4—LINEAMENTS AND JOINTS

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
	DECOMM NOW	4.1—Lineaments	S TO S. I. T. I. O. I. E. I. I. O. I. I. I. I. O. I. I. I. O. I. I. I. I. O. I. I. I. I. O. I.	
		4.1—Lineaments	lineweight .375 mm	Use to show linear fea-
4.1.1	Lineament		→ \ → \ \ \ 4.5 mm 1.25 mm	tures that have been determined from aerial
4.1.2	Lineament—Showing name	OLYMPIC-WALLOWA	OLYMPIC-WALLOWA H-7	photographs or remotely sensed imagery but not identified on the ground.
		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
4.2.2	Joint—Identity and existence certain, location approximate		2.0 mm ⇒ ≼ ⇒ ≼ .5 mm	beyond outcrop. May also be shown in red or other colors.
4.2.3	Inclined joint (1st option)—Showing dip value and direction	35 	tick length 35 ← HI-6 1.75 mm; → I lineweight 2 mm	Place tick where observation was made. Add arrowhead or '90'
4.2.4	Inclined joint (2nd option)—Showing dip value and direction		tick length 15 ½ 15 ½ 1.375 mm; 15 ½ 1.375 mm; 15 ½ 1.375 mm 15 ½ 1.375 mm	to tick if necessary for clarity.
4.2.5	Vertical or subvertical joint (1st option)		tick length 2.5 mm; Ilineweight .2 mm	
4.2.6	Vertical or subvertical joint (2nd option)	90	90 ← HI-6 	
		4.3—Small, minor join	nts	Į.
4.3.1	Small, minor horizontal joint (1st option)	•	lineweight .2 mm $\Rightarrow \leftarrow 1.125 \text{ mm}$ $\bigcirc \frac{1}{\sqrt{1.125}} \text{ mm}$ circle diameter 2.5 mm	Use to show small, minor joints that are observed in outcrop but
4.3.2	Small, minor inclined joint (1st option)—Showing strike and dip	60	$\begin{array}{c c} 1.125 \text{ mm} \Rightarrow & HI-6 \\ \hline 60 & \frac{1}{4}.5625 \text{ mm} \\ 2.2 \text{ mm} & \Rightarrow 5.0 \\ \hline 60 & \frac{1}{4}.5625 \text{ mm} \end{array}$	that cannot be traced away from that outcrop. For symbols represent-
4.3.3	Small, minor vertical or near-vertical joint (1st option)—Showing strike		1.125 mm → \\	ing 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	60	5.5 60 HI-6 	For multiple observa- tions at one locality, join symbols at the "tail"
4.3.5	Small, minor inclined (dip direction to left) joint, for multiple observations at one locality (1st option)—Showing strike and dip	60	, ⁶⁰	ends of the strike lines (opposite the ornamen- tation); the junction
4.3.6	Small, minor vertical or near-vertical joint, for multiple observations at one locality (1st option)— Showing strike	→	5.5 ₹ ₹ 1.125 mm ↑ ↑ 1.125 mm	point is at point of observation. To obey the right-hand rule, use the "dip direction to
4.3.7	Small, minor horizontal joint (2nd option)	0	all lineweights .2 mm □ ↓ 1.125 mm circle diameter 2.5 mm	right" symbols (use "dip direction to left" sym- bols only when neces-
4.3.8	Small, minor inclined joint (2nd option)—Showing strike and dip	70	1.125 mm \Rightarrow \leftarrow HI-6 70 $\stackrel{\checkmark}{\cancel{k}}$ 5625 mm 2 mm \Rightarrow \leftarrow \leftarrow	sary to prevent over- crowding). May also be shown in
4.3.9	Small, minor vertical or near-vertical joint (2nd option)—Showing strike	-0-	1.125 mm → \structure \frac{\psi}{1.125 mm} → \frac{\psi}{1.125 mm}	red or other colors.
4.3.10	Small, minor inclined (dip direction to right) joint, for multiple observations at one locality (2nd option) —Showing strike and dip	o ⁷⁰	5.5 ₹70 ∠ HI-6 mm 70 ∠ HI-6 .5625 mm ★ 1.125 mm	
4.3.11	Small, minor inclined (dip direction to left) joint, for multiple observations at one locality (2nd option) —Showing strike and dip	J ⁵⁷⁰	A ⁷⁰	
4.3.12	Small, minor vertical or near-vertical joint, for multiple observations at one locality (2nd option)— Showing strike	A	5.5 **\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	

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

6—BEDDING

	6—BEDDING					
REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*		
6.1	Horizontal bedding	\oplus	all lineweights .2 mm Circle diameter 2.5 mm	Inclined (upright) and overturned bedding symbols are used when		
6.2	Inclined bedding—Showing strike and dip	40	1.0 mm $\frac{1}{4}$ $\frac{40}{5.0}$ $\stackrel{\text{HI-6}}{\leftarrow}$ all lineweights 2 mm	the top direction of beds is known to a reasonable degree of certainty.		
6.3	Vertical bedding—Showing strike	+	2.0 mm +	On maps where deter- mination of top direction is "known" at some pla- ces and "unknown" at		
6.4	Overturned bedding—Showing strike and dip	<u>65</u>	1.0 mm 4 65 ∠ HI-6 625 mm radius	others, such symbols also may be used to indicate where top direction		
6.5	Bedding overturned more than 180 degrees— Showing strike and dip	20 1	.7 mm 🕴 20 .375 mm radius	is "unknown" (compare with ref. nos. 6.13-24). Symbols may be used		
6.6	Inclined (dip direction to right) bedding, for multiple observations at one locality—Showing strike and dip	× ⁴⁰	5.5 ¥ 40 ∠ HI-6 mm	without a dip value to indicate the generalized strike and direction of dip of beds.		
6.7	Inclined (dip direction to left) bedding, for multiple observations at one locality—Showing strike and dip	× 40	×40	For symbols represent- ing a single observation at one locality, point of		
6.8	Vertical bedding, for multiple observations at one locality—Showing strike	×	2.0 mm 1 ₁	observation is the mid- point of the strike line. For multiple observa-		
6.9	Overturned (dip direction to right) bedding, for multiple observations at one locality—Showing strike and dip	P 65	.625 mm radius 65 € HI-6	tions at one locality, join symbols at the "tail" ends of the strike lines		
6.10	Overturned (dip direction to left) bedding, for multiple observations at one locality—Showing strike and dip	رمر ⁶⁵ مر	≫ ⁶⁵	(opposite the ornamen- tation); the junction point is at point of observation. To obey the		
6.11	Bedding overturned more than 180 degrees (dip direction to right), for multiple observations at one locality—Showing strike and dip	× ²⁰	.7 mm \(375 mm radius	right-hand rule, use the "dip direction to right" symbols (use "dip direc-		
6.12	Bedding overturned more than 180 degrees (dip direction to left), for multiple observations at one locality—Showing strike and dip	ي پ ²⁰	S 20	tion to left" symbols only when necessary to pre- vent overcrowding).		
6.13	Inclined bedding, where top direction of beds is known from local features—Showing strike and dip	30	1.0 mm $\frac{\sqrt{30}}{1.0}$ All lineweights $\frac{30}{1.0}$ $\frac{5.0}{1.0}$ dot diameter .75 mm	Symbols that have a ball may be used to indicate a greater level		
6.14	Vertical bedding, where top direction of beds is known from local features—Showing strike. Ball shows top direction	+	2.0 mm \(\frac{\psi}{\psi} \) - \(\frac{\psi}{\psi} \)	of certainty in the determination of top direction.		
6.15	Overturned bedding, where top direction of beds is known from local features—Showing strike and dip	85 • J	1.0 mm ½ 85 ∠ HI-6 .625 mm radius	On maps where deter- mination of top direction is "known" at some pla- ces and "unknown" at		
6.16	Bedding overturned more than 180 degrees, where top direction of beds is known from local features —Showing strike and dip	. <u>10</u>	.7 mm 10 2 HI-6 .375 mm radius	others, symbols that have a ball also may be used to indicate where		
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	× 30	5.5 ¥ 30 ∠ HI-6 mm • 30 ∠ HI-6 1.0 mm • 1.325 mm	top direction is "known" (compare with ref. nos. 6.1-12).		
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	رمر ³⁰	For symbols represent- ing a single observation at one locality, point of observation is the mid-		
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	X	2.0 mm 1,	point of the strike line. For multiple observa- tions at one locality, join		
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	×	*	symbols at the "tail" ends of the strike lines (opposite the ornamen-		
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	tation); the junction point is at point of observation. To obey the		
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	<i>≫</i> ⁸⁵	right-hand rule, use the "dip direction to right" symbols (use "dip direc- tion to left" symbols only		
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-6 210 HI-6 3.375 mm radius	when necessary to prevent overcrowding).		
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 معر	So.10			

