2.26	Coal bed—Identity or existence questionable, location accurate		12.0 mm .75 mm	
1.2.27	Coal bed—Identity and existence certain, location approximate		3.5 mm .75 mm .75 mm	
1.2.28	Coal bed—Identity or existence questionable, location approximate			
1.2.29	Coal bed—Identity and existence certain, location inferred		1.5 mm .75 mm .75 mm	
1.2.30	Coal bed—Identity or existence questionable, location inferred			
1.2.31	Coal bed—Identity and existence certain, location concealed		.5 mm .75 mm .75 mm	
1.2.32	Coal bed—Identity or existence questionable, location concealed			Use to show clinkered coal beds that are too narrow to map as an area at map scale. Tops of V's follow trace of bed; V's point downward stratigraphically. Add name if more than one type is shown on map (see Section 1.4). May also be shown in black or other colors.
1.2.33	Clinkered coal bed—Identity and existence certain, location accurate		.375 mm .8 mm H-8 (100% red) 2.0 mm color 100% red	
1.2.34	Clinkered coal bed—Identity or existence questionable, location accurate			
1.2.35	Clinkered coal bed—Identity and existence certain, location approximate		.375 mm 2.0 mm 2.0 mm	
1.2.36	Clinkered coal bed—Identity or existence questionable, location approximate			
1.2.37	Clinkered coal bed—Identity and existence certain, location inferred		.375 mm 2.0 mm 2.0 mm	
1.2.38	Clinkered coal bed—Identity or existence questionable, location inferred			
1.2.39	Clinkered coal bed—Identity and existence certain, location concealed			
1.2.40	Clinkered coal bed—Identity or existence questionable, location concealed			
1.2.41	Area of clinkered coal bed		contact [lineweight .15 mm] pattern 317-R	Add name if more than one type is shown on map (see Section 1.4).
1.2.42	Outcrop area of key bed or bed of economically important commodity (1st option)		scratch boundary [lineweight 0.0] 100% black	Outcrop areas may either overprint other geologic map units or be used as stand-alone geologic map units. Each type of outcrop area may also be shown in other values of black or in other colors; add name(s) if more than one type is shown on map (see Section 1.4).
1.2.43	Outcrop area of key bed or bed of economically important commodity (2nd option)		scratch boundary [lineweight 0.0] 30% black	
1.2.44	Outcrop area of clay bed		scratch boundary [lineweight 0.0] 100% green	
1.2.45	Outcrop area of coal bed		scratch boundary [lineweight 0.0] 100% red	

*For more information, see general guidelines on pages A-1 to A-9.

1—CONTACTS, KEY BEDS, AND DIKES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.3—Dikes				
1.3.1	Dike (1st option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm	Use when dike is too narrow to show as an area at map scale. Add map-unit labels to dikes if needed (see Section 1.4); use a queried label if identity of dike is questionable. May also be shown in black or other colors.
1.3.2	Dike (1st option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.3	Dike (2nd option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm 2.0 mm 1.25 mm	
1.3.4	Dike (2nd option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.5	Dike (3rd option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm 90° 4.25 mm 1.0 mm	
1.3.6	Dike (3rd option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.7	Dike (4th option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm dot diameter 1.125 mm 4.25 mm	
1.3.8	Dike (4th option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.9	Dike (5th option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm circle diameter 1.175 mm 4.25 mm	
1.3.10	Dike (5th option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.11	Dike (6th option)—Identity and existence certain, location accurate		color 100% red lineweight .25 mm 1.125 mm 4.25 mm	
1.3.12	Dike (6th option)—Identity and existence certain, location approximate		3.5 mm lineweight .75 mm	
1.3.13	Dike of variable thickness		50% red contact [lineweight .15 mm]	
1.3.14	Dike intruding fault (1st option)		fault [lineweight .375 mm]	
1.3.15	Dike intruding fault (2nd option)		contact [lineweight .15 mm]	

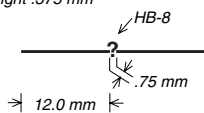
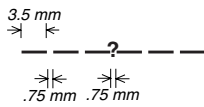
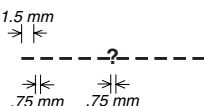
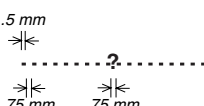
*For more information, see general guidelines on pages A-i to A-v.

1—CONTACTS, KEY BEDS, AND DIKES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
1.4—Line-symbol decorations and notations for contacts, key beds, and dikes				
1.4.1	Inclined contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (1st option)—Showing dip value and direction		tick length 1.75 mm; lineweight .15 mm 	Line-symbol decorations may be added to any type or style of contact, as well as to any type or style of key bed or dike (use proper line-weights, etc., to show clay beds, coal beds, dikes, etc.). Place tick, arrow, or other line-symbol decoration where observation was made. Add arrowhead or '90' to ticks showing dip if necessary for clarity.
1.4.2	Inclined contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (2nd option)—Showing dip value and direction		tick length 1.375 mm; lineweight .15 mm 	
1.4.3	Vertical or near-vertical contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (1st option)		tick length 2.5 mm; lineweight .15 mm 	
1.4.4	Vertical or near-vertical contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (2nd option)			
1.4.5	Overtaken contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (1st option)—Showing dip value and direction		tick length 1.75 mm; lineweight .15 mm 	
1.4.6	Overtaken contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity (2nd option)—Showing dip value and direction		tick length 1.375 mm; lineweight .15 mm 	
1.4.7	Lineation on surface of contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity—Showing bearing and plunge			
1.4.8	Lineation on surface of inclined contact, dike, key bed, clay bed, coal bed, or bed of economically important commodity—Tick shows contact dip value and direction; arrow shows bearing and plunge of lineation		tick length 1.75 mm; lineweight .15 mm 	
1.4.9	Contact—Showing relative age of intrusive or extrusive units where known: Y, younger; O, older			
1.4.10	Contact—Showing location where contact is particularly well exposed in field			
1.4.11	Key bed, clay bed, coal bed, bed of economically important commodity, or dike—Showing thickness and location where measured			Use proper line-weights, etc., to show clay beds, coal beds, dikes, etc.
1.4.12	Key bed—Showing name			
1.4.13	Clay bed—Showing name			
1.4.14	Bed of economically important commodity—Showing name			
1.4.15	Coal bed—Showing name			
1.4.16	Clinkered coal bed—Showing name			
1.4.17	Area of clinkered coal bed—Showing name			
1.4.18	Dike—Showing name			
1.4.19	Dike of variable thickness—Showing name			
1.4.20	Dike intruding fault (1st option)—Showing name			Although only "dike (2nd option)" is shown labeled here, map-unit labels may be added to any type of dike symbol. Use a queried map-unit label if identity of dike is questionable.
1.4.21	Dike intruding fault (2nd option)—Showing name			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.1—Faults (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)				
2.1.1	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location accurate	—————	<i>lineweight .375 mm</i> 	Use generic, nonspecific (non-ornamented) fault symbols when orientation or sense of slip is not known or not specified; use also on small-scale maps to show regional fault patterns. If orientation or sense of slip is known and if scale allows, use more specific types of ornamented fault symbols to indicate fault geometry and (or) relative motion.
2.1.2	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location accurate	—————?		
2.1.3	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location approximate	-----		
2.1.4	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location approximate	-----?		
2.1.5	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location inferred	- - - - -		
2.1.6	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location inferred	- - - - -?		
2.1.7	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location concealed		
2.1.8	Fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location concealed?		

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.2—Normal faults				
2.2.1	Normal fault—Identity and existence certain, location accurate. Ball and bar on downthrown block			Ball and bar symbols are placed along a fault to indicate its overall fault type (normal fault). Ball and bar symbols may also be placed along other types of faults at specific localities where observations of normal (or apparent normal) offset have been made (see Section 2.11).
2.2.2	Normal fault—Identity or existence questionable, location accurate. Ball and bar on downthrown block			
2.2.3	Normal fault—Identity and existence certain, location approximate. Ball and bar on downthrown block			Ball and bar symbols may be combined with paired arrows to show oblique offset (see Sections 2.7, 2.11). In cross section, use paired arrows to show relative motion of normal faults (see Section 2.11).
2.2.4	Normal fault—Identity or existence questionable, location approximate. Ball and bar on downthrown block			
2.2.5	Normal fault—Identity and existence certain, location inferred. Ball and bar on downthrown block			
2.2.6	Normal fault—Identity or existence questionable, location inferred. Ball and bar on downthrown block			
2.2.7	Normal fault—Identity and existence certain, location concealed. Ball and bar on downthrown block			
2.2.8	Normal fault—Identity or existence questionable, location concealed. Ball and bar on downthrown block			
2.2.9	Low-angle normal fault—Identity and existence certain, location accurate. Half-circles on downthrown block			Half-circles indicate overall fault type (low-angle normal fault); they are not placed at specific localities where observations have been made.
2.2.10	Low-angle normal fault—Identity or existence questionable, location accurate. Half-circles on downthrown block			
2.2.11	Low-angle normal fault—Identity and existence certain, location approximate. Half-circles on downthrown block			In cross section, use paired arrows to show relative motion of low-angle normal faults (see Section 2.11).
2.2.12	Low-angle normal fault—Identity or existence questionable, location approximate. Half-circles on downthrown block			
2.2.13	Low-angle normal fault—Identity and existence certain, location inferred. Half-circles on downthrown block			
2.2.14	Low-angle normal fault—Identity or existence questionable, location inferred. Half-circles on downthrown block			
2.2.15	Low-angle normal fault—Identity and existence certain, location concealed. Half-circles on downthrown block			
2.2.16	Low-angle normal fault—Identity or existence questionable, location concealed. Half-circles on downthrown block			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.3—Low-angle faults (unknown or unspecified sense of slip)				
2.3.1	Low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location accurate. Half-circles on upper plate			<p>Use to show faults that exhibit low-angle geometry but for which relative motion cannot be (or has not been) specified.</p> <p>Half-circles indicate overall fault type (low-angle fault, unknown or unspecified sense of slip); they are not placed at specific localities where observations have been made.</p>
2.3.2	Low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location accurate. Half-circles on upper plate			
2.3.3	Low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location approximate. Half-circles on upper plate			
2.3.4	Low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location approximate. Half-circles on upper plate			
2.3.5	Low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location inferred. Half-circles on upper plate			
2.3.6	Low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location inferred. Half-circles on upper plate			
2.3.7	Low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location concealed. Half-circles on upper plate			
2.3.8	Low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location concealed. Half-circles on upper plate			
2.4—Reverse faults				
2.4.1	Reverse fault—Identity and existence certain, location accurate. Rectangles on upthrown block			<p>Rectangles indicate overall fault type (reverse fault); they are not placed at specific localities where observations have been made.</p> <p>In cross section, use paired arrows to show relative motion of reverse faults (see Section 2.11).</p>
2.4.2	Reverse fault—Identity or existence questionable, location accurate. Rectangles on upthrown block			
2.4.3	Reverse fault—Identity and existence certain, location approximate. Rectangles on upthrown block			
2.4.4	Reverse fault—Identity or existence questionable, location approximate. Rectangles on upthrown block			
2.4.5	Reverse fault—Identity and existence certain, location inferred. Rectangles on upthrown block			
2.4.6	Reverse fault—Identity or existence questionable, location inferred. Rectangles on upthrown block			
2.4.7	Reverse fault—Identity and existence certain, location concealed. Rectangles on upthrown block			
2.4.8	Reverse fault—Identity or existence questionable, location concealed. Rectangles on upthrown block			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.5—Rotational or scissor faults				
2.5.1	Rotational or scissor fault, reverse-slip offset— Identity and existence certain, location accurate. Rectangles on upthrown block			<p>Rectangles indicate overall fault type (rotational or scissor fault, reverse-slip offset); they are not placed at specific localities where observations have been made.</p> <p>In cross section, use paired arrows to show relative motion of rotational or scissor faults (see Section 2.11).</p>
2.5.2	Rotational or scissor fault, reverse-slip offset— Identity or existence questionable, location accurate. Rectangles on upthrown block			
2.5.3	Rotational or scissor fault, reverse-slip offset— Identity and existence certain, location approximate. Rectangles on upthrown block			
2.5.4	Rotational or scissor fault, reverse-slip offset— Identity or existence questionable, location approximate. Rectangles on upthrown block			
2.5.5	Rotational or scissor fault, reverse-slip offset— Identity and existence certain, location inferred. Rectangles on upthrown block			
2.5.6	Rotational or scissor fault, reverse-slip offset— Identity or existence questionable, location inferred. Rectangles on upthrown block			
2.5.7	Rotational or scissor fault, reverse-slip offset— Identity and existence certain, location concealed. Rectangles on upthrown block			
2.5.8	Rotational or scissor fault, reverse-slip offset— Identity or existence questionable, location concealed. Rectangles on upthrown block			
2.5.9	Rotational or scissor fault, normal-slip offset— Identity and existence certain, location accurate. Rectangles on downthrown block			<p>Rectangles indicate overall fault type (rotational or scissor fault, normal-slip offset); they are not placed at specific localities where observations have been made.</p> <p>In cross section, use paired arrows to show relative motion of rotational or scissor faults (see Section 2.11).</p>
2.5.10	Rotational or scissor fault, normal-slip offset— Identity or existence questionable, location accurate. Rectangles on downthrown block			
2.5.11	Rotational or scissor fault, normal-slip offset— Identity and existence certain, location approximate. Rectangles on downthrown block			
2.5.12	Rotational or scissor fault, normal-slip offset— Identity or existence questionable, location approximate. Rectangles on downthrown block			
2.5.13	Rotational or scissor fault, normal-slip offset— Identity and existence certain, location inferred. Rectangles on downthrown block			
2.5.14	Rotational or scissor fault, normal-slip offset— Identity or existence questionable, location inferred. Rectangles on downthrown block			
2.5.15	Rotational or scissor fault, normal-slip offset— Identity and existence certain, location concealed. Rectangles on downthrown block			
2.5.16	Rotational or scissor fault, normal-slip offset— Identity or existence questionable, location concealed. Rectangles on downthrown block			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.6—Strike-slip faults				
2.6.1	Strike-slip fault, right-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion			<p>Paired arrows are placed along a fault to indicate its overall type (strike-slip fault) and its relative motion.</p> <p>Paired arrows may also be placed along other types of faults at specific localities where observations of strike-slip (or apparent strike-slip) offset have been made (see Section 2.11).</p> <p>Paired arrows may be combined with ball and bar symbols to show oblique offset (see Sections 2.7, 2.11).</p> <p>In cross section, use either A/T or +/- notation to show relative motion of strike-slip faults (see Section 2.11).</p>
2.6.2	Strike-slip fault, right-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion			
2.6.3	Strike-slip fault, right-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion			
2.6.4	Strike-slip fault, right-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion			
2.6.5	Strike-slip fault, right-lateral offset—Identity and existence certain, location inferred. Arrows show relative motion			
2.6.6	Strike-slip fault, right-lateral offset—Identity or existence questionable, location inferred. Arrows show relative motion			
2.6.7	Strike-slip fault, right-lateral offset—Identity and existence certain, location concealed. Arrows show relative motion			
2.6.8	Strike-slip fault, right-lateral offset—Identity or existence questionable, location concealed. Arrows show relative motion			
2.6.9	Strike-slip fault, left-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion			
2.6.10	Strike-slip fault, left-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion			
2.6.11	Strike-slip fault, left-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion			
2.6.12	Strike-slip fault, left-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion			
2.6.13	Strike-slip fault, left-lateral offset—Identity and existence certain, location inferred. Arrows show relative motion			
2.6.14	Strike-slip fault, left-lateral offset—Identity or existence questionable, location inferred. Arrows show relative motion			
2.6.15	Strike-slip fault, left-lateral offset—Identity and existence certain, location concealed. Arrows show relative motion			
2.6.16	Strike-slip fault, left-lateral offset—Identity or existence questionable, location concealed. Arrows show relative motion			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.7—Oblique-slip faults				
2.7.1	Oblique-slip fault, right-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion; ball and bar on downthrown block			Sets of paired arrows and ball and bar symbols are placed along a fault to indicate its overall type (oblique-slip fault) and its relative motion.
2.7.2	Oblique-slip fault, right-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion; ball and bar on downthrown block			
2.7.3	Oblique-slip fault, right-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion; ball and bar on downthrown block			Sets of paired arrows and ball and bar symbols may also be placed along other types of faults at specific localities where observations of oblique-slip (or apparent oblique-slip) offset have been made (see Section 2.11).
2.7.4	Oblique-slip fault, right-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion; ball and bar on downthrown block			
2.7.5	Oblique-slip fault, right-lateral offset—Identity and existence certain, location inferred. Arrows show relative motion; ball and bar on downthrown block			In cross section, use paired arrows with either A/T or +/- notation to show relative motion of oblique-slip faults (see Section 2.11).
2.7.6	Oblique-slip fault, right-lateral offset—Identity or existence questionable, location inferred. Arrows show relative motion; ball and bar on downthrown block			
2.7.7	Oblique-slip fault, right-lateral offset—Identity and existence certain, location concealed. Arrows show relative motion; ball and bar on downthrown block			
2.7.8	Oblique-slip fault, right-lateral offset—Identity or existence questionable, location concealed. Arrows show relative motion; ball and bar on downthrown block			
2.7.9	Oblique-slip fault, left-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion; ball and bar on downthrown block			
2.7.10	Oblique-slip fault, left-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion; ball and bar on downthrown block			
2.7.11	Oblique-slip fault, left-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion; ball and bar on downthrown block			
2.7.12	Oblique-slip fault, left-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion; ball and bar on downthrown block			
2.7.13	Oblique-slip fault, left-lateral offset—Identity and existence certain, location inferred. Arrows show relative motion; ball and bar on downthrown block			
2.7.14	Oblique-slip fault, left-lateral offset—Identity or existence questionable, location inferred. Arrows show relative motion; ball and bar on downthrown block			
2.7.15	Oblique-slip fault, left-lateral offset—Identity and existence certain, location concealed. Arrows show relative motion; ball and bar on downthrown block			
2.7.16	Oblique-slip fault, left-lateral offset—Identity or existence questionable, location concealed. Arrows show relative motion; ball and bar on downthrown block			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.8—Thrust faults				
2.8.1	Thrust fault (1st option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate			Sawteeth indicate overall fault type (thrust fault); they are not placed at specific localities where observations have been made.
2.8.2	Thrust fault (1st option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate			
2.8.3	Thrust fault (1st option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.4	Thrust fault (1st option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.5	Thrust fault (1st option)—Identity and existence certain, location inferred. Sawteeth on upper (tectonically higher) plate			In cross section, use paired arrows to show relative motion of thrust faults (see Section 2.11). If desired, "2nd option" and "3rd option" symbols may be used to show other types or generations of thrust faults.
2.8.6	Thrust fault (1st option)—Identity or existence questionable, location inferred. Sawteeth on upper (tectonically higher) plate			
2.8.7	Thrust fault (1st option)—Identity and existence certain, location concealed. Sawteeth on upper (tectonically higher) plate			
2.8.8	Thrust fault (1st option)—Identity or existence questionable, location concealed. Sawteeth on upper (tectonically higher) plate			
2.8.9	Thrust fault (2nd option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate			
2.8.10	Thrust fault (2nd option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate			
2.8.11	Thrust fault (2nd option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.12	Thrust fault (2nd option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.13	Thrust fault (2nd option)—Identity and existence certain, location inferred. Sawteeth on upper (tectonically higher) plate			
2.8.14	Thrust fault (2nd option)—Identity or existence questionable, location inferred. Sawteeth on upper (tectonically higher) plate			
2.8.15	Thrust fault (2nd option)—Identity and existence certain, location concealed. Sawteeth on upper (tectonically higher) plate			
2.8.16	Thrust fault (2nd option)—Identity or existence questionable, location concealed. Sawteeth on upper (tectonically higher) plate			
2.8.17	Thrust fault (3rd option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate			
2.8.18	Thrust fault (3rd option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate			
2.8.19	Thrust fault (3rd option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.20	Thrust fault (3rd option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate			
2.8.21	Thrust fault (3rd option)—Identity and existence certain, location inferred. Sawteeth on upper (tectonically higher) plate			
2.8.22	Thrust fault (3rd option)—Identity or existence questionable, location inferred. Sawteeth on upper (tectonically higher) plate			
2.8.23	Thrust fault (3rd option)—Identity and existence certain, location concealed. Sawteeth on upper (tectonically higher) plate			
2.8.24	Thrust fault (3rd option)—Identity or existence questionable, location concealed. Sawteeth on upper (tectonically higher) plate			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.9—Overturned thrust faults				
2.9.1	Overturned thrust fault (1st option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			<p>Bars and sawteeth indicate overall fault type (overturned thrust fault); they are not placed at specific localities where observations have been made.</p>
2.9.2	Overturned thrust fault (1st option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.3	Overturned thrust fault (1st option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			<p>In cross section, use paired arrows to show relative motion of overturned thrust faults (see Section 2.11).</p>
2.9.4	Overturned thrust fault (1st option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.5	Overturned thrust fault (1st option)—Identity and existence certain, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			<p>If desired, "2nd option" and "3rd option" symbols may be used to show other types or generations of overturned thrust faults.</p>
2.9.6	Overturned thrust fault (1st option)—Identity or existence questionable, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.7	Overturned thrust fault (1st option)—Identity and existence certain, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.8	Overturned thrust fault (1st option)—Identity or existence questionable, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.9	Overturned thrust fault (2nd option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.10	Overturned thrust fault (2nd option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.11	Overturned thrust fault (2nd option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.12	Overturned thrust fault (2nd option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.13	Overturned thrust fault (2nd option)—Identity and existence certain, location inferred. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.14	Overturned thrust fault (2nd option)—Identity or existence questionable, location inferred. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.15	Overturned thrust fault (2nd option)—Identity and existence certain, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.16	Overturned thrust fault (2nd option)—Identity or existence questionable, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.17	Overturned thrust fault (3rd option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.18	Overturned thrust fault (3rd option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.19	Overturned thrust fault (3rd option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.20	Overturned thrust fault (3rd option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.21	Overturned thrust fault (3rd option)—Identity and existence certain, location inferred. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.22	Overturned thrust fault (3rd option)—Identity or existence questionable, location inferred. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.23	Overturned thrust fault (3rd option)—Identity and existence certain, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			
2.9.24	Overturned thrust fault (3rd option)—Identity or existence questionable, location concealed. Bars on tectonically higher plate (footwall); sawteeth in direction of dip			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.10—Detachment faults (sense of slip unspecified)				
2.10.1	Detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location accurate. Hachures on upper plate			May be used to show either normal (extensional) or thrust (compressional) offset. Hachures indicate overall fault type (detachment fault); they are not placed at specific localities where observations have been made.
2.10.2	Detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location accurate. Hachures on upper plate			
2.10.3	Detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location approximate. Hachures on upper plate			In cross section, use paired arrows to show relative motion of detachment faults (see Section 2.11).
2.10.4	Detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location approximate. Hachures on upper plate			
2.10.5	Detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location inferred. Hachures on upper plate			If desired, "2nd option" and "3rd option" symbols may be used to show other types or generations of detachment faults.
2.10.6	Detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location inferred. Hachures on upper plate			
2.10.7	Detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location concealed. Hachures on upper plate			
2.10.8	Detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location concealed. Hachures on upper plate			
2.10.9	Detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location accurate. Boxes on upper plate			May be used to show either normal (extensional) or thrust (compressional) offset. Boxes indicate overall fault type (detachment fault); they are not placed at specific localities where observations have been made.
2.10.10	Detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location accurate. Boxes on upper plate			
2.10.11	Detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location approximate. Boxes on upper plate			In cross section, use paired arrows to show relative motion of detachment faults (see Section 2.11).
2.10.12	Detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location approximate. Boxes on upper plate			
2.10.13	Detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location inferred. Boxes on upper plate			If desired, "2nd option" and "3rd option" symbols may be used to show other types or generations of detachment faults.
2.10.14	Detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location inferred. Boxes on upper plate			
2.10.15	Detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location concealed. Boxes on upper plate			
2.10.16	Detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location concealed. Boxes on upper plate			
2.10.17	Detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location accurate. Boxes on upper plate			
2.10.18	Detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location accurate. Boxes on upper plate			
2.10.19	Detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location approximate. Boxes on upper plate			
2.10.20	Detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location approximate. Boxes on upper plate			
2.10.21	Detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location inferred. Boxes on upper plate			
2.10.22	Detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location inferred. Boxes on upper plate			
2.10.23	Detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location concealed. Boxes on upper plate			
2.10.24	Detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location concealed. Boxes on upper plate			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.10—Detachment faults (sense of slip unspecified) (continued)				
2.10.25	Master detachment fault (sense of slip unspecified) —Identity and existence certain, location accurate. Hachures on upper plate			May be used to show either normal (extensional) or thrust (compressional) offset. Hachures indicate overall fault type (master detachment fault); they are not placed at specific localities where observations have been made. In cross section, use paired arrows to show relative motion of master detachment faults (see Section 2.11).
2.10.26	Master detachment fault (sense of slip unspecified) —Identity or existence questionable, location accurate. Hachures on upper plate			
2.10.27	Master detachment fault (sense of slip unspecified) —Identity and existence certain, location approximate. Hachures on upper plate			
2.10.28	Master detachment fault (sense of slip unspecified) —Identity or existence questionable, location approximate. Hachures on upper plate			
2.10.29	Master detachment fault (sense of slip unspecified) —Identity and existence certain, location inferred. Hachures on upper plate			
2.10.30	Master detachment fault (sense of slip unspecified) —Identity or existence questionable, location inferred. Hachures on upper plate			
2.10.31	Master detachment fault (sense of slip unspecified) —Identity and existence certain, location concealed. Hachures on upper plate			May be used to show either normal (extensional) or thrust (compressional) offset. Ticks indicate overall fault type (listric fault at head of detachment fault); they are not placed at specific localities where observations have been made. In cross section, use paired arrows to show relative motion of listric faults at head of detachment faults (see Section 2.11).
2.10.32	Master detachment fault (sense of slip unspecified) —Identity or existence questionable, location concealed. Hachures on upper plate			
2.10.33	Listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location accurate. Ticks on upper plate			
2.10.34	Listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location accurate. Ticks on upper plate			
2.10.35	Listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location approximate. Ticks on upper plate			
2.10.36	Listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location approximate. Ticks on upper plate			
2.10.37	Listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location inferred. Ticks on upper plate			
2.10.38	Listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location inferred. Ticks on upper plate			
2.10.39	Listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location concealed. Ticks on upper plate			
2.10.40	Listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location concealed. Ticks on upper plate			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.11—Line-symbol decorations and notations for faults				
2.11.1	Fault showing local normal offset (1st option)—Ball and bar on downthrown block		tick length 1.0 mm; lineweight .175 mm lineweight .375 mm	Place line-symbol decorations where observations have been made.
2.11.2	Fault showing local normal offset (2nd option)—U, upthrown block; D, downthrown block			Line-symbol decorations may be added to any type or style of fault to show local relative motion or geomorphic relations.
2.11.3	Fault showing local reverse offset—Showing dip value and direction. U, upthrown block; D, downthrown block			Line-symbol decorations may also be added to faults in places where local geomorphic features may indicate an apparent offset but where true sense of displacement is unknown.
2.11.4	Fault showing local right-lateral strike-slip offset—Arrows show relative motion		5.25 mm arrow lineweight .2 mm	
2.11.5	Fault showing local left-lateral strike-slip offset—Arrows show relative motion		5.25 mm arrow lineweight .2 mm	
2.11.6	Fault showing local right-lateral oblique-slip offset—Arrows show relative motion; ball and bar on downthrown block		5.25 mm tick length 1.0 mm; lineweight .175 mm	
2.11.7	Fault showing local left-lateral oblique-slip offset—Arrows show relative motion; ball and bar on downthrown block		5.25 mm tick length 1.0 mm; lineweight .175 mm	
2.11.8	Inclined fault (1st option)—Showing dip value and direction		tick length 1.75 mm; lineweight .225 mm	Place tick, arrow, or other line-symbol decoration where observation was made.
2.11.9	Inclined fault (2nd option)—Showing dip value and direction		tick length 1.375 mm; lineweight .225 mm	Add arrowhead or '90' to ticks showing dip if necessary for clarity.
2.11.10	Vertical or near-vertical fault (1st option)		tick length 2.5 mm; lineweight .225 mm	
2.11.11	Vertical or near-vertical fault (2nd option)		90 ← H-6	
2.11.12	Lineation on fault surface—Showing bearing and plunge		6.0 mm 65 ← H-6 lineweight .225 mm	
2.11.13	Lineation on inclined fault surface—Tick shows fault dip value and direction; arrow shows bearing and plunge of lineation		tick length 1.75 mm; lineweight .225 mm	
2.11.14	Fault—Showing amount of local displacement		68 ← H-6	Place displacement value where measurement was made.
2.11.15	Fault—Showing name		GOLDEN FAULT ← H-8	Letter size or spacing may be increased on longer fault segments.
2.11.16	Normal fault (in cross section)—Arrows show relative motion		5.25 mm arrow lineweight .2 mm	
2.11.17	Thrust fault or reverse fault (in cross section)—Arrows show relative motion		5.25 mm	
2.11.18	Detachment fault, movement of upper plate to left (in cross section)—Arrows show relative motion		5.25 mm arrow lineweight .2 mm	
2.11.19	Detachment fault, movement of upper plate to right (in cross section)—Arrows show relative motion			
2.11.20	Strike-slip fault (in cross section) (1st option)—A, away from observer; T, toward observer		H-7 → A T ← H-7	May be combined with paired arrows to show oblique-slip offset.
2.11.21	Strike-slip fault (in cross section) (2nd option)—minus, away from observer; plus, toward observer		circle diameters 1.75 mm; crossbar lengths 1.75 mm lineweights .2 mm	
2.11.22	Normal fault (on small-scale maps or figures)—Tick on downthrown side		tick length .8 mm; lineweight .25 mm	Usually reserved for use on page-size illustrations or on maps at scales of 1:1,000,000 or smaller.
2.11.23	Reverse fault (on small-scale maps or figures)—R on upthrown block		H-6 (rotate parallel to fault)	
2.11.24	Thrust fault (on small-scale maps or figures)—T on upper (tectonically higher) plate		H-6 (rotate parallel to fault)	

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.12—Fault scarps				
2.12.1	Scarp on fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location accurate. Hachures point downscarp			
2.12.2	Scarp on fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location accurate. Hachures point downscarp			
2.12.3	Scarp on fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity and existence certain, location approximate. Hachures point downscarp			
2.12.4	Scarp on fault (generic; vertical, subvertical, or high-angle; or unknown or unspecified orientation or sense of slip)—Identity or existence questionable, location approximate. Hachures point downscarp			
2.12.5	Scarp on normal fault—Identity and existence certain, location accurate. Ball and bar on downthrown block. Hachures point downscarp			
2.12.6	Scarp on normal fault—Identity or existence questionable, location accurate. Ball and bar on downthrown block. Hachures point downscarp			
2.12.7	Scarp on normal fault—Identity and existence certain, location approximate. Ball and bar on downthrown block. Hachures point downscarp			
2.12.8	Scarp on normal fault—Identity or existence questionable, location approximate. Ball and bar on downthrown block. Hachures point downscarp			
2.12.9	Scarp on low-angle normal fault—Identity and existence certain, location accurate. Half-circles on downthrown block. Hachures point downscarp			
2.12.10	Scarp on low-angle normal fault—Identity or existence questionable, location accurate. Half-circles on downthrown block. Hachures point downscarp			
2.12.11	Scarp on low-angle normal fault—Identity and existence certain, location approximate. Half-circles on downthrown block. Hachures point downscarp			
2.12.12	Scarp on low-angle normal fault—Identity or existence questionable, location approximate. Half-circles on downthrown block. Hachures point downscarp			
2.12.13	Scarp on low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location accurate. Half-circles on upper plate. Hachures point downscarp			
2.12.14	Scarp on low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location accurate. Half-circles on upper plate. Hachures point downscarp			
2.12.15	Scarp on low-angle fault (unknown or unspecified sense of slip)—Identity and existence certain, location approximate. Half-circles on upper plate. Hachures point downscarp			
2.12.16	Scarp on low-angle fault (unknown or unspecified sense of slip)—Identity or existence questionable, location approximate. Half-circles on upper plate. Hachures point downscarp			
2.12.17	Scarp on reverse fault—Identity and existence certain, location accurate. Rectangles on upthrown block. Hachures point downscarp			
2.12.18	Scarp on reverse fault—Identity or existence questionable, location accurate. Rectangles on upthrown block. Hachures point downscarp			
2.12.19	Scarp on reverse fault—Identity and existence certain, location approximate. Rectangles on upthrown block. Hachures point downscarp			
2.12.20	Scarp on reverse fault—Identity or existence questionable, location approximate. Rectangles on upthrown block. Hachures point downscarp			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.12—Fault scarps (continued)				
2.12.21	Scarp on rotational or scissor fault, reverse-slip offset—Identity and existence certain, location accurate. Rectangles on upthrown block. Hachures point downscarp			
2.12.22	Scarp on rotational or scissor fault, reverse-slip offset—Identity or existence questionable, location accurate. Rectangles on upthrown block. Hachures point downscarp			
2.12.23	Scarp on rotational or scissor fault, reverse-slip offset—Identity and existence certain, location approximate. Rectangles on upthrown block. Hachures point downscarp			
2.12.24	Scarp on rotational or scissor fault, reverse-slip offset—Identity or existence questionable, location approximate. Rectangles on upthrown block. Hachures point downscarp			
2.12.25	Scarp on rotational or scissor fault, normal-slip offset—Identity and existence certain, location accurate. Rectangles on downthrown block. Hachures point downscarp			
2.12.26	Scarp on rotational or scissor fault, normal-slip offset—Identity or existence questionable, location accurate. Rectangles on downthrown block. Hachures point downscarp			
2.12.27	Scarp on rotational or scissor fault, normal-slip offset—Identity and existence certain, location approximate. Rectangles on downthrown block. Hachures point downscarp			
2.12.28	Scarp on rotational or scissor fault, normal-slip offset—Identity or existence questionable, location approximate. Rectangles on downthrown block. Hachures point downscarp			
2.12.29	Scarp on strike-slip fault, right-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion. Hachures point downscarp			
2.12.30	Scarp on strike-slip fault, right-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion. Hachures point downscarp			
2.12.31	Scarp on strike-slip fault, right-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion. Hachures point downscarp			
2.12.32	Scarp on strike-slip fault, right-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion. Hachures point downscarp			
2.12.33	Scarp on strike-slip fault, left-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion. Hachures point downscarp			
2.12.34	Scarp on strike-slip fault, left-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion. Hachures point downscarp			
2.12.35	Scarp on strike-slip fault, left-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion. Hachures point downscarp			
2.12.36	Scarp on strike-slip fault, left-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion. Hachures point downscarp			
2.12.37	Scarp on oblique-slip fault, right-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.38	Scarp on oblique-slip fault, right-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.39	Scarp on oblique-slip fault, right-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.40	Scarp on oblique-slip fault, right-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.41	Scarp on oblique-slip fault, left-lateral offset—Identity and existence certain, location accurate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.42	Scarp on oblique-slip fault, left-lateral offset—Identity or existence questionable, location accurate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.43	Scarp on oblique-slip fault, left-lateral offset—Identity and existence certain, location approximate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			
2.12.44	Scarp on oblique-slip fault, left-lateral offset—Identity or existence questionable, location approximate. Arrows show relative motion; ball and bar on downthrown block. Hachures point downscarp			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.12—Fault scarps (continued)				
2.12.45	Scarp on thrust fault (1st option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.46	Scarp on thrust fault (1st option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.47	Scarp on thrust fault (1st option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.48	Scarp on thrust fault (1st option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.49	Scarp on thrust fault (2nd option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.50	Scarp on thrust fault (2nd option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.51	Scarp on thrust fault (2nd option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.52	Scarp on thrust fault (2nd option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.53	Scarp on thrust fault (3rd option)—Identity and existence certain, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.54	Scarp on thrust fault (3rd option)—Identity or existence questionable, location accurate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.55	Scarp on thrust fault (3rd option)—Identity and existence certain, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.56	Scarp on thrust fault (3rd option)—Identity or existence questionable, location approximate. Sawteeth on upper (tectonically higher) plate. Hachures point downscarp			
2.12.57	Scarp on overturned thrust fault (1st option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.58	Scarp on overturned thrust fault (1st option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.59	Scarp on overturned thrust fault (1st option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.60	Scarp on overturned thrust fault (1st option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.61	Scarp on overturned thrust fault (2nd option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.62	Scarp on overturned thrust fault (2nd option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.63	Scarp on overturned thrust fault (2nd option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.64	Scarp on overturned thrust fault (2nd option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.65	Scarp on overturned thrust fault (3rd option)—Identity and existence certain, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.66	Scarp on overturned thrust fault (3rd option)—Identity or existence questionable, location accurate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.67	Scarp on overturned thrust fault (3rd option)—Identity and existence certain, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			
2.12.68	Scarp on overturned thrust fault (3rd option)—Identity or existence questionable, location approximate. Bars on tectonically higher plate (footwall); sawteeth in direction of dip. Hachures point downscarp			

