OUR RESPONSES to REVIEWERS' COMMENTS to FGDC "Public Review Draft -- Digital Cartographic Standard for Geologic Map Symbolization"

No.	Decision type[1]	Our responses and reasons for our decisions [new # in FGDC-approved standard]	Sec/Pg/Ln (# in PRD)	Symbol (# in PRD)	Reviewers' comments	Reviewers' proposed changes
1	AIP	- We modified the introduction to make it more informative; however, we are limited by FGDC's guidelines in formatting FGDC standards documents	Sec. 1.1		A book aimed at "the Nation's producers and users of geologic map information" demands a more stirring introductory paragraph. Highlight the wide range of producers and user of such maps, and the confusion that results from using non-standardized sets of symbols on these maps. I suggest moving the 2.1 Background section up front and expanding on the themes at which it hints	
2	--	- Duly noted	ln 217-890		Introductory text is very well done, clear, good explanations of reasons for many of the standards, and excellent conversion tables	
3	NLA	- We changed wording	ln 223		Change "that have" to "with"	
4	AAS	- We agree -- we deleted the word "digital" in this context	e.g., ln 226		The title of the report is good; this is a standard for cartography by digital means (i.e., digitally produced graphics to communicate geologic information), not to be confused with digital storage and communication of geologic information itself. However, in a few places (e.g. line 226) reference is made to "digital geologic maps". This is unfortunate. If the phrase "digital geologic map" has any meaning, it should be in reference to the databases that lie behind many digitally produced maps *The word "digital" describes the process used to make maps, not the map itself. Once the map is sent to printer or plotter and ink hits the paper, it is a map. Regardless of whether the lines were scribed, scanned, or digitally traced, the end product is a geologic map. Using computers may bring about slight changes in the details of the standard as mentioned in Sec. 2.2, lines 346, 347. But the end product remains a geologic map*	Search for all uses of "digital geol*" and replace them with "geol*"
5	RAS	- We prefer to retain hyphenation because "offset print" is a unit modifier (here it modifies "format")	ln 232		"Offset print" does not need a hyphen	Remove hyphen
6	RAS	- We examined the USBR Engineering Geology Office Manual, and we found it to be somewhat limited in its coverage of geologic features [see Sec. 1.4 in text]	ln 236, Sec. 1.4		In the "Related Standards" section, there is no mention of standards developed by the U.S. Bureau of Reclamation (USBR) for geologic and geophysical exploration (listed on p. 33 of the 1988 USBR Engineering Geology Office Manual). Incorporate these symbols into the [Standard]. Most symbols could be included in existing sections like "3.2 Geophysical Survey Lines and Stations" & "19. Natural Resources"	
7	AIP	- We have updated the PostScript implementation to reflect changes to this standard and released it online as a USGS Techniques and Methods Report [http://pubs.usgs.gov/tm/2005/11A02/]. We also hope to complete preliminary work on an ArcGIS implementation and release it as a USGS Open-File Report - Beyond these efforts, we lack resources to prepare the standard for any other software	ln 288-89		While I understand you want to address the large ArcInfo user base, can I assume you will also be implementing the Standard for other proprietary software as well? I'm certain you are aware that a number of CAD and GIS programs are in use for geologic mapping across the country, both at the state and federal level. The Geologic Data Subcommittee of the Federal Geographic Data Committee needs to be open-minded when it comes to implementing the Standard, and not just choose to implement in one proprietary software. *If USGS adopts the proposed standards before providing symbol sets compatible with ArcInfo software, we simply do not have the staff or the time to create the complete symbol sets given in the public review draft.* Upon adoption of the standard will shade and symbol sets be available? *I think it is time to move ahead with the arc versions as quickly as possible. I would suggest focusing on the most important symbols and get those translated and released as quickly as possible. If you wait until all symbols are produced in Arc, others will have gone ahead and created their own conflicting versions*	
8	RAS	- The underscore is part of the URL for this website, so it cannot be deleted	ln 291, 294		The URL contains an underscore between fgdc and gds. With an underline of the URL the underscore cannot be read	Remove URL underline
9	AAS	- We made this correction	ln 307		Acronym is not spelled correctly	Correct spelling is NGMDB
10	AAS	- We expanded and revised this section	p.3, Sec. 2		see ***'s document for discussion of standards history	
11	AAS	- We expanded and revised this section	Sec. 2.1		The historic Background presented here is severely truncated, commencing ca. 1975. The USGS has an illustrious history dating back to the 1860's. USGS maps dating from the 1920's through the 1960's employ highly standardized symbols. The USGS topographic map series illustrates standardized symbolization dating back at least to the 1910's. Surely the USGS began to develop standardized lists of map symbols at an early date. The present document is only the latest refinement of more than a century of setting standards for U.S. mapmakers. The point is that is the past lists of USGS map symbols have not been widely disseminated, leading many of us to improvise non-standard symbols on geologic maps. A goal of this document is to remedy that situation…	
12	AAS	- We made this correction	ln 338		Do not use parentheses within parentheses	Change inner ( ) to [ ] "contained in [normative] appendix A"
13	Beyond	- The symbols in this standard are designed	ln 349-52,		You hint at the device-dependency of good cartography	(A) Explicitly state the range of