6—BEDDING (continued)

	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	25 ~ ~	1.0 mm ½ 25 HI-6 all lineweights ↑ 5.0 ½ 375 mm .2 mm .75 mm radius	Symbols may be used without a dip value to indicate the generalized		
6.26	Vertical or near-vertical crenulated, warped, undu- latory, or contorted bedding—Showing approxi- mate strike	~	2.1875 mm ↑ 5.0 mm	strike and direction of dip of beds.		
6.27	Inclined graded bedding—Showing strike and dip	25 	all lineweights 2 mm 1.0 mm 1.5 mm 25 HI-6 875 mm; spacing .5 mm			
6.28	Vertical or near-vertical graded bedding—Showing strike	-+-	$2.25 \text{ mm} \frac{\checkmark}{\land} = +-$			
6.29	Overturned graded bedding—Showing strike and dip	70 -J	1.0 mm √ 70 ← HI-6 .625 mm radius			
6.30	Inclined bedding in crossbedded rocks—Showing approximate strike and dip	35 111111	1.0 mm			
6.31	Vertical or near-vertical bedding in crossbedded rocks—Showing approximate strike	 	2.25 mm + 27427			
6.32	Overturned bedding in crossbedded rocks— Showing approximate strike and dip	75 7J <i>m</i>	1.0 mm 🕌 75 🗠 HI-6 1.0 mm 🛧 プラブ .625 mm radius			
6.33	Approximate orientation of inclined bedding— Showing approximate strike and dip	15 —'—	1.0 mm ψ 1.0 mm ψ 2.0 mm 1.0 mm ψ 1.5 ψ 7 mm 3.6 ψ 3.7 mm 3.7 mm 3.8 ψ 2.2 mm	Use when the measure- ment of strike and (or) dip value is approximate		
6.34	Approximate orientation of vertical or near-vertical bedding—Showing approximate strike	-:-	2.0 mm	servation is accurate. Symbols that have a		
6.35	Approximate orientation of overturned bedding— Showing approximate strike and dip	85 - -'	.7 mm ½ 85 ∠ HI-6 .7 mm ½	ball may be used to indicate a greater level of certainty in the deter- mination of top direc-		
6.36	Approximate orientation of inclined bedding, where top direction of beds is known from local features —Showing approximate strike and dip	25 ← '—	$HI-6$ \rightleftharpoons \gtrless 2.0 mm 1.0 mm $\stackrel{\checkmark}{\checkmark}$ ${\sim}$ ${\sim}$ 7 mm dot diameter $\stackrel{?}{\land}$ 5.0 $\stackrel{?}{\sim}$ 1 lineweights 75 mm $\stackrel{?}{\sim}$ 22 mm	tion. On maps where determination of top direction		
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	-!-	2.0 mm √ - † - ≡ 7 mm	is "known" at some pla- ces and "unknown" at others, symbols that		
6.38	Approximate orientation of overturned bedding, where top direction of beds is known from local features—Showing approximate strike and dip	75 ← ! —	HI-6 → 75	have a ball also may be used to indicate where top direction is "known."		
6.39	Horizontal bedding, as determined remotely or from aerial photographs	÷	.75 mm -4375 mm .2 mm 1.375 mm -4375 mm .4375 mm .4375 mm	Usually reserved for use in reconnaissance geologic mapping.		
6.40	Gently inclined (between 0° and 30°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip	_1_	1.375 mm			
6.41	Moderately inclined (between 30° and 60°) bedding, as determined remotely or from aerial photographs —Showing approximate strike and direction of dip	-π-	.5 mm → I⊬ II_			
6.42	Steeply inclined (between 60° and 90°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip	_ w _	.5 mm			
6.43	Vertical or near-vertical bedding, as determined remotely or from aerial photographs—Showing approximate strike	-+-	$-+-\frac{4}{\pi}2.0 \ mm$			
6.44	Gently overturned (between 0° and 30°) bedding, as determined remotely or from aerial photographs—Showing approximate strike and direction of dip	- -J-	-J .625 mm radius			
6.45	Moderately overturned (between 30° and 60°) bedding, as determined remotely or from aerial photographs —Showing approximate strike and direction of dip	- 4 -	.5 mm خاند – لل–			
6.46	Steeply overturned (between 60° and 90°) bedding, as determined remotely or from aerial photographs —Showing approximate strike and direction of dip	-	.5 mm			

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

7—CLEAVAGE

	7—CLEAVAGE						
REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*			
7.1	Horizontal cleavage (generic or type unspecified)	\vdash	all lineweights $\psi \Rightarrow +1.0 \text{ mm}$ $\cdot 2 \text{ mm}$ $\cdot 4.0 \text{ mm} + \frac{1}{4} \cdot \frac{4}{5} \cdot 1.0 \text{ mm}$	For symbols represent- ing a single observation at one locality, point of observation is the mid-			
7.2	Inclined cleavage (generic or type unspecified)— Showing strike and dip	_20_	HI-6 ≥20 ± 1.0 mm ⇒ 5.0 ★ 1.0 mm	point of the strike line. For multiple observa- tions at one locality, join			
7.3	Vertical cleavage (generic or type unspecified)— Showing strike	Н	├──┤ <u>∜</u> 1.5 mm	symbols at the "tail" ends of the strike lines (opposite the ornamen-			
7.4	Inclined (dip direction to right) cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike and dip	20	5.5 ₹ 20 ← HI-6 mm 20 ← HI-6	tation); the junction point is at point of observation. To obey the			
7.5	Inclined (dip direction to left) cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike and dip	> ²⁰	>20	right-hand rule, use the "dip direction to right" symbols (use "dip direc- tion to left" symbols only			
7.6	Vertical cleavage (generic or type unspecified), for multiple observations at one locality—Showing strike		▶ 1.5 mm	when necessary to prevent overcrowding).			
7.7	Horizontal continuous, slaty cleavage	# 	all lineweights 2 mm 4.0 mm 4.0 mm 4.0 mm 4.0 mm 4.0 mm 4.0 mm 4.0 mm				
7.8	Inclined continuous, slaty cleavage—Showing strike and dip	<u></u>	HI-6 25 5 mm 1.0 mm 1.0 mm				
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	25	5.5 \(\psi_{25} \leftarrow HI-6 \) mm \(\frac{3}{5} \) 1.0 mm \(\frac{3}{5} \) 1.0 mm \(\frac{3}{5} \)				
7.11	Inclined (dip direction to left) continuous, slaty cleavage, for multiple observations at one locality —Showing strike and dip	y ²⁵	_y ²⁵				
7.12	Vertical continuous slaty, cleavage, for multiple observations at one locality—Showing strike	*	≯ 1.5 mm				
7.13	Horizontal disjunctive, spaced cleavage	⊕	all lineweights 1-1.0 mm long dash length 1.0 mm short mm; short dash, 5 mm; spacing .5 mm				
7.14	Inclined disjunctive, spaced cleavage—Showing strike and dip	<u>30</u>	4.0 mm Spacing .5 mm HI-6 30 10 mm 1.0				
7.15	Vertical disjunctive, spaced cleavage—Showing strike	 	<u>₩</u> 1.5 mm				
7.16	Inclined (dip direction to right) disjunctive, spaced cleavage, for multiple observations at one locality —Showing strike and dip	/\ ³⁰	5.5 \(\psi_{30} \lefta \) HI-6				
7.17	Inclined (dip direction to left) disjunctive, spaced cleavage, for multiple observations at one locality —Showing strike and dip	Ju 30	≥¥ ³⁰				
7.18	Vertical disjunctive, spaced cleavage, for multiple observations at one locality—Showing strike	<i>*</i>	↓ 1.5 mm				
7.19	Horizontal disjunctive, symmetric crenulation cleavage	()	all lineweights 45 long dash .2 mm 4.0 1.125 dash .5 mm 4.0 mm 4.0 mm spacing 5 mm				
7.20	Inclined disjunctive, symmetric crenulation cleavage—Showing strike and dip	35 - AA J	4.0 mm				
7.21	Vertical or near-vertical disjunctive, symmetric crenulation cleavage—Showing strike	 	 ↑ 1.5 mm				
7.22	Inclined (dip direction to right) disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike and dip	X ³⁵	5.5 mm [₩] 35 HI-6				
7.23	Inclined (dip direction to left) disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike and dip	大 ³⁵	74 ³⁵				
7.24	Vertical or near-vertical disjunctive, symmetric crenulation cleavage, for multiple observations at one locality—Showing strike	X	≯1.5 mm				