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.12—Fault scarps (continued)				
2.12.69	Scarp on detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location accurate. Long-hachure pairs on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.70	Scarp on detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location accurate. Long-hachure pairs on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.71	Scarp on detachment fault (sense of slip unspecified) (1st option)—Identity and existence certain, location approximate. Long-hachure pairs on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.72	Scarp on detachment fault (sense of slip unspecified) (1st option)—Identity or existence questionable, location approximate. Long-hachure pairs on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.73	Scarp on detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location accurate. Boxes on upper plate. Hachures point downscarp			
2.12.74	Scarp on detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location accurate. Boxes on upper plate. Hachures point downscarp			
2.12.75	Scarp on detachment fault (sense of slip unspecified) (2nd option)—Identity and existence certain, location approximate. Boxes on upper plate. Hachures point downscarp			
2.12.76	Scarp on detachment fault (sense of slip unspecified) (2nd option)—Identity or existence questionable, location approximate. Boxes on upper plate. Hachures point downscarp			
2.12.77	Scarp on detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location accurate. Boxes on upper plate. Hachures point downscarp			
2.12.78	Scarp on detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location accurate. Boxes on upper plate. Hachures point downscarp			
2.12.79	Scarp on detachment fault (sense of slip unspecified) (3rd option)—Identity and existence certain, location approximate. Boxes on upper plate. Hachures point downscarp			
2.12.80	Scarp on detachment fault (sense of slip unspecified) (3rd option)—Identity or existence questionable, location approximate. Boxes on upper plate. Hachures point downscarp			
2.12.81	Scarp on master detachment fault (sense of slip unspecified)—Identity and existence certain, location accurate. Long-hachure triplets on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.82	Scarp on master detachment fault (sense of slip unspecified)—Identity or existence questionable, location accurate. Long-hachure triplets on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.83	Scarp on master detachment fault (sense of slip unspecified)—Identity and existence certain, location approximate. Long-hachure triplets on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.84	Scarp on master detachment fault (sense of slip unspecified)—Identity or existence questionable, location approximate. Long-hachure triplets on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.85	Scarp on listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location accurate. Single (longer) ticks on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.86	Scarp on listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location accurate. Single (longer) ticks on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.87	Scarp on listric fault at head of detachment fault (sense of slip unspecified)—Identity and existence certain, location approximate. Single (longer) ticks on upper plate. Shorter, widely spaced hachures point downscarp			
2.12.88	Scarp on listric fault at head of detachment fault (sense of slip unspecified)—Identity or existence questionable, location approximate. Single (longer) ticks on upper plate. Shorter, widely spaced hachures point downscarp			

*For more information, see general guidelines on pages A-i to A-v.

2—FAULTS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
2.13—Quaternary faulting				
2.13.1	Fault showing displacement during historic time (includes areas of known fault creep)			Although only shown here on "identity and existence certain," generic faults, color may be added to any type or style of fault to highlight where geomorphic evidence indicates displacement during Quaternary time.
2.13.2	Fault showing displacement during Holocene time			
2.13.3	Fault showing displacement during late Quaternary time			
2.13.4	Fault showing displacement during Quaternary time (undifferentiated)			
2.14—Shear zones; mylonite zones; fault-breccia zones				
2.14.1	Ductile shear zone or mylonite zone—May or may not be associated with mappable faults			Orient S-shaped symbols to indicate linear trend of zone; spacing may be varied to show intensity of shear. Width of zones may vary. Patterns may either overprint other map units or be used as stand-alone map units (if zones have well-defined boundaries).
2.14.2	Zone of sheared rock within fault			
2.14.3	Fault-breccia zone or zone of broken rock within fault			
2.14.4	Fault-breccia zone or zone of broken rock around fault			
2.15—Small, minor faults				
2.15.1	Small, minor inclined fault—Showing strike and dip			Use to show small, minor faults that are observed in outcrop but that cannot be traced away from that outcrop.
2.15.2	Small, minor vertical or near-vertical fault—Showing strike			
2.15.3	Small, minor shear fault—Showing dip. Arrow shows direction of relative horizontal displacement			


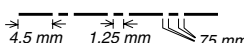

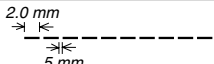
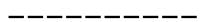
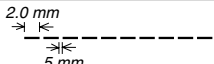
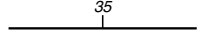

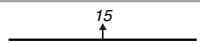
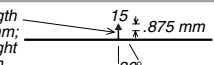

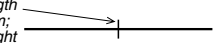
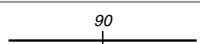
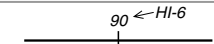



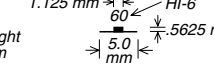

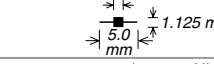

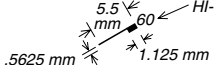

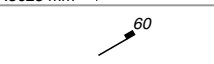

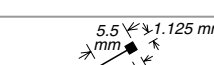

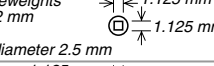

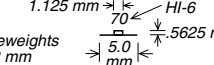

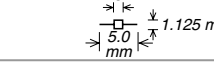



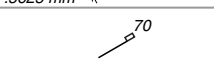


*For more information, see general guidelines on pages A-i to A-v.

3—BOUNDARIES LOCATED BY GEOPHYSICAL SURVEYS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
3.1—Boundaries located by geophysical methods				
3.1.1	Boundary located by aeromagnetic survey	— — — — — AM — — — — —	lineweight .2 mm 3.5 mm → ← H-8 AM ← .5 mm	Use for boundaries that have been defined by measured contrasts in rock properties but that may not be definitively identifiable as either a contact or a fault by survey methods. May be shown in red or other colors.
3.1.2	Boundary located by ground magnetic survey	— — — — — M — — — — —	— — — — — M — — — — —	
3.1.3	Boundary located by gravity survey	— — — — — G — — — — —	— — — — — G — — — — —	
3.1.4	Boundary located by radiometric survey	— — — — — RM — — — — —	— — — — — RM — — — — —	
3.1.5	Boundary located by seismic reflection survey	— — — — — S — — — — —	— — — — — S — — — — —	
3.1.6	Boundary located by induced polarization survey	— — — — — IP — — — — —	— — — — — IP — — — — —	
3.1.7	Boundary located by electromagnetic survey	— — — — — EM — — — — —	— — — — — EM — — — — —	
3.1.8	Boundary located by resistivity survey	— — — — — R — — — — —	— — — — — R — — — — —	
3.1.9	Boundary located by magnetotelluric survey	— — — — — MT — — — — —	— — — — — MT — — — — —	
3.2—Faults located by geophysical methods				
3.2.1	Fault located by aeromagnetic survey	— — — — — AM — — — — —	lineweight .375 mm 3.5 mm → ← H-8 AM ← .5 mm	Use for boundaries that have been defined by measured contrasts in rock properties and that also can be identified as faults by geophysical survey or by other evidence that contributes to survey. May be shown in red or other colors.
3.2.2	Fault located by ground magnetic survey	— — — — — M — — — — —	— — — — — M — — — — —	
3.2.3	Fault located by gravity survey	— — — — — G — — — — —	— — — — — G — — — — —	
3.2.4	Fault located by radiometric survey	— — — — — RM — — — — —	— — — — — RM — — — — —	
3.2.5	Fault located by seismic reflection survey	— — — — — S — — — — —	— — — — — S — — — — —	
3.2.6	Fault located by induced polarization survey	— — — — — IP — — — — —	— — — — — IP — — — — —	
3.2.7	Fault located by electromagnetic survey	— — — — — EM — — — — —	— — — — — EM — — — — —	
3.2.8	Fault located by resistivity survey	— — — — — R — — — — —	— — — — — R — — — — —	
3.2.9	Fault located by magnetotelluric survey	— — — — — MT — — — — —	— — — — — MT — — — — —	
3.3—Geophysical survey lines and stations				
3.3.1	Geophysical data collection line—Accurately located	— — — — —	lineweight .15 mm — — — — — dash length 3.75 mm; spacing 3.75 mm	May be shown in red or other colors.
3.3.2	Geophysical data collection line—Located by aerial survey	— — — — —	lineweight .15 mm — — — — — dash length 7.5 mm; spacing 7.5 mm	
3.3.3	Cross ticks showing location and orientation of data collection lines crossing geophysical boundary	+ + + + +	tick lineweight .15 mm + + + + + 1.25 mm	
3.3.4	Horizontal control point	△	dot diameter .3 mm lineweight .2 mm △ 1.75 mm / 60°	
3.3.5	Survey station	+	lineweight .2 mm + 1.75 mm 1.75 mm → ←	

*For more information, see general guidelines on pages A-i to A-v.

4—LINEAMENTS AND JOINTS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
4.1—Lineaments				
4.1.1	Lineament		lineweight .375 mm 	Use to show linear features that have been determined from aerial photographs or remotely sensed imagery but not identified on the ground.
4.1.2	Lineament—Showing name	<u>OLYMPIC-WALLOWA</u>	<u>OLYMPIC-WALLOWA</u> ← H-7	
4.2—Joints				
4.2.1	Joint—Identity and existence certain, location accurate		lineweight .3 mm 	Use to show regional joint patterns or single joints that are mappable beyond outcrop. May also be shown in red or other colors.
4.2.2	Joint—Identity and existence certain, location approximate			
4.2.3	Inclined joint (1st option)—Showing dip value and direction		tick length 1.75 mm; lineweight .2 mm 	Place tick where observation was made. Add arrowhead or '90' to tick if necessary for clarity.
4.2.4	Inclined joint (2nd option)—Showing dip value and direction		tick length 1.375 mm; lineweight .2 mm 	
4.2.5	Vertical or subvertical joint (1st option)		tick length 2.5 mm; lineweight .2 mm 	
4.2.6	Vertical or subvertical joint (2nd option)			
4.3—Small, minor joints				
4.3.1	Small, minor horizontal joint (1st option)		lineweight .2 mm 	Use to show small, minor joints that are observed in outcrop but that cannot be traced away from that outcrop.
4.3.2	Small, minor inclined joint (1st option)—Showing strike and dip		lineweight .2 mm 	
4.3.3	Small, minor vertical or near-vertical joint (1st option)—Showing strike			For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line.
4.3.4	Small, minor inclined (dip direction to right) joint, for multiple observations at one locality (1st option)—Showing strike and dip			
4.3.5	Small, minor inclined (dip direction to left) joint, for multiple observations at one locality (1st option)—Showing strike and dip			For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
4.3.6	Small, minor vertical or near-vertical joint, for multiple observations at one locality (1st option)—Showing strike			
4.3.7	Small, minor horizontal joint (2nd option)		all lineweights .2 mm 	May also be shown in red or other colors.
4.3.8	Small, minor inclined joint (2nd option)—Showing strike and dip		all lineweights .2 mm 	
4.3.9	Small, minor vertical or near-vertical joint (2nd option)—Showing strike			
4.3.10	Small, minor inclined (dip direction to right) joint, for multiple observations at one locality (2nd option)—Showing strike and dip			
4.3.11	Small, minor inclined (dip direction to left) joint, for multiple observations at one locality (2nd option)—Showing strike and dip			
4.3.12	Small, minor vertical or near-vertical joint, for multiple observations at one locality (2nd option)—Showing strike			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*	
5.1—Anticlines					
5.1.1	Anticline (1st option)—Identity and existence certain, location accurate			<p>Place fold trace where axial surface of anticline intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (anticline); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.</p> <p>May also be shown in black or other colors.</p>	
5.1.2	Anticline (1st option)—Identity or existence questionable, location accurate				
5.1.3	Anticline (1st option)—Identity and existence certain, location approximate				
5.1.4	Anticline (1st option)—Identity or existence questionable, location approximate				
5.1.5	Anticline (1st option)—Identity and existence certain, location inferred				
5.1.6	Anticline (1st option)—Identity or existence questionable, location inferred				
5.1.7	Anticline (1st option)—Identity and existence certain, location concealed				
5.1.8	Anticline (1st option)—Identity or existence questionable, location concealed				
5.1.9	Anticline (2nd option)—Identity and existence certain, location accurate				
5.1.10	Anticline (2nd option)—Identity or existence questionable, location accurate				
5.1.11	Anticline (2nd option)—Identity and existence certain, location approximate				
5.1.12	Anticline (2nd option)—Identity or existence questionable, location approximate				
5.1.13	Anticline (2nd option)—Identity and existence certain, location inferred				
5.1.14	Anticline (2nd option)—Identity or existence questionable, location inferred				
5.1.15	Anticline (2nd option)—Identity and existence certain, location concealed				
5.1.16	Anticline (2nd option)—Identity or existence questionable, location concealed				

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.2—Antiforms				
5.2.1	Antiform (1st option)—Identity and existence certain, location accurate			Place fold trace where axial surface of antiform intersects the ground surface.
5.2.2	Antiform (1st option)—Identity or existence questionable, location accurate			
5.2.3	Antiform (1st option)—Identity and existence certain, location approximate			Place arrows at places along fold trace to indicate overall fold type (antiform); do not place at specific locality where observation was made.
5.2.4	Antiform (1st option)—Identity or existence questionable, location approximate			
5.2.5	Antiform (1st option)—Identity and existence certain, location inferred			Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.
5.2.6	Antiform (1st option)—Identity or existence questionable, location inferred			
5.2.7	Antiform (1st option)—Identity and existence certain, location concealed			May also be shown in black or other colors.
5.2.8	Antiform (1st option)—Identity or existence questionable, location concealed			
5.2.9	Antiform (2nd option)—Identity and existence certain, location accurate			
5.2.10	Antiform (2nd option)—Identity or existence questionable, location accurate			
5.2.11	Antiform (2nd option)—Identity and existence certain, location approximate			
5.2.12	Antiform (2nd option)—Identity or existence questionable, location approximate			
5.2.13	Antiform (2nd option)—Identity and existence certain, location inferred			
5.2.14	Antiform (2nd option)—Identity or existence questionable, location inferred			
5.2.15	Antiform (2nd option)—Identity and existence certain, location concealed			
5.2.16	Antiform (2nd option)—Identity or existence questionable, location concealed			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.3—Asymmetric, overturned, and inverted anticlines				
5.3.1	Asymmetric anticline (1st option)—Identity and existence certain, location accurate. Beds are upright; shorter arrow on steeper limb			Place fold trace where axial surface of asymmetric anticline intersects the ground surface.
5.3.2	Asymmetric anticline (1st option)—Identity or existence questionable, location accurate. Beds are upright; shorter arrow on steeper limb			
5.3.3	Asymmetric anticline (1st option)—Identity and existence certain, location approximate. Beds are upright; shorter arrow on steeper limb			
5.3.4	Asymmetric anticline (1st option)—Identity or existence questionable, location approximate. Beds are upright; shorter arrow on steeper limb			
5.3.5	Asymmetric anticline (1st option)—Identity and existence certain, location inferred. Beds are upright; shorter arrow on steeper limb			Place arrows at places along fold trace to indicate overall fold type (asymmetric anticline); do not place at specific locality where observation was made.
5.3.6	Asymmetric anticline (1st option)—Identity or existence questionable, location inferred. Beds are upright; shorter arrow on steeper limb			
5.3.7	Asymmetric anticline (1st option)—Identity and existence certain, location concealed. Beds are upright; shorter arrow on steeper limb			
5.3.8	Asymmetric anticline (1st option)—Identity or existence questionable, location concealed. Beds are upright; shorter arrow on steeper limb			
5.3.9	Asymmetric anticline (2nd option)—Identity and existence certain, location accurate. Beds are upright; shorter arrow on steeper limb			Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.3.10	Asymmetric anticline (2nd option)—Identity or existence questionable, location accurate. Beds are upright; shorter arrow on steeper limb			
5.3.11	Asymmetric anticline (2nd option)—Identity and existence certain, location approximate. Beds are upright; shorter arrow on steeper limb			
5.3.12	Asymmetric anticline (2nd option)—Identity or existence questionable, location approximate. Beds are upright; shorter arrow on steeper limb			
5.3.13	Asymmetric anticline (2nd option)—Identity and existence certain, location inferred. Beds are upright; shorter arrow on steeper limb			
5.3.14	Asymmetric anticline (2nd option)—Identity or existence questionable, location inferred. Beds are upright; shorter arrow on steeper limb			
5.3.15	Asymmetric anticline (2nd option)—Identity and existence certain, location concealed. Beds are upright; shorter arrow on steeper limb			
5.3.16	Asymmetric anticline (2nd option)—Identity or existence questionable, location concealed. Beds are upright; shorter arrow on steeper limb			
5.3.17	Overturned anticline (1st option)—Identity and existence certain, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			Place fold trace where axial surface of overturned anticline intersects the ground surface.
5.3.18	Overturned anticline (1st option)—Identity or existence questionable, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.19	Overturned anticline (1st option)—Identity and existence certain, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.20	Overturned anticline (1st option)—Identity or existence questionable, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.21	Overturned anticline (1st option)—Identity and existence certain, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			Place arrows at places along fold trace to indicate overall fold type (overturned anticline); do not place at specific locality where observation was made.
5.3.22	Overturned anticline (1st option)—Identity or existence questionable, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.23	Overturned anticline (1st option)—Identity and existence certain, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.24	Overturned anticline (1st option)—Identity or existence questionable, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.3—Asymmetric, overturned, and inverted anticlines (continued)				
5.3.25	Overturned anticline (2nd option)—Identity and existence certain, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			Place fold trace where axial surface of overturned anticline intersects the ground surface.
5.3.26	Overturned anticline (2nd option)—Identity or existence questionable, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			Place arrows at places along fold trace to indicate overall fold type (overturned anticline); do not place at specific locality where observation was made.
5.3.27	Overturned anticline (2nd option)—Identity and existence certain, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			Arrowheads may be added to show direction of plunge (see Section 5.10).
5.3.28	Overturned anticline (2nd option)—Identity or existence questionable, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.
5.3.29	Overturned anticline (2nd option)—Identity and existence certain, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			May also be shown in black or other colors.
5.3.30	Overturned anticline (2nd option)—Identity or existence questionable, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.31	Overturned anticline (2nd option)—Identity and existence certain, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.32	Overturned anticline (2nd option)—Identity or existence questionable, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			
5.3.33	Inverted anticline (1st option)—Identity and existence certain, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			Place fold trace where axial surface of inverted anticline intersects the ground surface.
5.3.34	Inverted anticline (1st option)—Identity or existence questionable, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			Place arrows at places along fold trace to indicate overall fold type (inverted anticline); do not place at specific locality where observation was made.
5.3.35	Inverted anticline (1st option)—Identity and existence certain, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			Arrowheads may be added to show direction of plunge (see Section 5.10).
5.3.36	Inverted anticline (1st option)—Identity or existence questionable, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.
5.3.37	Inverted anticline (1st option)—Identity and existence certain, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			May also be shown in black or other colors.
5.3.38	Inverted anticline (1st option)—Identity or existence questionable, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.39	Inverted anticline (1st option)—Identity and existence certain, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.40	Inverted anticline (1st option)—Identity or existence questionable, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.41	Inverted anticline (2nd option)—Identity and existence certain, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.42	Inverted anticline (2nd option)—Identity or existence questionable, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.43	Inverted anticline (2nd option)—Identity and existence certain, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.44	Inverted anticline (2nd option)—Identity or existence questionable, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.45	Inverted anticline (2nd option)—Identity and existence certain, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.46	Inverted anticline (2nd option)—Identity or existence questionable, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.47	Inverted anticline (2nd option)—Identity and existence certain, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.3.48	Inverted anticline (2nd option)—Identity or existence questionable, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.4—Antiformal sheath folds				
5.4.1	Antiformal sheath fold (1st option)—Identity and existence certain, location accurate			Place fold trace where axial surface of antiformal sheath fold intersects the ground surface.
5.4.2	Antiformal sheath fold (1st option)—Identity or existence questionable, location accurate			
5.4.3	Antiformal sheath fold (1st option)—Identity and existence certain, location approximate			Place arrows at places along fold trace to indicate overall fold type (antiformal sheath fold); do not place at specific locality where observation was made.
5.4.4	Antiformal sheath fold (1st option)—Identity or existence questionable, location approximate			
5.4.5	Antiformal sheath fold (1st option)—Identity and existence certain, location inferred			Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.4.6	Antiformal sheath fold (1st option)—Identity or existence questionable, location inferred			
5.4.7	Antiformal sheath fold (1st option)—Identity and existence certain, location concealed			
5.4.8	Antiformal sheath fold (1st option)—Identity or existence questionable, location concealed			
5.4.9	Antiformal sheath fold (2nd option)—Identity and existence certain, location accurate			
5.4.10	Antiformal sheath fold (2nd option)—Identity or existence questionable, location accurate			
5.4.11	Antiformal sheath fold (2nd option)—Identity and existence certain, location approximate			
5.4.12	Antiformal sheath fold (2nd option)—Identity or existence questionable, location approximate			
5.4.13	Antiformal sheath fold (2nd option)—Identity and existence certain, location inferred			
5.4.14	Antiformal sheath fold (2nd option)—Identity or existence questionable, location inferred			
5.4.15	Antiformal sheath fold (2nd option)—Identity and existence certain, location concealed			
5.4.16	Antiformal sheath fold (2nd option)—Identity or existence questionable, location concealed			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.5—Synclines				
5.5.1	Syncline (1st option)—Identity and existence certain, location accurate		<p>arrow line weight .2 mm color 100% magenta HB-8 line weight .25 mm 2.725 mm 12.0 mm 1.475 mm</p>	Place fold trace where axial surface of syncline intersects the ground surface.
5.5.2	Syncline (1st option)—Identity or existence questionable, location accurate			
5.5.3	Syncline (1st option)—Identity and existence certain, location approximate		<p>3.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	Place arrows at places along fold trace to indicate overall fold type (syncline); do not place at specific locality where observation was made.
5.5.4	Syncline (1st option)—Identity or existence questionable, location approximate			
5.5.5	Syncline (1st option)—Identity and existence certain, location inferred		<p>1.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.
5.5.6	Syncline (1st option)—Identity or existence questionable, location inferred			
5.5.7	Syncline (1st option)—Identity and existence certain, location concealed		<p>.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	May also be shown in black or other colors.
5.5.8	Syncline (1st option)—Identity or existence questionable, location concealed			
5.5.9	Syncline (2nd option)—Identity and existence certain, location accurate		<p>arrow line weight .2 mm color 100% magenta HB-8 line weight .25 mm 2.725 mm 12.0 mm 1.475 mm</p>	
5.5.10	Syncline (2nd option)—Identity or existence questionable, location accurate			
5.5.11	Syncline (2nd option)—Identity and existence certain, location approximate		<p>3.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	
5.5.12	Syncline (2nd option)—Identity or existence questionable, location approximate			
5.5.13	Syncline (2nd option)—Identity and existence certain, location inferred		<p>1.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	
5.5.14	Syncline (2nd option)—Identity or existence questionable, location inferred			
5.5.15	Syncline (2nd option)—Identity and existence certain, location concealed		<p>.5 mm 2.725 mm 12.0 mm 1.475 mm</p>	
5.5.16	Syncline (2nd option)—Identity or existence questionable, location concealed			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.6—Synforms				
5.6.1	Synform (1st option)—Identity and existence certain, location accurate			<p>Place fold trace where axial surface of synform intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (synform); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.</p> <p>May also be shown in black or other colors.</p>
5.6.2	Synform (1st option)—Identity or existence questionable, location accurate			
5.6.3	Synform (1st option)—Identity and existence certain, location approximate			
5.6.4	Synform (1st option)—Identity or existence questionable, location approximate			
5.6.5	Synform (1st option)—Identity and existence certain, location inferred			
5.6.6	Synform (1st option)—Identity or existence questionable, location inferred			
5.6.7	Synform (1st option)—Identity and existence certain, location concealed			
5.6.8	Synform (1st option)—Identity or existence questionable, location concealed			
5.6.9	Synform (2nd option)—Identity and existence certain, location accurate			
5.6.10	Synform (2nd option)—Identity or existence questionable, location accurate			
5.6.11	Synform (2nd option)—Identity and existence certain, location approximate			
5.6.12	Synform (2nd option)—Identity or existence questionable, location approximate			
5.6.13	Synform (2nd option)—Identity and existence certain, location inferred			
5.6.14	Synform (2nd option)—Identity or existence questionable, location inferred			
5.6.15	Synform (2nd option)—Identity and existence certain, location concealed			
5.6.16	Synform (2nd option)—Identity or existence questionable, location concealed			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.7—Asymmetric, overturned, and inverted synclines				
5.7.1	Asymmetric syncline (1st option)—Identity and existence certain, location accurate. Beds are upright; shorter arrow on steeper limb			Place fold trace where axial surface of asymmetric syncline intersects the ground surface. Place arrows at places along fold trace to indicate overall fold type (asymmetric syncline); do not place at specific locality where observation was made. Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.7.2	Asymmetric syncline (1st option)—Identity or existence questionable, location accurate. Beds are upright; shorter arrow on steeper limb			
5.7.3	Asymmetric syncline (1st option)—Identity and existence certain, location approximate. Beds are upright; shorter arrow on steeper limb			
5.7.4	Asymmetric syncline (1st option)—Identity or existence questionable, location approximate. Beds are upright; shorter arrow on steeper limb			
5.7.5	Asymmetric syncline (1st option)—Identity and existence certain, location inferred. Beds are upright; shorter arrow on steeper limb			
5.7.6	Asymmetric syncline (1st option)—Identity or existence questionable, location inferred. Beds are upright; shorter arrow on steeper limb			
5.7.7	Asymmetric syncline (1st option)—Identity and existence certain, location concealed. Beds are upright; shorter arrow on steeper limb			
5.7.8	Asymmetric syncline (1st option)—Identity or existence questionable, location concealed. Beds are upright; shorter arrow on steeper limb			
5.7.9	Asymmetric syncline (2nd option)—Identity and existence certain, location accurate. Beds are upright; shorter arrow on steeper limb			
5.7.10	Asymmetric syncline (2nd option)—Identity or existence questionable, location accurate. Beds are upright; shorter arrow on steeper limb			
5.7.11	Asymmetric syncline (2nd option)—Identity and existence certain, location approximate. Beds are upright; shorter arrow on steeper limb			
5.7.12	Asymmetric syncline (2nd option)—Identity or existence questionable, location approximate. Beds are upright; shorter arrow on steeper limb			
5.7.13	Asymmetric syncline (2nd option)—Identity and existence certain, location inferred. Beds are upright; shorter arrow on steeper limb			
5.7.14	Asymmetric syncline (2nd option)—Identity or existence questionable, location inferred. Beds are upright; shorter arrow on steeper limb			
5.7.15	Asymmetric syncline (2nd option)—Identity and existence certain, location concealed. Beds are upright; shorter arrow on steeper limb			
5.7.16	Asymmetric syncline (2nd option)—Identity or existence questionable, location concealed. Beds are upright; shorter arrow on steeper limb			
5.7.17	Overturned syncline (1st option)—Identity and existence certain, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			Place fold trace where axial surface of overturned syncline intersects the ground surface. Place arrows at places along fold trace to indicate overall fold type (overturned syncline); do not place at specific locality where observation was made. Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.7.18	Overturned syncline (1st option)—Identity or existence questionable, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.19	Overturned syncline (1st option)—Identity and existence certain, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.20	Overturned syncline (1st option)—Identity or existence questionable, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.21	Overturned syncline (1st option)—Identity and existence certain, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.22	Overturned syncline (1st option)—Identity or existence questionable, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.23	Overturned syncline (1st option)—Identity and existence certain, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.24	Overturned syncline (1st option)—Identity or existence questionable, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.7—Asymmetric, overturned, and inverted synclines (continued)				
5.7.25	Overturned syncline (2nd option)—Identity and existence certain, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			<p>Place fold trace where axial surface of overturned syncline intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (overturned syncline); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.</p>
5.7.26	Overturned syncline (2nd option)—Identity or existence questionable, location accurate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.27	Overturned syncline (2nd option)—Identity and existence certain, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.28	Overturned syncline (2nd option)—Identity or existence questionable, location approximate. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.29	Overturned syncline (2nd option)—Identity and existence certain, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.30	Overturned syncline (2nd option)—Identity or existence questionable, location inferred. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.31	Overturned syncline (2nd option)—Identity and existence certain, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			<p>Place fold trace where axial surface of inverted syncline intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (inverted syncline); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.</p>
5.7.32	Overturned syncline (2nd option)—Identity or existence questionable, location concealed. Beds on one limb are overturned; arrows show dip direction of limbs			
5.7.33	Inverted syncline (1st option)—Identity and existence certain, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.34	Inverted syncline (1st option)—Identity or existence questionable, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.35	Inverted syncline (1st option)—Identity and existence certain, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.36	Inverted syncline (1st option)—Identity or existence questionable, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.37	Inverted syncline (1st option)—Identity and existence certain, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			<p>Place fold trace where axial surface of inverted syncline intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (inverted syncline); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.</p>
5.7.38	Inverted syncline (1st option)—Identity or existence questionable, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.39	Inverted syncline (1st option)—Identity and existence certain, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.40	Inverted syncline (1st option)—Identity or existence questionable, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.41	Inverted syncline (2nd option)—Identity and existence certain, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.42	Inverted syncline (2nd option)—Identity or existence questionable, location accurate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.43	Inverted syncline (2nd option)—Identity and existence certain, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			<p>Place fold trace where axial surface of inverted syncline intersects the ground surface.</p> <p>Place arrows at places along fold trace to indicate overall fold type (inverted syncline); do not place at specific locality where observation was made.</p> <p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p> <p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.</p>
5.7.44	Inverted syncline (2nd option)—Identity or existence questionable, location approximate. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.45	Inverted syncline (2nd option)—Identity and existence certain, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.46	Inverted syncline (2nd option)—Identity or existence questionable, location inferred. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.47	Inverted syncline (2nd option)—Identity and existence certain, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			
5.7.48	Inverted syncline (2nd option)—Identity or existence questionable, location concealed. Beds on both limbs are overturned; arrows show dip direction of limbs			