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	scope	for use with any output device; however, best results will be obtained when output at higher resolutions (1800 dpi or higher) [see related information in "Preface to Appendix A"]. More specific information that is suitable for every user's needs or output device is beyond the scope of this standard	504-12			devices this standard has been developed for-- what resolution [plotters]? what res film recorders? what color gamut plotter/ rasterizer is needed to utilize the full color chart? (B) Note that users should expect to modify these symbols for output devices that fall outside the range of capabilities of "standard" devices
14	RAS	- We prefer to retain hyphenation because "offset print" is a unit modifier (here it modifies "version")	ln 355		"Offset print" is not hyphened	Omit hyphen in "offset print"
15	RAS	- We are limited by FGDC's guidelines in the authorship and formatting of FGDC standards documents	Sec. 2.3		The authors' names belong on the front cover and on the title page, not in the middle of the text of the report. Putting authors' names up front gives credit where due, and presents the reader with human faces rather than a blank "Geologic Mapping Subcommittee"! A list of the special qualifications and contributions of the several authors may be added at the end of the text (either directly before or directly after the list of references)	
16	AAS	- We moved this section to the end [see Sec. 7 in text] and the tables to the appendix [see "Preface to Appendix A"]	Sec. 3		This chapter is necessary for specialized use by digital cartographers, but of scant interest to the general readership. My first choice is to move this chapter to an appendix, together with its full-page Table 1 listing English-to-metric conversions. Second choice: put this chapter at the end of the text, and bring Chapter 4, forward	
17	NLA	- We rewrote this section	ln 438		Delete the words "and such"	Delete "and such"
18	NLA	- We rewrote this section	ln 450		Delete the comma before the word "and"	Delete comma before "and"
19	AAS	- We capitalized "Table" in citations	ln 435, 439, 454		The word "table" should be capitalized as it appears above the table	[Capitalize] the word "table"
20	AAS	- Both True Type and Type 1 (Postscript) versions of the font [note: font is now called "FGDC-GeoAge"] are available at http://pubs.usgs.gov/tm/2005/11A02/	ln 466, Sec. 3.2		The StratagemAge font was correctly designed as a Type 1 font for use in graphics programs such as Adobe Illustrator. However, the ESRI ArcView 3.2 software does not allow the use of Type 1 fonts. Therefore, there is no way to use the StratagemAge font inside ArcView 3.2	Design TrueType version of font for use in ArcView. One note— the forthcoming ArcView v.8.x may allow using Type 1 fonts. If new ArcView does allow Type 1 fonts, this may not be necessary
21	RAS	- We feel that this should be author's and (or) cartographer's choice	Sec. 3.3		Color: We've used black rather than blue for most line symbols, spot symbols, and patterns because it shows up better than blue. We use map-unit colors made up of only one or two printers inks (cyan, magenta, or yellow) for Pleistocene sediment and three-ink colors for everything else. We use hue to indicate sediment origin. We use black rather than blue because blue tends to change the hue of the map unit, especially the area patterns	
22	RAS	- We prefer to retain hyphenation because "process color" is a unit modifier (here it modifies "inks")	ln 480		The term "process color" is not hyphenated	Omit hyphen in "process color"
23	AAS	- We omitted common abbreviations -- we also moved tables to the appendix [see "Preface to Appendix A"]	p. 8, Table 2		This table is a blend of common knowledge and the arcane. Common knowledge to school children are the abbreviations for centimeters, feet, and inches. Arcane is the correlation of C with cyan and 502-C pattern. I suggest deleting the commonplace abbreviations, and banishing the others to the appendix	
24	AAS	- We moved tables to the appendix [see "Preface to Appendix A"]	p. 9, Table 3		This table should join the other arcane items in an appendix, at the back of the report and out of the way for the general user but available to the specialist	
25	--	- Section refers to hand scribing, not hand drafting (many maps are still hand drafted, at least in early compilation stage)	ln 568-69		Here is one of several places where manuscript states or implies that hand-drafted maps are relics of a bygone era. Given the struggles I and my colleagues are undergoing in trying to adapt computer technology to mapmaking, I seriously doubt that hand-drafted maps ever will be totally obsolete. Field maps and early drafts always will be hand-drawn, and many maps of limited circulation (as for student projects) probably will be also. Certainly, digital technology is increasingly taking over at top-level production levels such as the USGS. Just state the facts in this manner, and indicate that an updated symbol catalog is required to meet the needs of digital cartographers	
26	NLA	- We changed wording	ln 576		"Pattern set" is two words	Add space between pattern, set

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27	--	- Both True Type and Type 1 (Postscript) versions of the font [note: font is now called "FGDC-GeoAge"] are available at http://pubs.usgs.gov/tm/2005/11A02/	ln 585-91		Where does one go to get a copy of the new StratagemAge fonts?	Add URL where the user can go to download the fonts
28	AAS	- We agree -- topic is addressed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text]	ln 595-605		Note use of the word "query". Bradley, 1956, defines query not as a further degradation of accuracy but existence. This is one of the more fundamental ideas in recording linear objects. Does object exist?	