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	(†)	all lineweights 2 mm 4.0 mm long dash length 1.0 mm, short dash .5 4.0 mm 4.0 mm	For symbols represent- ing a single observation at one locality, point of
7.26	Inclined disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage —Showing strike and dip	40 LSJ	HI-6 40 draft as shown 1.0 mm 5.0 km	point of the strike line. For multiple observa-
7.27	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage—Showing strike	⊦ S -l	⊢S → ½ 1.5 mm	tions at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamen-
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	J8m ⁴⁰	5.5 mm 40 HI-6	tation); the junction point is at point of observation. To obey the
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	J8 ² ⁴⁰	AN 40	right-hand rule, use the "dip direction to right" symbols (use "dip direc- tion to left" symbols only
7.30	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike	J8H	¥ 1.5 mm	when necessary to prevent overcrowding).
7.31	Horizontal disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage	(1)	all lineweights 2 mm 4.0 mm 4.0 mm 4.0 mm; Spacing 5 mm 4.0 mm	
7.32	Inclined disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage— Showing strike and dip	45 Z	1.0 mm 45 draft as shown	
7.33	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage—Showing strike	⊢Z I	⊢ Z 	
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	A 45	5.5 mm 45 HI-6	
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	45	A4 45	
7.36	Vertical or near-vertical disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation cleavage, for multiple observations at one locality—Showing strike	Jest .	¥ 1.5 mm	

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

8—FOLIATION

		6—FULIATION		
REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
	8.1—Generic f	oliation (origin not know		
8.1.1	Horizontal generic (origin not known or not specified) foliation	•	all lineweights .2 mm circle diameter 1.5 mm circle diameter 2.5 mm	For symbols representing a single observation at one locality, point of
8.1.2	Inclined generic (origin not known or not specified) foliation—Showing strike and dip	<u>55</u>	1.0 mm $\frac{1}{4}$ $\frac{90^{\circ}}{55}$ HI-6 All lineweights 2 mm	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join
8.1.3	Vertical generic (origin not known or not specified) foliation—Showing strike	-	2.0 mm ↓ - ↓	symbols at the "tail" ends of the strike lines (opposite the ornamen-
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	A ⁵⁵	5.5 × HI-6 mm 55 1.0 mm 90°	tation); the junction point is at point of observation. To obey the
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	⁵⁵	, 55 , 55	right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only
8.1.6	Vertical generic (origin not known or not specified) foliation or foliation, for multiple observations at one locality—Showing strike	Ø	2.0 mm 1 ₅	when necessary to prevent overcrowding).
	8.2—Primar	y foliation or layering (in	igneous rocks)	
		, , ,	dot diameter .35 mm	May be used at locality
8.2.1	Massive igneous rock	::	2.0 mm \frac{\fin}}}}}{\frac{\fir}}}{\frac{\frac{\frac{\frac{\frac{\frac}\frac{\frac{\frac{\frac{\fir}}}}}{\frac{\frac{\frac{\frac{\frac{\frac{\frac{\frac	where foliation and lineation are absent.
8.2.2	Horizontal flow banding, lamination, layering, or foliation in igneous rock	\oint{\oint}	all lineweights .2 mm	For symbols representing a single observation at one locality, point of
8.2.3	Inclined flow banding, lamination, layering, or foliation in igneous rock—Showing strike and dip	10	1.0 mm $\frac{1}{4}$ $\stackrel{60\%}{=}$ 1.0 mm $\stackrel{1}{\leftarrow}$ All lineweights 2 mm	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join
8.2.4	Vertical flow banding, lamination, layering, or foliation in igneous rock—Showing strike	→	2.0 mm ↓ - ↓	symbols at the "tail" ends of the strike lines (opposite the ornamen-
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	✓ ¹⁰	5.5 ¥ 10 ∠ HI-6 1.0 mm 160°	tation); the junction point is at point of observation. To obey the
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	¹⁰	<i>▶</i> 10	right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only
8.2.7	Vertical flow banding, lamination, layering, or foliation in igneous rock, for multiple observations at one locality—Showing strike	A	2.0 mm 1	when necessary to prevent overcrowding).
8.2.8	Inclined crinkled or deformed flow banding, lamination, layering, or foliation in igneous rock— Showing approximate strike and dip	20 ~Å~	1.0 mm $\phantom{00000000000000000000000000000000000$	
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 ½ ~ ↓	
8.2.10	Horizontal cumulate foliation	⊕	all lineweights .2 mm	Inclined (upright) and overturned cumulate foliation symbols are
8.2.11	Inclined cumulate foliation—Showing strike and dip	45	all lineweights .2 mm $\frac{45}{mm}$ $\frac{45}{4}$ $\frac{1.0}{4}$ $\frac{1.0}$ $\frac{1.0}{4}$ $\frac{1.0}{4}$ $\frac{1.0}{4}$ $\frac{1.0}{4}$ $\frac{1.0}{4}$	direction of layers is known to a reasonable degree of certainty.
8.2.12	Vertical cumulate foliation—Showing strike	+	2.5 mm \frac{\psi}{\pi} = \frac{1}{1}	Symbols that have a ball may be used to indicate a greater level
8.2.13	Overturned cumulate foliation—Showing strike and dip	70 -J=	1.0 ¥ 70 ← HI-6 mm ★625 mm radius	of certainty in the deter- mination of top direc- tion.
8.2.14	Inclined cumulate foliation, where top direction of layers is known from local features—Showing strike and dip	30	all lineweights .2 mm $\begin{array}{c c} 30 & \leftarrow HI-6 \\ .2 \text{ mm} & .5 & \downarrow & \downarrow & \downarrow & 1.0 \\ \hline & & & & \uparrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & \uparrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & & \uparrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & & \downarrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & & & \downarrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & & & \downarrow & \downarrow & \downarrow & \downarrow & \uparrow & 1.0 \\ \hline & & & & & & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow$	On maps where determination of top direction is "known" at some places and "unknown" at
8.2.15	Vertical cumulate foliation, where top direction of layers is known from local features—Showing strike. Ball shows top direction	<u>+</u>	$2.5 \text{ mm} \frac{\Psi}{\Lambda} = \frac{\bullet}{1}$	ces and "unknown" at others, symbols that have a ball also may be used to indicate where
8.2.16	Overturned cumulate foliation, where top direction of layers is known from local features—Showing strike and dip	<u>80</u>	1.0 ¥ 80 ← HI-6 mm ★625 mm radius	top direction is "known".