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.8—Synformal sheath folds				
5.8.1	Synformal sheath fold (1st option)—Identity and existence certain, location accurate		<p>color 100% magenta arrow line weight .2 mm 1.475 mm 50° 1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	<p>Place fold trace where axial surface of synformal sheath fold intersects the ground surface.</p>
5.8.2	Synformal sheath fold (1st option)—Identity or existence questionable, location accurate			
5.8.3	Synformal sheath fold (1st option)—Identity and existence certain, location approximate		<p>3.5 mm 1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	<p>Place arrows at places along fold trace to indicate overall fold type (synformal sheath fold); do not place at specific locality where observation was made.</p>
5.8.4	Synformal sheath fold (1st option)—Identity or existence questionable, location approximate			
5.8.5	Synformal sheath fold (1st option)—Identity and existence certain, location inferred		<p>1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	<p>Arrowheads may be added to show direction of plunge (see Section 5.10).</p>
5.8.6	Synformal sheath fold (1st option)—Identity or existence questionable, location inferred			
5.8.7	Synformal sheath fold (1st option)—Identity and existence certain, location concealed		<p>.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	<p>Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type.</p>
5.8.8	Synformal sheath fold (1st option)—Identity or existence questionable, location concealed			
5.8.9	Synformal sheath fold (2nd option)—Identity and existence certain, location accurate		<p>color 100% magenta arrow line weight .2 mm 1.475 mm 50° 1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	<p>May also be shown in black or other colors.</p>
5.8.10	Synformal sheath fold (2nd option)—Identity or existence questionable, location accurate			
5.8.11	Synformal sheath fold (2nd option)—Identity and existence certain, location approximate		<p>3.5 mm 1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	
5.8.12	Synformal sheath fold (2nd option)—Identity or existence questionable, location approximate			
5.8.13	Synformal sheath fold (2nd option)—Identity and existence certain, location inferred		<p>1.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	
5.8.14	Synformal sheath fold (2nd option)—Identity or existence questionable, location inferred			
5.8.15	Synformal sheath fold (2nd option)—Identity and existence certain, location concealed		<p>.5 mm 1.25 mm radius line weight .25 mm 12.0 mm</p>	
5.8.16	Synformal sheath fold (2nd option)—Identity or existence questionable, location concealed			

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.9—Monoclines				
5.9.1	Monocline (1st option)—Identity and existence certain, location accurate. Arrow shows direction of dip			Use to show monocline whose anticlinal and synclinal bends are too close together at map scale to show as separate fold traces.
5.9.2	Monocline (1st option)—Identity or existence questionable, location accurate. Arrow shows direction of dip			
5.9.3	Monocline (1st option)—Identity and existence certain, location approximate. Arrow shows direction of dip			Place fold trace where dip of surface connecting anticlinal and synclinal bends is at its maximum angle. Place arrow at places along fold trace to indicate overall fold type (monocline); do not place at specific locality where observation was made.
5.9.4	Monocline (1st option)—Identity or existence questionable, location approximate. Arrow shows direction of dip			
5.9.5	Monocline (1st option)—Identity and existence certain, location inferred. Arrow shows direction of dip			Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.9.6	Monocline (1st option)—Identity or existence questionable, location inferred. Arrow shows direction of dip			
5.9.7	Monocline (1st option)—Identity and existence certain, location concealed. Arrow shows direction of dip			
5.9.8	Monocline (1st option)—Identity or existence questionable, location concealed. Arrow shows direction of dip			
5.9.9	Monocline (2nd option)—Identity and existence certain, location accurate. Arrow shows direction of dip			
5.9.10	Monocline (2nd option)—Identity or existence questionable, location accurate. Arrow shows direction of dip			
5.9.11	Monocline (2nd option)—Identity and existence certain, location approximate. Arrow shows direction of dip			
5.9.12	Monocline (2nd option)—Identity or existence questionable, location approximate. Arrow shows direction of dip			
5.9.13	Monocline (2nd option)—Identity and existence certain, location inferred. Arrow shows direction of dip			
5.9.14	Monocline (2nd option)—Identity or existence questionable, location inferred. Arrow shows direction of dip			
5.9.15	Monocline (2nd option)—Identity and existence certain, location concealed. Arrow shows direction of dip			
5.9.16	Monocline (2nd option)—Identity or existence questionable, location concealed. Arrow shows direction of dip			
5.9.17	Monocline, anticlinal bend (1st option)—Identity and existence certain, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			Place fold trace where axial surface of anticlinal bend of monocline intersects the ground surface. Place arrows at places along fold trace to indicate overall fold type (anticlinal bend of monocline); do not place at specific locality where observation was made.
5.9.18	Monocline, anticlinal bend (1st option)—Identity or existence questionable, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.19	Monocline, anticlinal bend (1st option)—Identity and existence certain, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			Arrowheads may be added to show direction of plunge (see Section 5.10). Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.9.20	Monocline, anticlinal bend (1st option)—Identity or existence questionable, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.21	Monocline, anticlinal bend (1st option)—Identity and existence certain, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.22	Monocline, anticlinal bend (1st option)—Identity or existence questionable, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.23	Monocline, anticlinal bend (1st option)—Identity and existence certain, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.24	Monocline, anticlinal bend (1st option)—Identity or existence questionable, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.9—Monoclines (continued)				
5.9.25	Monocline, anticlinal bend (2nd option)—Identity and existence certain, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			Place fold trace where axial surface of anticlinal bend of monocline intersects the ground surface. Place arrows at places along fold trace to indicate overall fold type (anticlinal bend of monocline); do not place at specific locality where observation was made. Arrowheads may be added to show direction of plunge (see Section 5.10).
5.9.26	Monocline, anticlinal bend (2nd option)—Identity or existence questionable, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.27	Monocline, anticlinal bend (2nd option)—Identity and existence certain, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.28	Monocline, anticlinal bend (2nd option)—Identity or existence questionable, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.29	Monocline, anticlinal bend (2nd option)—Identity and existence certain, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.9.30	Monocline, anticlinal bend (2nd option)—Identity or existence questionable, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.31	Monocline, anticlinal bend (2nd option)—Identity and existence certain, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.32	Monocline, anticlinal bend (2nd option)—Identity or existence questionable, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.33	Monocline, synclinal bend (1st option)—Identity and existence certain, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			Place fold trace where axial surface of synclinal bend of monocline intersects the ground surface. Place arrows at places along fold trace to indicate overall fold type (synclinal bend of monocline); do not place at specific locality where observation was made. Arrowheads may be added to show direction of plunge (see Section 5.10).
5.9.34	Monocline, synclinal bend (1st option)—Identity or existence questionable, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.35	Monocline, synclinal bend (1st option)—Identity and existence certain, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.36	Monocline, synclinal bend (1st option)—Identity or existence questionable, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.37	Monocline, synclinal bend (1st option)—Identity and existence certain, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.9.38	Monocline, synclinal bend (1st option)—Identity or existence questionable, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.39	Monocline, synclinal bend (1st option)—Identity and existence certain, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.40	Monocline, synclinal bend (1st option)—Identity or existence questionable, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.41	Monocline, synclinal bend (2nd option)—Identity and existence certain, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.42	Monocline, synclinal bend (2nd option)—Identity or existence questionable, location accurate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.43	Monocline, synclinal bend (2nd option)—Identity and existence certain, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.44	Monocline, synclinal bend (2nd option)—Identity or existence questionable, location approximate. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.45	Monocline, synclinal bend (2nd option)—Identity and existence certain, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.46	Monocline, synclinal bend (2nd option)—Identity or existence questionable, location inferred. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.47	Monocline, synclinal bend (2nd option)—Identity and existence certain, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			
5.9.48	Monocline, synclinal bend (2nd option)—Identity or existence questionable, location concealed. Arrows show direction of dip; shorter arrow on steeper limb			

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.10—Line-symbol decorations and notations for folds				
5.10.1	Fold having inclined axial surface (1st option)—Tick shows dip value and direction		HI-6 (100% black) tick length 1.75 mm; linewidth .175 mm; color 100% magenta	Although only shown here on anticlines, line-symbol decorations and notations may be added to any type or style of fold. Add arrowhead or '90' to ticks showing dip if necessary for clarity. Place where observation was made.
5.10.2	Fold having inclined axial surface (2nd option)—Tick shows dip value and direction		HI-6 (100% black) tick length 1.375 mm; linewidth .175 mm; color 100% magenta	
5.10.3	Fold having vertical or near-vertical axial surface (1st option)		tick length 2.5 mm; linewidth .175 mm; color 100% magenta	
5.10.4	Fold having vertical or near-vertical axial surface (2nd option)		HI-6 (100% black)	
5.10.5	Plunging anticline—Large arrowhead shows direction of plunge		1.5 mm color 100% magenta	Although only shown here on anticlines and synclines, line-symbol decorations and notations may be added to any type or style of fold. Place arrowhead(s) showing plunge at end(s) of, or along, any type or style of fold to indicate general plunge direction(s); do not add plunge angle.
5.10.6	Doubly plunging anticline		1.5 mm color 100% magenta	
5.10.7	Plunging syncline—Large arrowhead shows direction of plunge		1.5 mm color 100% magenta	
5.10.8	Doubly plunging syncline		1.5 mm color 100% magenta	
5.10.9	Fold having near-vertical fold limbs—Half-circle shows direction of closure		radius 1.25 mm; linewidth .2 mm; color 100% magenta	Although only shown here on anticlines and synclines, line-symbol decorations and notations may be added to any type or style of fold.
5.10.10	Crest line (CL) of fold where it diverges from axial surface of anticline		H-7 dash length 2.0 mm; spacing .5 mm; linewidth .2 mm line and text color 100% magenta	
5.10.11	Trough line (TL) of fold where it diverges from axial surface of syncline		H-7 dash length 2.0 mm; spacing .5 mm; linewidth .2 mm line and text color 100% magenta	
5.10.12	Fold—Showing name		H-8 text color 100% magenta	Letter size or spacing may be increased on longer fold segments.

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.11—Small, minor folds				
5.11.1	Small, minor fold, horizontal axial surface		color 100% magenta circle diameter 3.0 mm; linewidth .2 mm crossbar linewidth .25 mm	Use when beds are too tightly folded to show traces of individual folds or when small, minor folds are observed in outcrop but cannot be traced away from that outcrop. Open-armed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.11.2	Small, minor dome		color 100% magenta linewidth .2 mm 5.5 mm 1.475 mm 40°	
5.11.3	Small, minor basin		color 100% magenta linewidth .2 mm 5.5 mm 1.475 mm 40°	
5.11.4	Small, minor anticline, vertical or near-vertical axial surface (1st option)—Showing strike		color 100% magenta 2.75 mm 6.0 mm 2.75 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.5	Small, minor anticline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.6	Small, minor anticline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 100% magenta 2.75 mm 6.0 mm 2.75 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.7	Small, minor anticline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.8	Small, minor antiform, vertical or near-vertical axial surface (1st option)—Showing strike		color 100% magenta 2.75 mm 6.0 mm 2.75 mm 60° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.9	Small, minor antiform, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.10	Small, minor antiform, vertical or near-vertical axial surface (2nd option)—Showing strike		color 100% magenta 2.75 mm 6.0 mm 2.75 mm 60° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.11	Small, minor antiform, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.12	Small, minor asymmetric anticline, vertical or near-vertical axial surface (1st option)—Showing strike		color 100% magenta 2.25 mm 6.0 mm 3.5 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.13	Small, minor asymmetric anticline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.14	Small, minor asymmetric anticline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 100% magenta 2.25 mm 6.0 mm 3.5 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.15	Small, minor asymmetric anticline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.16	Small, minor overturned anticline, vertical or near-vertical axial surface (1st option)—Showing strike		color 100% magenta 2.275 mm 1.0 mm radius 6.0 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.17	Small, minor overturned anticline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.18	Small, minor overturned anticline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 100% magenta 2.275 mm 1.0 mm radius 6.0 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.19	Small, minor overturned anticline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.20	Small, minor inverted anticline, vertical or near-vertical axial surface (1st option)—Showing strike		color 100% magenta .875 mm radius 6.0 mm 2.25 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.21	Small, minor inverted anticline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.22	Small, minor inverted anticline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 100% magenta .875 mm radius 6.0 mm 2.25 mm 40° arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.23	Small, minor inverted anticline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

5—FOLDS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
5.11—Small, minor folds (continued)				
5.11.24	Small, minor syncline, vertical or near-vertical axial surface (1st option)—Showing strike		color 2.75 mm 100% magenta 6.0 mm 2.75 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	Use when beds are too tightly folded to show traces of individual folds or when small, minor folds are observed in outcrop but cannot be traced away from that outcrop. Open-armed ("2nd option") symbols may be used to show a second generation or another instance of a particular fold type. May also be shown in black or other colors.
5.11.25	Small, minor syncline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.26	Small, minor syncline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 2.75 mm 100% magenta 6.0 mm 2.75 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.27	Small, minor syncline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.28	Small, minor synform, vertical or near-vertical axial surface (1st option)—Showing strike		color 2.75 mm 100% magenta 6.0 mm 2.75 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.29	Small, minor synform, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.30	Small, minor synform, vertical or near-vertical axial surface (2nd option)—Showing strike		color 2.75 mm 100% magenta 6.0 mm 2.75 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.31	Small, minor synform, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.32	Small, minor asymmetric syncline, vertical or near-vertical axial surface (1st option)—Showing strike		color 2.25 mm 100% magenta 6.0 mm 3.5 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.33	Small, minor asymmetric syncline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.34	Small, minor asymmetric syncline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 2.25 mm 100% magenta 6.0 mm 3.5 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.35	Small, minor asymmetric syncline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.36	Small, minor overturned syncline, vertical or near-vertical axial surface (1st option)—Showing strike		color 2.275 mm 100% magenta 1.0 mm radius 6.0 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.37	Small, minor overturned syncline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.38	Small, minor overturned syncline, vertical or near-vertical axial surface (2nd option)—Showing strike		color 2.275 mm 100% magenta 1.0 mm radius 6.0 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.39	Small, minor overturned syncline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.40	Small, minor inverted syncline, vertical or near-vertical axial surface (1st option)—Showing strike		color .875 mm radius 100% magenta 6.0 mm 2.25 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.41	Small, minor inverted syncline, inclined axial surface (1st option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	
5.11.42	Small, minor inverted syncline, vertical or near-vertical axial surface (2nd option)—Showing strike		color .875 mm radius 100% magenta 6.0 mm 2.25 mm arrow linewidth .2 mm 1.475 mm linewidth .25 mm	
5.11.43	Small, minor inverted syncline, inclined axial surface (2nd option)—Showing strike and dip		HI-6 (100% black) 35 tick length 1.75 mm; linewidth .2 mm; color 100% magenta 9.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

6—BEDDING

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
6.1	Horizontal bedding		all lineweights .2 mm circle diameter 2.5 mm	Inclined (upright) and overturned bedding symbols are used when the top direction of beds is known to a reasonable degree of certainty.
6.2	Inclined bedding—Showing strike and dip		1.0 mm 40 HI-6 5.0 mm all lineweights .2 mm	On maps where determination of top direction is "known" at some places and "unknown" at others, such symbols also may be used to indicate where top direction is "unknown" (compare with ref. nos. 6.13-24). Symbols may be used without a dip value to indicate the generalized strike and direction of dip of beds.
6.3	Vertical bedding—Showing strike		2.0 mm	
6.4	Overturned bedding—Showing strike and dip		1.0 mm 65 HI-6 .625 mm radius	
6.5	Bedding overturned more than 180 degrees—Showing strike and dip		.7 mm 20 .375 mm radius	
6.6	Inclined (dip direction to right) bedding, for multiple observations at one locality—Showing strike and dip		5.5 mm 40 HI-6 1.0 mm 1.325 mm	
6.7	Inclined (dip direction to left) bedding, for multiple observations at one locality—Showing strike and dip		40	
6.8	Vertical bedding, for multiple observations at one locality—Showing strike		2.0 mm	
6.9	Overturned (dip direction to right) bedding, for multiple observations at one locality—Showing strike and dip		.625 mm radius 65 HI-6 1.0 mm	
6.10	Overturned (dip direction to left) bedding, for multiple observations at one locality—Showing strike and dip		65	
6.11	Bedding overturned more than 180 degrees (dip direction to right), for multiple observations at one locality—Showing strike and dip		20 HI-6 .7 mm .375 mm radius	
6.12	Bedding overturned more than 180 degrees (dip direction to left), for multiple observations at one locality—Showing strike and dip		20	
6.13	Inclined bedding, where top direction of beds is known from local features—Showing strike and dip		1.0 mm 30 HI-6 5.0 mm all lineweights .2 mm dot diameter .75 mm	Symbols that have a ball may be used to indicate a greater level of certainty in the determination of top direction.
6.14	Vertical bedding, where top direction of beds is known from local features—Showing strike. Ball shows top direction		2.0 mm	
6.15	Overturned bedding, where top direction of beds is known from local features—Showing strike and dip		1.0 mm 85 HI-6 .625 mm radius	
6.16	Bedding overturned more than 180 degrees, where top direction of beds is known from local features—Showing strike and dip		10 HI-6 .7 mm .375 mm radius	
6.17	Inclined (dip direction to right) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		5.5 mm 30 HI-6 1.0 mm 1.325 mm	
6.18	Inclined (dip direction to left) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		30	
6.19	Vertical (top direction to right) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike. Ball shows top direction		2.0 mm	
6.20	Vertical (top direction to left) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike. Ball shows top direction			
6.21	Overturned (dip direction to right) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		.625 mm radius 85 HI-6 1.0 mm 1.7 mm	
6.22	Overturned (dip direction to left) bedding, where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		85	
6.23	Bedding overturned more than 180 degrees (dip direction to right), where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		10 HI-6 .7 mm .375 mm radius 1.325 mm	
6.24	Bedding overturned more than 180 degrees (dip direction to left), where top direction of beds is known from local features, for multiple observations at one locality—Showing strike and dip		10	

*For more information, see general guidelines on pages A-i to A-v.

6—BEDDING (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
6.25	Inclined crenulated, warped, undulatory, or contorted bedding—Showing approximate strike and dip			Symbols may be used without a dip value to indicate the generalized strike and direction of dip of beds.
6.26	Vertical or near-vertical crenulated, warped, undulatory, or contorted bedding—Showing approximate strike			
6.27	Inclined graded bedding—Showing strike and dip			
6.28	Vertical or near-vertical graded bedding—Showing strike			
6.29	Overtuned graded bedding—Showing strike and dip			
6.30	Inclined bedding in crossbedded rocks—Showing approximate strike and dip			
6.31	Vertical or near-vertical bedding in crossbedded rocks—Showing approximate strike			
6.32	Overtuned bedding in crossbedded rocks—Showing approximate strike and dip			Use when the measurement of strike and (or) dip value is approximate but the location of observation is accurate. Symbols that have a ball may be used to indicate a greater level of certainty in the determination of top direction. On maps where determination of top direction is "known" at some places and "unknown" at others, symbols that have a ball also may be used to indicate where top direction is "known."
6.33	Approximate orientation of inclined bedding—Showing approximate strike and dip			
6.34	Approximate orientation of vertical or near-vertical bedding—Showing approximate strike			
6.35	Approximate orientation of overtuned bedding—Showing approximate strike and dip			
6.36	Approximate orientation of inclined bedding, where top direction of beds is known from local features—Showing approximate strike and dip			
6.37	Approximate orientation of vertical or near-vertical bedding, where top direction of beds is known from local features—Showing approximate strike. Ball shows top direction			
6.38	Approximate orientation of overtuned bedding, where top direction of beds is known from local features—Showing approximate strike and dip			
6.39	Horizontal bedding, as determined remotely or from aerial photographs			
6.40	Gently inclined (between 0° and 30°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			
6.41	Moderately inclined (between 30° and 60°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			
6.42	Steeply inclined (between 60° and 90°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			
6.43	Vertical or near-vertical bedding, as determined remotely or from aerial photographs—Showing approximate strike			Usually reserved for use in reconnaissance geologic mapping.
6.44	Gently overtuned (between 0° and 30°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			
6.45	Moderately overtuned (between 30° and 60°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			
6.46	Steeply overtuned (between 60° and 90°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip			

*For more information, see general guidelines on pages A-i to A-v.

7—CLEAVAGE

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
7.1	Horizontal cleavage (generic or type unspecified)			For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
7.2	Inclined cleavage (generic or type unspecified)—Showing strike and dip			
7.3	Vertical cleavage (generic or type unspecified)—Showing strike			
7.4	Inclined (dip direction to right) cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike and dip			
7.5	Inclined (dip direction to left) cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike and dip			
7.6	Vertical cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike			
7.7	Horizontal continuous, slaty cleavage			
7.8	Inclined continuous, slaty cleavage—Showing strike and dip			
7.9	Vertical continuous, slaty cleavage—Showing strike			
7.10	Inclined (dip direction to right) continuous, slaty cleavage, for multiple observations at one locality—Showing strike and dip			
7.11	Inclined (dip direction to left) continuous, slaty cleavage, for multiple observations at one locality—Showing strike and dip			
7.12	Vertical continuous slaty, cleavage, for multiple observations at one locality—Showing strike			
7.13	Horizontal disjunctive, spaced cleavage			For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
7.14	Inclined disjunctive, spaced cleavage—Showing strike and dip			
7.15	Vertical disjunctive, spaced cleavage—Showing strike			
7.16	Inclined (dip direction to right) disjunctive, spaced cleavage, for multiple observations at one locality—Showing strike and dip			
7.17	Inclined (dip direction to left) disjunctive, spaced cleavage, for multiple observations at one locality—Showing strike and dip			
7.18	Vertical disjunctive, spaced cleavage, for multiple observations at one locality—Showing strike			
7.19	Horizontal disjunctive, symmetric crenulation cleavage			
7.20	Inclined disjunctive, symmetric crenulation cleavage—Showing strike and dip			
7.21	Vertical or near-vertical disjunctive, symmetric crenulation cleavage—Showing strike			
7.22	Inclined (dip direction to right) disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.23	Inclined (dip direction to left) disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.24	Vertical or near-vertical disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike			

*For more information, see general guidelines on pages A-i to A-v.

7—CLEAVAGE (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
7.25	Horizontal disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage			For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
7.26	Inclined disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage—Showing strike and dip			
7.27	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage—Showing strike			
7.28	Inclined (dip direction to right) disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.29	Inclined (dip direction to left) disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.30	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike			
7.31	Horizontal disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage			
7.32	Inclined disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage—Showing strike and dip			
7.33	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage—Showing strike			
7.34	Inclined (dip direction to right) disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.35	Inclined (dip direction to left) disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike and dip			
7.36	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike			

*For more information, see general guidelines on pages A-i to A-v.

8—FOLIATION

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
8.1—Generic foliation (origin not known or not specified)				
8.1.1	Horizontal generic (origin not known or not specified) foliation		all lineweights .2 mm 1.5 mm circle diameter 2.5 mm 90°	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line.
8.1.2	Inclined generic (origin not known or not specified) foliation—Showing strike and dip		1.0 mm 5.0 mm all lineweights .2 mm 90° HI-6	For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.1.3	Vertical generic (origin not known or not specified) foliation—Showing strike		2.0 mm	
8.1.4	Inclined (dip direction to right) generic (origin not known or not specified) foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 90° HI-6	
8.1.5	Inclined (dip direction to left) generic (origin not known or not specified) foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 90° HI-6	
8.1.6	Vertical generic (origin not known or not specified) foliation or foliation, for multiple observations at one locality—Showing strike		2.0 mm	
8.2—Primary foliation or layering (in igneous rocks)				
8.2.1	Massive igneous rock		dot diameter .35 mm 2.0 mm 90°	May be used at locality where foliation and lineation are absent.
8.2.2	Horizontal flow banding, lamination, layering, or foliation in igneous rock		all lineweights .2 mm 60° circle diameter 2.5 mm	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line.
8.2.3	Inclined flow banding, lamination, layering, or foliation in igneous rock—Showing strike and dip		1.0 mm 5.0 mm all lineweights .2 mm 60° HI-6	For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.2.4	Vertical flow banding, lamination, layering, or foliation in igneous rock—Showing strike		2.0 mm	
8.2.5	Inclined (dip direction to right) flow banding, lamination, layering, or foliation in igneous rock, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 60° HI-6	
8.2.6	Inclined (dip direction to left) flow banding, lamination, layering, or foliation in igneous rock, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 60° HI-6	
8.2.7	Vertical flow banding, lamination, layering, or foliation in igneous rock, for multiple observations at one locality—Showing strike		2.0 mm	
8.2.8	Inclined crinkled or deformed flow banding, lamination, layering, or foliation in igneous rock—Showing approximate strike and dip		1.0 mm 5.0 mm all lineweights .2 mm 60° HI-6 375 mm .75 mm radius	
8.2.9	Vertical or near-vertical crinkled or deformed flow banding, lamination, layering, or foliation in igneous rock—Showing approximate strike		2.0 mm	
8.2.10	Horizontal cumulate foliation		all lineweights .2 mm circle diameter 2.5 mm 5.5 mm	Inclined (upright) and overturned cumulate foliation symbols are used when the top direction of layers is known to a reasonable degree of certainty.
8.2.11	Inclined cumulate foliation—Showing strike and dip		all lineweights .2 mm 1.0 mm 45° HI-6 .5 mm	Symbols that have a ball may be used to indicate a greater level of certainty in the determination of top direction.
8.2.12	Vertical cumulate foliation—Showing strike		2.5 mm	
8.2.13	Overturned cumulate foliation—Showing strike and dip		1.0 mm 70° HI-6 .625 mm radius	
8.2.14	Inclined cumulate foliation, where top direction of layers is known from local features—Showing strike and dip		all lineweights .2 mm .5 mm 30° HI-6 1.0 mm 5.0 mm dot diameter .75 mm	On maps where determination of top direction is "known" at some places and "unknown" at others, symbols that have a ball also may be used to indicate where top direction is "known".
8.2.15	Vertical cumulate foliation, where top direction of layers is known from local features—Showing strike. Ball shows top direction		2.5 mm	
8.2.16	Overturned cumulate foliation, where top direction of layers is known from local features—Showing strike and dip		1.0 mm 80° HI-6 .625 mm radius	

*For more information, see general guidelines on pages A-i to A-v.

8—FOLIATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
8.2—Primary foliation or layering (in igneous rocks) (continued)				
8.2.17	Inclined crinkled or deformed cumulate foliation—Showing approximate strike and dip			For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.2.18	Vertical or near-vertical crinkled or deformed cumulate foliation—Showing approximate strike			
8.2.19	Horizontal eutaxitic foliation			
8.2.20	Inclined eutaxitic foliation—Showing strike and dip			
8.2.21	Vertical or near-vertical eutaxitic foliation—Showing strike			
8.2.22	Inclined (dip direction to right) eutaxitic foliation, for multiple observations at one locality—Showing strike and dip			
8.2.23	Inclined (dip direction to left) eutaxitic foliation, for multiple observations at one locality—Showing strike and dip			
8.2.24	Vertical or near-vertical eutaxitic foliation, for multiple observations at one locality—Showing strike			
8.2.25	Inclined crinkled or deformed eutaxitic foliation—Showing approximate strike and dip			
8.2.26	Vertical or near-vertical crinkled or deformed eutaxitic foliation—Showing approximate strike			

*For more information, see general guidelines on pages A-i to A-v.

8—FOLIATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
8.3—Secondary foliation (caused by metamorphism or tectonism)				
8.3.1	Horizontal metamorphic or tectonic foliation		circle diameter 2.5 mm lineweight .2 mm	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.3.2	Inclined metamorphic or tectonic foliation—Showing strike and dip		1.0 mm 60° 35 5.0 mm lineweight .2 mm	
8.3.3	Vertical metamorphic or tectonic foliation—Showing strike		2.0 mm	
8.3.4	Inclined (dip direction to right) metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 35 60° 1.0 mm	
8.3.5	Inclined (dip direction to left) metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike and dip		35	
8.3.6	Vertical metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike		2.0 mm	Inclined (upright) and overturned foliation symbols are used when the top direction of bedding is known to a reasonable degree of certainty. Symbols that have a ball may be used to indicate a greater level of certainty in the determination of top direction. On maps where determination of top direction is "known" at some places and "unknown" at others, symbols that have a ball also may be used to indicate where top direction is "known".
8.3.7	Horizontal metamorphic or tectonic foliation parallel to bedding		circle diameter 2.5 mm all lineweights .2 mm	
8.3.8	Inclined metamorphic or tectonic foliation parallel to bedding—Showing strike and dip		1.0 mm 10 60° 5.0 mm all lineweights .2 mm	
8.3.9	Vertical metamorphic or tectonic foliation parallel to bedding—Showing strike		4.0 mm 2.0 mm	
8.3.10	Inclined metamorphic or tectonic foliation parallel to overturned bedding—Showing strike and dip		75 HI-6 .625 mm radius	
8.3.11	Inclined metamorphic or tectonic foliation parallel to upright bedding, where top direction of beds is known from local features—Showing strike and dip		1.0 mm 15 60° 5.0 mm dot diameter .75 mm all lineweights .2 mm	
8.3.12	Vertical metamorphic or tectonic foliation parallel to bedding, where top direction of beds is known from local features—Showing strike. Ball shows top direction		4.0 mm 2.0 mm	
8.3.13	Inclined metamorphic or tectonic foliation parallel to overturned bedding, where top direction of beds is known from local features—Showing strike and dip		85 HI-6 .625 mm radius	
8.3.14	Inclined crinkled or deformed metamorphic or tectonic foliation—Showing approximate strike and dip		30 HI-6 60° 1.0 mm lineweight .2 mm 3.75 mm 5.0 mm .75 mm radius	
8.3.15	Vertical or near-vertical crinkled or deformed metamorphic or tectonic foliation—Showing approximate strike		2.0 mm	
8.3.16	Horizontal continuous, penetrative foliation		1.0 mm 60° 5 mm circle diameter 2.5 mm all lineweights .2 mm 4.25 mm	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.3.17	Inclined continuous, penetrative foliation—Showing strike and dip		1.0 mm 25 60° 5 mm HI-6 all lineweights .2 mm	
8.3.18	Vertical continuous, penetrative foliation—Showing strike		2.0 mm	
8.3.19	Inclined (dip direction to right) continuous, penetrative foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 25 60° 1.0 mm 5 mm	
8.3.20	Inclined (dip direction to left) continuous, penetrative foliation, for multiple observations at one locality—Showing strike and dip		25	
8.3.21	Vertical continuous, penetrative foliation, for multiple observations at one locality—Showing strike		2.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

8—FOLIATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
8.3—Secondary foliation (caused by metamorphism or tectonism) (continued)				
8.3.22	Horizontal disjunctive, spaced foliation		circle diameter 2.5 mm all lineweights .2 mm HI-6 1.0 mm 3.6 mm	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.3.23	Inclined disjunctive, spaced foliation—Showing strike and dip		HI-6 1.0 mm 5.0 mm 1.0 mm	
8.3.24	Vertical disjunctive, spaced foliation—Showing strike		2.0 mm	
8.3.25	Inclined (dip direction to right) disjunctive, spaced foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 1.0 mm HI-6 60°	
8.3.26	Inclined (dip direction to left) disjunctive, spaced foliation, for multiple observations at one locality—Showing strike and dip		30	
8.3.27	Vertical disjunctive, spaced foliation, for multiple observations at one locality—Showing strike		2.0 mm	
8.3.28	Horizontal disjunctive, symmetric crenulation foliation		circle diameter 2.5 mm all lineweights .2 mm draft as shown	
8.3.29	Inclined disjunctive, symmetric crenulation foliation—Showing strike and dip		draft as shown HI-6 1.0 mm 5.0 mm 1.0 mm	
8.3.30	Vertical or near-vertical disjunctive, symmetric crenulation foliation—Showing strike		2.0 mm	
8.3.31	Inclined (dip direction to right) disjunctive, symmetric crenulation foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 1.0 mm HI-6 60° draft as shown	
8.3.32	Inclined (dip direction to left) disjunctive, symmetric crenulation foliation, for multiple observations at one locality—Showing strike and dip		35	
8.3.33	Vertical or near-vertical disjunctive, symmetric crenulation foliation, for multiple observations at one locality—Showing strike		2.0 mm	
8.3.34	Horizontal disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation		circle diameter 2.5 mm all lineweights .2 mm draft as shown	
8.3.35	Inclined disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation—Showing strike and dip		HI-6 1.0 mm 5.0 mm 1.0 mm draft as shown	
8.3.36	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation—Showing strike		2.0 mm	
8.3.37	Inclined (dip direction to right) disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 1.0 mm HI-6 60° draft as shown	
8.3.38	Inclined (dip direction to left) disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike and dip		40	
8.3.39	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike		2.0 mm	
8.3.40	Horizontal disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation		circle diameter 2.5 mm all lineweights .2 mm draft as shown	
8.3.41	Inclined disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation—Showing strike and dip		HI-6 1.0 mm 5.0 mm 1.0 mm draft as shown	
8.3.42	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation—Showing strike		2.0 mm	
8.3.43	Inclined (dip direction to right) disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike and dip		5.5 mm 1.0 mm 1.0 mm HI-6 60° draft as shown	
8.3.44	Inclined (dip direction to left) disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike and dip		45	
8.3.45	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation, for multiple observations at one locality—Showing strike		2.0 mm	

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
8.3—Secondary foliation (caused by metamorphism or tectonism) (continued)				
8.3.46	Horizontal gneissic layering		circle diameter 2.5 mm all lineweights .2 mm 	For symbols representing a single observation at one locality, point of observation is the mid-point of the strike line. For multiple observations at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamentation); the junction point is at point of observation. To obey the right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only when necessary to prevent overcrowding).
8.3.47	Inclined gneissic layering—Showing strike and dip		HI-6 	
8.3.48	Vertical or near-vertical gneissic layering—Showing strike			
8.3.49	Inclined (dip direction to right) gneissic layering, for multiple observations at one locality—Showing strike and dip		HI-6 	
8.3.50	Inclined (dip direction to left) gneissic layering, for multiple observations at one locality—Showing strike and dip			
8.3.51	Vertical or near-vertical gneissic layering, for multiple observations at one locality—Showing strike			
8.3.52	Horizontal undulatory gneissic layering		circle diameter 2.5 mm all lineweights .2 mm 	
8.3.53	Inclined undulatory gneissic layering—Showing strike and dip		HI-6 	
8.3.54	Vertical or near-vertical undulatory gneissic layering—Showing strike			
8.3.55	Horizontal mylonitic foliation		circle diameter 2.5 mm all lineweights .2 mm 	
8.3.56	Inclined mylonitic foliation—Showing strike and dip		HI-6 	
8.3.57	Vertical or near-vertical mylonitic foliation—Showing strike			
8.3.58	Inclined (dip direction to right) mylonitic foliation, for multiple observations at one locality—Showing strike and dip		HI-6 	
8.3.59	Inclined (dip direction to left) mylonitic foliation, for multiple observations at one locality—Showing strike and dip			
8.3.60	Vertical or near-vertical mylonitic foliation, for multiple observations at one locality—Showing strike			

A-8-5

9—LINEATION

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.1	Approximate plunge direction of inclined generic (origin or type not known or not specified) lineation or linear structure (1st option)			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation. Lineation symbols may be used separately or combined with other symbols.
9.2	Approximate plunge direction of inclined generic (origin or type not known or not specified) lineation or linear structure (2nd option)			
9.3	Inclined generic (origin or type not known or not specified) lineation or linear structure (1st option)—Showing bearing and plunge			
9.4	Inclined generic (origin or type not known or not specified) lineation or linear structure (2nd option)—Showing bearing and plunge			
9.5	Horizontal generic (origin or type not known or not specified) lineation or linear structure (1st option)—Showing bearing			For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line.
9.6	Horizontal generic (origin or type not known or not specified) lineation or linear structure (2nd option)—Showing bearing			
9.7	Vertical or near-vertical generic (origin or type not known or not specified) lineation or linear structure (1st option)			
9.8	Vertical or near-vertical generic (origin or type not known or not specified) lineation or linear structure (2nd option)			
9.9	Inclined parting lineation in sedimentary materials (1st option)—Showing bearing and plunge			For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation.
9.10	Inclined parting lineation in sedimentary materials (2nd option)—Showing bearing and plunge			
9.11	Horizontal parting lineation in sedimentary materials (1st option)—Showing bearing			
9.12	Horizontal parting lineation in sedimentary materials (2nd option)—Showing bearing			
9.13	Inclined sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (1st option)—Showing bearing and plunge			For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentalations); the junction point is at the point of observation.
9.14	Inclined sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (2nd option)—Showing bearing and plunge			
9.15	Horizontal sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (1st option)—Showing bearing			
9.16	Horizontal sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (2nd option)—Showing bearing			
9.17	Inclined slickenline, groove, or striation on fault surface (1st option)—Showing bearing and plunge			
9.18	Inclined slickenline, groove, or striation on fault surface (2nd option)—Showing bearing and plunge			
9.19	Horizontal slickenline, groove, or striation on fault surface (1st option)—Showing bearing			
9.20	Horizontal slickenline, groove, or striation on fault surface (2nd option)—Showing bearing			
9.21	Inclined surface groove or striation (origin not known or not specified) (1st option)—Showing bearing and plunge			
9.22	Inclined surface groove or striation (origin not known or not specified) (2nd option)—Showing bearing and plunge			
9.23	Horizontal surface groove or striation (origin not known or not specified) (1st option)—Showing bearing			
9.24	Horizontal surface groove or striation (origin not known or not specified) (2nd option)—Showing bearing			


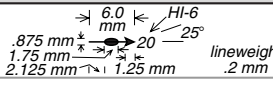

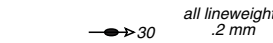

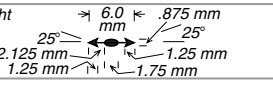

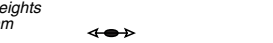

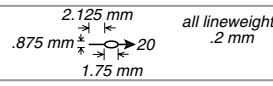

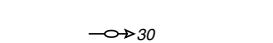

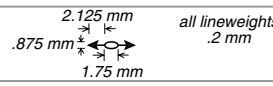

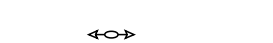

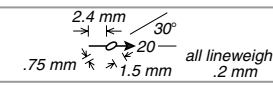

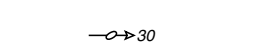

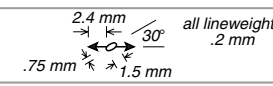

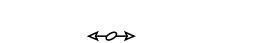

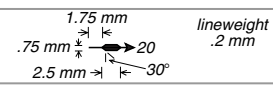

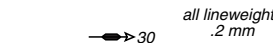

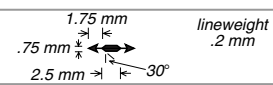



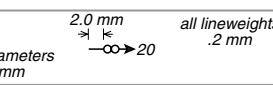

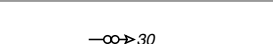

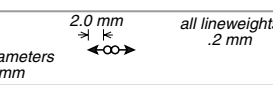



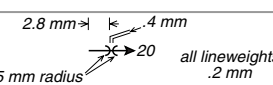

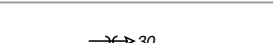

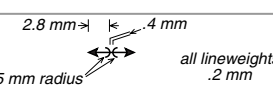


*For more information, see general guidelines on pages A-i to A-v.