29	AAS	- We agree -- we have included a new standard for the locational accuracy of geologic features in which the degree of reliability is expressed by the "zone of confidence" [see new "Scientific Confidence and Locational Accuracy" section (Sec. 4) in text] - We also include a small triangle showing where a contact is well exposed [see Ref. No. 1.4.10], which may be added in places where the length of a solid (accurately located) contact is too short to clearly distinguish it from an adjacent dashed (approximately located) segment (note that this small triangle was in the Public Review Draft of standard -- see original Ref. No. 1.1.11) - Although it may not always be possible to adequately show some short line segments on the map, the information on locational accuracy is always recorded in the geologic map database	ln 595-611 & related symbols		I suspect that a lot of the symbols found in this standard were generated from mapping in western states where visual confirmation of contacts, faults, etc. could actually be followed on the surface for perhaps miles. The occurrence of a contact, fault, etc. to be visible in our eastern states for scores of feet would be a "mother lode" of an occasion. The problem would arise in using the symbols in this standard that a "certain" contact segment would be as short (or perhaps shorter) as an "approximately located" contact symbol for the same feature, thus a user would not be aware that a portion of a contact line had changed reliability	In Missouri, we have 4 degrees of reliability that are analogous to certain, approximately located, inferred, and inferred queried (almost everything is concealed, not necessarily by water but certainly by surficial materials). Our symbol set consists of a solid line for "possible", long dash line for "probable", and dotted line for "questionable". A small triangle on the solid line shows "observed" reliability (considered certain because we are telling the user where a contact, fault, etc. can be seen). Although the triangle covers some map data, we feel if the user needs to know what the mapper is calling the contact, fault, etc., they would need to know where to observe that feature. You also might consider accommodation for symbology in areas where "long" contacts are not exposed
30	AAS	- We agree -- topic is addressed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text]	ln 595-611		Levels of uncertainty should be uniquely defined for each map	None
31	--	- Topic is addressed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text]			see ***'s original for extensive discussion of certainty of mapped features	
32	--	- Duly noted	ln 600-03		The levels of uncertainty are appropriate	No change suggested
33	RAS	- We prefer to retain hyphenation because "very short dashed" is a unit modifier (here it modifies "line")	p. 10, 2nd footnote		Delete the word "and." Delete hyphens between "very""short""dashed"	Delete the word "and" "…so a very short dashed line has…"
34	RAS	- Dotted lines are difficult to produce in certain applications -- see response in #66 below	p. 10, 2nd footnote		The cost difference between short dashes and dots is not an issue, as nobody I know is using photomechanical methods to produce geologic-map plots. Dots are easily generated in digital geologic map plots – the trend of the future. I strongly recommend dots against short dashes. "Dotted where concealed" is the convention we are used to. Thus, ref. #'s 1.1.6-7 would best be displayed as dots. Computer plots have no trouble with round dots	
35	NLA	- We deleted this section	ln 622		Change sentence	"This does not, however, preclude them from being used"
36	AAS	- We added symbol [see Ref. No. 2.11.14]	Sec. 4.1.2		Add that the amount of displacement on a fault may be indicated by use of numbers along the fault trace	
37	AAS	- We agree -- topic is addressed in new "Geologic Point Features" section [see	ln 647-49		We place the end of the arrow at the point of observation	See PGS comment on 5.6.16-22

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		Secs. 3.6.1.1 and 3.6.2.1 in text]				
38	RAS	- We disagree -- topic is addressed in new "Geologic Point Features" section [see Secs. 3.6.1.1 and 3.6.2.1 in text]	ln 647-49		We prefer that any point symbol should be centered for consistency throughout marker sets. The center of any symbol used for a point of observation should be at the location of the observation	
39	--	- This should be a State agency's prerogative	ln 650-57		MGS also has developed stratigraphic age nomenclature and symbols that we use for our maps. Some of us do not favor changing this scheme. This is related to the consistency that we have established in our geologic maps.	
40	RAS AIP	- Although we respect the reviewer's comments, this standard is not intended to adhere strictly to USGS policies but instead to reflect what has become common usage in the geoscience community -- if common usage changes, the standard will be revised accordingly - We omitted age ranges; for currently accepted ages, users should consult the latest definitions from the International Commission on Stratigraphy	ln 651-54 p. A-38-1, A-38-2	Ref. Nos. 38.8-9, 38.15-16, 38.21-22	These symbols probably were approved for use by the USGS by ***, Chairman of the Geologic Names Committee, sometime between 1990 and 1995. The supporting paperwork should be in the former Geologic Names Unit files in ***'s or ***'s offices in Reston, Va. However, please be sure that the age ranges are accurate as well. The approval memo should be referred to on page 11 of the text.	Add references for approved use of these symbols. Supporting documents are in files of former Geologic Names Unit in Reston; copies are probably also in Regional Publications Groups files in Reston, Denver, or Menlo Park. Please also look into use of Paleoproterozoic, Mesoproterozoic, and Neoproterozoic and whether or not they were formally approved for use. If so, substitute as appropriate on pages A-38-1,2
41	AAS RAS	- We deleted the symbols for Epochs - We retained the symbols for Subperiods Paleogene (38.29) and Neogene (38.25) [see Ref. Nos. 32.1-34]	ln 651-54 p. A-38-1, A-38-2	Ref. Nos. 38.11-12, 38.23, 38.26, 38.28-29, 38.33-35	First of all, none of these symbols were ever approved for use by the Geologic Names Committee following publication of Hansen (1991); they do not show up on the chart found on page 59 of Hansen (1991). I was Chief of Geologic Names Unit in Reston from 1990-95, during which time these symbols were not approved. I am fairly confident that there has been no formal approval of these symbols by Geologic Names Committee since 1995. If there was, then Regional Publications Groups should have been provided with revised symbol charts. I have not seen such a chart or any correspondence indicating that they should be used. Secondly, if the symbols are ever approved, the point size for the smaller symbol attached to larger one would need to be boosted. I find them difficult to read against a white background; imagine how difficult they will be to read against a colored map with a screened base map beneath it	Delete these symbols from the chart on pages A-38-1 and A-38-2. After they are formally approved, they may be added back as a revision to this standard. Boost point size of smaller part of each symbol