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

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	25 ————	all lineweights .2 mm 1.0 mm 1.0 mm 1.0 mm 1.0 mm 1.0 mm 1.75	For symbols representing a single observation at one locality, point of		
8.2.18	Vertical or near-vertical crinkled or deformed cumulate foliation—Showing approximate strike	₩	2.375 mm +	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join		
8.2.19	Horizontal eutaxitic foliation	⊖	.75 mm ↑ 110° all lineweights .2 mm circle diameter 2.5 mm	symbols at the "tail" ends of the strike lines (opposite the ornamen-		
8.2.20	Inclined eutaxitic foliation—Showing strike and dip	_5	.75 mm $\frac{110^{\circ}}{1}$ $\frac{5}{50}$ HI-6 all lineweights 2 mm	tation); the junction point is at point of observation. To obey the		
8.2.21	Vertical or near-vertical eutaxitic foliation—Showing strike	→	$1.5 \text{ mm} \frac{\psi}{\Lambda} \longrightarrow$	right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only		
8.2.22	Inclined (dip direction to right) eutaxitic foliation, for multiple observations at one locality—Showing strike and dip	A 5	5.5 \(\) \(HI-6 \) \(when necessary to prevent overcrowding).		
8.2.23	Inclined (dip direction to left) eutaxitic foliation, for multiple observations at one locality—Showing strike and dip	₽ ⁵	₽ ⁵			
8.2.24	Vertical or near-vertical eutaxitic foliation, for multiple observations at one locality—Showing strike	Þ	1.5 mm - _K			
8.2.25	Inclined crinkled or deformed eutaxitic foliation— Showing approximate strike and dip	15 ≈	110° HI-6 35 mm 15			
8.2.26	Vertical or near-vertical crinkled or deformed eutaxitic foliation—Showing approximate strike	➾	$1.5 mm \frac{\psi}{\Lambda} \Longrightarrow$			

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

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
	8.3—Secondary fol	iation (caused by metam	orphism or tectonism)	
8.3.1	Horizontal metamorphic or tectonic foliation	•	circle diameter © lineweight .2 mm	For symbols represent- ing a single observation at one locality, point of
8.3.2	Inclined metamorphic or tectonic foliation— Showing strike and dip	35	1.0 mm $\frac{1}{4}$ $\frac{35}{5.0}$ HI-6 lineweight mm 2.2 mm	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join
8.3.3	Vertical metamorphic or tectonic foliation—Showing strike		2.0 mm \delta \delta \delta \delta	symbols at the "tail" ends of the strike lines (opposite the ornamen-
8.3.4	Inclined (dip direction to right) metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike and dip	✓ ³⁵	5.5 * 35 = HI-6 1.0 mm \(\) 60°	tation); the junction point is at point of observation. To obey the
8.3.5	Inclined (dip direction to left) metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike and dip	→ ³⁵	<i>→</i> ³⁵	right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only
8.3.6	Vertical metamorphic or tectonic foliation, for multiple observations at one locality—Showing strike	<i>></i>	2.0 mm 🐒	when necessary to prevent overcrowding).
8.3.7	Horizontal metamorphic or tectonic foliation parallel to bedding	•	circle diameter	Inclined (upright) and overturned foliation symbols are used when
8.3.8	Inclined metamorphic or tectonic foliation parallel to bedding—Showing strike and dip		1.0 mm $^{\downarrow}$	the top direction of bed- ding is known to a rea- sonable degree of cer- tainty.
8.3.9	Vertical metamorphic or tectonic foliation parallel to bedding—Showing strike	+	$4.0 \text{ mm} \xrightarrow{\frac{\Psi}{\Lambda}} - \frac{\Psi}{\Lambda} 2.0 \text{ mm}$	Symbols that have a ball may be used to indicate a greater level
8.3.10	Inclined metamorphic or tectonic foliation parallel to overturned bedding—Showing strike and dip		75 ← HI-6 	of certainty in the deter- mination of top direc- tion.
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	15	1.0 mm 15 HI-6 .75 mm all lineweights .2 mm	On maps where determination of top direction is "known" at some pla-
8.3.12	Vertical metamorphic or tectonic foliation parallel to bed- ding, where top direction of beds is known from local features—Showing strike. Ball shows top direction	+	$4.0 \frac{\frac{1}{100}}{\frac{1}{1000}} \frac{1}{1000} \frac{1}{1000} 2.0 \text{ mm}$	ces and "unknown" at others, symbols that have a ball also may be used to indicate where
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	. #5 - J	85 ∠ HI-6 • 625 mm radius	top direction is "known".
8.3.14	Inclined crinkled or deformed metamorphic or tectonic foliation—Showing approximate strike and dip	30	1.0 mm \(\frac{\psi}{\rm \tau} \) 30 \(\frac{\psi}{\rm \tau} \) 375 mm \(\frac{\psi}{\rm \tau} \) 375 mm radius	
8.3.15	Vertical or near-vertical crinkled or deformed meta- morphic or tectonic foliation—Showing approxi- mate strike	~	2.0 mm √/ _↑ ~ ◆	
8.3.16	Horizontal continuous, penetrative foliation	н	1.0 mm all lineweights circle diameter 2.5 mm 4.25 mm	For symbols represent- ing a single observation at one locality, point of
8.3.17	Inclined continuous, penetrative foliation—Showing strike and dip	25 н ▲ н	1.0 mm 2 5 60° HI-6 1.0 mm 2 5 mm 5 0.0 all lineweights 2 mm	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join
8.3.18	Vertical continuous, penetrative foliation—Showing strike	н 🔷 н	2.0 mm	symbols at the "tail" ends of the strike lines (opposite the ornamen-
8.3.19	Inclined (dip direction to right) continuous, penetrative foliation, for multiple observations at one locality—Showing strike and dip	× ²⁵	5.5 ¥ 25 ← HI-6 1.0 mm ← 5 mm 1.0 mm ← 60°	tation); the junction point is at point of observation. To obey the
8.3.20	Inclined (dip direction to left) continuous, penetrative foliation, for multiple observations at one locality—Showing strike and dip	→ ²⁵	→ ²⁵	right-hand rule, use the "dip direction to right" symbols (use "dip direction to left" symbols only
8.3.21	Vertical continuous, penetrative foliation, for multiple observations at one locality—Showing strike	→	2.0 mm /s	when necessary to prevent overcrowding).