9—LINEATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.25	Inclined aligned-object lineation (1st option)—Showing bearing and plunge			Open-angled ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation.
9.26	Inclined aligned-object lineation (2nd option)—Showing bearing and plunge			
9.27	Horizontal aligned-object lineation (1st option)—Showing bearing			Lineation symbols may be used separately or combined with other symbols.
9.28	Horizontal aligned-object lineation (2nd option)—Showing bearing			
9.29	Inclined aligned-clast or aligned-grain lineation (in sedimentary materials) (1st option)—Showing bearing and plunge			For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line.
9.30	Inclined aligned-clast or aligned-grain lineation (in sedimentary materials) (2nd option)—Showing bearing and plunge			
9.31	Horizontal aligned-clast or aligned-grain lineation (in sedimentary materials) (1st option)—Showing bearing			For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation.
9.32	Horizontal aligned-clast or aligned-grain lineation (in sedimentary materials) (2nd option)—Showing bearing			
9.33	Inclined aligned-inclusion lineation (in igneous rocks) (1st option)—Showing bearing and plunge			For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the junction point is at the point of observation.
9.34	Inclined aligned-inclusion lineation (in igneous rocks) (2nd option)—Showing bearing and plunge			
9.35	Horizontal aligned-inclusion lineation (in igneous rocks) (1st option)—Showing bearing			
9.36	Horizontal aligned-inclusion lineation (in igneous rocks) (2nd option)—Showing bearing			
9.37	Inclined aligned-mineral lineation (1st option)—Showing bearing and plunge			
9.38	Inclined aligned-mineral lineation (2nd option)—Showing bearing and plunge			
9.39	Horizontal aligned-mineral lineation (1st option)—Showing bearing			
9.40	Horizontal aligned-mineral lineation (2nd option)—Showing bearing			
9.41	Inclined aligned mineral-aggregate lineation (1st option)—Showing bearing and plunge			
9.42	Inclined aligned mineral-aggregate lineation (2nd option)—Showing bearing and plunge			
9.43	Horizontal aligned mineral-aggregate lineation (1st option)—Showing bearing			
9.44	Horizontal aligned mineral-aggregate lineation (2nd option)—Showing bearing			
9.45	Inclined aligned deformed-mineral lineation (1st option)—Showing bearing and plunge			
9.46	Inclined aligned deformed-mineral lineation (2nd option)—Showing bearing and plunge			
9.47	Horizontal aligned deformed-mineral lineation (1st option)—Showing bearing			
9.48	Horizontal aligned deformed-mineral lineation (2nd option)—Showing bearing			


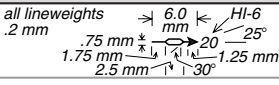



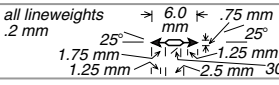



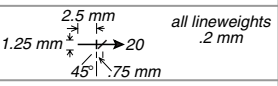



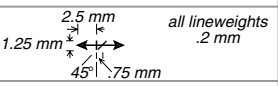



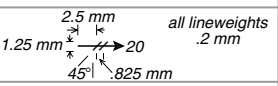



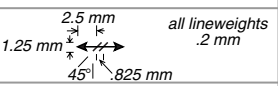



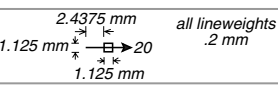



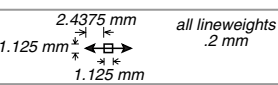



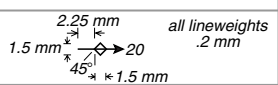



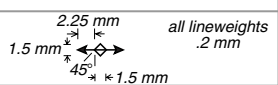



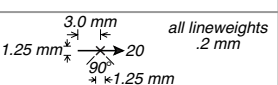



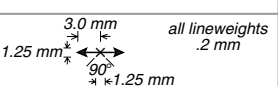


*For more information, see general guidelines on pages A-i to A-v.

9—LINEATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.49	Inclined aligned stretched-object lineation (1st option)—Showing bearing and plunge			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation.
9.50	Inclined aligned stretched-object lineation (2nd option)—Showing bearing and plunge			
9.51	Horizontal aligned stretched-object lineation (1st option)—Showing bearing			Lineation symbols may be used separately or combined with other symbols.
9.52	Horizontal aligned stretched-object lineation (2nd option)—Showing bearing			
9.53	Inclined aligned stretched-pebble lineation (1st option)—Showing bearing and plunge			For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line.
9.54	Inclined aligned stretched-pebble lineation (2nd option)—Showing bearing and plunge			
9.55	Horizontal aligned stretched-pebble lineation (1st option)—Showing bearing			For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation.
9.56	Horizontal aligned stretched-pebble lineation (2nd option)—Showing bearing			
9.57	Inclined aligned stretched-oid lineation (1st option)—Showing bearing and plunge			For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentalations); the junction point is at the point of observation.
9.58	Inclined aligned stretched-oid lineation (2nd option)—Showing bearing and plunge			
9.59	Horizontal aligned stretched-oid lineation (1st option)—Showing bearing			
9.60	Horizontal aligned stretched-oid lineation (2nd option)—Showing bearing			
9.61	Inclined rodding (1st option)—Showing bearing and plunge			
9.62	Inclined rodding (2nd option)—Showing bearing and plunge			
9.63	Horizontal rodding (1st option)—Showing bearing			
9.64	Horizontal rodding (2nd option)—Showing bearing			
9.65	Inclined mullions (1st option)—Showing bearing and plunge			
9.66	Inclined mullions (2nd option)—Showing bearing and plunge			
9.67	Horizontal mullions (1st option)—Showing bearing			
9.68	Horizontal mullions (2nd option)—Showing bearing			
9.69	Inclined boudins (1st option)—Showing bearing and plunge			
9.70	Inclined boudins (2nd option)—Showing bearing and plunge			
9.71	Horizontal boudins (1st option)—Showing bearing			
9.72	Horizontal boudins (2nd option)—Showing bearing			

*For more information, see general guidelines on pages A-i to A-v.

9—LINEATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.73	Inclined pencil structure (1st option)—Showing bearing and plunge			Open-arrowed ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation. Lineation symbols may be used separately or combined with other symbols.
9.74	Inclined pencil structure (2nd option)—Showing bearing and plunge			
9.75	Horizontal pencil structure (1st option)—Showing bearing			
9.76	Horizontal pencil structure (2nd option)—Showing bearing			
9.77	Inclined lineation at intersection of bedding and cleavage (1st option)—Showing bearing and plunge			For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line. For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation.
9.78	Inclined lineation at intersection of bedding and cleavage (2nd option)—Showing bearing and plunge			
9.79	Horizontal lineation at intersection of bedding and cleavage (1st option)—Showing bearing			
9.80	Horizontal lineation at intersection of bedding and cleavage (2nd option)—Showing bearing			
9.81	Inclined lineation at intersection of two cleavages (1st option)—Showing bearing and plunge			For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the junction point is at the point of observation.
9.82	Inclined lineation at intersection of two cleavages (2nd option)—Showing bearing and plunge			
9.83	Horizontal lineation at intersection of two cleavages (1st option)—Showing bearing			
9.84	Horizontal lineation at intersection of two cleavages (2nd option)—Showing bearing			
9.85	Inclined lineation at intersection of two fractures or joints (1st option)—Showing bearing and plunge			
9.86	Inclined lineation at intersection of two fractures or joints (2nd option)—Showing bearing and plunge			
9.87	Horizontal lineation at intersection of two fractures or joints (1st option)—Showing bearing			
9.88	Horizontal lineation at intersection of two fractures or joints (2nd option)—Showing bearing			
9.89	Inclined lineation at intersection of two foliations (1st option)—Showing bearing and plunge			
9.90	Inclined lineation at intersection of two foliations (2nd option)—Showing bearing and plunge			
9.91	Horizontal lineation at intersection of two foliations (1st option)—Showing bearing			
9.92	Horizontal lineation at intersection of two foliations (2nd option)—Showing bearing			
9.93	Inclined lineation at intersection of two surfaces (origin or type unspecified) (1st option)—Showing bearing and plunge			
9.94	Inclined lineation at intersection of two surfaces (origin or type unspecified) (2nd option)—Showing bearing and plunge			
9.95	Horizontal lineation at intersection of two surfaces (origin or type unspecified) (1st option)—Showing bearing			
9.96	Horizontal lineation at intersection of two surfaces (origin or type unspecified) (2nd option)—Showing bearing			





































*For more information, see general guidelines on pages A-i to A-v.

9—LINEATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.97	Inclined fold hinge of generic (type or orientation unspecified) small, minor fold (1st option)—Showing bearing and plunge		dot diameter .5 mm color 100% magenta 2.75 mm 6.0 mm HI-6 (100% black) 20 25° 1.25 mm line weight .2 mm	Open-armed ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation. Lineation symbols may be used separately or combined with other symbols. For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line. For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation. For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the junction point is at the point of observation. May also be shown in black or other colors.
9.98	Inclined fold hinge of generic (type or orientation unspecified) small, minor fold (2nd option)—Showing bearing and plunge		all line weights .2 mm	
9.99	Horizontal fold hinge of generic (type or orientation unspecified) small, minor fold (1st option)—Showing bearing		dot diameter .5 mm 2.75 mm 6.0 mm 25° 1.25 mm color 100% magenta line weight .2 mm	
9.100	Horizontal fold hinge of generic (type or orientation unspecified) small, minor fold (2nd option)—Showing bearing		all line weights .2 mm	
9.101	Inclined fold hinge of small, minor penecontemporaneous soft-sediment fold (1st option)—Showing bearing and plunge		3.0 mm color 100% magenta 20 draft as shown	
9.102	Inclined fold hinge of small, minor penecontemporaneous soft-sediment fold (2nd option)—Showing bearing and plunge		30	
9.103	Horizontal fold hinge of small, minor penecontemporaneous soft-sediment fold (1st option)—Showing bearing		3.0 mm color 100% magenta draft as shown	
9.104	Horizontal fold hinge of small, minor penecontemporaneous soft-sediment fold (2nd option)—Showing bearing		all line weights .2 mm	
9.105	Inclined fold hinge of small, minor anticline (1st option)—Showing bearing and plunge		color 100% magenta 3.5 mm 20 draft as shown	
9.106	Inclined fold hinge of small, minor anticline (2nd option)—Showing bearing and plunge		30	
9.107	Horizontal fold hinge of small, minor anticline (1st option)—Showing bearing. Ball on topographically higher side of fold		dot diameter .5 mm 3.5 mm draft as shown	
9.108	Horizontal fold hinge of small, minor anticline (2nd option)—Showing bearing. Ball on topographically higher side of fold		all line weights .2 mm color 100% magenta 4 mm	
9.109	Inclined fold hinge of small, minor antiform (1st option)—Showing bearing and plunge		color 100% magenta 3.3 mm 20 draft as shown	
9.110	Inclined fold hinge of small, minor antiform (2nd option)—Showing bearing and plunge		30	
9.111	Horizontal fold hinge of small, minor antiform (1st option)—Showing bearing. Ball on topographically higher side of fold		dot diameter .5 mm 3.5 mm draft as shown	
9.112	Horizontal fold hinge of small, minor antiform (2nd option)—Showing bearing. Ball on topographically higher side of fold		all line weights .2 mm color 100% magenta 4 mm	
9.113	Inclined fold hinge of small, minor syncline (1st option)—Showing bearing and plunge		color 100% magenta 2.45 mm 20 draft as shown	
9.114	Inclined fold hinge of small, minor syncline (2nd option)—Showing bearing and plunge		30	
9.115	Horizontal fold hinge of small, minor syncline (1st option)—Showing bearing. Ball on topographically higher side of fold		dot diameter .5 mm 2.45 mm draft as shown	
9.116	Horizontal fold hinge of small, minor syncline (2nd option)—Showing bearing. Ball on topographically higher side of fold		all line weights .2 mm color 100% magenta 1.3 mm	
9.117	Inclined fold hinge of small, minor synform (1st option)—Showing bearing and plunge		color 100% magenta 3.3 mm 20 draft as shown	
9.118	Inclined fold hinge of small, minor synform (2nd option)—Showing bearing and plunge		30	
9.119	Horizontal fold hinge of small, minor synform (1st option)—Showing bearing. Ball on topographically higher side of fold		dot diameter .5 mm 3.3 mm draft as shown	
9.120	Horizontal fold hinge of small, minor synform (2nd option)—Showing bearing. Ball on topographically higher side of fold		all line weights .2 mm color 100% magenta 8 mm	

*For more information, see general guidelines on pages A-i to A-v.

9—LINEATION (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.121	Inclined symmetric minor fold hinge (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 2.75 mm 6.0 mm HI-6 (100% black) 25° all lineweights .2 mm 1.25 mm	Open-angled ("2nd option") symbols may be used to show a second generation or another instance of a particular lineation. Lineation symbols may be used separately or combined with other symbols. For lineation symbols representing a single observation at one locality, the point of observation is at one of the following two places: for inclined lineations, at the "tail" end (opposite the arrow-head); for horizontal lineations, at the midpoint of the bearing line. For a single lineation symbol combined with a single planar-feature (for example, bedding or foliation) symbol, join the "tail" end of the lineation arrow to the midpoint of the strike line of the planar-feature symbol; the junction point is at the point of observation. For multiple observations at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentalations); the junction point is at the point of observation. May also be shown in black or other colors.
9.122	Inclined symmetric minor fold hinge (2nd option)—Showing bearing and plunge			
9.123	Horizontal symmetric minor fold hinge (1st option)—Showing bearing		color 100% magenta draft as shown 2.5 mm 6.0 mm 25° all lineweights .2 mm 1.25 mm	
9.124	Horizontal symmetric minor fold hinge (2nd option)—Showing bearing			
9.125	Inclined asymmetric (S-shaped, counterclockwise sense of shear) minor fold hinge (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.126	Inclined asymmetric (S-shaped, counterclockwise sense of shear) minor fold hinge (2nd option)—Showing bearing and plunge			
9.127	Horizontal asymmetric (S-shaped, counterclockwise sense of shear) minor fold hinge (1st option)—Showing bearing		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.128	Horizontal asymmetric (S-shaped, counterclockwise sense of shear) minor fold hinge (2nd option)—Showing bearing			
9.129	Inclined asymmetric (Z-shaped, clockwise sense of shear) minor fold hinge (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.130	Inclined asymmetric (Z-shaped, clockwise sense of shear) minor fold hinge (2nd option)—Showing bearing and plunge			
9.131	Horizontal asymmetric (Z-shaped, clockwise sense of shear) minor fold hinge (1st option)—Showing bearing		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.132	Horizontal asymmetric (Z-shaped, clockwise sense of shear) minor fold hinge (2nd option)—Showing bearing			
9.133	Inclined crenulation lineation (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.134	Inclined crenulation lineation (2nd option)—Showing bearing and plunge			
9.135	Horizontal crenulation lineation (1st option)—Showing bearing		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.136	Horizontal crenulation lineation (2nd option)—Showing bearing			
9.137	Inclined asymmetric (S-shaped, counterclockwise sense of shear) kink-band crenulation lineation (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.138	Inclined asymmetric (S-shaped, counterclockwise sense of shear) kink-band crenulation lineation (2nd option)—Showing bearing and plunge			
9.139	Horizontal asymmetric (S-shaped, counterclockwise sense of shear) kink-band crenulation lineation (1st option)—Showing bearing		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.140	Horizontal asymmetric (S-shaped, counterclockwise sense of shear) kink-band crenulation lineation (2nd option)—Showing bearing			
9.141	Inclined asymmetric (Z-shaped, clockwise sense of shear) kink-band crenulation lineation (1st option)—Showing bearing and plunge		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.142	Inclined asymmetric (Z-shaped, clockwise sense of shear) kink-band crenulation lineation (2nd option)—Showing bearing and plunge			
9.143	Horizontal asymmetric (Z-shaped, clockwise sense of shear) kink-band crenulation lineation (1st option)—Showing bearing		color 100% magenta draft as shown 3.0 mm all lineweights .2 mm	
9.144	Horizontal asymmetric (Z-shaped, clockwise sense of shear) kink-band crenulation lineation (2nd option)—Showing bearing			

*For more information, see general guidelines on pages A-i to A-v.

10—PALEONTOLOGICAL FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*				
10.1—Fossil locality								
10.1.1	Fossil locality—Showing collection number		 <i>line weight .2 mm</i> <i>dot diameter .5 mm</i>	May be shown in red or other colors.				
REF NO	DESCRIPTION	SYMBOL	REF NO	DESCRIPTION	SYMBOL	REF NO	DESCRIPTION	SYMBOL
10.2—Fossil symbols			10.2—Fossil symbols (continued)			10.2—Fossil symbols (continued)		
10.2.1	Macrofossils		10.2.23	Gastropods		10.2.45	Microfossils	
10.2.2	Invertebrates		10.2.24	Pelecypods		10.2.46	Conodonts	
10.2.3	Annelids		10.2.25	Sponges		10.2.47	Diatoms	
10.2.4	Arthropods		10.2.26	Vertebrates		10.2.48	Foraminifera	
10.2.5	Arachnids		10.2.27	Amphibians		10.2.49	Larger foraminifera, or fusulinids	
10.2.6	Crustaceans		10.2.28	Fish		10.2.50	Smaller, benthonic foraminifera	
10.2.7	Insects		10.2.29	Mammals		10.2.51	Smaller, planktonic foraminifera	
10.2.8	Trilobites		10.2.30	Reptiles		10.2.52	Nannofossils	
10.2.9	Brachiopods		10.2.31	Plants		10.2.53	Ostracodes	
10.2.10	Bryozoans		10.2.32	Leaves		10.2.54	Palynomorphs	
10.2.11	Cnidarians		10.2.33	Roots		10.2.55	Acritarchs	
10.2.12	Corals		10.2.34	Wood		10.2.56	Chitinozoans	
10.2.13	Stromatoporoids		10.2.35	Algae		10.2.57	Dinoflagellates	
10.2.14	Echinoderms		10.2.36	Conifers		10.2.58	Pollen and (or) spores	
10.2.15	Crinoids		10.2.37	Ferns		10.2.59	Radiolarians	
10.2.16	Echinoids		10.2.38	Flowering plants and (or) trees		10.2.60	Silicoflagellates	
10.2.17	Graptolites		10.2.39	Stromatolites		10.2.61	Spicules	
10.2.18	Mollusks		10.2.40	Fungi		CARTOGRAPHIC SPECIFICATIONS*		
10.2.19	Cephalopods		10.2.41	Trace fossils		<i>all line weights .125 mm</i> <i>draft as shown; size may vary (see below)</i>  <i>fill color 100% white</i>  <i>fill color 100% black</i>		
10.2.20	Ammonoids		10.2.42	Burrows		NOTES ON USAGE*		
10.2.21	Belemnoids		10.2.43	Coprolites		Fossil symbols usually are reserved for use on stratigraphic columns, sections, or charts. Cartographic specifications, although shown for only two examples, pertain to all fossil symbols. Fossil symbols may be reduced in size, and line weights reduced accordingly. Note, however, that line weights below .125 mm may not plot correctly if output at higher resolutions (1800 dpi or higher). May also be shown in other colors.		
10.2.22	Nautiloids		10.2.44	Tracks				

11—GEOPHYSICAL AND STRUCTURE CONTOURS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
11.1	Geophysical contour (index)—Accurately located		lineweight .325 mm line and text color 100% red HI-8	On most maps, every fourth or fifth contour should be an index contour.
11.2	Geophysical contour (index)—Showing datum (in parentheses): SL, sea level			Only index contours are labeled. Negative values must be preceded by a minus (–) sign.
11.3	Geophysical contour (index)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.0 mm 1.0 mm	Add hachures to indicate closed areas of lower values or if it is unclear that contour values are decreasing (hachures point into areas of low value).
11.4	Geophysical contour (index)—Approximately located where data are incomplete		.5 mm 4.5 mm	May be shown in black or other colors.
11.5	Geophysical contour (index)—Approximately located where data are incomplete. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.0 mm 1.0 mm	
11.6	Geophysical contour (intermediate)—Accurately located		lineweight .2 mm line color 100% red	
11.7	Geophysical contour (intermediate)—Accurately located. Hachures point into closed areas of lower values		all lineweights .2 mm 5.0 mm 1.0 mm	
11.8	Geophysical contour (intermediate)—Approximately located where data are incomplete		.5 mm 4.5 mm	
11.9	Geophysical contour (intermediate)—Approximately located where data are incomplete. Hachures point into closed areas of lower values		5.0 mm 1.0 mm	
11.10	Geophysical data collection locality		2.0 mm line color 100% red 90° lineweight .25 mm	May be shown in black or other colors.
11.11	Geophysical data collection locality—Showing value where known		line and text color 100% red 752 HI-7	
11.12	Maximum or minimum intensity value within closed high or closed low		lineweights .15 mm 30° 2.0 mm line and text color 100% red 2864 HI-7	
11.13	Structure contour, 1st surface (index)—Accurately located		lineweight .4 mm line and text color 100% red HI-9	On most maps, every fourth or fifth contour should be an index contour.
11.14	Structure contour, 1st surface (index)—Showing datum (in parentheses): SL, sea level			Only index contours are labeled. Negative values must be preceded by a minus (–) sign.
11.15	Structure contour, 1st surface (index)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm	Add hachures to indicate closed areas of lower values or if it is unclear that contour values are decreasing (hachures point into areas of low value).
11.16	Structure contour, 1st surface (index)—Approximately located where control is poor		.5 mm 5.0 mm	May be shown in black or other colors.
11.17	Structure contour, 1st surface (index)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	
11.18	Structure contour, 1st surface (intermediate)—Accurately located		lineweight .275 mm	
11.19	Structure contour, 1st surface (intermediate)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm	
11.20	Structure contour, 1st surface (intermediate)—Approximately located where control is poor		.5 mm 5.0 mm	
11.21	Structure contour, 1st surface (intermediate)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	
11.22	Outcrop point as structural control point (1st surface)		line and text color 100% red 90° 2.0 mm line weight .275 mm 1520 HI-7	May be shown in black or other colors.

*For more information, see general guidelines on pages A-i to A-v.

11—GEOPHYSICAL AND STRUCTURE CONTOURS (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
11.23	Structure contour, 2nd surface (index)—Accurately located		lineweight .4 mm HI-9 line and text color 100% violet	On most maps, every fourth or fifth contour should be an index contour. Only index contours are labeled. Negative values must be preceded by a minus (–) sign. Add hachures to indicate closed areas of low values or if it is unclear that contour values are decreasing (hachures point into areas of low value). May be shown in black or other colors.
11.24	Structure contour, 2nd surface (index)—Showing datum (in parentheses): SL, sea level			
11.25	Structure contour, 2nd surface (index)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm 5.0 mm	
11.26	Structure contour, 2nd surface (index)—Approximately located where control is poor		5.5 mm 5.0 mm	
11.27	Structure contour, 2nd surface (index)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	
11.28	Structure contour, 2nd surface (intermediate)—Accurately located		lineweight .275 mm	
11.29	Structure contour, 2nd surface (intermediate)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm 5.0 mm	
11.30	Structure contour, 2nd surface (intermediate)—Approximately located where control is poor		5.5 mm 5.0 mm	May be shown in black or other colors.
11.31	Structure contour, 2nd surface (intermediate)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	
11.32	Outcrop point as structural control point (2nd surface)		line and text color 100% violet 90° HI-7 lineweight .275 mm 2.0 mm	
11.33	Structure contour, 3rd surface (index)—Accurately located		lineweight .4 mm HI-9 line and text color 100% green	
11.34	Structure contour, 3rd surface (index)—Showing datum (in parentheses): SL, sea level			
11.35	Structure contour, 3rd surface (index)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm 5.0 mm	
11.36	Structure contour, 3rd surface (index)—Approximately located where control is poor		5.5 mm 5.0 mm	
11.37	Structure contour, 3rd surface (index)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	May be shown in black or other colors.
11.38	Structure contour, 3rd surface (intermediate)—Accurately located		lineweight .275 mm	
11.39	Structure contour, 3rd surface (intermediate)—Accurately located. Hachures point into closed areas of lower values		hachure lineweight .2 mm 5.5 mm 1.0 mm 5.0 mm	
11.40	Structure contour, 3rd surface (intermediate)—Approximately located where control is poor		5.5 mm 5.0 mm	
11.41	Structure contour, 3rd surface (intermediate)—Approximately located where control is poor. Hachures point into closed areas of lower values		5.5 mm 1.0 mm	
11.42	Outcrop point as structural control point (3rd surface)		line and text color 100% green 90° HI-7 lineweight .275 mm 2.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

12—FLUVIAL AND ALLUVIAL FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
12.1	Fluvial terrace scarp—Identity and existence certain, location accurate. Hachures point downscarp		<p>all lineweights .2 mm</p> <p>2.0 mm</p> <p>H-8</p> <p>1.125 mm</p> <p>.75 mm</p> <p>12.0 mm</p> <p>color 100% cyan</p> <p>3.5 mm</p> <p>.75 mm .75 mm</p>	May also be shown in black or other colors.
12.2	Fluvial terrace scarp—Identity or existence questionable, location accurate. Hachures point downscarp			
12.3	Fluvial terrace scarp—Identity and existence certain, location approximate. Hachures point downscarp			
12.4	Fluvial terrace scarp—Identity or existence questionable, location approximate. Hachures point downscarp			
12.5	Fluvial transport direction		<p>lineweight .2 mm</p> <p>1.75 mm</p> <p>25°</p> <p>6.0 mm</p> <p>color 100% cyan</p>	
12.6	Sediment transport direction determined from imbrication		<p>circle diameters .75 mm</p> <p>6.0 mm</p> <p>color 100% cyan</p> <p>all lineweights .2 mm</p>	
12.7	Sediment transport direction determined from crossbeds		<p>90°</p> <p>1.25 mm</p> <p>5.5 mm</p> <p>color 100% cyan</p> <p>all lineweights .2 mm</p>	
12.8	Sediment transport direction determined from flute casts		<p>90°</p> <p>1.375 mm</p> <p>5.5 mm</p> <p>color 100% cyan</p> <p>all lineweights .2 mm</p>	

*For more information, see general guidelines on pages A-i to A-v.

13—GLACIAL AND GLACIOFLUVIAL FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
13.1	Crevasse on glacier		lineweights .2 mm color 100% cyan lengths may vary	
13.2	Ice-flow direction		lineweight .25 mm color 100% cyan length may vary 60°	
13.3	Glacial-lake spillway—Arrow shows direction of flow		color 100% cyan 1.25 mm lineweight .2 mm 25° length may vary 60° 2.0 mm	
13.4	Glacial-lake spillway—Showing elevation. Arrow shows direction of flow		785' HI-6 (100% black)	
13.5	Inferred glacial-lake spillway—Arrow shows direction of flow		all lineweights .2 mm	
13.6	Inferred glacial-lake spillway—Showing estimated elevation. Arrow shows direction of flow		785'	
13.7	Glacial meltwater stream—Barbs show direction of flow		all lineweights .2 mm 7.5 mm color 100% cyan 3.0 mm 2.25 mm spacing may vary 20°	
13.8	Cutbanks of glacial meltwater stream channel (mapped to scale)—Hachures point into channel		all lineweights .25 mm color 100% cyan 1.125 mm 3.0 mm	
13.9	Flow direction of glacial meltwater in stream channel		color 100% cyan all lineweights .2 mm 2.0 mm stem lengths may vary 25°	
13.10	Crest line of moraine, sense of symmetry unspecified (1st option)		color 100% cyan lineweight .2 mm circle diameter .75 mm; spacing .625 mm	
13.11	Crest line of moraine, sense of symmetry unspecified (2nd option)		color 100% cyan dot diameter .825 mm; spacing .625 mm	
13.12	Crest line of symmetrical moraine		color 100% cyan 3.0 mm .5 mm all lineweights .2 mm circle diameter .675 mm; hachure height 1.5 mm	
13.13	Crest line of asymmetrical moraine—Ticks point down steeper slope		hachure height .75 mm	
13.14	Ridges on moraine		color 100% cyan lineweight .25 mm lengths and spacing may vary	
13.15	Scarp at top of ice-contact slope—Hachures point downscarp		.5 mm 1.375 mm 12° color 100% cyan	
13.16	Ice-contact slope		pattern 521-C in 50% cyan	
13.17	Esker or ice-channel deposit, transport direction unknown		1.25 mm .375 mm .625 mm color 100% cyan lineweight .2 mm 70°	
13.18	Esker or ice-channel deposit, transport direction known (1st option)—Chevrons point in direction of transport		color 100% cyan 70° 1.25 mm 1.0 mm lineweight .2 mm	
13.19	Esker or ice-channel deposit, transport direction known (2nd option)—Chevrons point in direction of transport		color 100% cyan 70° 5.0 mm 1.25 mm lineweight .375 mm lineweight .2 mm	
13.20	Drumlin—Showing bearing and direction of flow		2.25 mm 1.25 mm 25° 1.875 mm 6.0 mm color 100% cyan all lineweights .2 mm	Point of observation is at the midpoint of the bearing line.
13.21	Drumlin, flow direction unknown (1st option)—Showing bearing		1.875 mm 6.0 mm lineweight .2 mm	May also be shown in black or other colors.
13.22	Drumlin, flow direction unknown (2nd option)—Showing bearing		1.75 mm 1.0 mm 3.5 mm lineweight .2 mm color 100% cyan	
13.23	Drumlin (length mapped to scale)—Showing bearing and direction of flow		color 100% cyan 1.25 mm draw length to scale 1.25 mm 25° all lineweights .2 mm	Use when map scale is large enough to show actual length of drumlin.
13.24	Drumlin (length mapped to scale), flow direction unknown—Showing bearing		draw length to scale	May also be shown in black or other colors.