42	AAS	- We added this reference	ln 655, 869-70		There is a newer version of this time scale, published around 1989 Check with *** — there was a copy in the old Geologic Names Unit library	Revise reference
43	AAS	- We added this reference	ln 655		Update list to include Palmer & Geissman, 1999	
44	--	- Duly noted	p. 12, Sec. 5., general comment		Several map units in the draft reference surficial materials examples. I see map making difficulties increasing. The USGS glacial deposits map is an excellent and unique representation of many surficial deposit features on one map with a minimum of text considering the complexities. However, it demands one have absolutely no vision color impairments. Your draft references color which is a long standing means to identify geologic map formations or other mappable units. However, map references to these are aided by formation abbreviations plus the fact such maps represent two-dimensional units. For complex surficial material deposits I do not think we can rely just on equally complex colors even though the one has a three axis portrayal of the deposits. It demands extremely good color separation by the user. I do not know the percentage, but many will have difficulty. Also, printing on demand will not be easy	Wish I had a good suggestion to offer here. Using the color code numbers for computer printouts is a limited option. Really could be a crazy quilt pattern
45	--	- This should be a State agency's prerogative	ln 685-705		Although the proposed standards appear to allow some flexibility in assigning map unit colors, MGS has tended to use specific colors for particular rock types rather than for particular rock ages. This is especially true for our Precambrian terranes, where the age-dependent color schemes are practically useless and lithology-dependent color schemes yield clear, aesthetically pleasing maps. Also, to change color selections now to a scheme strictly	

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					based on age would disrupt the consistency already established for our mapping products	
46	Beyond scope	- We concur that label placement by digital cartography is problematic; however, we feel it is not appropriate to provide examples of good and bad cartography to illustrate the practices and guidances described in this standard	Sec. 6		Why not add a couple of figures that exemplify good and bad use of labels on a geologic map? One of the many problems with computer mapmaking, mentioned briefly in the first paragraph of this section should be hammered home more forcefully. That is that labeling software now in use if highly inept, commonly crowding and superposing labels in some areas of a map while leaving vast areas elsewhere devoid of labels. Software limitation fire up the excuse factor for the lazy. "The software only lets me put one number next to a well, therefore I can't show both the API number and the total depth"	
47	RAS	- We prefer to leave "as is" -- see related comment in #48 below	ln 826-35		Symbols that are accompanied by type (e.g., dip or plunge values) are required to be Helvetica Italic 6 pt. In practice, on most digital geologic maps that the New Mexico Bureau of Mines produces this type size is too large and cumbersome due to large quantities of symbols in small geographic areas. We use Helvetica Italic 5 pt as a standard for these which greatly reduces clutter. While 5 pt is very small, in my opinion it is still clearly legible. In addition, a 5 pt symbol value is necessary for differentiation from unit labels of small polygons which are 6 pt	
48	RAS	- We prefer to leave "as is" -- see related comment in #47 above	ln 830		5-point type of any style is unreadable and shouldn't be used. Although it may be legible against a white background, it won't be discernable against a darker map-unit color or against a busy base map	Avoid decreasing point size of map-unit label where subscripts are involved. Subscripts should go no lower than 6 points
49	AAS	- We moved index to back of book	Sec. 9		I can see the value in having an index that lists every single item in the catalog, but its 52 pages belong in the traditional place for an index, at the very back of the book	
50	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 895, 900, 908, 901, 1246, 1820, 2601, 2775		Points to wrong Ref. No	Point to 9.3.13 instead
51	NLA	- No longer applicable because we have new pattern numbers and new index	ln 1147		Correct to 605-06	
52	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 1371		Incorrect pairing of symbol description and Ref. No. due to a missing symbol index	Correct symbol description and a index for missing symbol
53	AAS	- We omitted these from index	ln 1536		Drop the 72 m and 620 m from the description	
54	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 1745		Ref. No. points to 26.2.35, which does not exist	Create one (Note: 26.2 would be the wrong section for the new symbol. Should be under 26.3)
55	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 2108		Points to wrong Ref. No.	Point to 31.7 instead
56	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 2304		These symbols occur in Sec. 19.4 also	Point to Sec. 19.3-4 instead
57	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 2651		Points to wrong Ref. No	Point to 26.4.3 instead
58	NLA	- No longer applicable because we have new Ref. No. scheme and new index	ln 2974		Points to wrong Ref. No	Point to 29.14 instead
59	RAS AAS	- Duly noted, and a good suggestion; however, we feel that it is better to put all introductory material together, and to treat the symbols as a normative appendix - We moved tables to the appendix [see "Preface to Appendix A"]	Appendix A		The appendix of a book contains material "appended", or added on. Generally, appendices include material that is too detailed or specialized to interest the general reader, but is of value to the scholar or specialist. I suggest that the material in Chapter 3 and Tables 2 and 3 belongs in an appendix, so as to be out of the way of the geologist or student who wishes to know which symbols to use of a geologic map. In contrast, the catalog of geologic map symbols represents the heart of this report. As such, it should occupy the central part of the book. The catalog should be preceded by the brief introductory text, and followed by the true appendix of specialized information that is of use only to the professional cartographer. Cross-references should be provided where the same, or similar symbols appear under different headings. For example, well symbols appear in Secs. 19.4, 19.5, and 26.2	
60	AAS	- We added new symbols [see Ref. Nos. 1.1.25-32]	A-1		Is there a need for a symbol indicating an unconformity and, if so, are you aware of such a symbol already in use (e.g., some sort of "decorated" contact line)? Yes, there is a need for this symbol. We are not aware of a specific symbol in use at present	
61	--	- In order to consider this suggestion, we	A-1		Occasionally we use a symbol for younging within geologic beds and there is no symbol provided for this in the	

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		would need an example symbol			standard draft	
62	--	- Duly noted		1.1	Contacts look OK to me	