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

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
	8.3—Secondary foliation	(caused by metamorphis	sm or tectonism) (continued)	
8.3.22	Horizontal disjunctive, spaced foliation	l () l	circle diameter 2.5 mm all lineweights 2 mm 3.6 mm	For symbols representing a single observation at one locality, point of observation is the midpoint of the strike line. For multiple observa-
8.3.23	Inclined disjunctive, spaced foliation—Showing strike and dip	30 H ≜ H	HI-6 30 — 1.0 mm 1.0 mm + 1.0 mm 5.5.0 + 1.0 mm	
8.3.24	Vertical disjunctive, spaced foliation—Showing strike	+-♦+ +	2.0 mm	tions at one locality, join symbols at the "tail" ends of the strike lines (opposite the ornamen-
8.3.25	Inclined (dip direction to right) disjunctive, spaced foliation, for multiple observations at one locality—Showing strike and dip	×30	5.5 \(\) 3.0 \(\text{HI-6} \) 1.0 mm \(\text{1.0 mm} \) 1.0 mm	tation); the junction point is at point of observation. To obey the
8.3.26	Inclined (dip direction to left) disjunctive, spaced foliation, for multiple observations at one locality—Showing strike and dip	, 30	<i>→</i> ³⁰	right-hand rule, use the "dip direction to right" symbols (use "dip direc- tion to left" symbols only
8.3.27	Vertical disjunctive, spaced foliation, for multiple observations at one locality—Showing strike	*	2.0 mm	when necessary to prevent overcrowding).
8.3.28	Horizontal disjunctive, symmetric crenulation foliation	*	circle diameter \$60, all lineweights 2.5 mm .2 mm	
8.3.29	Inclined disjunctive, symmetric crenulation foliation—Showing strike and dip	35 H ^ A⊃H	draft as shown 350	
8.3.30	Vertical or near-vertical disjunctive, symmetric crenulation foliation—Showing strike	но фо н	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	35	5.5 × 35 ← HI-6 mm 1.0 mm 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	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	(5)	circle diameter 50°, all lineweights 2.5 mm 2 mm	
8.3.35	Inclined disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation—Showing strike and dip	40 ***	1.0 mm $\frac{4}{4}$ $\frac{40}{4}$ $\frac{4}{4}$ 1.0 mm draft as shown $\frac{4}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$	
8.3.36	Vertical or near-vertical disjunctive, asymmetric (S-shaped, counterclockwise sense of shear) crenulation foliation—Showing strike	⊢≸ -1	2.0 mm / → ★ - ★ - 1	
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	, \$ ⁴⁰	5.5 \(\frac{40}{40} \) HI-6 1.0 mm \(\frac{40}{40} \) draft as shown 1.0 mm \(\frac{40}{40} \) l60	
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	× 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 80°, all lineweights 2.5 mm .2 mm	
8.3.41	Inclined disjunctive, asymmetric (Z-shaped, clockwise sense of shear) crenulation foliation— Showing strike and dip	45	1.0 mm $\frac{4}{h}$ $\frac{45}{1.0 \text{ mm}}$ $\frac{4}{h}$ 1.0 mm $\frac{5.0}{1.0 \text{ mm}}$ 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 + 1	
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	×45	5.5 \(\frac{45}{1.0 \text{ mm}} \) \(\frac{45}{60^{\circ}} \) \(\delta \text{ draft as shown} \) \(\frac{1.0 \text{ mm}}{1.0 \text{ mm}} \) \(\frac{60^{\circ}}{1.0 \text{ mm}} \)	
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	A ⁴⁵	≠4 ⁵	
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 metamorphis	sm or tectonism) (continued)	
8.3.46	Horizontal gneissic layering	H∰H	circle diameter 2.5 mm all lineweights 2 mm 4.0 mm	For symbols representing a single observation at one locality, point of
8.3.47	Inclined gneissic layering—Showing strike and dip	<u>50</u>	HI-6 \ \ \frac{60\gamma}{50} \ \frac{\pi}{\pi} 1.0 mm \ \ \frac{\pi}{\pi} \ \frac{\pi}{\pi} 1.0 mm \ \ \frac{\pi}{\pi} \ \frac{\pi}{\pi} 1.0 mm \ \ \frac{\pi}{\pi} \pi \tankin \pi} \ \frac{\pi}{\pi} \ \pi	observation is the mid- point of the strike line. For multiple observa- tions at one locality, join
8.3.48	Vertical or near-vertical gneissic layering—Showing strike	⊢	2.0 mm / ←	symbols at the "tail" ends of the strike lines (opposite the ornamen-
8.3.49	Inclined (dip direction to right) gneissic layering, for multiple observations at one locality—Showing strike and dip	, ⁵⁰	5.5 ₹ 50 ← HI-6 1.0 mm 1.0 mm 60°	tation); the junction point is at point of observation. To obey the
8.3.50	Inclined (dip direction to left) gneissic layering, for multiple observations at one locality—Showing strike and dip	> 50	→ ⁵⁰	right-hand rule, use the "dip direction to right" symbols (use "dip direc- tion to left" symbols only
8.3.51	Vertical or near-vertical gneissic layering, for multiple observations at one locality—Showing strike	<i>></i>	2.0 mm _K	when necessary to prevent overcrowding).
8.3.52	Horizontal undulatory gneissic layering	r ⊕ d	circle diameter 2.5 mm radius 2.5 mm 1.0 ¥ 1.0 ¥ 1.375 mm radius 1.0 ¥ 1.375 mm 1.0 1.0	
8.3.53	Inclined undulatory gneissic layering—Showing strike and dip	.55 	$HI-6$ $\begin{array}{c} 60\% \\ \hline 55\% \\ \hline 1.0 \text{ mm} \\ \hline \end{array}$ $\begin{array}{c} 1.5 \text{ mm radius} \\ \hline \begin{array}{c} 55\% \\ \hline \end{array}$ $\begin{array}{c} 1.375 \text{ mm} \\ \hline \end{array}$ $\begin{array}{c} 375 \text{ mm} \\ \hline \end{array}$ $\begin{array}{c} 310 \text{ mm} \\ \hline \end{array}$ $\begin{array}{c} 1.0 \text{ mm} \\ \hline \end{array}$	
8.3.54	Vertical or near-vertical undulatory gneissic layering —Showing strike	~	2.0 mm + -	
8.3.55	Horizontal mylonitic foliation	•	circle diameter 2.5 mm 4.1.5 mm all lineweights 2 mm 3.4 ≤ 1.475 mm	
8.3.56	Inclined mylonitic foliation—Showing strike and dip	60 	HI-6 60/ 60 1.5 mm 1.0 mm 1.475 mm 5.0 mm	
8.3.57	Vertical or near-vertical mylonitic foliation— Showing strike	-₩ -	2.0 mm + ++-	
8.3.58	Inclined (dip direction to right) mylonitic foliation, for multiple observations at one locality—Showing strike and dip	→ ⁶⁰	5.5 \(\sigma \) 60 \(\sigma \) HI-6	
8.3.59	Inclined (dip direction to left) mylonitic foliation, for multiple observations at one locality—Showing strike and dip	A 60	№ 60	
8.3.60	Vertical or near-vertical mylonitic foliation, for multiple observations at one locality—Showing strike	*	2.0 mm _K	