*For more information, see general guidelines on pages A-i to A-v.

13—GLACIAL AND GLACIOFLUVIAL FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
13.25	Kettle		color 100% cyan 45° 1.75 mm 3.0 mm all lineweights .2 mm	May also be shown in black or other colors.
13.26	Hummocky topography (1st option)		pattern 523-K in 50% black	
13.27	Hummocky topography (2nd option)		pattern 523-DO in 50% black	
13.28	Hummocky topography (3rd option)		pattern 524-K in 50% black	
13.29	Younger glacial striation or groove—Showing general bearing and direction of flow		lineweight .2 mm 6.0 mm 25° 1.25 mm color 100% cyan	Point of observation is at the midpoint of the bearing line.
13.30	Younger glacial striation or groove—Showing measured bearing and direction of flow. Dot indicates location of observation point		2.625 mm dot diameter .75 mm	May also be shown in black or other colors.
13.31	Older glacial striation or groove—Showing general bearing and direction of flow		2.625 mm all lineweights .2 mm circle diameter .75 mm	
13.32	Older glacial striation or groove—Showing measured bearing and direction of flow. Open circle indicates location of observation point		2.625 mm all lineweights .2 mm circle diameter .75 mm	
13.33	Younger glacial striation or groove, flow direction unknown—Showing general bearing		lineweight .2 mm 6.0 mm color 100% cyan	
13.34	Younger glacial striation or groove, flow direction unknown—Showing measured bearing. Dot indicates location of observation point		2.625 mm dot diameter .75 mm	
13.35	Older glacial striation or groove, flow direction unknown—Showing general bearing		2.625 mm all lineweights .2 mm circle diameter .75 mm	
13.36	Older glacial striation or groove, flow direction unknown—Showing measured bearing. Open circle indicates location of observation point		2.625 mm all lineweights .2 mm circle diameter .75 mm	
13.37	Younger glacial striation or groove (length mapped to scale)—Arrow shows direction of flow		lineweight .2 mm color 100% cyan length may vary 25° 1.5 mm	Use when map scale is large enough to show actual length of striation or groove.
13.38	Younger glacial striation or groove (length mapped to scale), flow direction unknown		length may vary	May also be shown in black or other colors.
13.39	Older glacial striation or groove (length mapped to scale)—Arrow shows direction of flow		lineweight .2 mm 2.125 mm color 100% cyan length may vary circle diameter .75 mm	
13.40	Older glacial striation or groove (length mapped to scale), flow direction unknown		length may vary	
13.41	Cirque headwall—Hachures point into cirque		lineweight .2 mm color 100% cyan hachure height 1.0 mm; spacing 1.0 mm lineweight .3 mm	May also be shown in black or other colors.
13.42	Arête or headwall of adjoining cirques		lineweight .2 mm color 100% cyan hachure height 2.0 mm; spacing 1.0 mm lineweight .3 mm	
13.43	Margin of glacially scoured basin—Identity and existence certain, location accurate. Hachures point into basin		all lineweights .225 mm color 100% cyan H-8 1.0 mm 12.0 mm 1.0 mm 2.0 mm	
13.44	Margin of glacially scoured basin—Identity or existence questionable, location accurate. Hachures point into basin			
13.45	Margin of glacially scoured basin—Identity and existence certain, location approximate. Hachures point into basin		3.5 mm 2.0 mm 1.25 mm 1.25 mm	
13.46	Margin of glacially scoured basin—Identity or existence questionable, location approximate. Hachures point into basin		.75 mm .75 mm	
13.47	Margin of glacially scoured basin—Identity and existence certain, location concealed. Hachures point into basin		1.25 mm	
13.48	Margin of glacially scoured basin—Identity or existence questionable, location concealed. Hachures point into basin		.75 mm .75 mm	

*For more information, see general guidelines on pages A-i to A-v.

13—GLACIAL AND GLACIOFLUVIAL FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
13.49	Glacial limit or terminus—Identity and existence certain, location accurate		lineweight .45 mm color 100% cyan	May also be shown in black or other colors.
13.50	Glacial limit or terminus—Identity or existence questionable, location accurate			
13.51	Glacial limit or terminus—Identity and existence certain, location approximate			
13.52	Glacial limit or terminus—Identity or existence questionable, location approximate			
13.53	Glacial limit or terminus—Identity and existence certain, location inferred			
13.54	Glacial limit or terminus—Identity or existence questionable, location inferred			
13.55	Glacial limit or terminus—Identity and existence certain, location concealed			
13.56	Glacial limit or terminus—Identity or existence questionable, location concealed			
13.57	Glacial limit or terminus—Showing name of glaciation (BL, Bull Lake)			
13.58	Limit of significant glacial advance—Identity and existence certain, location accurate. Hachures on side of advancing ice		lineweight .3 mm color 100% cyan	
13.59	Limit of significant glacial advance—Identity or existence questionable, location accurate. Hachures on side of advancing ice			
13.60	Limit of significant glacial advance—Identity and existence certain, location approximate. Hachures on side of advancing ice			
13.61	Limit of significant glacial advance—Identity or existence questionable, location approximate. Hachures on side of advancing ice			
13.62	Limit of significant glacial advance—Identity and existence certain, location concealed. Hachures on side of advancing ice			
13.63	Limit of significant glacial advance—Identity or existence questionable, location concealed. Hachures on side of advancing ice			
13.64	Retreatal position of stagnant ice margin—Identity and existence certain, location accurate		lineweight .3 mm color 100% cyan	
13.65	Retreatal position of stagnant ice margin—Identity or existence questionable, location accurate			
13.66	Retreatal position of stagnant ice margin—Identity and existence certain, location approximate			
13.67	Retreatal position of stagnant ice margin—Identity or existence questionable, location approximate			
13.68	Retreatal position of stagnant ice margin—Identity and existence certain, location inferred			
13.69	Retreatal position of stagnant ice margin—Identity or existence questionable, location inferred			
13.70	Retreatal position of stagnant ice margin—Identity and existence certain, location concealed			
13.71	Retreatal position of stagnant ice margin—Identity or existence questionable, location concealed			
13.72	Retreatal position of stagnant ice margin—Showing name of depositional unit			

*For more information, see general guidelines on pages A-i to A-v.

14—PERIGLACIAL FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
14.1	Pingo		all lineweights .2 mm dot diameter .325 mm circle diameter 1.5 mm 60° .875 mm color 100% cyan	May also be shown in black or other colors.
14.2	Periglacial patterned ground		pattern 591-C	
14.3	Polygonal patterned ground		pattern 592-C	
14.4	Sorted circles		diameter .9 mm color 100% cyan lineweight .2 mm	
14.5	Stone stripe, fine debris		circle diameter .9 mm; spacing .45 mm	
14.6	Stone stripe, coarse debris		circle lineweight .2 mm color 100% cyan dot diameter .5 mm; spacing 1.25 mm	
14.7	Solifluction lobes		pattern 593-C	
14.8	Ice-wedge polygon		2.25 mm color 100% cyan	
14.9	Ice-wedge polygons		pattern 594-C	
14.10	Felsenmeer		pattern 595-C	
14.11	Thermokarst depression		color 100% cyan all lineweights .2 mm hachure height 1.0 mm; spacing 1.75 mm	

*For more information, see general guidelines on pages A-i to A-v.

15—LACUSTRINE AND MARINE FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
15.1	Beach		color 100% cyan dot diameter .75 mm; spacing .75 mm	May also be shown in black or other colors.
15.2	Beach ridges		color 100% cyan lineweight .2 mm length and spacing may vary	
15.3	Marine-abrasion platform (1st option)		pattern 201-C (at 45°)	
15.4	Marine-abrasion platform (2nd option)		pattern 522-C	
15.5	Aggradational shoreline—Identity and existence certain, location accurate. Triangles point offshore		color 100% cyan lineweight .2 mm H-8	
15.6	Aggradational shoreline—Identity or existence questionable, location accurate. Triangles point off-shore		1.5 mm 12.0 mm 2.0 mm 22° .75 mm	
15.7	Aggradational shoreline—Identity and existence certain, location approximate. Triangles point off-shore		3.5 mm	
15.8	Aggradational shoreline—Identity or existence questionable, location approximate. Triangles point offshore		.75 mm .75 mm	
15.9	Erosional shoreline—Identity and existence certain, location accurate. Triangles point onshore		color 100% cyan lineweight .2 mm H-8	
15.10	Erosional shoreline—Identity or existence questionable, location accurate. Triangles point onshore		1.5 mm 12.0 mm 2.0 mm 22° .75 mm	
15.11	Erosional shoreline—Identity and existence certain, location approximate. Triangles point onshore		3.5 mm	
15.12	Erosional shoreline—Identity or existence questionable, location approximate. Triangles point on-shore		.75 mm .75 mm	
15.13	Former shoreline or marine limit—Identity and existence certain, location accurate		lineweight .25 mm color 100% cyan H-8	
15.14	Former shoreline or marine limit—Identity or existence questionable, location accurate		.75 mm 12.0 mm	
15.15	Former shoreline or marine limit—Identity and existence certain, location approximate		3.5 mm	
15.16	Former shoreline or marine limit—Identity or existence questionable, location approximate		.75 mm .75 mm	
15.17	Former shoreline or marine limit—Identity and existence certain, location inferred		1.5 mm	
15.18	Former shoreline or marine limit—Identity or existence questionable, location inferred		.75 mm .75 mm	
15.19	Former shoreline or marine limit—Identity and existence certain, location concealed		.5 mm	
15.20	Former shoreline or marine limit—Identity or existence questionable, location concealed		.75 mm .75 mm	
15.21	Former shoreline or marine limit—Showing name (B, Bonneville)		H-8 (100% black)	

*For more information, see general guidelines on pages A-i to A-v.

15—LACUSTRINE AND MARINE FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
15.22	Shoreline cliff—Identity and existence certain, location accurate. Hachures point down cliff		<p>color 100% cyan all lineweights .2 mm</p>	May also be shown in black or other colors.
15.23	Shoreline cliff—Identity or existence questionable, location accurate. Hachures point down cliff			
15.24	Shoreline cliff—Identity and existence certain, location approximate. Hachures point down cliff			
15.25	Shoreline cliff—Identity or existence questionable, location approximate. Hachures point down cliff			
15.26	Spit or bar—Identity and existence certain, location accurate		<p>color 100% cyan all lineweights .2 mm</p>	
15.27	Spit or bar—Identity or existence questionable, location accurate			
15.28	Spit or bar—Identity and existence certain, location approximate			
15.29	Spit or bar—Identity or existence questionable, location approximate			

*For more information, see general guidelines on pages A-i to A-v.

16—EOLIAN FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
16.1	Dune crest		lineweight .25 mm dash .375 mm; space .3 mm	Dune forms shown by traces of dune crests.
16.2	Scarp on dune crest, caused by slip—Hachures point down slip face of dune		hachure lineweight .2 mm; height 1.0 mm; spacing 4.75 mm	
16.3	Blowout rim around closed depression of eolian origin in dune field—Hachures point into closed depression		all lineweights .15 mm hachure height .875 mm; spacing 3.5 mm long dash 1.4 mm; short dash .5 mm; space .375 mm	
16.4	Blowout rim around closed depression of eolian origin in bedrock—Accurately located. Hachures point into closed depression		all lineweights .2 mm hachure height .875 mm; spacing 2.5 mm	
16.5	Blowout rim around closed depression of eolian origin in bedrock—Approximately located. Hachures point into closed depression		2.5 mm 5 mm	
16.6	Edge of dry lakebed within closed depression of eolian origin in bedrock		lineweight .15 mm; dash length 1.5 mm; space .375 mm	
16.7	Sediment transport direction determined from dune forms		all lineweights .15 mm 1.5 mm .875 mm 5.0 mm .875 mm 20° 1.0 mm 1.25 mm	Point of observation is at the midpoint of the bearing line.
16.8	Sediment transport direction determined from dune bedding in horizontal section		1.25 mm 1.5 mm 1.0 mm .875 mm radius all lineweights .15 mm	
16.9	Sediment transport direction determined from eolian crossbedding in vertical or near-vertical section		.5 mm 2.5 mm 1.0 mm dot diameter .3 mm; spacing .225 mm 40°	

*For more information, see general guidelines on pages A-i to A-v.

17—LANDSLIDE AND MASS-WASTING FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
17.1	Outline of slip surface of landslide—Identity and existence certain, location accurate		linecolor 60% black lineweight .2 mm H-8 (60% black)	May be used to outline area of slip surface of landslide if desired. Do not use to outline landslide deposits (use a map-unit boundary contact instead).
17.2	Outline of slip surface of landslide—Identity or existence questionable, location accurate		12.0 mm .75 mm	
17.3	Outline of slip surface of landslide—Identity and existence certain, location approximate		3.5 mm ?	
17.4	Outline of slip surface of landslide—Identity or existence questionable, location approximate		.75 mm .75 mm	
17.5	Outline of slip surface of landslide—Identity and existence certain, location inferred		1.5 mm ?	
17.6	Outline of slip surface of landslide—Identity or existence questionable, location inferred		.75 mm .75 mm	
17.7	Outline of slip surface of landslide—Identity and existence certain, location concealed		.5 mm ?	
17.8	Outline of slip surface of landslide—Identity or existence questionable, location concealed		.75 mm .75 mm	
17.9	Area of slip surface of landslide		pattern 431-K in 50% black (rotated so lines parallel slip direction)	Downslope edge of slip surface is usually concealed by landslide deposits or debris materials. Landslide arrows may be shown singly or in pairs.
17.10	Direction of downslope movement of landslide		outline of slip surface [lineweight .2 mm, in 60% black] contact [lineweight .15 mm] 50°/2.0 mm arrow lineweight .175 mm length and curve of arrow may vary	
17.11	Landslide deposits—Arrows show direction of downslope movement			
17.12	Head or main scarp of landslide—Active, sharp, distinct, and accurately located. Hachures point down scarp		all lineweights .25 mm hachure height 1.0 mm; spacing 1.75 mm	Place line along crown of scarp. May be shown in red or other colors.
17.13	Head or main scarp of landslide—Inactive, subdued, indistinct, and (or) approximately located. Hachures point down scarp		.5 mm 3.0 mm	
17.14	Head or main scarp of landslide—Showing height (in meters). Hachures point down scarp		0.8 HI-7	
17.15	Head or main scarp of rotated block in landslide—Arrow shows direction of oblique slip. Hachures point down scarp		5.0 mm 2.5 mm 15° arrow lineweight .175 mm	
17.16	Internal or minor scarp in landslide—Active, sharp, distinct, and accurately located. Hachures point down scarp		all lineweights .25 mm hachure height .75 mm; spacing 1.25 mm	
17.17	Internal or minor scarp in landslide—Inactive, subdued, indistinct, and (or) approximately located. Hachures point down scarp		.5 mm 2.0 mm	
17.18	Internal or minor scarp in landslide—Showing height (in meters). Hachures point down scarp		0.3 HI-6	
17.19	Internal or minor scarp of rotated block in landslide—Arrow shows direction of oblique slip. Hachures point down scarp		4.5 mm 15° 2.0 mm arrow lineweight .175 mm	

*For more information, see general guidelines on pages A-i to A-v.

17—LANDSLIDE AND MASS-WASTING FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
17.20	Main toe of landslide—Active, sharp, distinct, and accurately located		3.0 mm lineweight .25 mm	Place line along base of toe; sawteeth on over-riding block.
17.21	Main toe of landslide—Inactive, subdued, indistinct, and (or) approximately located		.5 mm 3.0 mm	May be shown in red or other colors.
17.22	Minor toe, internal thrust fault, or pressure ridge in landslide—Active, sharp, distinct, and accurately located		2.5 mm lineweight .25 mm	
17.23	Minor toe, internal thrust fault, or pressure ridge in landslide—Inactive, subdued, indistinct, and (or) approximately located		.5 mm 2.0 mm	
17.24	Minor toe, internal thrust fault, or pressure ridge in landslide, showing transport reversal—Active, sharp, distinct, and accurately located		lineweight .25 mm .85 mm	
17.25	Minor toe, internal thrust fault, or pressure ridge in landslide, showing transport reversal—Inactive, subdued, indistinct, and (or) approximately located		.5 mm 2.0 mm	
17.26	Right flank of landslide or right-lateral shear feature—Active, sharp, distinct, and accurately located		15° lineweight .25 mm arrow lineweight .175 mm	Arrow shows sense of lateral movement. Place arrow on side of moving ground or on displaced earth materials.
17.27	Right flank of landslide or right-lateral shear feature—Inactive, subdued, indistinct, and (or) approximately located		.5 mm 3.0 mm	
17.28	Right flank of landslide or right-lateral shear feature—Concealed by landslide deposits or debris materials		.5 mm .5 mm	In cross section, can also be used to show plane of slope failure.
17.29	Right flank of landslide or right-lateral shear feature—Showing amount of offset (in meters)		2.3 2.3 HI-7	May be shown in red or other colors.
17.30	Left flank of landslide or left-lateral shear feature—Active, sharp, distinct, and accurately located		2.5 mm lineweight .25 mm arrow lineweight .175 mm	
17.31	Left flank of landslide or left-lateral shear feature—Inactive, subdued, indistinct, and (or) approximately located		.5 mm 3.0 mm	
17.32	Left flank of landslide or left-lateral shear feature—Concealed by landslide deposits or debris materials		.5 mm .5 mm	
17.33	Left flank of landslide or left-lateral shear feature—Showing amount of offset (in meters)		2.3 2.3 HI-7	
17.34	Open tension crack or fracture on landslide		hachure height .5 mm all lineweights .2 mm	Hachures point into crack.
17.35	Tension crack or fracture on landslide (1st option)		all lineweights .2 mm 1.0 mm	May be shown in red or other colors.
17.36	Tension crack or fracture on landslide (2nd option)		all lineweights .2 mm 1.2 mm dash .375 mm; space .325 mm	
17.37	Tension crack or fracture on landslide (3rd option)		lineweight .2 mm .75 mm	
17.38	En echelon cracks or fractures on landslide, indicating right-lateral shear		15° crack lineweights .2 mm arrow lineweight .175 mm	Arrow shows sense of lateral movement. May be shown in red or other colors.
17.39	En echelon cracks or fractures on landslide, indicating left-lateral shear		2.5 mm crack lineweights .2 mm arrow lineweight .175 mm	
17.40	Anticlinal soft-sediment fold, buckle fold, bulge, or linear ridge on landslide		line length can vary lineweight .25 mm arrow lineweight .175 mm	May be shown in red or other colors.
17.41	Dome structure or bulge on landslide		line length can vary lineweight .25 mm arrow lineweight .175 mm	
17.42	Synclinal soft-sediment fold or linear depression on landslide		line length can vary lineweight .25 mm arrow lineweight .175 mm	
17.43	Basin structure or depression on landslide		line length can vary line lengths can vary 1.0 mm .75 mm	

*For more information, see general guidelines on pages A-i to A-v.

17—LANDSLIDE AND MASS-WASTING FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
17.44	Crest line of lateral levee on landslide (1st option)		lineweights .175 mm 1.0 mm 1.5 mm crest line .65 mm angle < 60°	
17.45	Crest line of lateral levee on landslide (2nd option)		1.0 mm 1.5 mm crest line .65 mm angle < 60°	
17.46	Path of gully on landslide		all lineweights .2 mm 25° 4.5 mm 1.375 mm 1.575 mm	
17.47	Soil creep or incipient sliding on landslide		lineweight .2 mm 1.0 mm 6.75 mm 20° 1.5 mm	Arrow points downhill. May be shown in red or other colors.
17.48	Spring, seep, or drainage (runoff) on landslide		lineweight .2 mm circle diameter 1.5 mm; tail length 3.0 mm	Tail points downhill. May be shown in red or other colors.
17.49	Sag pond or closed depression on landslide (mapped to scale)		all lineweights .175 mm hachure height .875 mm; spacing 1.25 mm	Hachures point into depression.
17.50	Hummock on landslide (mapped to scale)		all lineweights .175 mm hachure height .875 mm; spacing 1.25 mm	Hachures point away from hummock.
17.51	Hummock on landslide (shown as point symbol when too small to outline at map scale)		all lineweights .175 mm 60° hachure height .875 mm circle diameter 1.5 mm	
17.52	Tilt direction of surface of landslide		4.0 mm 1.125 mm 2.0 mm 30° lineweight .2 mm 2.0 mm	Usually shown on special-purpose landslide activity maps.
17.53	Tilt direction of surface of landslide—Showing angle of tilt		14 HI-6	May also be shown in red or other colors.
17.54	Displacement vector—Showing bearing		lineweight .2 mm 1.75 mm 6.75 mm 25°	
17.55	Displacement vector—Showing bearing and distance		1.3 HI-7	
17.56	Active, reactivated, or historically active debris flow, showing a sharply defined morphology		4.0 mm 1.5 mm 20° color 100% magenta	Usually shown on special-purpose landslide activity maps.
17.57	Dormant-young debris flow, showing a fresh and uneroded morphology but having no evidence of historic activity		color 50% magenta	If necessary, alphanumeric characters may be added to help distinguish landslide areas.
17.58	Active, reactivated, or historically active landslide (mapped to scale), showing a sharply defined morphology		fill color 60% magenta	May also be shown in red or other colors.
17.59	Dormant-young landslide (mapped to scale), showing a fresh and uneroded morphology but having no evidence of historic activity		fill color 40% magenta	
17.60	Dormant-mature landslide (mapped to scale), showing a smoothed and eroded morphology		fill color 20% magenta	
17.61	Dormant-old or relict landslide (mapped to scale), showing a weak morphology		fill color 8% magenta	
17.62	Rock slide, slump, block-glide landslide, rotational landslide, or Toreva block, consisting of a relatively intact mass of displaced materials		draft as shown 5 mm 90° all lineweights .3 mm	Usually shown on special-purpose landslide activity maps.
17.63	Earth flow, consisting of a relatively thick and jumbled mixture of displaced materials		draft as shown 90° all lineweights .3 mm	May also be shown in red or other colors.
17.64	Debris slide, consisting of a loose and relatively shallow veneer of displaced materials		4.5 mm 1.0 mm 90° all lineweights .3 mm	If necessary, symbols may be enlarged or reduced.
17.65	Debris-slide slope (mapped to scale), consisting of coalesced scars of landslides and debris flows that are too small or numerous to be shown at map scale		fill color 20% black	Usually shown on special-purpose landslide activity maps.

*For more information, see general guidelines on pages A-i to A-v.

18—VOLCANIC FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
18.1	Rim of volcanic crater—Identity and existence certain, location accurate. Hachures point into crater			Use to show outline of topographic wall. Rim may not outline crater completely. May also be shown in red, magenta, or other colors.
18.2	Rim of volcanic crater—Identity or existence questionable, location accurate. Hachures point into crater			
18.3	Rim of volcanic crater—Identity or existence certain, location approximate. Hachures point into crater			
18.4	Rim of volcanic crater—Identity or existence questionable, location approximate. Hachures point into crater			
18.5	Rim of volcanic crater—Identity and existence certain, location concealed. Hachures point into crater			
18.6	Rim of volcanic crater—Identity or existence questionable, location concealed. Hachures point into crater			
18.7	Rim of volcanic crater—Dot shows low point of crater			
18.8	Caldera margin (1st option)—Identity and existence certain, location accurate. Ticks point into caldera			May also be shown in red, magenta, or other colors.
18.9	Caldera margin (1st option)—Identity or existence questionable, location accurate. Ticks point into caldera			
18.10	Caldera margin (1st option)—Identity and existence certain, location approximate. Ticks point into caldera			
18.11	Caldera margin (1st option)—Identity or existence questionable, location approximate. Ticks point into caldera			
18.12	Caldera margin (1st option)—Identity and existence certain, location inferred. Ticks point into caldera			
18.13	Caldera margin (1st option)—Identity or existence questionable, location inferred. Ticks point into caldera			
18.14	Caldera margin (1st option)—Identity and existence certain, location concealed. Ticks point into caldera			
18.15	Caldera margin (1st option)—Identity or existence questionable, location concealed. Ticks point into caldera			
18.16	Caldera margin (2nd option)—Identity and existence certain, location accurate. Ticks point into caldera			May also be shown in red, magenta, or other colors.
18.17	Caldera margin (2nd option)—Identity or existence questionable, location accurate. Ticks point into caldera			
18.18	Caldera margin (2nd option)—Identity and existence certain, location approximate. Ticks point into caldera			
18.19	Caldera margin (2nd option)—Identity or existence questionable, location approximate. Ticks point into caldera			
18.20	Caldera margin (2nd option)—Identity and existence certain, location inferred. Ticks point into caldera			
18.21	Caldera margin (2nd option)—Identity or existence questionable, location inferred. Ticks point into caldera			
18.22	Caldera margin (2nd option)—Identity and existence certain, location concealed. Ticks point into caldera			
18.23	Caldera margin (2nd option)—Identity or existence questionable, location concealed. Ticks point into caldera			

*For more information, see general guidelines on pages A-i to A-v.

18—VOLCANIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
18.24	Contact separating individual lava flows within same map unit—Identity and existence certain, location accurate		lineweight .2 mm color 100% red	May also be shown in magenta, black, or other colors.
18.25	Contact separating individual lava flows within same map unit—Identity or existence questionable, location accurate			
18.26	Contact separating individual lava flows within same map unit—Identity and existence certain, location approximate			
18.27	Contact separating individual lava flows within same map unit—Identity or existence questionable, location approximate			
18.28	Contact separating individual lava flows within same map unit—Identity and existence certain, location inferred			
18.29	Contact separating individual lava flows within same map unit—Identity or existence questionable, location inferred			
18.30	Contact separating individual lava flows within same map unit—Identity and existence certain, location concealed			
18.31	Contact separating individual lava flows within same map unit—Identity or existence questionable, location concealed			
18.32	Flow lobe or lava-flow front—Identity and existence certain, location accurate. Hachures on side of overlying younger flow		all lineweights .2 mm color 100% red 	
18.33	Flow lobe or lava-flow front—Identity or existence questionable, location accurate. Hachures on side of overlying younger flow			
18.34	Flow lobe or lava-flow front—Identity and existence certain, location approximate. Hachures on side of overlying younger flow			
18.35	Flow lobe or lava-flow front—Identity or existence questionable, location approximate. Hachures on side of overlying younger flow			
18.36	Flow lobe or lava-flow front—Identity and existence certain, location concealed. Hachures on side of overlying younger flow			
18.37	Flow lobe or lava-flow front—Identity or existence questionable, location concealed. Hachures on side of overlying younger flow			
18.38	Form line on lava flow		lineweight .2 mm color 100% red length and spacing may vary	
18.39	Flow lines on lava flow		color 100% red stem lineweight .175 mm 25° 2.0 mm stem length and spacing may vary	
18.40	Cracks on surface of lava flow		lineweight .25 mm color 100% red length and spacing may vary	
18.41	Volcanic fissure			
18.42	Buried volcanic fissure			
18.43	Volcanic fissure where lava has been emitted			
18.44	Lava tube—Red circles indicate presence of skylights (not mapped to scale) along lava tube		circle lineweight .2 mm; diameter .75 mm; color 100% red lineweight .15 mm 25° 1.375 mm	
18.45	Lava tube—Red circles outline collapses (mapped to scale) along lava tube		lineweight .2 mm; color 100% red	
18.46	Crest line of pressure ridge or tumulus on lava flow		lineweight .2 mm color 100% red 60° 5.5 mm 1.0 mm	
18.47	Pressure ridge on lava flow		lineweight .2 mm color 100% red 60° 5.5 mm 1.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

18—VOLCANIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
18.48	Ice-contact lava-flow margin—Identity and existence certain, location accurate. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red	May also be shown in magenta, black, or other colors.
18.49	Ice-contact lava-flow margin—Identity or existence questionable, location accurate. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red H-8 rectangle height .5 mm rectangle width .75 mm rectangle spacing 2.0 mm line spacing 12.0 mm	
18.50	Ice-contact lava-flow margin—Identity and existence certain, location approximate. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red rectangle height .5 mm rectangle width .75 mm rectangle spacing 2.0 mm	
18.51	Ice-contact lava-flow margin—Identity or existence questionable, location approximate. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red rectangle height .5 mm rectangle width .75 mm rectangle spacing 2.0 mm	
18.52	Ice-contact lava-flow margin—Identity and existence certain, location concealed. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red rectangle height .5 mm rectangle width .75 mm rectangle spacing 2.0 mm	
18.53	Ice-contact lava-flow margin—Identity or existence questionable, location concealed. Rectangles on side of overlying younger flow		lineweight .2 mm color 100% red rectangle height .5 mm rectangle width .75 mm rectangle spacing 2.0 mm	
18.54	Outline of basalt-filled lava pond		all lineweights .2 mm tick spacing 2.0 mm (at base) color 100% red rectangle height .875 mm rectangle width 1.0 mm	May also be shown in magenta, black, or other colors.
18.55	Small cone, vent, cinder cone, or spatter cone		lineweight .2 mm color 100% red asterisk height 2.0 mm asterisk width 2.0 mm asterisk angle 60°	May also be shown in magenta, black, or other colors.
18.56	Large cone, vent, cinder cone, or spatter cone		lineweight .2 mm color 100% red asterisk height 2.625 mm asterisk width 2.625 mm asterisk angle 60°	
18.57	Small hornito		lineweight .2 mm color 100% red asterisk height 2.0 mm asterisk width 2.0 mm asterisk angle 45°	
18.58	Large hornito		lineweight .2 mm color 100% red asterisk height 2.625 mm asterisk width 2.625 mm asterisk angle 45°	
18.59	Spatter rampart		lineweight .2 mm color 100% red rectangle height .5 mm rectangle width 1.5 mm rectangle spacing 2.0 mm line spacing 90°	
18.60	Rootless vent area on lava flow		lineweight .2 mm line color 100% red pattern 327-R	
18.61	Thermal area		lineweight .2 mm line color 100% red pattern 121-R in 50% red	May also be shown in magenta, black, or other colors.
18.62	Thermal spring		color 100% red dot diameter 1.5 mm radius .5 mm lineweight .15 mm circle diameter 2.0 mm	
18.63	Geyser		lineweight .2 mm lineweight .375 mm lineweight .2 mm color 100% red radius .5 mm ellipse height 2.75 mm ellipse height 1.25 mm; width 2.5 mm	
18.64	Fumarole or steam vent		draft as shown 2.5 mm all lineweights .2 mm color 100% red ellipse height 1.25 mm; width 2.5 mm	
18.65	Recent volcano on small-scale maps		outer diameter 3.0 mm; inner diameter 1.375 mm all lineweights .2 mm color 100% red angle 22.5°	
18.66	Active volcano on small-scale maps		lineweight .3 mm color 100% red asterisk height 2.625 mm asterisk width 2.625 mm asterisk angle 60°	Usually reserved for maps at scales of 1:250,000 or smaller. May also be shown in magenta, black, or other colors.
18.67	Inactive volcano on small-scale maps		color 100% red lineweight .3 mm asterisk height 2.5 mm asterisk width 2.5 mm asterisk angle 90°	
18.68	Cinder cone on small-scale maps		circle diameter 1.375 mm lineweight .2 mm color 100% red	
18.69	Diatreme		dot diameter 1.375 mm color 100% red H-7	
18.70	Breccia pipe		dot diameter 1.375 mm color 100% red H-7	
18.71	Collapse structure—Indicating breccia pipe at depth		lineweight .2 mm circle diameter 1.375 mm color 100% red H-7	

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.1—Veins and mineralized areas; mineral resource areas; metamorphic facies boundary				
19.1.1	Vein, veinlet, or mineralized stringer—Identity and existence certain, location accurate		lineweight .25 mm color 100% red → 8.0 mm ← H-8 dot diameter .75 mm; spacing 4.5 mm	May also be shown in black or other colors.
19.1.2	Vein, veinlet, or mineralized stringer—Identity or existence questionable, location accurate			
19.1.3	Vein, veinlet, or mineralized stringer—Identity and existence certain, location approximate		3.625 mm dot diameter .75 mm; spacing 4.5 mm	
19.1.4	Vein, veinlet, or mineralized stringer—Identity or existence questionable, location approximate			
19.1.5	Vein, veinlet, or mineralized stringer—Identity and existence certain, location concealed		.5 mm dot diameter .75 mm; spacing 4.5 mm	
19.1.6	Vein, veinlet, or mineralized stringer—Identity or existence questionable, location concealed			
19.1.7	Vein, veinlet, or mineralized stringer—Showing type of mineral occurrence		Cu ← H-8 (100% black)	
19.1.8	Inclined vein, veinlet, or mineralized stringer (1st option)—Showing dip value and direction		tick length 1.75 mm; lineweight .2 mm 35 ← H-6 (100% black) tick color 100% black	Place tick, arrow, or other line-symbol decoration where observation was made. Add arrowhead or '90' to ticks showing dip if necessary for clarity.
19.1.9	Inclined vein, veinlet, or mineralized stringer (2nd option)—Showing dip value and direction		tick length 1.375 mm; lineweight .2 mm 15 ← H-6 (100% black) 30°	
19.1.10	Vertical or near-vertical vein, veinlet, or mineralized stringer (1st option)		tick length 2.5 mm; lineweight .2 mm	
19.1.11	Vertical or near-vertical vein, veinlet, or mineralized stringer (2nd option)		90 ← H-6 (100% black)	
19.1.12	Small, minor inclined vein, veinlet, or mineralized stringer—Showing strike and dip		H-6 (100% black) 1.25 mm 70 lineweight .25 mm; line color 100% red 5.5 mm	May also be shown in black or other colors.
19.1.13	Small, minor vertical or near-vertical vein, veinlet, or mineralized stringer—Showing strike		2.5 mm	
19.1.14	Zone of mineralized or altered rock (1st option)		pattern 405-R (at 45°)	Add labels to show specific types of alteration. May be used alone or may overprint other mapped units. May also be shown in black or other colors.
19.1.15	Zone of mineralized or altered rock (2nd option)		pattern 405-R in 50% red (at 45°)	
19.1.16	Zone of mineralized or altered rock, showing high level of mineralization		pattern 119-R	
19.1.17	Zone of mineralized or altered rock, showing low level of mineralization		pattern 117-R	
19.1.18	Area of identified resources		lineweight .5 mm color 100% red	Usually reserved for use on special-purpose maps, not on general-purpose geologic maps. Generally shown in red, but may also be shown in black or other colors.
19.1.19	Area of high mineral resource potential		lineweight .3 mm line and text color 100% red H-12 pattern 427-R in 50% red	
19.1.20	Area of moderate mineral resource potential		lineweight .3 mm H-12 pattern 229-R (at 45°) in 50% red	
19.1.21	Area of low mineral resource potential		lineweight .2 mm H-10	
19.1.22	Area considered to have mineral resource potential but not evaluated, mostly because of inadequate data		lineweight .2 mm H-10 dash 1.75 mm; space .5 mm	
19.1.23	Metamorphic facies boundary—Showing approximate boundary between diagnostic mineral assemblages		H-8 Greenschist Amphibolite dot diameter .5 mm; spacing .5 mm line and text color 100% red	May also be shown in black or other colors.