63	AAS	- We added new symbols [see Ref. Nos. 1.1.33-36]	A-1		Hachured geologic contact for surficial materials: Although not commonly used, some surficial-materials maps in the southwest use a hachured sedimentary contact to demarcate where a younger surficial unit has been deposited on a lower terrace level incised into an older surficial unit. This contact type instantly conveys important visual information about geomorphic relations among surficial units, especially where a normal contact line type is used where non-incised relations occur. Although not used by all researchers, I (for one) use this line type and would benefit from its inclusion. A line of this type occurs in Sec. 12 but it is used (apparently) only to identify geomorphic features and not geologic features. In southern California, a sedimentary map unit (alluvial unit) commonly occurs on the lower terrace tread at the base of geomorphic terrace scarps cut into older units. Thus, the "terrace-scarp" feature actually is a type of geologic contact. For this reason, mappers in the southwest need a geologic-contact line type in Sec. 1.1 that looks like 12.1, and a dashed equivalent (for approximately located)	
64	AAS	- We agree -- topic is addressed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text] - We propagated new standard (concepts and terminology) throughout [see "contact" example in Ref. Nos. 1.1.1-8]	A1.1.1	Contact certain, Fault certain, etc.	"Certain" is a terrible word for this category	USGS Suggestions to Authors 1991, p. 186, uses "accurately located." There is a subtle but important difference between them. Also, according to USGS STA 1991, p. 186, solid can also mean "approximately located" if it is the only line type used
65	AIP	- We agree -- we tested various dash/gap lengths in ArcMap (v.8x), ArcInfo (v.7x), & Adobe Illustrator, and we found that dash lengths of ~12.0, ~3.5, ~1.5, and ~.5 mm, and a gap length of ~.75 mm, work best for nondecorated line styles - We propagated new specs throughout [see "contact" example in Ref. Nos. 1.1.1-8]		1.1.2	I consider the specified dashes are too broad and tend to obscure the feature in areas where geology is complex and the total line length is relatively short. The current standard is 3.5, .5 mm. Increasing this to 4.0, 1.0 is going in the wrong direction	Use 3.0, .5 mm, and change the Coal bed – Approximately located to something else, if need be. This line type is much more commonly used and more important in the total scheme of geologic mapping
66	RAS AIP	- Dotted "concealed contact" requires .006" (~.15 mm) dot size; however, dotted line symbols made of dots smaller than .011" (~.25 mm) cannot be made using certain applications, so instead we use a very-short-dashed line for "concealed contact" - We added symbol for "internal contact" (nonvolcanic) [see Ref. Nos. 1.1.9-16], keeping existing line for "volcanic internal contact" [see Ref. Nos. 18.24-31]		1.1, 18.39	We currently use and define a very short dashed contact as an internal contact, between individual flows within one unit or between individual alluvial fans within one unit. Your 18.39 would take care of the lava flows and the ash-flow tuffs on colored maps. But what about black and white maps where your 18.39 is indistinct from a solid contact, and what is your suggested representation for internal contacts of alluvial units?	Represent concealed contacts as dots, and use a .7 mm dash with a .5 mm space for internal contacts within a single map unit. The dash pattern has been used on several of our published geologic maps and is easily distinguishable from inferred contacts and concealed contacts
67	RAS	- Contacts that dip can also be overturned -- thus we favor keeping "overturned contact" [see Ref. Nos. 1.4.5-6]	A-1-1	1.1.9	Contacts are contacts. Beds are overturned. If used for series of overturned beds, will add unnecessary complexity	Take out. Do not use
68	RAS	- See response in #66 above		1.1.6-7, 1.2.6-7, 17-18, 28-29, etc	Since the days of hand-inked maps, concealed features were represented by dots. When scribing replaced inking, the line was scribed solid and opaquing fluid added to give the appearance of dots (actually small squares). Modern computer graphic software does allow for the simple generation of round dots	Either modify standard to round dots for concealed features that use small squares, or note that round dots are an acceptable substitution. Several standards do use dots, 28.21, 19.1.14, 26.6.1, 26.6.2, 29.6-11
69	AAS	- We added symbol [see Ref. Nos. 31.18-20]	A-1-2		It would be useful to have a symbol for general outcrop area (all geologic units)	Choose stipple pattern that shows up over map unit colors
70	RAS	- We reduced lineweight of "clay bed" to .3 mm, but we retained symbol for clay beds	A-1-2	1.2.23-29	Why is clay bed treated different than PO4, Gyp, salt, etc. (i.e., different line width)	Use same line width for all economic bedded commodities,

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		because of their stratigraphic significance [see Ref. Nos. 1.2.9-16]				but have label added
	AIP	- We added symbol for "bed of economically important commodity" [see Ref. Nos. 1.2.17-24]				
	AIP	- We added examples for labeling each type of commodity [see Ref. Nos. 1.4.12-17]				
71	AIP RAS	- We modified sizes of dikes slightly to enhance clarity [see Ref. Nos. 1.3.1-12] - Note that "Notes on Usage" [see p. A-1-5] says "May also be shown in black or other colors" -- because using different colors is optional, we oppose specifying several colors as standard	A-1-4	1.3.6-15	Ornamentation distinguishing various dike types could be confusing where there are splays	Distinguish the different types of dikes by using different colors
72	RAS	- See response in #66 above		2.1.6,7, etc	"Dotted fault" line types surely can be made into round dots???? What is driving us to square dots in this digital age?	
73	AIP	- We added arrowhead as 2nd option [see Ref. Nos. 2.11.9; also, Ref. Nos. 1.4.2,6]	A-2-1	2.1.9	Incorrect symbol for fault dip. Convention uses open arrow or closed arrow	Modify
74	RAS	- We favor retaining both U/D and ball and bar for normal faults, as both are used commonly [see Ref. Nos. 2.11.1-2; also, 2.2.1-8] -- see related comments & responses in #75, #76, and #78 below		2.1.12	Caption indicates this symbol may be used for normal faults when the ball-and-bar symbol is not used. Why would anyone use U and D, when these letters take up more space than a ball-and-bar, while presenting less information? Normal faults always should be symbolized using the B&B, or if space is tight, ticks on the downthrown (and down-dip) side. The U and D symbols should be reserved for faults for which the direction of throw is known, but the type of fault is not	
75	--	- We concur, these letters are appropriate	ln 1640	2.1.12	The letters "U" and "D" are appropriate for reverse faults	No change suggested
76	AAS	- See comment & response in #75 above [see also Ref. Nos. 2.11.2,3]	A-2		We have used U/D for reverse faults as well as for normal faults. Clarify with tick showing dip	None