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

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)	→	lineweight	Open-arrowed ("2nd option") symbols may be used to show a sec-
9.2	Approximate plunge direction of inclined generic (origin or type not known or not specified) lineation or linear structure (2nd option)	→	all lineweights .2 mm —→	ond generation or another instance of a particular lineation. Lineation symbols may
9.3	Inclined generic (origin or type not known or not specified) lineation or linear structure (1st option) —Showing bearing and plunge	> 20	> 20 HI-6	be used separately or combined with other symbols.
9.4	Inclined generic (origin or type not known or not specified) lineation or linear structure (2nd option) —Showing bearing and plunge	>30	>30	For lineation symbols representing a single observation at one
9.5	Horizontal generic (origin or type not known or not specified) lineation or linear structure (1st option) —Showing bearing	←→	lineweight $ 6.0 \leftarrow $ $ 2 \text{ mm} 25^{\circ} \leftarrow $ $ 1.25 \text{ mm} \leftarrow $ $ 1.25 \text{ mm} \leftarrow $	locality, the point of observation is at one of the following two pla-
9.6	Horizontal generic (origin or type not known or not specified) lineation or linear structure (2nd option) —Showing bearing	←→	all lineweights .2 mm ←→	ces: for inclined linea- tions, at the "tail" end (opposite the arrow- head); for horizontal lin-
9.7	Vertical or near-vertical generic (origin or type not known or not specified) lineation or linear structure (1st option)	+	all lineweights .2 mm .975 mm .975 mm	eations, at the midpoint of the bearing line. For a single lineation
9.8	Vertical or near-vertical generic (origin or type not known or not specified) lineation or linear structure (2nd option)	+	+	symbol combined with a single planar-feature (for example, bedding
9.9	Inclined parting lineation in sedimentary materials (1st option)—Showing bearing and plunge	-++> 20	all lineweights $1.25 \text{ mm} \xrightarrow{\frac{1}{k}} 20 \qquad .2 \text{ mm}$ $2.5 \text{ mm} 1.0 \text{ mm}$	or foliation) symbol, join the "tail" end of the lin- eation arrow to the mid- point of the strike line of
9.10	Inclined parting lineation in sedimentary materials (2nd option)—Showing bearing and plunge	-++> 30	-++> 30	the planar-feature symbol; the junction point is at the point of observa-
9.11	Horizontal parting lineation in sedimentary materials (1st option)—Showing bearing	< ++→	all lineweights .2 mm 2.5 mm 2.5 mm	tion. For multiple observa- tions at one locality, join
9.12	Horizontal parting lineation in sedimentary materials (2nd option)—Showing bearing	∢ ++→	∢ ++→	all symbols at their "tail" ends (opposite the arrowheads or other
9.13	Inclined sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (1st option)—Showing bearing and plunge	→> 20	2.0 mm lineweight 20 20 mm draft as shown	ornamentations); 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	> 30	all lineweights→30 .2 mm	
9.15	Horizontal sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (1st option)—Showing bearing	↔>	2.0 mm lineweight ⇒ k .2 mm draft as shown	
9.16	Horizontal sole mark, tool mark, scour mark, flute mark, groove, or channel in sedimentary materials (2nd option)—Showing bearing	←→ >	all lineweights .2 mm	
9.17	Inclined slickenline, groove, or striation on fault surface (1st option)—Showing bearing and plunge	 ◆20	lineweight .2 mm	
9.18	Inclined slickenline, groove, or striation on fault surface (2nd option)—Showing bearing and plunge	>30	all lineweights .2 mm ——⇒30	
9.19	Horizontal slickenline, groove, or striation on fault surface (1st option)—Showing bearing	•	lineweight 30° $6.0 \leftarrow 30^{\circ}$ 1.5 mm 30° 1.5 mm 60° $ 60^{\circ} $ $ 60^{\circ} $ $ 60^{\circ} $	
9.20	Horizontal slickenline, groove, or striation on fault surface (2nd option)—Showing bearing	→	all lineweights .2 mm	
9.21	Inclined surface groove or striation (origin not known or not specified) (1st option)—Showing bearing and plunge	→+◆ 20	all lineweights 1.25 mm $\frac{1}{4}$ $+$ 20 .2 mm $+$ $+$ 3.0 mm	
9.22	Inclined surface groove or striation (origin not known or not specified) (2nd option)—Showing bearing and plunge	-+ ⇒30	-+ ⇒30	
9.23	Horizontal surface groove or striation (origin not known or not specified) (1st option)—Showing bearing	*+*	all lineweights 1.25 mm \star	
9.24	Horizontal surface groove or striation (origin not known or not specified) (2nd option)—Showing bearing	⋄ +⋄	*+ *	

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.25	Inclined aligned-object lineation (1st option)— Showing bearing and plunge	→→ 20	dot diameter 1.0 mm $\stackrel{ }{\longrightarrow}$ 20 $\stackrel{ }{\longrightarrow}$ 21 lineweight 2.5 mm $\stackrel{ }{\longrightarrow}$ 22 mm	Open-arrowed ("2nd option") symbols may be used to show a sec-
9.26	Inclined aligned-object lineation (2nd option)— Showing bearing and plunge	> 30	all lineweights —◆→30 .2 mm	ond generation or another instance of a particular lineation.
9.27	Horizontal aligned-object lineation (1st option)— Showing bearing	←◆→	dot diameter 6.0 ineweight 1.0 mm 25° ineweight .2 mm 1.25 mm 1.25 mm	Lineation symbols may be used separately or combined with other symbols.
9.28	Horizontal aligned-object lineation (2nd option)— Showing bearing	◆◆ >	all lineweights ←→→ .2 mm	For lineation symbols representing a single observation at one
9.29	Inclined aligned-clast or aligned-grain lineation (in sedimentary materials) (1st option)—Showing bearing and plunge		2.425 mm 30° lineweight → 20 — .2 mm .675 mm ★ ≯ 2.0 mm	locality, the point of observation is at one of the following two pla-
9.30	Inclined aligned-clast or aligned-grain lineation (in sedimentary materials) (2nd option)—Showing bearing and plunge	-≠ >30	all lineweights →→30 .2 mm	ces: for inclined linea- tions, at the "tail" end (opposite the arrow- head); for horizontal lin-
9.31	Horizontal aligned-clast or aligned-grain lineation (in sedimentary materials) (1st option)—Showing bearing	<0>	2.425 mm → 1 10 10 10 10 10 10 10 10 10 10 10 10 1	eations, at the midpoint of the bearing line. For a single lineation
9.32	Horizontal aligned-clast or aligned-grain lineation (in sedimentary materials) (2nd option)—Showing bearing	◆● >	all lineweights ∢≠→ .2 mm	symbol combined with a single planar-feature (for example, bedding
9.33	Inclined aligned-inclusion lineation (in igneous rocks) (1st option)—Showing bearing and plunge	> 20	circle diameter 1.0 mm O→20 2.5 mm all lineweights 2.5 mm	or foliation) symbol, join the "tail" end of the lin- eation arrow to the mid- point of the strike line of
9.34	Inclined aligned-inclusion lineation (in igneous rocks) (2nd option)—Showing bearing and plunge	> 30	— ◇→ 30	the planar-feature symbol; the junction point is at the point of observa-
9.35	Horizontal aligned-inclusion lineation (in igneous rocks) (1st option)—Showing bearing	←○→	circle diameter 1.0 mm → ← 2.5 mm all lineweights .2 mm	tion. For multiple observations at one locality, join
9.36	Horizontal aligned-inclusion lineation (in igneous rocks) (2nd option)—Showing bearing	←○→	←○→	all symbols at their "tail" ends (opposite the arrowheads or other
9.37	Inclined aligned-mineral lineation (1st option)— Showing bearing and plunge	> 20	1.0 mm 1.0 $\stackrel{\checkmark}{\cancel{\longleftarrow}}$ ${\cancel{\longleftarrow}}$ ${\cancel{\longleftarrow}}$ 1.2 mm ${\cancel{\longleftarrow}}$ ${\cancel{\longleftarrow}}$ 2.5 mm	ornamentations); the junction point is at the point of observation.
9.38	Inclined aligned-mineral lineation (2nd option)— Showing bearing and plunge		all lineweights —■→30 .2 mm	
9.39	Horizontal aligned-mineral lineation (1st option)— Showing bearing	<=>	1.0 mm 1.0 $\stackrel{\downarrow}{\star}$ $\stackrel{\leftarrow}{\leftarrow}$ lineweight $mm \underset{\overline{\star} \to \downarrow}{\stackrel{\leftarrow}{\star}} \stackrel{\leftarrow}{\leftarrow}$.2 mm	
9.40	Horizontal aligned-mineral lineation (2nd option)— Showing bearing	∢≣ >	all lineweights ∢=→ .2 mm	
9.41	Inclined aligned mineral-aggregate lineation (1st option)—Showing bearing and plunge	-==> 20	.75 mm 5 mm lineweight .75 ½ 4 20 20 mm mm ½ 4 5.75 mm	
9.42	Inclined aligned mineral-aggregate lineation (2nd option)—Showing bearing and plunge	> 30	all lineweights —=⇒>30 .2 mm	
9.43	Horizontal aligned mineral-aggregate lineation (1st option)—Showing bearing	<==>	.75 mm .5 mm lineweight .75 ½ .2 mm mm ½ .45	
9.44	Horizontal aligned mineral-aggregate lineation (2nd option)—Showing bearing	<== >	all lineweights ∢==→ .2 mm	
9.45	Inclined aligned deformed-mineral lineation (1st option)—Showing bearing and plunge		2.75 mm .5 mm lineweight 1.0 mm $\frac{1}{4}$ 20 .2 mm	
9.46	Inclined aligned deformed-mineral lineation (2nd option)—Showing bearing and plunge	-# ≯30	all lineweights —#→30 .2 mm	
9.47	Horizontal aligned deformed-mineral lineation (1st option)—Showing bearing	<++>	2.75 mm .5 mm lineweight 1.0 mm 1.0 mm 30°	
9.48	Horizontal aligned deformed-mineral lineation (2nd option)—Showing bearing	←#→	all lineweights ∢∌→ .2 mm	