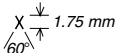

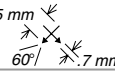



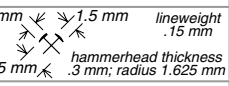









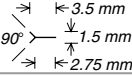

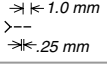

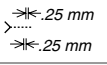

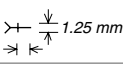

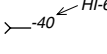



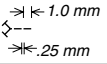

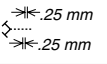

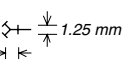

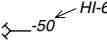

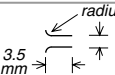

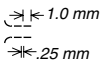

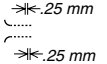

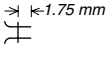

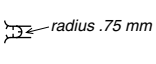

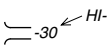
*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.2—Areas of extensively disturbed ground; surface workings; subsurface workings projected to surface				
19.2.1	Graded area—Extensive amount of mapped geologic unit has been removed		lineweight .2 mm line color 100% red pattern 226-R (at 45°)	Patterns should overlay other mapped units. Generally shown in black or red, but may also be shown in brown or other colors.
19.2.2	Strip mine (1st option)		lineweight .3 mm lineweight .15 mm pattern 226-K (at 45°)	
19.2.3	Strip mine (2nd option)		pattern 419-R in 50% red	
19.2.4	Artificial fill—Earth materials		lineweight .15 mm H-8 20% black	Show as separately mapped units. Generally shown in black or red, but may also be shown in other colors.
19.2.5	Artificial fill—Human-generated refuse (landfill)		lineweight .15 mm H-8 pattern 226-R (at 45°)	
19.2.6	Tailings		lineweights .125 mm draft as shown	Symbols should overlay other mapped units. Generally shown in red or black, but may also be shown in brown or other colors.
19.2.7	Mine dump (1st option)		all lineweights .125 mm dash length and spacing may vary draft as shown	
19.2.8	Mine dump (2nd option)		all lineweights .125 mm dash length and spacing may vary draft as shown	
19.2.9	Mine dump bench		.75 mm 2.5 mm all lineweights .125 mm	Different symbols may be used to show different levels of workings. Symbols should overlay other mapped units. Generally shown in red, but may also be shown in black or other colors.
19.2.10	Subsurface workings, projected to surface (1st option)		color 100% red lineweights .2 mm spacing may vary	
19.2.11	Subsurface workings, projected to surface (2nd option)		dash 3.0 mm; spacing .5 mm	
19.2.12	Subsurface workings, projected to surface (3rd option)		dash 1.5 mm; spacing .5 mm	
19.2.13	Subsurface workings, projected to surface (4th option)		dash .5 mm; spacing .5 mm	
19.2.14	Subsurface workings, projected to surface (5th option)		long dash 2.5 mm; short dashes .5 mm; spacing .5 mm	
19.2.15	Subsurface workings, projected to surface (6th option)		long dash 4.0 mm; short dash .5 mm; spacing .5 mm	

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.3—Mining and mineral exploration (at surface)				
19.3.1	Prospect (pit or small open cut)	X	lineweight .2 mm 	
19.3.2	Sand, gravel, clay, or placer pit		3.125 mm all lineweights .15 mm 	
19.3.3	Abandoned sand, gravel, clay, or placer pit		 all lineweights .15 mm	
19.3.4	Open pit, quarry, or glory hole		pick thickness .25 mm; radius 1.625 mm 1.5 mm 3.125 mm 1.5 mm lineweight .15 mm hammerhead thickness .3 mm; radius 1.625 mm 	
19.3.5	Abandoned open pit, quarry, or glory hole		all lineweights .15 mm 	
19.3.6	Open pit or quarry (mapped to scale)		all lineweights .25 mm  hachure height .6 mm; spacing 1.5 mm	
19.3.7	Trench (generalized trace)		1.5 mm length may vary all lineweights .25 mm 	
19.3.8	Trench (drawn to scale)		all lineweights .25 mm  hachure height .6 mm; spacing 1.5 mm	
19.3.9	Adit or tunnel entrance (1st option)		all lineweights .175 mm 90° 3.5 mm 1.5 mm 2.75 mm 	Long line points in direction of adit or tunnel entrance at surface.
19.3.10	Approximately located adit or tunnel entrance (1st option)		1.0 mm 25 mm 	Map position of adit or tunnel entrance is at intersection of long line and two short lines.
19.3.11	Destroyed adit or tunnel entrance (1st option)		25 mm 25 mm 	
19.3.12	Abandoned or inaccessible adit or tunnel entrance (1st option)		all lineweights .175 mm 1.75 mm 1.25 mm 	
19.3.13	Adit or tunnel entrance (1st option)—Showing angle of inclination (negative value indicates downward slope)		HI-6 -40 	Angle of inclination may be added to any adit or tunnel entrance symbol.
19.3.14	Adit or tunnel entrance (2nd option)		all lineweights .175 mm 90° 3.5 mm 1.5 mm 1.0 mm 2.75 mm 	Long line points in direction of adit or tunnel entrance at surface.
19.3.15	Approximately located adit or tunnel entrance (2nd option)		1.0 mm 25 mm 	Map position of adit or tunnel entrance is at intersection of long line and two short lines.
19.3.16	Destroyed adit or tunnel entrance (2nd option)		25 mm 25 mm 	
19.3.17	Abandoned or inaccessible adit or tunnel entrance (2nd option)		all lineweights .175 mm 1.75 mm 1.25 mm 	
19.3.18	Adit or tunnel entrance (2nd option)—Showing angle of inclination (negative value indicates downward slope)		HI-6 -50 	Angle of inclination may be added to any adit or tunnel entrance symbol.
19.3.19	Portal		all lineweights .175 mm radius .75 mm 3.5 mm 1.5 mm 	Long lines point in direction of portal entry at surface.
19.3.20	Approximately located portal		1.0 mm 25 mm 	Map position of portal entry is between the two lines, at the position where the short curved lines intersect the long lines.
19.3.21	Destroyed portal		25 mm 25 mm 	
19.3.22	Abandoned or inaccessible portal		all lineweights .175 mm 1.75 mm 	
19.3.23	Portal and open cut		all lineweights .175 mm tick length .5 mm radius .75 mm 	Open cut may be added to any portal symbol.
19.3.24	Portal—Showing angle of inclination (negative value indicates downward slope)		HI-6 -30 	Angle of inclination may be added to any portal symbol.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.3—Mining and mineral exploration (at surface) (continued)				
19.3.25	Drill hole for mineral exploration	○	lineweight .175 mm ○ diameter 1.5 mm	
19.3.26	Drill hole for mineral exploration—No geologic data available	○ ND	○ ND ← H-6	
19.3.27	Drill hole for mineral exploration—Showing name and number	○ PAHUTE 2	○ PAHUTE 2 ← H-7	
19.3.28	Drill hole for mineral exploration—Showing type (DDH, diamond drill hole)	DDH ○	HI-6 → DDH ○	
19.3.29	Drill hole for exploration of low-grade ore	⊕	all lineweights .175 mm ⊕ 4.0 mm	
19.3.30	Drill hole for exploration of high-grade ore	⊙	⊙ 4.0 mm	
19.3.31	Inclined drill hole for mineral exploration—Showing location of collar (circle) and projected trace (dashed line) and bottom (T) of drill hole	○-----┴	all lineweights .175 mm length may vary ○-----┴ 1.0 mm ┴ 1.5 mm	Projected trace of drill hole, angle of inclination, surface altitude, and total depth may be added to any drill hole symbol.
19.3.32	Inclined drill hole for mineral exploration—Showing angle of inclination (negative value indicates downward slope)	○-----┴ ⁻⁶⁵	○-----┴ ⁻⁶⁵ ← HI-6	
19.3.33	Inclined drill hole for mineral exploration—Showing surface altitude of collar (in meters)	2500 ○-----┴	HI-6 → 2500 ○-----┴	
19.3.34	Inclined drill hole for mineral exploration—Showing total depth of drill hole (in meters)	○-----┴ ^{TD 1000}	○-----┴ ^{TD 1000} ← HI-6	
19.3.35	Vertical mine shaft, as shown on smaller scale or general-purpose maps	■	lineweight .175 mm ■ 1.5 mm	
19.3.36	Multiple vertical mine shafts, as shown on smaller scale or general-purpose maps	■■■	■■■	
19.3.37	Abandoned or inaccessible vertical mine shaft, as shown on smaller scale or general-purpose maps	■ ^A	■ ^A ← H-7	
19.3.38	Inclined mine shaft, as shown on smaller scale or general-purpose maps—Showing direction of inclination	┴	all lineweights .175 mm ┴ 1.0 mm	
19.3.39	Inclined mine shaft, as shown on smaller scale or general-purpose maps—Showing angle of inclination (negative value indicates downward slope)	┴ ⁻²⁵	┴ ⁻²⁵ ← HI-6	













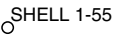
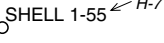

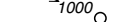




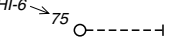
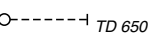
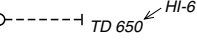
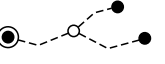
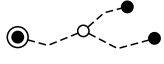
*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.4—Mines and subsurface workings				
19.4.1	Vertical mine shaft at surface (drawn to scale), as shown on subsurface exploration maps		size may vary lineweight .175 mm	
19.4.2	Inclined mine shaft at surface (drawn to scale), as shown on subsurface exploration maps—Showing direction of inclination		all lineweights .175 mm lengths may vary	
19.4.3	Inclined mine shaft at surface (drawn to scale), as shown on subsurface exploration maps—Showing angle of inclination (negative value indicates downward slope)		-30 HI-6	
19.4.4	Mine shaft, above and below level (drawn to scale), as shown on subsurface exploration maps		size may vary all lineweights .175 mm	
19.4.5	Bottom of mine shaft (drawn to scale), as shown on subsurface exploration maps		size may vary all lineweights .175 mm	
19.4.6	Winze or head of raise (drawn to scale), as shown on subsurface exploration maps		size may vary all lineweights .175 mm	
19.4.7	Raise or winze extending through level (drawn to scale), as shown on subsurface exploration maps		size may vary all lineweights .175 mm	
19.4.8	Raise or foot of winze (drawn to scale), as shown on subsurface exploration maps		size may vary all lineweights .175 mm	
19.4.9	Crosscut tunnel or intersection of workings (drawn to scale), as shown on subsurface exploration maps		radius 1.25 mm lineweight .175 mm	size may vary
19.4.10	Workings (drawn to scale), as shown on subsurface exploration maps		spacing may vary lineweights .175 mm	
19.4.11	Caved or otherwise inaccessible workings (drawn to scale), as shown on subsurface exploration maps		all lineweights .175 mm length of crossbar may vary dash 1.5 mm; spacing .5 mm	spacing may vary
19.4.12	Inclined workings, as shown on subsurface exploration maps (drawn to scale)—Chevrons point down-slope (multiple chevrons indicate steeper slope)		all lineweights .175 mm spacing may vary 90°	
19.4.13	Ore chute (drawn to scale), as shown on subsurface exploration maps		1.5 mm spacing may vary all lineweights .15 mm	
19.4.14	Lagging or cribbing along drift (drawn to scale), as shown on subsurface exploration maps		all lineweights .15 mm spacing may vary circle diameter .75 mm; spacing .75 mm	.55 mm
19.4.15	Elevation of roof or back, as shown on subsurface exploration maps		1.0 mm 60° 2801'	all lineweights .15 mm HI-6
19.4.16	Elevation of floor or sill, as shown on subsurface exploration maps		1.0 mm HI-6 2809'	60°
19.4.17	Stoped area (drawn to scale), as shown on subsurface exploration maps (section view)		all lineweights .15 mm dash 1.5 mm; spacing .5 mm	
19.4.18	Inferred stoped area (drawn to scale), as shown on subsurface exploration maps (section view)		pattern 226-K (at 45°) dash .3 mm; spacing .3 mm	

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation				
19.5.1	Oil field—Extent defined		lineweight .2 mm fill color 50% green line color 100% green	Patterned areas (extent defined) should be shown as separately mapped units. Outlined areas (extent not yet defined) should overlay other mapped units. Generally shown in red and (or) green, but may also be shown in other colors or patterns.
19.5.2	Oil field—Extent not yet defined		lineweight .2 mm dash .5 mm; spacing .5 mm line color 50% green	
19.5.3	Gas field—Extent defined		lineweight .2 mm fill color 50% red line color 100% red	
19.5.4	Gas field—Extent not yet defined		lineweight .2 mm dash 2.0 mm; spacing .5 mm line color 100% red	
19.5.5	Oil and gas field—Extent defined		lineweight .2 mm pattern 426 (at 45°)	
19.5.6	Oil and gas field—Extent not yet defined		lineweight .2 mm long dash 2.0 mm; short dash .5 mm; space .5 mm	
19.5.7	Core (nonspecific depth)		lineweight .2 mm dot diameter .5 mm 1.75 mm	May also be shown in other colors.
19.5.8	Shallow core			Use if both shallow and deep cores are shown on map.
19.5.9	Deep core		all lineweights .2 mm circle diameter 2.75 mm	May also be shown in other colors.
19.5.10	Drilling well or well location for hydrocarbon exploration or exploitation		lineweight .2 mm diameter 1.5 mm	Name, number, and total depth may be added to any type of well symbol. May also be shown in green (oil), red (gas), or other colors.
19.5.11	Drill hole for hydrocarbon exploration or exploitation—No data available			
19.5.12	Drill hole for hydrocarbon exploration or exploitation—Showing name and number			
19.5.13	Drill hole for hydrocarbon exploration or exploitation—Showing total depth (in meters)			
19.5.14	Inclined drill hole for hydrocarbon exploration or exploitation—Showing location of collar (circle) and projected trace (dashed line) and bottom (T) of drill hole		all lineweights .2 mm length of trace may vary 1.0 mm 1.5 mm 5 mm	Projected trace of drill hole, angle of inclination, surface altitude, and total depth may be added to any type of well symbol. May also be shown in green (oil), red (gas), or other colors.
19.5.15	Inclined drill hole for hydrocarbon exploration or exploitation—Showing angle of inclination			
19.5.16	Inclined drill hole for hydrocarbon exploration or exploitation—Showing surface altitude of collar (in meters)			
19.5.17	Inclined drill hole for hydrocarbon exploration or exploitation—Showing total depth of drill hole (in meters)			
19.5.18	Multiple wells drilled from single platform—Showing location of collar (open circle) on platform. Types of wells indicated at drill hole bottoms			

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation (continued)				
19.5.19	Dry hole (nonspecific depth)			May also be shown in other colors.
19.5.20	Dry hole—Showing map unit at surface (Km) and at bottom of hole (Kd). Also showing altitude at surface and total depth of hole (in meters)			
19.5.21	Shallow dry hole			Use if both shallow and deep dry holes are shown on map.
19.5.22	Deep dry hole			May also be shown in other colors.
19.5.23	Junked hole (nonspecific depth)			May also be shown in other colors.
19.5.24	Shallow junked hole			Use if both shallow and deep junked holes are shown on map.
19.5.25	Deep junked hole			May also be shown in other colors.
19.5.26	Disposal well (nonspecific depth)			May also be shown in other colors.
19.5.27	Plugged and abandoned disposal well (nonspecific depth)			
19.5.28	Shallow disposal well			Use if both shallow and deep disposal wells are shown on map.
19.5.29	Plugged and abandoned shallow disposal well			May also be shown in other colors.
19.5.30	Deep disposal well			
19.5.31	Plugged and abandoned deep disposal well			
19.5.32	Salt-water disposal well (nonspecific depth)			May also be shown in other colors.
19.5.33	Plugged and abandoned salt-water disposal well (nonspecific depth)			
19.5.34	Shallow salt-water disposal well			Use if both shallow and deep salt-water disposal wells are shown on map.
19.5.35	Plugged and abandoned shallow salt-water disposal well			May also be shown in other colors.
19.5.36	Deep salt-water disposal well			
19.5.37	Plugged and abandoned deep salt-water disposal well			

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation (continued)				
19.5.38	Oil seep		lineweight .2 mm diameter 1.5 mm	May also be shown in green or other colors.
19.5.39	Oil show		lineweight .2 mm diameter 1.5 mm	
19.5.40	Oil well (nonspecific depth)		diameter 1.5 mm	
19.5.41	Suspended oil well (nonspecific depth)		lineweight .2 mm 4.0 mm	
19.5.42	Plugged and abandoned oil well (nonspecific depth)		lineweight .2 mm 4.0 mm	
19.5.43	Shallow oil well			Use if both shallow and deep oil wells are shown on map.
19.5.44	Suspended shallow oil well			May also be shown in green or other colors.
19.5.45	Plugged and abandoned shallow oil well			
19.5.46	Deep oil well		lineweight .2 mm inner dot diameter 1.5 mm outer circle diameter 2.75 mm	
19.5.47	Suspended deep oil well		all lineweights .2 mm 4.0 mm	
19.5.48	Plugged and abandoned deep oil well		all lineweights .2 mm 4.0 mm	
19.5.49	Gas seep		all lineweights .2 mm 90° 90° 1.2 mm diameter 1.5 mm	May also be shown in red or other colors.
19.5.50	Gas show		all lineweights .2 mm diameter 1.5 mm	
19.5.51	Gas well (nonspecific depth)		all lineweights .2 mm diameter 1.5 mm	
19.5.52	Suspended gas well (nonspecific depth)		all lineweights .2 mm 4.0 mm	
19.5.53	Plugged and abandoned gas well (nonspecific depth)		all lineweights .2 mm 4.0 mm	
19.5.54	Shallow gas well			Use if both shallow and deep gas wells are shown on map.
19.5.55	Suspended shallow gas well			May also be shown in red or other colors.
19.5.56	Plugged and abandoned shallow gas well			
19.5.57	Deep gas well		inner circle diameter 1.5 mm; outer circle diameter 2.75 mm all lineweights .2 mm diameter 1.5 mm	
19.5.58	Suspended deep gas well		all lineweights .2 mm 4.0 mm	
19.5.59	Plugged and abandoned deep gas well		all lineweights .2 mm 4.0 mm	
19.5.60	Deep gas well, plugged back and producing shallow gas		all lineweights .2 mm 1.25 mm	May also be shown in red or other colors.

*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation (continued)				
19.5.61	Oil and gas seep		all lineweights .2 mm 90° 90° 1.2 mm .625 mm diameter 1.5 mm	May also be shown in other colors.
19.5.62	Oil and gas show		all lineweights .2 mm .625 mm diameter 1.5 mm	
19.5.63	Oil and gas well (nonspecific depth)		all lineweights .2 mm diameter 1.5 mm .625 mm	
19.5.64	Suspended oil and gas well (nonspecific depth)		all lineweights .2 mm 4.0 mm	
19.5.65	Plugged and abandoned oil and gas well (nonspecific depth)		all lineweights .2 mm 4.0 mm	
19.5.66	Shallow oil and gas well			Use if both shallow and deep oil and gas wells are shown on map. May also be shown in other colors.
19.5.67	Suspended shallow oil and gas well			
19.5.68	Plugged and abandoned shallow oil and gas well			
19.5.69	Deep oil and gas well		inner dot diameter 1.5 mm; outer circle diameter 2.75 mm all lineweights .2 mm .625 mm	
19.5.70	Suspended deep oil and gas well		all lineweights .2 mm 4.0 mm	
19.5.71	Plugged and abandoned deep oil and gas well		all lineweights .2 mm 4.0 mm	May also be shown in other colors.
19.5.72	Condensate show		lineweight .2 mm diameter 1.5 mm	
19.5.73	Condensate well (nonspecific depth)		lineweight .2 mm diameter 1.5 mm	
19.5.74	Suspended condensate well (nonspecific depth)		lineweight .2 mm 4.0 mm	
19.5.75	Plugged and abandoned condensate well (nonspecific depth)		lineweight .2 mm 4.0 mm	
19.5.76	Shallow condensate well			Use if both shallow and deep condensate wells are shown on map. May also be shown in other colors.
19.5.77	Suspended shallow condensate well			
19.5.78	Plugged and abandoned shallow condensate well			
19.5.79	Deep condensate well		all lineweights .2 mm inner dot diameter 1.5 mm outer circle diameter 2.75 mm	
19.5.80	Suspended deep condensate well		all lineweights .2 mm 4.0 mm	
19.5.81	Plugged and abandoned deep condensate well		all lineweights .2 mm 4.0 mm	


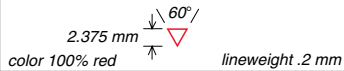

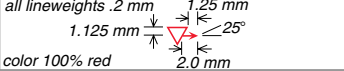

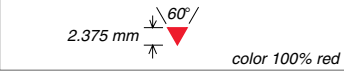










*For more information, see general guidelines on pages A-i to A-v.

19—NATURAL RESOURCES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
19.5—Oil and gas fields; wells drilled for hydrocarbon exploration or exploitation (continued)				
19.5.82	Gas and condensate show		all lineweights .2 mm diameter 1.5 mm 	May also be shown in other colors.
19.5.83	Gas and condensate well (nonspecific depth)		all lineweights .2 mm diameter 1.5 mm 	
19.5.84	Suspended gas and condensate well (nonspecific depth)		all lineweights .2 mm 	
19.5.85	Plugged and abandoned gas and condensate well (nonspecific depth)		all lineweights .2 mm 	
19.5.86	Shallow gas and condensate well			Use if both shallow and deep gas and condensate wells are shown on map. May also be shown in other colors.
19.5.87	Suspended shallow gas and condensate well			
19.5.88	Plugged and abandoned shallow gas and condensate well			
19.5.89	Deep gas and condensate well		inner circle diameter 1.5 mm; outer circle diameter 2.75 mm all lineweights .2 mm 	
19.5.90	Suspended deep gas and condensate well		all lineweights .2 mm 	May also be shown in other colors.
19.5.91	Plugged and abandoned deep gas and condensate well		all lineweights .2 mm 	
19.5.92	Gas storage well (nonspecific depth)		1.75 mm 	
19.5.93	Plugged and abandoned gas storage well (nonspecific depth)		lineweight .2 mm 4.0 mm 	
19.5.94	Shallow gas storage well			Use if both shallow and deep gas storage wells are shown on map. May also be shown in other colors.
19.5.95	Plugged and abandoned shallow gas storage well			
19.5.96	Deep gas storage well		lineweight .2 mm outer circle diameter 2.75 mm 	
19.5.97	Plugged and abandoned deep gas storage well		all lineweights .2 mm 	
19.5.98	Observation well for gas-storage field (nonspecific depth)		diameter 1.5 mm all lineweights .2 mm 0.725 mm 	May also be shown in other colors.
19.5.99	Plugged and abandoned observation well for gas-storage field [nonspecific depth]		all lineweights .2 mm 	
19.5.100	Shallow observation well for gas-storage field			
19.5.101	Plugged and abandoned shallow observation well for gas-storage field			
19.5.102	Deep observation well for gas-storage field		all lineweights .2 mm outer circle diameter 2.75 mm 	Use if both shallow and deep observation wells are shown on map. May also be shown in other colors.
19.5.103	Plugged and abandoned deep observation well for gas-storage field		all lineweights .2 mm 	

*For more information, see general guidelines on pages A-i to A-v.

20—HAZARDOUS WASTE SITES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
20.1	Hazardous waste site		 2.375 mm color 100% red line weight .2 mm 60° 1.125 mm	Generally shown in red, but may also be shown in black or other colors.
20.2	Hazardous waste site—Showing direction of surface-leachate flow from site		 all line weights .2 mm 1.125 mm color 100% red 2.375 mm 25° 2.0 mm	
20.3	Active (operating) hazardous waste site		 2.375 mm color 100% red line weight .2 mm 60° 1.125 mm	
20.4	Inactive (closed) hazardous waste site		 triangle line weight .2 mm bar line weight .3 mm color 100% red 2.375 mm 1.125 mm 3.75 mm	
20.5	Hazardous waste site—Clean-up activities are in progress		 color 100% red line weight .25 mm 2.375 mm 1.125 mm 60°	
20.6	Hazardous waste site—Clean-up activities have been completed		 color 100% red line weight .25 mm 2.375 mm 1.125 mm 60°	
20.7	Hazardous waste site, showing smaller restricted area (mapped to scale)		 line weight .25 mm color 100% red 1.5 mm 1.5 mm pattern 226-R (at 45°)	
20.8	Hazardous waste site, showing larger restricted area (mapped to scale)		 1.5 mm 1.5 mm line weight .25 mm color 100% red	

*For more information, see general guidelines on pages A-i to A-v.

21—NEOTECTONIC AND EARTHQUAKE-HAZARD FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
21.1	Earthquake epicenter, magnitude 7.5 or larger		color 100% violet outer circle diameter 7.0 mm; inner circle diameter 5.75 mm; linewidth .25 mm inner dot diameter 4.5 mm	The type of scale used for measuring earthquakes should be noted. May also be shown in black or other colors.
21.2	Earthquake epicenter, magnitude 7–7.49		color 100% violet dot diameter 4.25 mm	
21.3	Earthquake epicenter, magnitude 6.5–6.99		color 100% violet inner dot diameter 2.375 mm circle diameter 4.0 mm; linewidth .25 mm	
21.4	Earthquake epicenter, magnitude 6–6.49		color 100% violet dot diameter 2.25 mm	
21.5	Earthquake epicenter, magnitude 5.5–5.99		color 100% violet circle diameter 2.25 mm; linewidth .25 mm	
21.6	Earthquake epicenter, magnitude 4–5.49		color 100% violet circle diameter 1.4 mm; linewidth .225 mm	
21.7	Earthquake epicenter, magnitude less than 4		color 100% violet circle diameter .875 mm; linewidth .2 mm	
21.8	Fault-plane or focal-mechanism diagram for vertical, down-to-the-left offset along north-striking, vertical fault—Black quadrant indicates region of compression		size may vary linewidth .175 mm	Note that two types of fault motion and (or) two different fault-plane orientations could be represented by the same focal-mechanism diagram. For example, the focal-mechanism diagram that shows right-lateral strike-slip offset along a north-striking, vertical fault (ref. no. 21.9) could also show left-lateral strike-slip offset along an east-west-striking, vertical fault.
21.9	Fault-plane or focal-mechanism diagram for right-lateral strike-slip offset along north-striking, vertical fault—Black quadrants indicate regions of compression			
21.10	Fault-plane or focal-mechanism diagram for left-lateral strike-slip offset along north-striking, vertical fault—Black quadrants indicate regions of compression			
21.11	Fault-plane or focal-mechanism diagram for normal, down-to-the-left offset along north-striking, west-dipping (at 45°) fault—Black quadrants indicate regions of compression			
21.12	Fault-plane or focal-mechanism diagram for normal, down-to-the-left offset along northwest-striking, southwest-dipping (at 30°) fault—Black quadrants indicate regions of compression			
21.13	Fault-plane or focal-mechanism diagram for reverse, left-side-up offset along north-striking, west-dipping (at 45°) fault—Black quadrant indicates region of compression			
21.14	Fault-plane or focal-mechanism diagram for reverse, left-side-up offset along northwest-striking, southwest-dipping (at 60°) fault—Black quadrant indicates region of compression			
21.15	Fault-plane or focal-mechanism diagram for oblique reverse, left-side-up offset along northwest-striking, southwest-dipping (at 60°) fault—Black quadrants indicate regions of compression			May also be shown in violet or other colors.
21.16	Outer limit of subsidence caused by shock—Identity and existence certain, location accurate. Hachures point into subsided area		all linewidths .275 mm H-8 1.25 mm 12.0 mm	
21.17	Outer limit of subsidence caused by shock—Identity or existence questionable, location accurate. Hachures point into subsided area			
21.18	Outer limit of subsidence caused by shock—Identity or existence certain, location approximate. Hachures point into subsided area		3.5 mm 12.0 mm	
21.19	Outer limit of subsidence caused by shock—Identity or existence questionable, location approximate. Hachures point into subsided area		.75 mm .75 mm	
21.20	Outer limit of subsidence caused by shock—Identity or existence certain, location inferred. Hachures point into subsided area		1.5 mm 12.0 mm	
21.21	Outer limit of subsidence caused by shock—Identity or existence questionable, location inferred. Hachures point into subsided area		.75 mm .75 mm	
21.22	Outer limit of subsidence caused by shock—Identity and existence certain, location concealed. Hachures point into subsided area		.75 mm 12.0 mm	
21.23	Outer limit of subsidence caused by shock—Identity or existence questionable, location concealed. Hachures point into subsided area		.75 mm .75 mm	

*For more information, see general guidelines on pages A-i to A-v.

21—NEOTECTONIC AND EARTHQUAKE-HAZARD FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
21.24	Rim crest or crater with rim, formed by shock or sand blowouts—Identity and existence certain, location accurate. Hachures point into crater		<i>all lineweights .2 mm</i> 	May also be shown in violet or other colors.
21.25	Rim crest or crater with rim, formed by shock or sand blowouts—Identity or existence questionable, location accurate. Hachures point into crater			
21.26	Rim crest or crater with rim, formed by shock or sand blowouts—Identity or existence certain, location approximate. Hachures point into crater			
21.27	Rim crest or crater with rim, formed by shock or sand blowouts—Identity or existence questionable, location approximate. Hachures point into crater			
21.28	Rim crest or crater with rim, formed by shock or sand blowouts—Identity and existence certain, location concealed. Hachures point into crater			
21.29	Rim crest or crater with rim, formed by shock or sand blowouts—Identity or existence questionable, location concealed. Hachures point into crater			
21.30	Sinkhole or crater without rim, formed by shock—Identity and existence certain, location accurate. Hachures point into sinkhole		<i>all lineweights .2 mm</i> 	
21.31	Sinkhole or crater without rim, formed by shock—Identity or existence questionable, location accurate. Hachures point into sinkhole			
21.32	Sinkhole or crater without rim, formed by shock—Identity or existence certain, location approximate. Hachures point into sinkhole			
21.33	Sinkhole or crater without rim, formed by shock—Identity or existence questionable, location approximate. Hachures point into sinkhole			
21.34	Sinkhole or crater without rim, formed by shock—Identity or existence certain, location concealed. Hachures point into sinkhole			
21.35	Sinkhole or crater without rim, formed by shock—Identity or existence questionable, location concealed. Hachures point into sinkhole			
21.36	Fissures or cracks, formed in ground by earthquake		<i>lineweights .2 mm</i> 	
21.37	Fissures and sand and (or) other material ejected during earthquake		<i>lineweights .3 mm</i> 	

*For more information, see general guidelines on pages A-i to A-v.