77	AIP RAS	- We added decorated symbol for reverse fault, but we used a solid rectangle instead of a square, to make it more dissimilar to detachment fault [see Ref. Nos. 2.4.1-8] - On small-scale maps, we favor retaining option to use "R" notation for reverse faults (similar to "T" notation for thrust faults) to identify fault type where space is tight [see Ref. No. 2.11.23]	A-2	2.1.16	Reverse fault (no current symbol) -- I suggest a solid square decoration for reverse faults patterned on the specifications for detachment faults (see REF NO. 2.6.29) A filled square is easily differentiated from any other feature in the standard and is a wise choice over any rectangular decoration because it is a solid decoration and would be less likely to obscure other map features unnecessarily *The "R" symbol for a high-angle reverse fault has always left me unsatisfied. Normal, strike-slip, and thrust faults rate specific ornamentation, but the high-angle reverse fault, so characteristic of the Midcontinent and the Rocky Mountains, has to suffer with the lowly "R", which often is lost among other lettering on the map. I would prefer some variation on the ball and bar or sawtooth ornamentation, as used for normal and thrust faults, respectively. Now is the time to step forward boldly and propose a new symbol for the neglected high-angle reverse fault. I nominate square boxes on the downthrown side of the fault. If the mapper wants to distinguish generations of reverse faults, the boxes could be alternately open, shaded, or solid*	
78	AAS	- We modified "Notes on Usage" [see p. A-2-11] to say "Line-symbol decorations [e.g., ball and bar] may be added to any type or style of fault to show local relative motion or geomorphic relations. 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"	A-2		Bar and Ball = normal fault: Are you sure you want to restrict the bar-and-ball symbol to normal faults only? I have seen many maps where "bar is on downthrown block", but where the normal versus reverse versus strike-slip versus thrust nature of the displacement and skip style is not known- just the relative movement of the blocks. If you retain the "normal-slip origin" for the bar-and-ball symbol you obviously restrict it from any other usage. Your readership and user base will need to appreciate this: not all faults with down-dropped blocks are "normal-slip faults"	
79	RAS	- We oppose adding these because they are difficult to explain in captions ("bullet in circle" is awkward) -- instead, we added "plus" and "minus" symbols (inside circles) to indicate "toward" and "away"	A-2-1	2.1.13	There are other symbols we prefer to use that should be added as options	Open circle (away) and bullet (toward). X in circle (away) and bullet in circle (toward)

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		(these are easy to explain) [see Ref. Nos. 2.11.20-21]				
80	RAS	- We oppose adding "N" because symbol is sufficiently different from dipping fault [see Ref. Nos. 2.11.8-9] -- we favor retaining symbol "as is", as long as its use is restricted to small-scale maps or figures [see Ref. No. 2.11.22] -- see comment & response in #81 below	A-2-1	2.1.14	Symbol is confusing. Could be interpreted as fault showing dip direction	Follow pattern for 2.1.16, i.e., "N" on downthrown block
81	AAS	- We deleted "G" (and retained "ticked" fault) -- see response in #80 above	A-2-1	2.1.15	That the structure is a graben is evident from the line symbols. G is unnecessary	Remove G
82	AIP	- We changed descriptions as follows: - *original* Ref. No. 2.1.17, to "Ductile shear zone or mylonite zone—May or may not be associated with mappable faults" [see Ref. No. 2.14.1] - *original* Ref. No. 2.1.18, to "Zone of sheared rock within fault" [see Ref. No. 2.14.2] - *original* Ref. No. 2.1.19, to "Fault-breccia zone or zone of broken rock within fault" [see Ref. No. 2.14.3] - *original* Ref. No. 2.1.20, to " Fault-breccia zone or zone of broken rock around fault" [see Ref. No. 2.14.4]	A-2-1	2.1.19,20	Confusing. As shown implies breccia in or around fault, not sheared rock	Use well accepted symbols for sheared rock
83	AIP	- We lengthened "strike" line of symbol [see Ref. Nos. 2.15.1-3]		2.1.21	Proposed symbol looks so similar to a strike-and-dip symbol that these minor (or poorly exposed) faults are liable to be overlooked by the map user. Yes, the line widths are different, but the difference is subtle. I recommend much bolder lines for faults, and use broader and shorter tick symbols	
84	AIP	- See response in #83 above		2.1.22	Proposed symbol is nearly identical to that for a vertical joint; it should be made dramatically bolder or redesigned	
85	Beyond scope	- Providing detailed definitions is beyond the scope of this standard. As stated in the text, definitions are widely available in references such as the Glossary of Geology. Instead, standard provides specifications on visual representation of geologic features		2.4, general	Define the difference between thrust fault and reverse fault. My Dictionary of Geologic Terms defines a reverse fault as a fault having the hanging fault upthrown, whereas a thrust fault is a reverse fault that dips less than 45 degrees. Thus, a thrust fault is a kind of reverse fault. Others may use different definitions, so an illustration defining the various types of faults appears to be in order. If a thrust fault is a reverse fault that dips less than 45 degrees, then reverse faults that dip 45 degrees or steeper should be identified as such (or as high-angle reverse faults). Sure, this is Geology 101 stuff, buy not everyone remembers that information or applies it consistently	
86	AIP	- This is related to standard dash/gap lengths -- see response in #65 above - Note that, for "inferred" and "concealed" ornamented faults, dashes that contain ornamentation must be longer than other dashes in same line, to accommodate the ornamentation. Note also that ornamented symbols work best in longer line segments; specialized symbols could be created for shorter segments, but these should not be part of the standard		2.4	The tooth spacing on thrust faults is pretty large, 1.5 cm. For geologic-map plots where thrust faults traverse polygon areas on the order of 1-2 cm across, you may get only one tooth, or no teeth. Even for larger areas, the tooth spacing is a little broad. OFR 95-525 had tooth spacing that was a little too narrow; what was the basis for the 15 mm decision? Ditto for the ornament spacing on the detachment faults and literally all faults that require ornaments that repeat at regular intervals along the line	
87	--	- In order to consider this suggestion, we would need an example symbol		2.4-6	The section on faults should include a designation for bedding-plane parallel faulting due to flexural slip along and subparallel to bedding planes in folded, stratified rocks. A symbol for this type of fault should be established. Perhaps it may already be established with your proposed symbols for detachment faults. If that is true, then that is fine and my case is closed	
88	NLA	- We no longer use the term "generation" --		2.4.1-14,	First-generation thrust symbols should be unfilled and the second-generation ones filled, rather than the other	

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		we now use the term "option" ("option" can mean many things) [see "thrust fault" examples in Ref. Nos. 2.8.1-24]		2.6.1-14	way around. Later-generation thrusts are usually the more certain ones on a geologic map, and therefore should be in "bold"-- i.e. filled symbols. In contrast, first-generation thrusts (and detachments) commonly have less topographic expression, are usually more speculative, and therefore should have a less emphatic symbol.	