DEE NO	DECORIDATION	CYMPOL	,	NOTEC ON LICACE*
REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.49	Inclined aligned stretched-object lineation (1st option)—Showing bearing and plunge	-→> 20	36.0 k HI-6	Open-arrowed ("2nd option") symbols may be used to show a sec- ond generation or
9.50	Inclined aligned stretched-object lineation (2nd option)—Showing bearing and plunge	> 30	all lineweights →→>30 .2 mm	another instance of a particular lineation.
9.51	Horizontal aligned stretched-object lineation (1st option)—Showing bearing	<• >	lineweight	Lineation symbols may be used separately or combined with other symbols.
9.52	Horizontal aligned stretched-object lineation (2nd option)—Showing bearing	<-> >	all lineweights .2 mm ←→→	For lineation symbols representing a single observation at one
9.53	Inclined aligned stretched-pebble lineation (1st option)—Showing bearing and plunge	> 20	2.125 mm all lineweights → \ \ 20 .2 mm 1.75 mm	locality, the point of observation is at one of the following two pla-
9.54	Inclined aligned stretched-pebble lineation (2nd option)—Showing bearing and plunge	> 30	> 30	ces: for inclined linea- tions, at the "tail" end (opposite the arrow- head); for horizontal lin-
9.55	Horizontal aligned stretched-pebble lineation (1st option)—Showing bearing	←○→	2.125 mm \Rightarrow \Rightarrow \Rightarrow all lineweights .2 mm 1.75 mm	eations, at the midpoint of the bearing line. For a single lineation
9.56	Horizontal aligned stretched-pebble lineation (2nd option)—Showing bearing	♦ ○→	40>	symbol combined with a single planar-feature (for example, bedding
9.57	Inclined aligned stretched-ooid lineation (1st option)—Showing bearing and plunge	<i></i> 0→20	2.4 mm → → 30° 20 all lineweights .75 mm ↑ ≯1.5 mm .2 mm	or foliation) symbol, join the "tail" end of the lin- eation arrow to the mid- point of the strike line of
9.58	Inclined aligned stretched-ooid lineation (2nd option)—Showing bearing and plunge	<i></i> 0→30	> 30	the planar-feature symbol; the junction point is at the point of observa-
9.59	Horizontal aligned stretched-ooid lineation (1st option)—Showing bearing	← 0→	2.4 mm all lineweights → 1	tion. For multiple observations at one locality, join
9.60	Horizontal aligned stretched-ooid lineation (2nd option)—Showing bearing	♦ 0→	◆ <i>0</i> →	all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the
9.61	Inclined rodding (1st option)—Showing bearing and plunge	-→> 20	1.75 mm lineweight .2 mm .2 mm	junction point is at the point of observation.
9.62	Inclined rodding (2nd option)—Showing bearing and plunge	> 30	all lineweights →→>30 .2 mm	
9.63	Horizontal rodding (1st option)—Showing bearing	<=>	1.75 mm lineweight ⇒ k .2 mm .2 mm .2 mm .2 mm	
9.64	Horizontal rodding (2nd option)—Showing bearing	←→ >	all lineweights ←→→ .2 mm	
9.65	Inclined mullions (1st option)—Showing bearing and plunge	-∞→ 20	2.0 mm all lineweights ⇒ ★ .2 mm circle diameters 1.0 mm	
9.66	Inclined mullions (2nd option)—Showing bearing and plunge	-∞→ 30	-∞ <i>>30</i>	
9.67	Horizontal mullions (1st option)—Showing bearing	←∞→	2.0 mm all lineweights ⇒ ←	
9.68	Horizontal mullions (2nd option)—Showing bearing	←∞ →	4∞>	
9.69	Inclined boudins (1st option)—Showing bearing and plunge	->< ▶20	2.8 mm → 4 mm 20 all lineweights .625 mm radius .2 mm	
9.70	Inclined boudins (2nd option)—Showing bearing and plunge	-><-> 30	-><> 30	
9.71	Horizontal boudins (1st option)—Showing bearing	<> → →	2.8 mm → 4 mm all lineweights .625 mm radius .2 mm	
9.72	Horizontal boudins (2nd option)—Showing bearing	< X >	∢ ※ →	

		LINEATION (COILLI	,	
REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
9.73	Inclined pencil structure (1st option)—Showing bearing and plunge	→ 20	all lineweights → 6.0 kHl-6 2 mm .75 mm * 20 25 1.75 mm 1 30 1.25 mm	Open-arrowed ("2nd option") symbols may be used to show a sec-
9.74	Inclined pencil structure (2nd option)—Showing bearing and plunge	>> 30	- ⇒>30	ond generation or another instance of a particular lineation. Lineation symbols may
9.75	Horizontal pencil structure (1st option)—Showing bearing	← →	all lineweights > 6.0 \(\times \).75 mm \\ .2 mm \\ 25^\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	be used separately or combined with other symbols. For lineation symbols representing a single observation at one
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	- \ 	2.5 mm all lineweights 1.25 mm * +> 20 .2 mm 45 .75 mm	locality, the point of observation is at one of the following two pla-
9.78	Inclined lineation at intersection of bedding and cleavage (2nd option)—Showing bearing and plunge	- \- > 30	- ∨ > 30	ces: for inclined linea- tions, at the "tail" end (opposite the arrow- head); for horizontal lin-
9.79	Horizontal lineation at intersection of bedding and cleavage (1st option)—Showing bearing	< ∨ >	2.5 mm all lineweights 1.25 mm 45	eations, at the midpoint of the bearing line. For a single lineation
9.80	Horizontal lineation at intersection of bedding and cleavage (2nd option)—Showing bearing	<∀ >	∢⊬ >	symbol combined with a single planar-feature (for example, bedding
9.81	Inclined lineation at intersection of two cleavages (1st option)—Showing bearing and plunge	//→ 20	2.5 mm all lineweights 1.25 mm 20 .2 mm 45 825 mm	or foliation) symbol, join the "tail" end of the lin- eation arrow to the mid- point of the strike line of
9.82	Inclined lineation at intersection of two cleavages (2nd option)—Showing bearing and plunge	-// ≯30	-//-> 30	the planar-feature symbol; the junction point is at the point of observa-
9.83	Horizontal lineation at intersection of two cleavages (1st option)—Showing bearing	←//->	2.5 mm all lineweights 1.25 mm 45 825 mm	tion. For multiple observa- tions at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the
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	-□ > 20	2.4375 mm all lineweights 1.125 mm 1.125 mm 1.125 mm 1.125 mm	junction point is at the point of observation.
9.86	Inclined lineation at intersection of two fractures or joints (2nd option)—Showing bearing and plunge	—□→30	—□→30	
9.87	Horizontal lineation at intersection of two fractures or joints (1st option)—Showing bearing	<□>	2.4375 mm all lineweights 1.125 mm 1.125 mm 1.125 mm 2.4375 mm 2.2 mm	
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	- \$≯20	2.25 mm all lineweights 1.5 mm $\stackrel{>}{*} + \stackrel{>}{\longrightarrow} 20$.2 mm $\stackrel{?}{*} + \stackrel{?}{*} + 1.5$ mm	
9.90	Inclined lineation at intersection of two foliations (2nd option)—Showing bearing and plunge	- \$→30	- ♦→30	
9.91	Horizontal lineation at intersection of two foliations (1st option)—Showing bearing	< ♦>	2.25 mm all lineweights 1.5 mm $\stackrel{*}{\underset{\pi}{\longrightarrow}}$ 2.2 mm	
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	×> 20	3.0 mm all lineweights 1.25 mm 20 .2 mm 4 .1.25 mm	
9.94	Inclined lineation at intersection of two surfaces (origin or type unspecified) (2nd option)—Showing bearing and plunge	-×> 30	—×→30	
9.95	Horizontal lineation at intersection of two surfaces (origin or type unspecified) (1st option)—Showing bearing	<* >	3.0 mm all lineweights 1.25 mm * *** *** 2 mm * **** **** 1.25 mm	
9.96	Horizontal lineation at intersection of two surfaces (origin or type unspecified) (2nd option)—Showing bearing	< * >	∢ ×>	