22—PLATE-TECTONIC FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
22.1	Active spreading axis or mid-oceanic ridge, with rift—Accurately located. Sawteeth point in direction of spreading		color 100% red 1.25 mm 60° lineweight .375 mm spacing may vary sawtooth lineweight .25 mm; spacing 12.5 mm	May also be shown in black or other colors.
22.2	Active spreading axis or mid-oceanic ridge, with rift—Approximately located. Sawteeth point in direction of spreading		10.0 mm 2.5 mm	
22.3	Active spreading axis or mid-oceanic ridge, without rift—Accurately located. Sawteeth point in direction of spreading		color 100% red 1.25 mm 60° lineweight .625 mm sawtooth lineweight .25 mm; spacing 12.5 mm	
22.4	Active spreading axis or mid-oceanic ridge, without rift—Approximately located. Sawteeth point in direction of spreading		10.0 mm 2.5 mm	
22.5	Ancient spreading axis or mid-oceanic ridge—Accurately located. Sawteeth point in direction of spreading		1.25 mm 60° all lineweights .25 mm 75 mm sawtooth spacing 12.5 mm	May also be shown in other colors.
22.6	Ancient spreading axis or mid-oceanic ridge—Approximately located. Sawteeth point in direction of spreading		10.0 mm 2.5 mm	
22.7	Surface trace of active deep-seismofocal or subduction zone—Accurately located. Sawteeth on upper plate		lineweight .375 mm 1.25 mm 6.25 mm color 100% red sawtooth radius 3.0 mm	May also be shown in black or other colors.
22.8	Surface trace of active deep-seismofocal or subduction zone—Approximately located. Sawteeth on upper plate		5.25 mm 1.0 mm	
22.9	Surface trace of active deep-seismofocal or subduction zone—Showing fore-arc sediments. Sawteeth on upper plate		pattern 427-R	
22.10	Active convergent plate boundary—Accurately located. Sawteeth on upper plate		lineweight .375 mm color 100% red 6.25 mm 2.0 mm 60°	
22.11	Active convergent plate boundary—Approximately located. Sawteeth on upper plate		5.25 mm 1.0 mm	
22.12	Active convergent plate boundary—Showing accretionary prism. Sawteeth on upper plate		pattern 429-R	
22.13	Ancient convergent plate boundary—Accurately located. Sawteeth on upper plate		lineweight .25 mm 6.25 mm 1.75 mm 60°	May also be shown in other colors.
22.14	Ancient convergent plate boundary—Approximately located. Sawteeth on upper plate		5.25 mm 1.0 mm	
22.15	Active transform fault, sense of offset unspecified—Accurately located		color 100% red lineweight .375 mm	May also be shown in black or other colors.
22.16	Active transform fault, sense of offset unspecified—Approximately located		3.5 mm 1.0 mm	
22.17	Active transform fault, right-lateral offset—Accurately located. Arrows show relative motion		arrow lineweight .3 mm 25° 1.75 mm color 100% red lineweight .375 mm 5.0 mm	
22.18	Active transform fault, right-lateral offset—Approximately located. Arrows show relative motion		3.5 mm 1.0 mm	
22.19	Active transform fault, left-lateral offset—Accurately located. Arrows show relative motion		arrow lineweight .3 mm 25° 1.75 mm color 100% red lineweight .375 mm 5.0 mm	
22.20	Active transform fault, left-lateral offset—Approximately located. Arrows show relative motion		3.5 mm 1.0 mm	
22.21	Active transform fault, normal offset—Accurately located. Hachures on downthrown side		color 100% red lineweight .375 mm 1.0 mm hachure lineweight .175 mm; spacing .375 mm	
22.22	Active transform fault, normal offset—Approximately located. Hachures on downthrown side		3.5 mm 1.0 mm	
22.23	Ancient transform fault, sense of offset unspecified—Accurately located		lineweight .25 mm	May also be shown in other colors.
22.24	Ancient transform fault, sense of offset unspecified—Approximately located		3.5 mm 1.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

22—PLATE-TECTONIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
22.25	Continental slope—Accurately located. Rectangles point downslope		lineweight 25 mm tooth height .875 mm; width 1.5 mm	May also be shown in other colors.
22.26	Continental slope—Approximately located. Rectangles point downslope		5.25 mm 1.0 mm	
22.27	Continental slope—Showing margin filled by sedimentation. Rectangles point downslope		pattern 119-K	
22.28	Outline of basin—Accurately located. Sawteeth point into basin		all lineweights .2 mm 6.25 mm 90° .75 mm	
22.29	Outline of basin—Approximately located. Sawteeth point into basin		5.25 mm 1.0 mm	
22.30	Deep-sea trench—Patterned where filled by sedimentation		all lineweights .2 mm pattern 119-K	
22.31	Margin of oceanic rise—Accurately located. Hachures point downslope		all lineweights .2 mm 6.25 mm 1.0 mm	
22.32	Margin of oceanic rise—Approximately located. Hachures point downslope		5.25 mm 1.0 mm	
22.33	Volcanic ridge or edifice—Accurately located. Hachures point downslope		all lineweights .2 mm 3.125 mm .625 mm	
22.34	Volcanic ridge or edifice—Approximately located. Hachures point downslope		5.25 mm 1.0 mm	
22.35	Guyot—Hachures point downslope		all lineweights .2 mm hachure height .625 mm; spacing .5 mm	
22.36	Seamount, nonvolcanic origin—Sawteeth point downslope		sawtooth spacing 5.0 mm 60° 1.0 mm all lineweights .2 mm	
22.37	Seamount, volcanic origin—Sawteeth point downslope			
22.38	Seamount, nonvolcanic origin (shown as point symbol when too small to outline at map scale)		all lineweights .2 mm .625 mm circle diameter 1.375 mm	
22.39	Seamount, volcanic origin (shown as point symbol when too small to outline at map scale)		lineweights .2 mm dot diameter 1.375 mm	









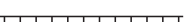
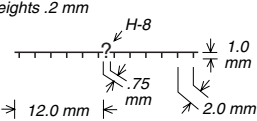
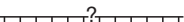

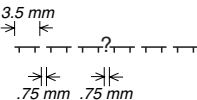
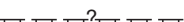

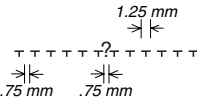


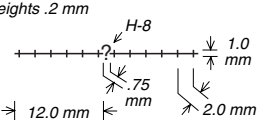
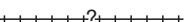
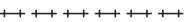
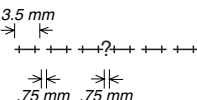

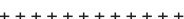
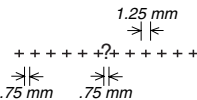









*For more information, see general guidelines on pages A-i to A-v.

23—MISCELLANEOUS UPLIFT AND COLLAPSE FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
23.1	Outline of metamorphic core complex—Identity and existence certain, location accurate. Hachures on upper plate			
23.2	Outline of metamorphic core complex—Identity or existence questionable, location accurate. Hachures on upper plate			
23.3	Outline of metamorphic core complex—Identity and existence certain, location approximate. Hachures on upper plate			
23.4	Outline of metamorphic core complex—Identity or existence questionable, location approximate. Hachures on upper plate			
23.5	Outline of metamorphic core complex—Identity and existence certain, location inferred. Hachures on upper plate			
23.6	Outline of metamorphic core complex—Identity or existence questionable, location inferred. Hachures on upper plate			
23.7	Outline of metamorphic core complex—Identity and existence certain, location concealed. Hachures on upper plate			
23.8	Outline of metamorphic core complex—Identity or existence questionable, location concealed. Hachures on upper plate			
23.9	Collapse structure or sinkhole (too small to draw to scale)			
23.10	Collapse structure or sinkhole (drawn to scale)			
23.11	Crater outline, unspecified origin			
23.12	Uplift—Local, intensely disturbed			
23.13	Salt dome			
23.14	Possible salt dome			
23.15	Salt and (or) shale diapirs			

*For more information, see general guidelines on pages A-i to A-v.

24—TERRESTRIAL IMPACT FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
24.1	Primary terrestrial impact crater (too small to draw to scale) (1st option)		dot diameter 2.125 mm 	
24.2	Secondary terrestrial impact crater (too small to draw to scale) (1st option)—Formed by debris thrown from primary crater		lineweight .2 mm circle diameter 2.125 mm 	
24.3	Primary terrestrial impact crater (too small to draw to scale) (2nd option)		dot diameter 1.625 mm 	
24.4	Secondary terrestrial impact crater (too small to draw to scale) (2nd option)—Formed by debris thrown from primary crater		lineweight .2 mm circle diameter 1.625 mm 	
24.5	Terrestrial impact crater without raised rim—Identity and existence certain, location accurate. Hachures point into crater		all lineweights .2 mm 	
24.6	Terrestrial impact crater without raised rim—Identity or existence questionable, location accurate. Hachures point into crater			
24.7	Terrestrial impact crater without raised rim—Identity or existence certain, location approximate. Hachures point into crater			
24.8	Terrestrial impact crater without raised rim—Identity or existence questionable, location approximate. Hachures point into crater			
24.9	Terrestrial impact crater without raised rim—Identity and existence certain, location concealed. Hachures point into crater			
24.10	Terrestrial impact crater without raised rim—Identity or existence questionable, location concealed. Hachures point into crater			
24.11	Terrestrial impact crater with raised rim—Identity and existence certain, location accurate		all lineweights .2 mm 	
24.12	Terrestrial impact crater with raised rim—Identity or existence questionable, location accurate			
24.13	Terrestrial impact crater with raised rim—Identity or existence certain, location approximate			
24.14	Terrestrial impact crater with raised rim—Identity or existence questionable, location approximate			
24.15	Terrestrial impact crater with raised rim—Identity or existence certain, location concealed			
24.16	Terrestrial impact crater with raised rim—Identity or existence questionable, location concealed			
24.17	Outer boundary of floor of terrestrial impact crater		dash length 2.0 mm; spacing .5 mm lineweight .25 mm 	
24.18	Outer boundary of central mound of complex terrestrial impact crater		dash length .75 mm; spacing .375 mm lineweight .2 mm 	
24.19	Terrestrial palimpsest area		100% black pattern 119-K 	
24.20	Palimpsest area around complex terrestrial impact crater—Ejecta obscures morphology of area surrounding crater			

**For more information, see general guidelines on pages A-i to A-v.*

25—PLANETARY GEOLOGY FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.1	Contact, planetary—Location accurate		lineweight .15 mm	
25.2	Contact, planetary—Location approximate		3.5 mm tick length .75 mm	
25.3	Contact, planetary—Location inferred		1.5 mm tick length .75 mm	
25.4	Contact, planetary—Location concealed		.5 mm tick length .75 mm	
25.5	Fault, planetary, sense of offset unspecified—Location accurate		lineweight .375 mm	
25.6	Fault, planetary, sense of offset unspecified—Location approximate		3.5 mm tick length .75 mm	
25.7	Fault, planetary, sense of offset unspecified—Location inferred		1.5 mm tick length .75 mm	
25.8	Fault, planetary, sense of offset unspecified—Location concealed		.5 mm tick length .75 mm	
25.9	Normal fault, planetary—Location accurate. Ball and bar on downthrown block		lineweight .375 mm ball .875 mm diameter tick length 1.0 mm; lineweight .175 mm	
25.10	Normal fault, planetary—Location approximate. Ball and bar on downthrown block		3.5 mm tick length .75 mm	
25.11	Normal fault, planetary—Location inferred. Ball and bar on downthrown block		1.5 mm tick length .75 mm	
25.12	Normal fault, planetary—Location concealed. Ball and bar on downthrown block		.5 mm tick length .75 mm	
25.13	Strike-slip fault, planetary, right-lateral offset—Location accurate. Arrows show relative motion		lineweight .375 mm 25° 1.75 mm 5.0 mm arrow lineweight .2 mm	
25.14	Strike-slip fault, planetary, right-lateral offset—Location approximate. Arrows show relative motion		3.5 mm tick length .75 mm	
25.15	Strike-slip fault, planetary, right-lateral offset—Location inferred. Arrows show relative motion		1.5 mm tick length .75 mm	
25.16	Strike-slip fault, planetary, right-lateral offset—Location concealed. Arrows show relative motion		.5 mm tick length .75 mm	
25.17	Strike-slip fault, planetary, left-lateral offset—Location accurate. Arrows show relative motion		lineweight .375 mm 25° 1.75 mm 5.0 mm arrow lineweight .2 mm	
25.18	Strike-slip fault, planetary, left-lateral offset—Location approximate. Arrows show relative motion		3.5 mm tick length .75 mm	
25.19	Strike-slip fault, planetary, left-lateral offset—Location inferred. Arrows show relative motion		1.5 mm tick length .75 mm	
25.20	Strike-slip fault, planetary, left-lateral offset—Location concealed. Arrows show relative motion		.5 mm tick length .75 mm	
25.21	Thrust fault, planetary—Location accurate. Sawteeth on upper plate		sawtooth height 1.5 mm lineweight .375 mm 60°	
25.22	Thrust fault, planetary—Location approximate. Sawteeth on upper plate		3.5 mm tick length .75 mm	
25.23	Thrust fault, planetary—Location inferred. Sawteeth on upper plate		1.5 mm tick length .75 mm	
25.24	Thrust fault, planetary—Location concealed. Sawteeth on upper plate		.5 mm tick length .75 mm	

*For more information, see general guidelines on pages A-i to A-v.

25—PLANETARY GEOLOGY FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.25	Graben trace, planetary (shown as single line where bounding normal faults cannot be mapped separately)—Location accurate		lineweight .375 mm 	
25.26	Graben trace, planetary (shown as single line where bounding normal faults cannot be mapped separately)—Location approximate		3.5 mm .75 mm	
25.27	Graben trace, planetary (shown as single line where bounding normal faults cannot be mapped separately)—Location inferred		1.5 mm .75 mm	
25.28	Graben trace, planetary (shown as single line where bounding normal faults cannot be mapped separately)—Location concealed		.5 mm .75 mm	
25.29	Regional fracture, planetary		lineweight .3 mm color 100% cyan 	
25.30	Partly buried regional fracture, planetary		1.5 mm .75 mm	
25.31	Arcuate fracture, planetary		lineweight .2 mm color 100% purple 	
25.32	Partly buried arcuate fracture, planetary		1.5 mm .75 mm	
25.33	Radial fracture, planetary (associated with coronae)		lineweight .325 mm color 100% purple 	
25.34	Concentric fracture, planetary (associated with coronae)		lineweight .25 mm color 100% violet 	
25.35	Fold crest, planetary		lineweight .3 mm color 100% red 	
25.36	Broad warp, planetary		lineweight .635 mm color 100% red .75 mm	
25.37	Wrinkle ridge, planetary		lineweight .25 mm color 100% magenta 	
25.38	Ribbon trends, planetary		lineweight .25 mm color 100% green 	
25.39	Ridge belt, planetary		all lineweights .25 mm color 100% red 1.75 mm	
25.40	Broad ridge crest, planetary (generally associated with coronae)		lineweight .635 mm color 100% red 	
25.41	Ridge crest, planetary (1st option)		65° 3.0 mm 65° lineweight .25 mm	
25.42	Ridge crest, planetary (2nd option)		all lineweights .25 mm 	
25.43	Ridge crest, planetary (1st option)—Arrowhead shows abrupt termination of ridge		65° 1.375 mm	
25.44	Ridge crest, planetary (2nd option)—Arrowhead shows abrupt termination of ridge			
25.45	Ridge crest (possible dike), planetary		70° all lineweights .25 mm 3.5 mm	
25.46	Corona annulus ridge, planetary—Showing axial trace and plunge. Short arrow indicates steeper limb or scarp bounding corona trough		3.75 mm all lineweights .25 mm 75° 2.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

25—PLANETARY GEOLOGY FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.47	Groove (generic), planetary		lineweight .25 mm	
25.48	Sharp groove, planetary		all lineweights .25 mm ↓ 1.5 mm ↑ .825 mm	
25.49	Subdued groove, planetary		all lineweights .25 mm ↓ 1.5 mm ↑	
25.50	Radially grooved ejecta (schematic), planetary		.75 mm .75 mm .25 mm ↓ ↓ ↓ ↓ ↓ ↓ ↑ ↑ ↑ .75 mm .75 mm .75 mm	
25.51	Furrow, planetary		lineweight .25 mm ↓ 1.75 mm ↑ 1.75 mm	
25.52	Trough or narrow depression, planetary		lineweight .25 mm 65° ↓ 3.0 mm ↑ 65°	
25.53	Depression (mapped to scale), planetary		all lineweights .25 mm hachure height .875 mm; spacing 3.5 mm	
25.54	Large depression (mapped to scale), planetary		all lineweights .25 mm hachure height .625 mm; spacing 3.5 mm pattern 118-K	
25.55	Shallow, linear depression or valley, or narrow channel, planetary		lineweight .25 mm color 100% cyan	
25.56	Channel (canali), planetary		lineweight .25 mm long dash 2.5 mm; short dash .5 mm; spacing .5 mm	
25.57	Channel (canali), planetary—Two short dashes where structureless or indefinite		lineweight .25 mm long dash 2.5 mm; short dashes .5 mm; spacing .5 mm	
25.58	Narrow channel (possible lava channel), planetary—Arrows point in direction of flow		all lineweights .175 mm 4.0 mm ↓ 1.875 mm 45°	
25.59	Erosional boundary, planetary—Erosion increases in direction of arrows		2.5 mm 30° ↓ lineweight .175 mm 20° ↓ 1.5 mm	
25.60	Angular unconformity, planetary—Hachures indicate truncated beds		lineweight .3 mm hachure height 1.75 mm; spacing 2.5 mm lineweight .2 mm	
25.61	Angular unconformity, planetary—Uncertain. Hachures indicate truncated beds		2.25 mm ↓ 5 mm lineweight .2 mm	
25.62	Layer, planetary		1.125 mm ↓ 75 mm lineweight .2 mm	
25.63	Lineament, planetary		lineweight .3 mm 1.5 mm ↓ 5 mm	
25.64	Layering in canyon wall, planetary		all lineweights .2 mm lengths and spacing will vary	
25.65	Fabric of short radar-bright lineaments (schematic), planetary		all lineweights .25 mm lengths and spacing will vary	
25.66	Penetrative lineations, within tessera terrain, planetary		all lineweights .125 mm lengths and spacing will vary	
25.67	Flow direction, planetary		lineweight .175 mm length may vary 3.0 mm 30° ↓ 1.5 mm ↑	
25.68	Wind streaks, planetary—Arrow points in inferred wind direction		all lineweights .2 mm length may vary 3.5 mm 30° ↓ 1.875 mm ↑	
25.69	Area of channelized erosion and scouring, planetary—Arrow points in direction of interpreted flow		lineweight .375 mm 2.75 mm ↓ 6.0 mm 30°	
25.70	Area of eolian transport, planetary—Arrow points in direction of air flow		all lineweights .375 mm	

*For more information, see general guidelines on pages A-i to A-v.

25—PLANETARY GEOLOGY FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.71	Scarp, planetary—Hachures point downscarp		all lineweights .25 mm 	
25.72	Lobate scarp, planetary—Hachures point downscarp		all lineweights .25 mm 	
25.73	Basal scarp, planetary—Hachures point downscarp		all lineweights .25 mm 	
25.74	Base of scarp, planetary—Barb points downscarp		lineweight .25 mm 	
25.75	Dome, edifice, or circular scarp, planetary (mapped to scale)—Hachures point downscarp		all lineweights .25 mm 	
25.76	Very small shield, dome, or volcanic construct, planetary (not mapped to scale)		all lineweights .4 mm 	
25.77	Small shield, dome, or volcanic construct, planetary (not mapped to scale)		all lineweights .6 mm 	
25.78	Large, steep-sided shield, dome, or volcanic construct, planetary (not mapped to scale)		all lineweights .375 mm 	
25.79	Mesa, planetary (not mapped to scale)		all lineweights .375 mm circle diameter 4.0 mm all barb lengths 1.625 mm 	
25.80	Large shield, dome, or volcanic construct, planetary (mapped to scale)—Hachures point downscarp		all lineweights .3 mm 	
25.81	Large cone, planetary (mapped to scale)—Hachures point downscarp		all lineweights .25 mm 	
25.82	Knob or central peak, planetary (not mapped to scale)		all lineweights .25 mm 	
25.83	Knob, planetary (mapped to scale)—Bar and ball indicate apical fissure. Hachures point downscarp		dot diameter 1.25 mm all lineweights .25 mm 	
25.84	Elevated plateau, planetary (mapped to scale)—Hachures point downscarp		all lineweights .25 mm 	
25.85	Steep-sided edifice, planetary (not mapped to scale)		2.0 mm all lineweights .25 mm 	
25.86	Steep-sided edifice, planetary (not mapped to scale)—Dotted where concealed or buried		short dashes .5 mm; spacing .5 mm 	
25.87	Large edifice, planetary (not mapped to scale)		all lineweights .25 mm 	
25.88	Very small tholi, planetary (not mapped to scale)		lineweight .25 mm 	
25.89	Small tholi, planetary (not mapped to scale)		all lineweights .25 mm 	
25.90	Small tholi, planetary (mapped to scale)		all lineweights .25 mm 	
25.91	Corona, planetary		lineweight .25 mm dash length 1.5 mm; spacing .75 mm 	
25.92	Nova, planetary		lineweight .5 mm dash length 2.25 mm; spacing .75 mm 	
25.93	Palimpsest ring, planetary		dot diameter .875 mm; spacing .375 mm 	


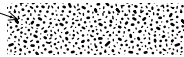


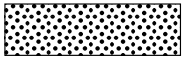



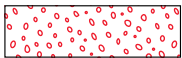
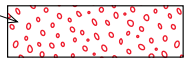
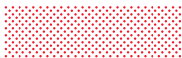
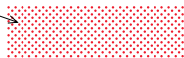


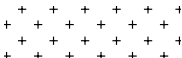
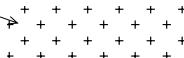


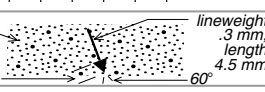


















*For more information, see general guidelines on pages A-i to A-v.

25—PLANETARY GEOLOGY FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.94	Raised rim of larger impact crater, planetary— Hachures point into crater		all lineweights .3 mm hachure height .75 mm; spacing of hachure pairs .5 mm	
25.95	Raised rim of smaller impact crater, planetary		lineweight .3 mm	
25.96	Raised rim of impact crater, planetary—Showing visible ejecta blanket		lineweight .15 mm	
25.97	Degraded impact crater rim, planetary (1st option)		lineweight .3 mm dash length 1.0 mm; spacing .5 mm	
25.98	Rimless impact crater, subdued impact crater rim, degraded impact crater rim (2nd option), or buried impact crater rim, planetary		lineweight .3 mm long dash 4.0 mm; short dashes .2 mm; spacing .5 mm	
25.99	Secondary impact crater chain and cluster, planetary		lineweight .25 mm dash length 1.5 mm; spacing .5 mm	
25.100	Basin ring, planetary		lineweight .375 mm dash length .75 mm; spacing .75 mm	
25.101	Central peak of impact crater, planetary (1st option)		ellipse width 1.875 mm; height 2.625 mm all lineweights .2 mm	
25.102	Central peak of impact crater, planetary (2nd option)		2.375 mm all lineweights .2 mm	
25.103	Pit of impact crater floor, planetary (1st option)		lineweight .2 mm	
25.104	Pit of impact crater floor, planetary (2nd option)		dot diameter .875 mm	
25.105	Pit-crater chain (mapped to scale), planetary		lineweight .2 mm	
25.106	Small endogenic crater, planetary		dot diameter 1.0 mm	
25.107	Small endogenic crater (mapped to scale), planetary		lineweight .25 mm	
25.108	Medium-sized endogenic crater (mapped to scale), planetary		lineweight .25 mm dot diameter 1.0 mm	
25.109	Large endogenic crater (mapped to scale), planetary		all lineweights .25 mm hachure height 1.25 mm; spacing 3.175 mm	
25.110	Chain craters or collapsed lava tube (mapped to scale), planetary		lineweight .2 mm	
25.111	Caldera, planetary		all lineweights .25 mm hachure height .625 mm; spacing .875 mm	
25.112	Volcano, planetary, having summit crater		lineweight .15 mm	
25.113	Volcano, planetary, without summit crater—Queried if origin is conjectural		H-8	
25.114	Flow front, planetary—Arrow indicates flow direction		1.375 mm lineweight .25 mm arrow lineweight .25 mm 40°	
25.115	Mountain (rugged), planetary—Origin uncertain		lineweight .2 mm line color 50% black	
25.116	Channel bars, planetary—May be erosional or depositional		lineweight .2 mm line color 30% black	
25.117	Slide or slump material, planetary—Arrow indicates direction of movement		lineweight .25 mm 2.5 mm 1.75 mm 60° arrow lineweight .2 mm	

*For more information, see general guidelines on pages A-i to A-v.

25—PLANETARY GEOLOGY FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
25.118	Dark-colored ejecta, planetary		<i>pattern</i> 428-K 	May also be shown in red or other colors.
25.119	Light-colored ejecta, planetary		<i>pattern</i> 429-K 	
25.120	Terrace deposits, planetary		<i>pattern</i> 427-K 	
25.121	Dark-colored mantling material, planetary		<i>pattern</i> 214-K (at 45°) 	
25.122	Secondary crater field, planetary		<i>pattern</i> 102-R 	May also be shown in black or other colors.
25.123	Diffuse highland-lowland boundary scarp, planetary		<i>pattern</i> 134-R 	
25.124	Joint or fracture pattern, planetary		<i>pattern</i> 430-K 	May also be shown in red or other colors.
25.125	Area of reticulate grooves, planetary—Showing trend		<i>pattern</i> 327-K 	
25.126	Detached lobe, planetary—Arrow points in direction of interpreted landslide or debris flow		<i>pattern</i> 116-K  1.75 mm 	
25.127	Low albedo smooth material, planetary—Interpreted as eolian material		<i>pattern</i> 136-K 	
25.128	Airburst spot		<i>pattern</i> 434-K 	
25.129	Mantling material, planetary—Light-colored		<i>pattern</i> 435-K in 50% black 	
25.130	Splotch, planetary—Circular, radar-bright halo on surface		<i>pattern</i> 116-K 	
25.131	Reticulate pattern on plains, planetary		<i>pattern</i> 119-K 	
25.132	Fracture zone, planetary		<i>pattern</i> 137-K 	
25.133	Superficial crater material having weak radar back-scatter coefficient, planetary		<i>pattern</i> 436-K 	
25.134	Crater-associated ejecta halo, planetary		<i>pattern</i> 429-K 	
25.135	Halo without associated crater, planetary		<i>pattern</i> 429-C 	

*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.1—Water wells				
26.1.1	Water well, type unspecified		lineweight .15 mm diameter 1.75 mm	May also be shown in cyan or other colors.
26.1.2	Unused water well		bar lineweight .3 mm circle lineweight .2 mm 3.725 mm	
26.1.3	Capped water well		1.235 mm all lineweights .2 mm	
26.1.4	Shut-in water well		1.125 mm all lineweights .2 mm	
26.1.5	Dry hole used for water exploration		1.0 mm all lineweights .2 mm	
26.1.6	Well used for collection of water data		1.0 mm all lineweights .2 mm	
26.1.7	Well used for domestic-water supply		diameter 1.75 mm	
26.1.8	Flowing artesian well used for domestic-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.9	Nonflowing artesian well used for domestic-water supply		1.375 mm radius .3125 mm lineweight .175 mm	
26.1.10	Recharge or waste-injection well, once used for domestic-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.11	Observation well used for domestic-water supply		bar lineweight .3 mm 3.725 mm 45°	
26.1.12	Observation well used for domestic-water supply—Equipped with a recorder		R H-6	
26.1.13	Dry well, once used for domestic-water supply		bar lineweight .2 mm 45° 3.725 mm	
26.1.14	Destroyed well, once used for domestic-water supply		bar lineweights .2 mm 90° 3.725 mm	
26.1.15	Test hole for well used for domestic-water supply		.6 mm bar lineweights .15 mm 2.75 mm	
26.1.16	Well used for stock-water supply		lineweight .25 mm diameter 1.75 mm	
26.1.17	Flowing artesian well used for stock-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.18	Nonflowing artesian well used for stock-water supply		1.375 mm radius .3125 mm lineweight .175 mm	
26.1.19	Recharge or waste-injection well, once used for stock-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.20	Observation well used for stock-water supply		bar lineweight .3 mm 3.725 mm 45°	
26.1.21	Observation well used for stock-water supply—Equipped with a recorder		R H-6	
26.1.22	Dry well, once used for stock-water supply		bar lineweight .2 mm 45° 3.725 mm	
26.1.23	Destroyed well, once used for stock-water supply		bar lineweights .2 mm 90° 3.725 mm	
26.1.24	Test hole for well used for stock-water supply		.6 mm bar lineweights .15 mm 2.75 mm	

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.1—Water wells (continued)				
26.1.25	Well used for irrigation-water supply		outer circle diameter 2.0 mm; lineweight .2 mm inner circle diameter 1.125 mm; lineweight .15 mm	May also be shown in cyan or other colors.
26.1.26	Flowing artesian well used for irrigation-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.27	Nonflowing artesian well used for irrigation-water supply		1.375 mm radius .3125 mm lineweight .175 mm	
26.1.28	Recharge or waste-injection well, once used for irrigation-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.29	Observation well used for irrigation-water supply		bar lineweight .3 mm 3.725 mm 45°	
26.1.30	Observation well used for irrigation-water supply—Equipped with a recorder		R ← H-6	
26.1.31	Dry well, once used for irrigation-water supply		bar lineweight .2 mm 45° 3.725 mm	
26.1.32	Destroyed well, once used for irrigation-water supply		bar lineweights .2 mm 90° 3.725 mm	
26.1.33	Test hole for well used for irrigation-water supply		.6 mm 2.75 mm bar lineweights .15 mm	
26.1.34	Well used for industrial-water supply		outer circle diameter 2.0 mm; lineweight .2 mm inner dot diameter 1.125 mm	
26.1.35	Flowing artesian well used for industrial-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.36	Nonflowing artesian well used for industrial-water supply		1.375 mm radius .3125 mm lineweight .175 mm	
26.1.37	Recharge or waste-injection well, once used for industrial-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm	
26.1.38	Observation well used for industrial-water supply		bar lineweight .3 mm 3.725 mm 45°	
26.1.39	Observation well used for industrial-water supply—Equipped with a recorder		R ← H-6	
26.1.40	Dry well, once used for industrial-water supply		bar lineweight .2 mm 45° 3.725 mm	
26.1.41	Destroyed well, once used for industrial-water supply		bar lineweights .2 mm 90° 3.725 mm	
26.1.42	Test hole for well used for industrial-water supply		.6 mm 2.75 mm bar lineweights .15 mm	

*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.1—Water wells (continued)				
26.1.43	Well used for public-water supply		lineweight .375 mm diameter 2.0 mm	May also be shown in cyan or other colors.
26.1.44	Flowing artesian well used for public-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm radius .3125 mm	
26.1.45	Nonflowing artesian well used for public-water supply		1.375 mm 1.25 mm arrow lineweight .15 mm radius .3125 mm	
26.1.46	Recharge or waste-injection well, once used for public-water supply		2.0 mm 1.25 mm arrow lineweight .15 mm radius .3125 mm	
26.1.47	Observation well used for public-water supply		bar lineweight .3 mm 3.725 mm 45°	
26.1.48	Observation well used for public-water supply— Equipped with a recorder		R H-6	
26.1.49	Dry well, once used for public-water supply		bar lineweight .2 mm 45° 3.725 mm	
26.1.50	Destroyed well, once used for public-water supply		bar lineweights .2 mm 90° 3.725 mm 3.725 mm	
26.1.51	Test hole for well used for public-water supply		.6 mm 2.75 mm bar lineweights .15 mm	


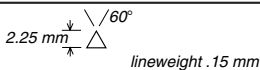



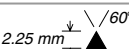

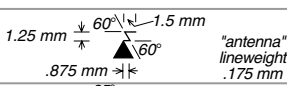



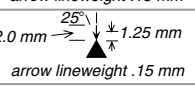

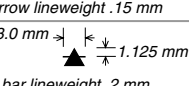

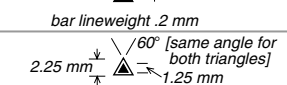

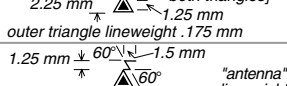



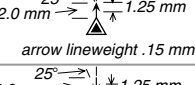

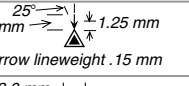

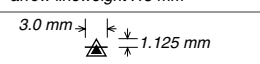

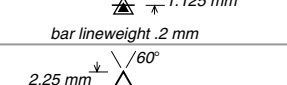

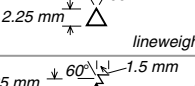

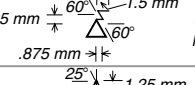

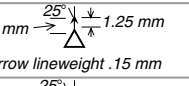
*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.2—Springs				
26.2.1	Spring, type of use unspecified		all lineweights .15 mm draft "tail" as shown circle diameter 1.75 mm	Rotate "tail" to point in direction of flow. May also be shown in cyan, red, or other colors.
26.2.2	Unused spring		bar lineweight .3 mm circle and "tail" lineweight .2 mm 3.725 mm	
26.2.3	Spring used for collection of water-quality data		circle and "tail" lineweight .2 mm dot diameter .375 mm	
26.2.4	Spring used for domestic-water supply		"tail" lineweight .2 mm draft "tail" as shown dot diameter 1.75 mm	
26.2.5	Thermal spring used for domestic-water supply		H-6 →	
26.2.6	Mineral spring used for domestic-water supply		H-6 →	
26.2.7	Extinct spring, once used for domestic-water supply		3.725 mm bar lineweight .2 mm	
26.2.8	Spring used for stock-water supply		"tail" lineweight .2 mm draft "tail" as shown circle diameter 1.75 mm; lineweight .25 mm	
26.2.9	Thermal spring used for stock-water supply		H-6 →	
26.2.10	Mineral spring used for stock-water supply		H-6 →	
26.2.11	Extinct spring, once used for stock-water supply		3.725 mm bar lineweight .2 mm	
26.2.12	Spring used for irrigation-water supply		inner circle diameter 1.125 mm; lineweight .15 mm draft "tail" as shown "tail" lineweight .2 mm outer circle diameter 1.75 mm; lineweight .2 mm	
26.2.13	Thermal spring used for irrigation-water supply		H-6 →	
26.2.14	Mineral spring used for irrigation-water supply		H-6 →	
26.2.15	Extinct spring, once used for irrigation-water supply		3.725 mm bar lineweight .2 mm	
26.2.16	Spring used for industrial-water supply		inner dot diameter 1.125 mm draft "tail" as shown "tail" lineweight .2 mm outer circle diameter 1.75 mm; lineweight .2 mm	
26.2.17	Thermal spring used for industrial-water supply		H-6 →	
26.2.18	Mineral spring used for industrial-water supply		H-6 →	
26.2.19	Extinct spring, once used for industrial-water supply		3.725 mm bar lineweight .2 mm	
26.2.20	Spring used for public-water supply		"tail" lineweight .2 mm draft "tail" as shown circle diameter 2.0 mm; lineweight .375 mm	
26.2.21	Thermal spring used for public-water supply		H-6 →	
26.2.22	Mineral spring used for public-water supply		H-6 →	
26.2.23	Extinct spring, once used for public-water supply		3.725 mm bar lineweight .2 mm	

*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.3—Water gaging stations				
26.3.1	Water gaging station, type of measurement unspecified			May also be shown in cyan or other colors.
26.3.2	Discontinued water gaging station			
26.3.3	Continuous-record water gaging station			
26.3.4	Continuous-record water gaging station—Equipped with a telephone or radio			
26.3.5	Continuous-record peak-flow measurement water gaging station			
26.3.6	Continuous-record low-flow measurement water gaging station			
26.3.7	Continuous-record stage-measurement water gaging station			
26.3.8	Partial-record water gaging station (floods)			
26.3.9	Partial-record water gaging station (floods)—Equipped with a telephone or radio			
26.3.10	Partial-record peak-flow measurement water gaging station (floods)			
26.3.11	Partial-record low-flow measurement water gaging station (floods)			
26.3.12	Partial-record stage-measurement water gaging station (floods)			
26.3.13	Measurement site without a gage			
26.3.14	Measurement site without a gage—Equipped with a telephone or radio			
26.3.15	Peak-flow measurement site without a gage			
26.3.16	Low-flow measurement site without a gage			
26.3.17	Stage-measurement site without a gage			