89	RAS	- Because showing different types or ages ("options") of thrusting is optional, we oppose modifying explanation. Note that ages may be added to database or shown as annotation [see Sec. 3.4.3 in text]	A 2-3,4	2.4.8-21, 2.5.8-21	Could be useful in distinguishing several widely different ages of thrusting. However, adds complexity unless used with restraint. For example, in Wyoming thrust belt should use new symbol for each new thrust	Modify explanation so not over used and abused
90	RAS	- We favor keeping symbol "as is" [see Ref. Nos. 2.8.17-24]	A-2-3	2.4.15	Tooth symbol with centerline would close up on most plotters and appear solid	Create another symbol for third generation thrust faults
91	RAS	- We favor keeping symbol "as is" because it has long been used on USGS maps. Note that ornamentation opposite sawtooth should be trapezoidal, not rectangular -- we modified it to make it more clear [see Ref. Nos. 2.9.1-24]		2.5, general	A rare bird perhaps, but I haven't mapped in the Appalachians or Canadian Rockies. The proposed symbol, with sawteeth slightly offset from the fault line, looks so similar to the standard thrust fault that the distinction is likely to be missed. I suggest using the sawteeth on the fault line (as usual) and adding a loop similar to that used to denote overturned bedding or fold	
92	NLA	- We changed "type" to "option" throughout -- see response in #88 above		2.6, general	What are type 1 and type 2 detachment faults? If these have standard definitions, please define them	
93	AIP	- We changed symbol to widely used hachured line (and its derivatives) [see Ref. Nos. 2.10.1-40] - Note that we have changed "type" to "option" throughout -- see response in #88 above		2.6	The detachment-fault symbol in Sec. 2.6 is one I have never seen in the Cordilleran Province. Moreover, I am not sure what a type 1 detachment fault (2.6.1) is versus a type 2 detachment fault (2.6.2). The proposed standard should indicate what these differences are, and when symbol 2.6.1 should be used in lieu of symbol 2.6.2, and vice versa. If they are regional in differentiation, then the standard ought to state so. You may want to consult the detachment-fault mapping literature to see how folks symbolize two additional structures: (1) master detachments as distinct from sub-parallel detachments that root into to sole detachment, and (2) normal faults that are listric into detachments. These are specialized features, yes, but they are a common element in the structural fabric of the Cordilleran Province, and hence may require some special consideration by the FGDC cartographic standard	
94	AAS	- We added several such symbols [see Ref. Nos. 3.1.1-9, 3.2.1-9]		3.1, general	Add "S" symbol for features located by means of seismic reflections surveys	
95	AAS	- See response in #94 above	A 3-1	3.1.5,10	More faults and boundaries are probably located by electrical methods than radioactivity (i.e., IP, EM, resistivity). If keeping others, add electrical, MT	Add additional categories for electrical methods with labels
96	AAS	- We changed these symbols [see Ref. Nos. 3.3.4-5]		3.2.4	The symbol proposed has a specific meaning—a horizontal control point. That particular symbol should only be used for that purpose. Several different symbols are needed since a map will often show different things. We might need to show gravity base stations with one symbol then ordinary gravity stations collected by different groups with different symbols. Often a "+" symbol or small filled circle (usually 0.5 mm high) is used for most locations with a larger polygon for base station locations	Have a series of symbols available to show hierarchy or different sources or classes of data. Alternatively permit use of any symbol that doesn't conflict with standards provided it is clearly explained on map. A symbol is needed to show where rocks have been collected for geophysical analysis.
97	--	- In order to consider this suggestion, we would need an example symbol	A-3-1	3.1.1	This shows geophysically determined boundaries as a line. There are techniques we frequently use that delineate boundaries as a series of points (that can even be scaled in size with magnitude if desired)	Permit boundaries to be shown as a series of points provided that a clear explanation is given
98	RAS AAS	- We oppose changing to solid line, which could easily be mistaken for fault [see Ref. No. 4.1.1] - We will add example showing named lineament [see Ref. No. 4.1.2]	A-4-1	4.1	Prefer a solid line for lineament and option to show name (similar to A-2-1, 2.1.8)	
99	AIP	- We modified "Notes on Usage" [see p. A-4-1] to say "Use to show linear features that have been determined from aerial photographs or remotely sensed imagery	A-4-1	4.1	Notes on usage should not restrict lineament type unless other types are given symbols	Remove text under "NOTES ON USAGE"

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		but not identified on the ground"				
100	RAS	- We're unsure about what is being described, so we will leave "as-is"	A-4-1	4.1	Many lineaments are mapped with fracture traces, the distinguishing trait being length	Change description to "Lineament or fracture trace." Possibly note length requirements
101	AIP	- We modified "Notes on Usage" [see p. A-4-1] to say "Use to show regional joint patterns or single joints that are mappable beyond outcrop"	A-4-1	4.2	What is meant by "large-scale joint patterns"? High density? Long lengths?	Clarify remarks under "NOTES ON USAGE"
102	RAS	- We used lineweight of .3 mm (.012") for joints [see Ref. No. 4.2.1-2]; we think that .175 mm (.007") lineweight is too close to that of contacts (.15 mm, .006") -- see related comment in #103 below	A-4-1	4.2,3	Because joints are commonly near faults, using similar lineweights (0.375 mm for fault, 0.3 mm for joint) can be confusing	Use the 0.175 mm lineweight
103	AAS	- We agree -- see response in #102 above	A-4-1	4.2,3	Preferred lineweight for joints? .012 inches	
104	AIP	- We modified symbol [see Ref. Nos. 4.2.3-6]	A 4-1	4.4	Seems redundant and easily confused with other symbol. Also, is not joint symbol	Take out. Do not use. 4.11 to 4.14 do better job
105	RAS	- We oppose this idea because individual planar features are much more common, and unique symbols for them have long been in use. We only use "flag" symbols in order to avoid overprinting of several "multiple observations at one locality" symbols joined together in groups - Note that we modified "Notes on Usage" [see p. A-4-1] to say "For symbols representing a single observation at one locality, point of observation is the midpoint 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"	A-4-1	4.6,7, 9-11,13	Have individual joint symbols mirror the grouped symbols	Place flags at ends of lines for single symbols. Note that observation is at end of line opposite flag. Remove categories 4.11 and 4.13
106	Beyond scope	- Such detailed definitions are beyond the scope of this standard -- see response in #85 above		5.1, general	I fancy myself a structural geologist, but confess I had to look these terms up in a geologic dictionary. There I discover that these terms denote folds in which the order of sequence of the strata is not known. I thought a primary task of the geologist was to work out the stratigraphy; yet I can visualize situations of intensely deformed rocks and limited outcrops where that may not be possible. Why not include a definition and brief discussion?	