REF NO	DESCRIPTION	SYMBOL	CARTOGRAPHIC SPECIFICATIONS*	NOTES ON USAGE*
	Inclined fold hinge of generic (type or orientation			Open-arrowed ("2nd
9.97	unspecified) small, minor fold (1st option)— Showing bearing and plunge	→ 20	color 100% 20 —— lineweight magenta 2,75 mm 1,25 mm .2 mm	option") symbols may be used to show a sec-
9.98	Inclined fold hinge of generic (type or orientation unspecified) small, minor fold (2nd option)—	→>30	all lineweights	ond generation or another instance of a particular lineation.
9.99	Showing bearing and plunge Horizontal fold hinge of generic (type or orientation unspecified) small, minor fold (1st option)—	<++		Lineation symbols may be used separately or combined with other
	Showing bearing Horizontal fold hinge of generic (type or orientation		1.25 mm 1.25 mm magenta	symbols.
9.100	unspecified) small, minor fold (2nd option)— Showing bearing	←→ >	.2 mm	For lineation symbols representing a single observation at one
9.101	Inclined fold hinge of small, minor penecontempor- aneous soft-sediment fold (1st option)—Showing bearing and plunge	- 	⇒	locality, the point of observation is at one of the following two pla-
9.102	Inclined fold hinge of small, minor penecontempor- aneous soft-sediment fold (2nd option)—Showing bearing and plunge	- 	- J → 30	ces: for inclined linea- tions, at the "tail" end (opposite the arrow- head); for horizontal lin-
9.103	Horizontal fold hinge of small, minor penecontem- poraneous soft-sediment fold (1st option)— Showing bearing	< ◆ →	3.0 mm all lineweights color 100% magenta draft as shown	eations, at the midpoint of the bearing line. For a single lineation
9.104	Horizontal fold hinge of small, minor penecontem- poraneous soft-sediment fold (2nd option)— Showing bearing	∜ ₽	∢₽>	symbol combined with a single planar-feature (for example, bedding
9.105	Inclined fold hinge of small, minor anticline (1st option)—Showing bearing and plunge	→→20	magenta 3	or foliation) symbol, join the "tail" end of the lin- eation arrow to the mid- point of the strike line of
9.106	Inclined fold hinge of small, minor anticline (2nd option)—Showing bearing and plunge	→>30	→>30	the planar-feature symbol; the junction point is at the point of observa-
9.107	Horizontal fold hinge of small, minor anticline (1st option)—Showing bearing. Ball on topographically higher side of fold	< >* >	dot diameter 3.5 mm all lineweights .5 mm .2 mm draft as shown .4 mm angenta	tion. For multiple observa- tions at one locality, join
9.108	Horizontal fold hinge of small, minor anticline (2nd option)—Showing bearing. Ball on topographically higher side of fold	< >* >	√→• >	all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the
9.109	Inclined fold hinge of small, minor antiform (1st option)—Showing bearing and plunge	→) 20		junction point is at the point of observation. May also be shown in
9.110	Inclined fold hinge of small, minor antiform (2nd option)—Showing bearing and plunge		→>30	black or other colors.
9.111	Horizontal fold hinge of small, minor antiform (1st option)—Showing bearing. Ball on topographically higher side of fold	<) ↔	dot diameter 3.5 mm all lineweights .2 mm .2 mm color 100% draft as shown 4 mm all lineweights .2 mm and lineweights .2 mm all lineweights .2 mm	
9.112	Horizontal fold hinge of small, minor antiform (2nd option)—Showing bearing. Ball on topographically higher side of fold	⟨-)• ⊳	√→ ▷	
9.113	Inclined fold hinge of small, minor syncline (1st option)—Showing bearing and plunge	→20	color 100% 2.45 mm all lineweights magenta	
9.114	Inclined fold hinge of small, minor syncline (2nd option)—Showing bearing and plunge	- ←>30	- ←→30	
9.115	Horizontal fold hinge of small, minor syncline (1st option)—Showing bearing. Ball on topographically higher side of fold	(⇔	dot diameter 2.45 mm all lineweights .2 mm .2 mm color 100% draft as shown 1.3 mm draft as shown 2.45 mm agenta	
9.116	Horizontal fold hinge of small, minor syncline (2nd option)—Showing bearing. Ball on topographically higher side of fold	<-(+) >	← ↔	
9.117	Inclined fold hinge of small, minor synform (1st option)—Showing bearing and plunge	-(→ 20	color 100% 3.3 mm all lineweights magenta 20 22 mm	
9.118	Inclined fold hinge of small, minor synform (2nd option)—Showing bearing and plunge	(-> 30	-(→30	
9.119	Horizontal fold hinge of small, minor synform (1st option)—Showing bearing. Ball on topographically higher side of fold	(↔	dot diameter 3.3 mm all lineweights .5 mm .2 mm .2 mm .0cor 100% draft as shown % 8 mm magenta	
9.120	Horizontal fold hinge of small, minor synform (2nd option)—Showing bearing. Ball on topographically higher side of fold	√-(+ >	√ (+ >	
			*For more information, see general guide	

all lineweights by 25° .2 mm 2 mm 0 all lineweights by 25° .2 mm 1.25 mm 2.5° .2 mm 3.5° .2 mm 3.5	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
0 all lineweights L 25° .2 mm 1.25 mm C aft as shown F	another instance of a particular lineation. Lineation symbols may
25° .2 mm b. 1.25 mm c. 3 s. 4 s.	
re	combined with other symbols.
10	For lineation symbols representing a single observation at one
all lineweights 0 0 2 mm 0 draft as shown	ocality, the point of observation is at one of he following two pla-
o ti	ces: for inclined linea- ions, at the "tail" end opposite the arrow- nead); for horizontal lin-
all lineweights e .2 mm	eations, at the midpoint of the bearing line.
s s (t	symbol combined with a single planar-feature for example, bedding
0 .2 mm th	or foliation) symbol, join he "tail" end of the lin- ceation arrow to the mid-
o ti	point of the strike line of the planar-feature sym- pol; the junction point is at the point of observa-
all lineweights ti .2 mm	tion. For multiple observa- tions at one locality, join all symbols at their "tail" ends (opposite the arrowheads or other ornamentations); the
a e a	
all lineweights .2 mm JU	unction point is at the point of observation. May also be shown in
b	plack or other colors.
all lineweights .2 mm draft as shown	
0	
all lineweights .2 mm	
all lineweights .2 mm draft as shown	
	all lineweights