*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.4—Quality-of-water sites				
26.4.1	Quality-of-water site, type of measurement unspecified		line weight .15 mm 2.25 mm 60°	May also be shown in cyan or other colors.
26.4.2	Inactive quality-of-water site		triangle line weight .2 mm bar line weight .3 mm 3.75 mm	
26.4.3	Active quality-of-water site		line weight .15 mm 2.25 mm 60°	
26.4.4	Active quality-of-water site, chemical measurement		line weight .15 mm 1.25 mm 60°	
26.4.5	Active quality-of-water site, temperature measurement		line weight .15 mm 1.25 mm	
26.4.6	Active quality-of-water site, biological measurement		line weight .15 mm 1.25 mm	
26.4.7	Active quality-of-water site, sediment measurement		line weight .15 mm 1.25 mm	
26.4.8	Active quality-of-water site—Equipped with a monitor		line weight .375 mm 2.25 mm 60°	
26.4.9	Active quality-of-water site, chemical measurement—Equipped with a monitor		line weight .375 mm 1.25 mm	
26.4.10	Active quality-of-water site, temperature measurement—Equipped with a monitor		line weight .375 mm 1.25 mm	
26.4.11	Active quality-of-water site, biological measurement—Equipped with a monitor		line weight .375 mm 1.25 mm	
26.4.12	Active quality-of-water site, sediment measurement—Equipped with a monitor		line weight .375 mm 1.25 mm	


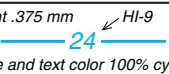

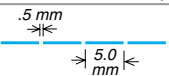

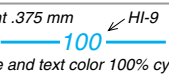

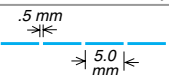

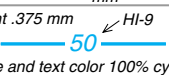

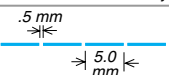

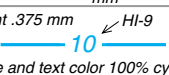

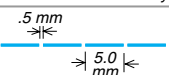

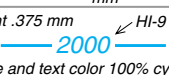

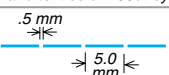

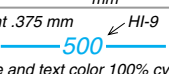

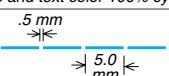

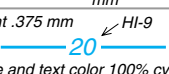

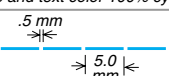

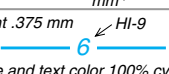

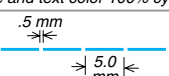

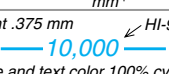

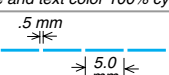
*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.5—Geohydrologic contours				
26.5.1	Structure contour (index), as shown on hydrologic maps, showing altitude of top or base of, or horizon within, stratigraphic unit, aquifer, or confining bed—Accurately located		lineweight .375 mm 600 line and text color 100% red	On most maps, every fourth or fifth contour is an index contour, and usually only index contours are labeled. May be shown in black or other colors.
26.5.2	Structure contour (index), as shown on hydrologic maps, showing altitude of top or base of, or horizon within, stratigraphic unit, aquifer, or confining bed—Approximately located		.5 mm 5.0 mm	
26.5.3	Structure contour (intermediate), as shown on hydrologic maps, showing altitude of top or base of, or horizon within, stratigraphic unit, aquifer, or confining bed—Accurately located		lineweight .275 mm line color 100% red	
26.5.4	Structure contour (intermediate), as shown on hydrologic maps, showing altitude of top or base of, or horizon within, stratigraphic unit, aquifer, or confining bed—Approximately located		.5 mm 5.0 mm	
26.5.5	Bedrock contour (index), as shown on hydrologic maps, showing altitude of bedrock surface—Accurately located		lineweight .375 mm 600 line and text color 100% violet	On most maps, every fourth or fifth contour is an index contour, and usually only index contours are labeled. May be shown in black or other colors.
26.5.6	Bedrock contour (index), as shown on hydrologic maps, showing altitude of bedrock surface—Approximately located		.5 mm 5.0 mm	
26.5.7	Bedrock contour (intermediate), as shown on hydrologic maps, showing altitude of bedrock surface—Accurately located		lineweight .275 mm line color 100% violet	
26.5.8	Bedrock contour (intermediate), as shown on hydrologic maps, showing altitude of bedrock surface—Approximately located		.5 mm 5.0 mm	
26.5.9	Water-table contour (index), showing altitude of unconfined water table [date]—Accurately located		lineweight .375 mm 600 line and text color 100% cyan	Use only in reference to unconfined (water-table) conditions. On most maps, every fourth or fifth contour is an index contour, and usually only index contours are labeled. May be shown in black or other colors.
26.5.10	Water-table contour (index), showing altitude of unconfined water table [date]—Approximately located		.5 mm 5.0 mm	
26.5.11	Water-table contour (intermediate), showing altitude of unconfined water table [date]—Accurately located		lineweight .275 mm line color 100% cyan	
26.5.12	Water-table contour (intermediate), showing altitude of unconfined water table [date]—Approximately located		.5 mm 5.0 mm	
26.5.13	Potentiometric or water-level contour (index), showing altitude at which water level would have stood in tightly cased wells [date]—Accurately located		lineweight .375 mm 600 line and text color 100% cyan	Use in reference to either confined (artesian) or unconfined conditions, when they are not differentiated on map. On most maps, every fourth or fifth contour is an index contour, and usually only index contours are labeled. May be shown in black or other colors.
26.5.14	Potentiometric or water-level contour (index), showing altitude at which water level would have stood in tightly cased wells [date]—Approximately located		.5 mm 5.0 mm	
26.5.15	Potentiometric or water-level contour (intermediate), showing altitude at which water level would have stood in tightly cased wells [date]—Accurately located		lineweight .275 mm line color 100% cyan	
26.5.16	Potentiometric or water-level contour (intermediate), showing altitude at which water level would have stood in tightly cased wells [date]—Approximately located		.5 mm 5.0 mm	
26.5.17	Water-quality-zone contour (index), showing altitude of top or base of, or horizon within, [type of] water-quality zone or water in aquifer [date]—Accurately located		lineweight .375 mm 600 line and text color 100% green	On most maps, every fourth or fifth contour is an index contour, and usually only index contours are labeled. May be shown in black or other colors.
26.5.18	Water-quality-zone contour (index), showing altitude of top or base of, or horizon within, [type of] water-quality zone or water in aquifer [date]—Approximately located		.5 mm 5.0 mm	
26.5.19	Water-quality-zone contour (intermediate), showing altitude of top or base of, or horizon within, [type of] water-quality zone or water in aquifer [date]—Accurately located		lineweight .275 mm line color 100% green	
26.5.20	Water-quality-zone contour (intermediate), showing altitude of top or base of, or horizon within, [type of] water-quality zone or water in aquifer [date]—Approximately located		.5 mm 5.0 mm	

*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.6—Geohydrologic lines				
26.6.1	Line of equal, average, mean, or median (etc.) annual, monthly, or daily (etc.) precipitation [date] —Accurately located		lineweight .375 mm  line and text color 100% cyan	Negative values must be preceded by a minus (–) sign. Date needed only for parameters that vary with time. May be shown in black or other colors.
26.6.2	Line of equal, average, mean, or median (etc.) annual, monthly, or daily (etc.) precipitation [date] —Approximately located			
26.6.3	Line of equal depth to geologic formation, bedrock, aquifer, or water (etc.) [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.4	Line of equal depth to geologic formation, bedrock, aquifer, or water (etc.) [date]—Approximately located			
26.6.5	Line of equal thickness of geologic formation, aquifer, confining bed, or saturated material (etc.) [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.6	Line of equal thickness of geologic formation, aquifer, confining bed, or saturated material (etc.) [date]—Approximately located			
26.6.7	Line of equal water temperature [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.8	Line of equal water temperature [date]—Approximately located			
26.6.9	Line of equal specific conductance [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.10	Line of equal specific conductance [date]—Approximately located			
26.6.11	Line of equal dissolved-solids concentration, hardness, or chemical-constituent concentration [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.12	Line of equal dissolved-solids concentration, hardness, or chemical-constituent concentration [date]—Approximately located			
26.6.13	Line of equal water-level change, rise, or decline [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.14	Line of equal water-level change, rise, or decline [date]—Approximately located			
26.6.15	Line of equal runoff [date]—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.16	Line of equal runoff [date]—Approximately located			
26.6.17	Line of equal transmissivity, hydraulic conductivity, or porosity (etc.)—Accurately located		lineweight .375 mm  line and text color 100% cyan	
26.6.18	Line of equal transmissivity, hydraulic conductivity, or porosity (etc.)—Approximately located			






































*For more information, see general guidelines on pages A-i to A-v.

26—GEOHYDROLOGIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
26.7—Miscellaneous geohydrologic features				
26.7.1	Watershed basin boundary, drainage divide, or surface-water basin boundary		lineweight .6 mm dash length 7.5 mm dot diameter .625 mm; spacing .5 mm	May also be shown in cyan or other colors.
26.7.2	Watershed subbasin boundary, drainage subdivide, or surface-water subbasin boundary		lineweight .425 mm dash length 5.0 mm dot diameter .45 mm; spacing .5 mm	
26.7.3	Ground-water divide—Accurately located		dot diameter .675 mm; spacing .575 mm	
26.7.4	Ground-water divide—Approximately located		lineweight .15 mm circle diameter .675 mm; spacing .575 mm	
26.7.5	Ground-water barrier (geologic)—Accurately located		lineweight .175 mm dot diameter .675 mm; spacing .575 mm	
26.7.6	Ground-water barrier (geologic)—Approximately located		lineweight .175 mm circle lineweight .15 mm; diameter .675 mm; spacing .575 mm	
26.7.7	Infiltration gallery		all lineweights .15 mm square side 1.125 mm spacing .625 mm	
26.7.8	Direction of ground-water flow (1st option)—Accurately located		1.125 mm 5.75 mm 30° 2.125 mm	
26.7.9	Direction of ground-water flow (2nd option)—Accurately located		lineweight .15 mm	
26.7.10	Direction of ground-water flow (1st option)—Approximately located		6.75 mm all lineweights .25 mm 2.75 mm 25° 1.5 mm	
26.7.11	Direction of ground-water flow (2nd option)—Approximately located		dash 1.5 mm; space .5 mm	

*For more information, see general guidelines on pages A-i to A-v.

27—WEATHER STATIONS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
27.1	Weather station, type of measurement unspecified		2.0 mm  all lineweights .15 mm	
27.2	Discontinued weather station		bar lineweight .3 mm "foursquare" lineweight .2 mm 	
27.3	Snow-survey course—Equipped with a telephone or radio		1.25 mm  "foursquare" lineweight .2 mm 	"antenna" lineweight .175 mm
27.4	Snow-survey course—Equipped with a recorder			
27.5	Weather station measuring precipitation—Equipped with a telephone or radio			
27.6	Weather station measuring precipitation—Equipped with a recorder			
27.7	Weather station measuring evaporation—Equipped with a telephone or radio			
27.8	Weather station measuring evaporation—Equipped with a recorder			
27.9	Weather station measuring temperature—Equipped with a telephone or radio			
27.10	Weather station measuring temperature—Equipped with a recorder			
27.11	Weather station measuring humidity—Equipped with a telephone or radio			
27.12	Weather station measuring humidity—Equipped with a recorder			
27.13	Weather station measuring solar radiation—Equipped with a telephone or radio		H-6 	
27.14	Weather station measuring solar radiation—Equipped with a recorder			
27.15	Weather station measuring wind velocity—Equipped with a telephone or radio		arrow lineweight .175 mm 	5.0 mm 25° 1.25 mm
27.16	Weather station measuring wind velocity—Equipped with a recorder			
27.17	Complete weather station—Equipped with a telephone or radio			
27.18	Complete weather station—Equipped with a recorder			




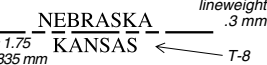




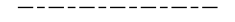


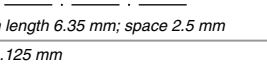
*For more information, see general guidelines on pages A-i to A-v.

28—TRANSPORTATION FEATURES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
28.1	Highway (generic)		 lineweight .325 mm; line color 70% black	May be used on non-topographic maps to show highways and streets.
28.2	Road or street (generic)		 lineweight .25 mm; line color 50% black	
28.3	Primary highway, undivided (Class 1)		outlines: lineweight .125 mm in 100% black .5 mm fill: lineweight .5 mm; line color 100% red	
28.4	Primary highway, divided by centerline (Class 1)		.5 mm	
28.5	Primary highway, divided by median strip (Class 1)		.5 mm ← spacing may vary	
28.6	Secondary highway, undivided (Class 2)		 fill: dash length 3.0 mm; space 3.0 mm	
28.7	Secondary highway, divided by centerline (Class 2)		.5 mm	
28.8	Secondary highway, divided by median strip (Class 2)		.5 mm ← spacing may vary	
28.9	Light-duty road, paved (Class 3)		outlines: lineweight .125 mm in 100% black .5 mm fill: lineweight .5 mm; line color 50% black	
28.10	Light-duty road, gravel (Class 3)		.5 mm fill: dash length 3.0 mm; space 1.5 mm	
28.11	Light-duty road, dirt (Class 3)		.5 mm fill: dash length 1.5 mm; space 3.0 mm	
28.12	Street in urban area; light-duty road, composition unspecified (Class 3)		lineweights .125 mm .5 mm	
28.13	Unimproved road (Class 4)		lineweights .125 mm .5 mm dash length 1.25 mm; space .5 mm	
28.14	Four-wheel-drive road (Class 5)		lineweights .125 mm .5 mm dash length 1.25 mm; space .5 mm	
28.15	Trail		lineweight .15 mm dash length 1.25 mm; space .5 mm	
28.16	Interstate route marker		H-6 (100% red) draft as shown lineweight .2 mm; line color 100% red	
28.17	U.S. route marker		H-6 (100% red) draft as shown lineweight .2 mm; line color 100% red	
28.18	State route marker		H-6 (100% red) circle diameter 4.375 mm lineweight .2 mm; line color 100% red	
28.19	Railroad (single track)		all lineweights .125 mm 5.0 mm 1.0 mm	
28.20	Railroad (more than one track)—Showing number of tracks		all lineweights .125 mm 1.325 mm 5.0 mm HI-5 → 4 TRACKS 1.5 mm	

*For more information, see general guidelines on pages A-i to A-v.

29—BOUNDARIES

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
29.1	Boundary—National		long dash 6.35 mm; short dashes 1.75 mm; space .835 mm  T-9	
29.2	Boundary—State, territory		long dash 6.35 mm; short dashes 1.75 mm; space .835 mm  T-8	
29.3	Boundary—County, parish, Alaska borough, municipio, judicial division		long dash 6.35 mm; short dash 1.75 mm; space .835 mm  T-7	
29.4	Boundary—Civil township, town, district, precinct, barrio		lineweight .175 mm dash length 4.325 mm; space .835 mm	
29.5	Boundary—Incorporated city, village, town, borough, or hamlet		lineweight .175 mm long dash 2.0 mm; short dash 1.0 mm; space .5 mm	
29.6	Boundary—National or state park, monument, reservation, forest, grassland, wilderness area, or wildlife refuge; Hawaii Homestead, Forest Reserve		lineweight .175 mm dot diameter .25 mm dash length 6.35 mm; space 2.5 mm	
29.7	Boundary—Small park		lineweight .125 mm dash length 1.0 mm; space .5 mm	
29.8	Continental Divide		lineweight .3 mm  HI-5 dash 10.0 mm; space 2.5 mm	

*For more information, see general guidelines on pages A-i to A-v.

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES







REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
30.1—Topographic, bathymetric, and glacier contours				
30.1.1	Index topographic contour (1st option)		lineweight .25 mm line and text color 100% brown HI-6	On most maps, every fourth or fifth contour is an index contour. Usually only index and supplementary contours are labeled. Negative values must be preceded by a minus (–) sign.
30.1.2	Index topographic contour (1st option)— Approximate or indefinite		1.75 mm tick length .5 mm HI-6	
30.1.3	Intermediate topographic contour (1st option)		lineweight .15 mm line color 100% brown	
30.1.4	Intermediate topographic contour (1st option)— Approximate or indefinite		1.75 mm tick length .5 mm	
30.1.5	Supplementary topographic contour (1st option)		lineweight .2 mm line and text color 100% brown HI-6	
30.1.6	Supplementary topographic contour (1st option)— Approximate or indefinite		1.75 mm tick length .5 mm HI-6	
30.1.7	Index topographic depression contour (1st option)		tick lineweight .15 mm; length .5 mm; spacing 3.0 mm contour lineweight .25 mm line color 100% brown	Hachures are added to indicate closed areas of low values.
30.1.8	Intermediate topographic depression contour (1st option)		tick length .5 mm; spacing 3.0 mm all lineweights .15 mm line color 100% brown	
30.1.9	Supplementary topographic depression contour (1st option)		tick lineweight .15 mm; length .5 mm; spacing 3.0 mm contour lineweight .2 mm line color 100% brown	
30.1.10	Topographic depression contours (1st option)— Showing tick spacing of adjacent contours		tick spacing 1.0 mm on lowest contour; on next contour, 2.0 mm; on all others, 3.0 mm (lineweights, etc., are given above)	
30.1.11	Index topographic contour (2nd option)		lineweight .25 mm line and text color 50% black HI-6	On most maps, every fourth or fifth contour is an index contour. Usually only index and supplementary contours are labeled. Negative values must be preceded by a minus (–) sign.
30.1.12	Index topographic contour (2nd option)— Approximate or indefinite		1.75 mm tick length .5 mm HI-6	
30.1.13	Intermediate topographic contour (2nd option)		lineweight .15 mm line color 50% black	
30.1.14	Intermediate topographic contour (2nd option)— Approximate or indefinite		1.75 mm tick length .5 mm	
30.1.15	Supplementary topographic contour (2nd option)		lineweight .2 mm line and text color 50% black HI-6	
30.1.16	Supplementary topographic contour (2nd option)— Approximate or indefinite		1.75 mm tick length .5 mm HI-6	
30.1.17	Index topographic depression contour (2nd option)		tick lineweight .15 mm; length .5 mm; spacing 3.0 mm contour lineweight .25 mm line color 50% black	Hachures are added to indicate closed areas of low values.
30.1.18	Intermediate topographic depression contour (2nd option)		tick length .5 mm; spacing 3.0 mm all lineweights .15 mm line color 50% black	
30.1.19	Supplementary topographic depression contour (2nd option)		tick lineweight .15 mm; length .5 mm; spacing 3.0 mm contour lineweight .2 mm line color 50% black	
30.1.20	Topographic depression contours (2nd option)— Showing tick spacing of adjacent contours		tick spacing 1.0 mm on lowest contour; on next contour, 2.0 mm; on all others, 3.0 mm (lineweights, etc., are given above)	

*For more information, see general guidelines on pages A-i to A-v.

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
30.1—Topographic, bathymetric, and glacier contours (continued)				
30.1.21	Index primary bathymetric contour		lineweight .275 mm 	On most maps, every fourth or fifth contour is an index contour. Do not break contours for contour values. Bathymetric contour values are always given in "below sea-level" units, so they are not preceded by a minus (-) sign.
30.1.22	Index primary bathymetric contour—Approximate			
30.1.23	Primary bathymetric contour		lineweight .175 mm 	
30.1.24	Primary bathymetric contour—Approximate			
30.1.25	Supplementary bathymetric contour		lineweight .2 mm line color 40% black	
30.1.26	Supplementary bathymetric contour—Approximate		 line color 40% black	
30.1.27	Index bathymetric contour		lineweight .25 mm line color 100% cyan	
30.1.28	Index bathymetric contour—Approximate		 line color 100% cyan	
30.1.29	Intermediate bathymetric contour		lineweight .15 mm line color 100% cyan	
30.1.30	Intermediate bathymetric contour—Approximate		 line color 100% cyan	
30.1.31	Index primary bathymetric depression contour		tick lineweight .175 mm; length .375 mm (spacing varies) 	Hachures are added to the lowest contour(s) to indicate a closed area of low values (depression) and also an area of higher value (rise) inside a depression.
30.1.32	Index primary bathymetric rise contour (inside depression)			
30.1.33	Primary bathymetric depression contour		tick length .375 mm (spacing varies) 	
30.1.34	Primary bathymetric rise contour (inside depression)			
30.1.35	Supplementary bathymetric depression contour		tick lineweight .175 mm; length .375 mm (spacing varies) 	
30.1.36	Supplementary bathymetric rise contour (inside depression)			
30.1.37	Index bathymetric depression contour		tick lineweight .175 mm; length .375 mm (spacing varies) 	
30.1.38	Index bathymetric rise contour (inside depression)			
30.1.39	Intermediate bathymetric depression contour		tick length .375 mm (spacing varies) 	
30.1.40	Intermediate bathymetric rise contour (inside depression)			
30.1.41	Bathymetric rise contour (inside depression)—Showing hachure spacing for closed contours less than 12.7 mm in circumference		tick spacing 1.0 mm 	
30.1.42	Bathymetric depression contours—Showing hachure spacing for closed contours less than 12.7 mm in circumference		tick spacing 1.0 mm 	
30.1.43	Bathymetric depression or rise contours—Showing hachure spacing for closed contours between 12.7 mm and 76.2 mm in circumference		tick spacing 2.0 mm 	
30.1.44	Bathymetric depression or rise contours—Showing hachure spacing for closed contours more than 76.2 mm in circumference		tick spacing 2.5 mm 	

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE
30.1—Topographic, bathymetric, and glacier contours (continued)				
30.1.45	Index contour on glacier or permanent snowfield		lineweight .225 mm line color 100% cyan	On most maps, every fourth or fifth contour is an index contour.
30.1.46	Index contour on glacier or permanent snowfield—Approximate or indefinite		2.5 mm tick length .5 mm line color 100% cyan	
30.1.47	Intermediate contour on glacier or permanent snowfield		lineweight .125 mm line color 100% cyan	
30.1.48	Intermediate contour on glacier or permanent snowfield—Approximate or indefinite		2.5 mm tick length .5 mm line color 100% cyan	
30.1.49	Index depression contour on glacier or permanent snowfield		tick lineweight .15 mm; length .5 mm; spacing 3.0 mm contour lineweight .225 mm line color 100% cyan	Hachures are added to indicate closed areas of low values.
30.1.50	Intermediate depression contour on glacier or permanent snowfield—Approximate or indefinite		tick length .5 mm; spacing 3.0 mm all lineweights .125 mm line color 100% cyan	

*For more information, see general guidelines on pages A-i to A-v.

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
30.2—Drainage features				
30.2.1	Perennial river, stream, or creek (single-line drainage)		 lineweight .2 mm line color 100% cyan	Letter size and spacing may be increased along longer features.
30.2.2	Intermittent river, stream, creek, or wash (single-line drainage)		 lineweight .2 mm long dash length 4.3 mm; very short dash, .2 mm; spacing .6 mm color 100% cyan	
30.2.3	Perennial river, stream, or creek (double-line drainage)		 TI-8 (100% black) color fill 20% cyan spacing may vary all lineweights .2 mm	Letter size and spacing may be increased along wider features.
30.2.4	River mileage marker		 lineweight .2 mm H-6	
30.2.5	Intermittent river, stream, creek, or wash (double-line drainage)		 pattern 132-C	
30.2.6	Braided river, stream, or creek		 all lineweights .2 mm color 100% cyan	
30.2.7	Canal or ditch (single-line drainage)		 lineweight .2 mm HI-6 (100% cyan)	
30.2.8	Canal or ditch (double-line drainage)		 color fill 20% cyan spacing may vary all lineweights .2 mm	
30.2.9	Canal lock (single-line drainage) (1st option)		 1.25 mm H-6 (100% black) lineweight .35 mm	
30.2.10	Canal lock (single-line drainage) (2nd option)			
30.2.11	Canal lock (double-line drainage)		 lineweight .35 mm width may vary	
30.2.12	Floodgate		 lineweight .35 mm H-6 (100% black)	
30.2.13	Tidegate		 lineweight .35 mm H-6 (100% black)	
30.2.14	Sluice gate		 lineweight .35 mm H-6 (100% black)	
30.2.15	Fish ladder		 lineweight .5 mm length may vary H-6 (100% black)	
30.2.16	Aqueduct (single-line drainage)		 lineweight .2 mm HI-6 (100% cyan)	
30.2.17	Aqueduct (double-line drainage)		 color fill 20% cyan spacing may vary all lineweights .2 mm	
30.2.18	Underground or underwater aqueduct		 dash length 1.25 mm; spacing .5 mm	
30.2.19	Aboveground water pipeline		 HI-6 (100% cyan)	
30.2.20	Underground or submerged water pipeline		 HI-6 (100% cyan) dash length 1.25 mm; spacing .5 mm	
30.2.21	Elevated water pipeline		 wing length .575 mm; angle 45° all lineweights .2 mm HI-6 (100% cyan)	
30.2.22	Flume		 HI-6 (100% cyan)	
30.2.23	Siphon		 HI-6 (100% cyan) dash length 1.25 mm; spacing .5 mm	
30.2.24	Penstock		 HI-6 (100% cyan)	

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
30.2—Drainage features (continued)				
30.2.25	Falls (single-line drainage)		TBI-7 (100% black) line color 100% cyan all lineweights .2 mm 1.25 mm	
30.2.26	Falls (double-line drainage)		lineweights .125 mm	
30.2.27	Rapids (single-line drainage)		6 mm 1.25 mm	
30.2.28	Rapids (double-line drainage)		lineweights .125 mm	
30.2.29	Shoreline—Showing open water		line color 100% cyan color fill 20% cyan lineweight .2 mm	
30.2.30	Indefinite or unsurveyed shoreline		dash length 1.75 mm; spacing .5 mm	
30.2.31	Approximate mean low water line		lineweight .15 mm	
30.2.32	Perennial lake or pond—Showing name		TI-8 (100% black) line color 100% cyan color fill 20% cyan lineweight .2 mm	Letter size and spacing may be increased within larger features.
30.2.33	Intermittent lake or pond		lineweight .2 mm; dash length 1.75 mm; spacing .5 mm pattern 132-C line color 100% cyan	
30.2.34	Dry lake or pond		pattern 132-B	
30.2.35	Land subject to inundation		pattern 231-C (@90%)	
30.2.36	Reservoir with natural shoreline		line color 100% cyan color fill 20% cyan	
30.2.37	Dammed reservoir		color fill 20% cyan lineweight .3 mm	
30.2.38	Area to be submerged behind dam		pattern 132-C	
30.2.39	Reservoir (uncovered) with man-made shoreline		lineweight .15 mm color fill 20% cyan	
30.2.40	Covered water storage reservoir		lineweight .15 mm pattern 214-K (@45°) [pattern overprints 20% cyan color fill]	
30.2.41	Salt flat		H-7 line color 100% cyan lineweight .2 mm	
30.2.42	Carolina bay		dash length 1.75 mm; spacing .5 mm line color 100% cyan lineweight .2 mm	
30.2.43	Tailings pond		H-7 line color 100% brown pattern 232-B dash length 1.75 mm; spacing .5 mm; lineweight .2 mm	
30.2.44	Outline of glacier or permanent snowfield		color 100% cyan lineweight .2 mm dash length 1.75 mm; spacing .5 mm	
30.2.45	Outline of glacier or permanent snowfield—Form lines show glacial trend		pattern 522-C (rotated perpendicular to glacial trend)	
30.2.46	Marsh, wetland, swamp, or bog		pattern 420-C	
30.2.47	Mangrove area		pattern 424-C	
30.2.48	Rice field		pattern 423-C	

30—TOPOGRAPHIC AND HYDROGRAPHIC FEATURES (continued)

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
30.3—Miscellaneous topographic and hydrographic features				
30.3.1	Open pit mine or quarry, as shown on topographic maps or on general-purpose or smaller scale maps	Quarry	H-7 → Quarry draft as shown	
30.3.2	Gravel, sand, clay, or borrow pit, as shown on topographic maps or on general-purpose or smaller scale maps	Gravel Pit	H-7 → Gravel Pit 2.235 mm .75 mm line weight .15 mm	
30.3.3	Adit or mine tunnel entrance, as shown on topographic maps or on general-purpose or smaller scale maps	Mine	H-7 → Mine 2.225 mm 1.175 mm 1.75 mm 55° all line weights .15 mm	Rotate symbol so that long line points in direction of cave or mine entrance.
30.3.4	Cave entrance, as shown on topographic maps or on general-purpose or smaller scale maps	Cave	H-7 → Cave	
30.3.5	Prospect, as shown on topographic maps or on general-purpose or smaller scale maps	Prospect	H-7 → Prospect line weight .15 mm 1.75 mm 45°	
30.3.6	Mine shaft, as shown on topographic maps or on general-purpose or smaller scale maps—Showing name	Garnet Mine	line weight .15 mm 1.0 mm Garnet Mine ← H-7	
30.3.7	Landmark object, as shown on topographic maps or on general-purpose or smaller scale maps	Lookout	H-7 → Lookout dot diameter .225 mm line weight .15 mm circle diameter 1.0 mm	Add label for type of object (as is shown for example of "lookout").
30.3.8	Windmill, as shown on topographic maps or on general-purpose or smaller scale maps	Windmill	H-7 → Windmill 1.125 mm 1.25 mm line weight .15 mm windmill arm angles 110°, 70° .675 mm circle diameter 1.0 mm	
30.3.9	Oil or gas well, as shown on topographic maps or on general-purpose or smaller scale maps	Well	H-7 → Well line weight .15 mm circle diameter 1.0 mm	
30.3.10	Water well, as shown on topographic maps or on general-purpose or smaller scale maps	Well	H-7 → Well line color 100% cyan line weight .2 mm circle diameter 1.0 mm	
30.3.11	Geothermal well, as shown on topographic maps or on general-purpose or smaller scale maps	Geothermal	H-7 → Geothermal line color 100% cyan line weight .2 mm circle diameter 1.0 mm	
30.3.12	Spring, as shown on topographic maps or on general-purpose or smaller scale maps	Spring	circle diameter 1.0 mm H-7 → Spring draft "tail" as shown line color 100% cyan line weight .2 mm	
30.3.13	Geyser, fumarole, mud pot, or thermal spring, as shown on topographic maps or on general-purpose or smaller scale maps	Geyser	H-7 → Geyser circle diameter 1.0 mm line color 100% cyan line weight .2 mm	
30.3.14	Gaging station, as shown on topographic maps or on general-purpose or smaller scale maps	Gaging Station	H-7 → Gaging Station circle diameter 1.25 mm line weight .15 mm	
30.3.15	Pumping station, as shown on topographic maps or on general-purpose or smaller scale maps	Pumping Station	H-7 → Pumping Station .875 mm	
30.3.16	Rock	Rock	H-7 → Rock 60° line weight .2 mm 1.25 mm	
30.3.17	Exposed wreck		line weight .15 mm draft as shown	
30.3.18	Coral reef	Coral	H-7 → Coral line weight .15 mm	
30.3.19	Shoal	Shoal	dash length .2 mm; spacing .425 mm H-7 → Shoal line weight .2 mm	
30.3.20	Ruins	Ruins	dash length 1.0 mm; spacing .5 mm H-7 → Ruins line weight .15 mm	
30.3.21	Power transmission line		line weight .125 mm dot diameter .425 mm .825 mm ← H-5	
30.3.22	Telephone line	TELEPHONE	line weight .125 mm TELEPHONE dash length 2.5 mm; space .5 mm ← H-5	
30.3.23	Underground gas or oil pipeline	PIPELINE	PIPELINE line weight .125 mm ← H-5	
30.3.24	Aboveground gas or oil pipeline	ABOVEGROUND PIPELINE	ABOVEGROUND PIPELINE line weight .125 mm ← H-5	

31—MISCELLANEOUS MAP ELEMENTS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
31.1	Township and range line—Definite		line and text color 100% red	<p>On larger scale maps (for example, 1:24,000 scale), usually every section (nos. 1–36) is numbered.</p> <p>On smaller scale maps (for example, 1:100,000 scale), usually only corner sections (nos. 1, 6, 31, 36) are numbered (type size may be decreased if necessary).</p> <p>Every township and range, regardless of scale, should be numbered.</p> <p>May also be shown in 50% black, especially if contours or other base-map information is shown in 50% black (see Section 30.1).</p>
31.2	Township and range line—Location approximate		line and text color 100% red	
31.3	Township label	T 32 N	line and text color 100% red	
31.4	Range label	R 44 E	line and text color 100% red	
31.5	Section line—Definite		line and text color 100% red	
31.6	Section line—Location approximate		line and text color 100% red	
31.7	Section number	5	line and text color 100% red	
31.8	Map neatline		line and text color 100% black	<p>Patterns should over-print other map units. Do not outline with contact (use scratch boundary instead). May be shown in other colors.</p>
31.9	Map neatline—Showing latitude or longitude tick and value	40°37'30"	line and text color 100% black	
31.10	Cross section line and label	A—A'	line and text color 100% black	
31.11	Leader		line and text color 100% black	
31.12	Map-unit label (add leader where necessary)	Qal	line and text color 100% black	
31.13	Map-unit label containing geologic age character (add leader where necessary)	Mzv	line and text color 100% black	
31.14	Area of outcrop (1st option)		line and text color 100% black	
31.15	Area of outcrop (2nd option)		line and text color 100% black	
31.16	Area of outcrop (3rd option)		line and text color 100% red	
31.17	Area of outcrop (4th option)		line and text color 100% red	
31.18	Area of outcrop in surficial deposits (1st option)		line and text color 100% black	
31.19	Area of outcrop in surficial deposits (2nd option)		line and text color 100% black	
31.20	Area of outcrop in surficial deposits (3rd option)		line and text color 100% red	
31.21	Sample locality—Showing sample number	98-103	line and text color 100% black	<p>May be shown in red or other colors.</p>
31.22	Field station locality, as shown on small-scale maps or on page-size illustrations	.	line and text color 100% black	
31.23	Chronostratigraphic zone, chronozone, or stage boundary		line and text color 100% red	<p>May be shown in black or other colors. Names may either be placed along zone boundary or within zones.</p>
31.24	Chronostratigraphic-zone, chronozone, or stage boundary—Showing names of stratigraphic ages	Aptian Albian	line and text color 100% red	

*For more information, see general guidelines on pages A-i to A-v.