107	AAS	- We added symbol [see Ref. Nos. 5.10.1-4]		5.1-7	NOTE: Nowhere in your anticline/syncline discussion do you have a symbol, etc. for showing dip of axial plane. Much more important than much of the stuff that's here	
108	AIP	- We deleted "AS" notation -- we modified "Notes on Usage" [see p. A-5-1] to say "Place fold trace where axial surface of anticline intersects the ground surface"	A 5-1	5.1.13	Axial surface is a plane. Usually trace of axial surface or trace of crestal plane is what's mapped at surface	
109	AAS	- We corrected symbol [see Ref. No. 5.10.11]	A 5-1	5.1.15	Nonsense. Cannot see how trough line exits for non-overturned or non-inverted anticline	Take out. Do not use
110	AAS	- We corrected symbols [see Ref. Nos. 5.3.33-48; also, 5.7.33-48]	A 5-3	5.2.15-21	All symbols incorrect. You show an antiformal (inverted) syncline, not an inverted anticline	Replace with proper symbol
111	Beyond scope	- Such detailed illustrations are beyond the scope of this standard -- see response in #85 above		5.2	Again, my lack of experiences in highly deformed, mountainous areas shows. I think I can visualize the inverted anticline; it is completely upside down, resembling a syncline, except that the oldest beds are in the core. Is an overturned anticline a fold in which the bedding of one limb is right side up, whereas on the opposite limb the bedding is overturned? How about a diagram?	

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112	--	- We did not intend to restrict to anticlines -- to aid clarity, we created a separate section for fold ornamentations [see Ref. Nos. 5.10.1-12]. Note that "Notes on Usage" [see p. A-5-13] says "Although only shown here on anticlines, line-symbol decorations and notations may be added to any type or style of fold"		5.3	See items 5.1.8 to 5.1.12 for anticlines. Need similar for synclines	Add additional symbols so synclines are treated fairly
113	AIP	- We added "open arrowhead" versions as 2nd option for all fold types (these can be used to show F1, F2, etc.) [see "anticline" example, Ref. Nos. 5.1.1-16]	A 5-4	5.3.15-21	May be rare situations when you would use - generally would have only one. If have for synform/antiform, why not for syncline/anticline? Also, often label as F1, F2, F3, for different generation fold axes - should discuss	
114	AAS	- See response in #110 above	A- 5-5	5.4.15-21	All symbols incorrect. You show inverted anticline	Replace with proper symbol
115	Beyond scope	- Such detailed illustrations are beyond the scope of this standard -- see response in #85 above		5.5	Categories are included for monoclines that have anticlinal and synclinal bends. Can you add illustrations (cross sections or block diagrams) for the sake of the structurally challenged? Where should the line representing the fold be placed relative to the flexures on the fold limb?	
116	RAS	- We're unsure about what is being described, so will leave "as-is"	A-5-7	5.6	We would like a symbol for measurements of inclined axial planes on minor folds that are not defined as antiforms or synforms	Add appropriate symbols—perhaps a variation of strike-and-dip symbols
117	Beyond scope	- Such detailed illustrations are beyond the scope of this standard -- see response in #85 above		5.6.1	The map symbol is identical to that used for horizontal bedding, except the symbol is magenta. If I'm not mistaken, a fold having a horizontal axial surface may be called a recumbent fold, and it is characteristic of intensely deformed rocks. Again, a diagram illustrating such a fold would be helpful. If this represents a recumbent fold, using the same symbol as for horizontal bedding appears inappropriate	
118	RAS	- We favor retaining so that user has option of showing this type of folding	A 5-7	5.6.2,3 vs. 4,5, 5.6.7,8 vs. 9,10	Unlikely that most workers will be purists in separating anticline/antiform or synform/syncline for minor folds	Combine into one symbol to reduce confusion and multiplication of unneeded features
119	RAS	- See response in #118 above	A 5-7	5.6.6,11	Change explanation so it refers to both antiform, anticline and synform, syncline	
120	RAS	- We oppose this idea -- see response in #105 above	A-5-7	5.6.16-22	Location of measurement for single arrows should mirror that for combined arrows	State that end of unidirectional arrow is preferred for point of observation
121	AAS	- We modified symbols [see Ref. Nos. 9.125-132]	A-5-7	5.6.19,20	We use the letters Z and S (as appropriate) on the arrow shafts	Replace the curve with letters Z and S as appropriate, or add the change as a second option
122	AAS	- We modified symbol [see Ref. Nos. 9.121-124]	A 5.7	5.6.21	Would change - as shown implies neutral vergence (keep symbol in, but redefine as neutral symmetry). For minor folds could use more squiggles so don't confuse with S, Z, & M	
123	AAS	- We modified symbol and we moved it to lineation section [see Ref. Nos. 9.69-72]	A 5-7	5.6.22	Probably ok, but most workers put boudins with lineations	
124	AAS	- We deleted entire section	A 5-8	5.7.6-8	Realize they are examples, but most are not too good. Gneiss rarely is thin marker bed. Foliation looks strange	
125	RAS	- We favor retaining so that user has option of showing this type of bedding in convoluted terrain	A 6-1	6.9-10	Only rarely will know that overturning is more than 180 degrees. If overturned between 180 and 270 degrees, it is equivalent to 90 to 180 degrees	Take out. Unnecessary & probably never used
126	RAS	- We favor retaining so that user has option of showing this type of bedding	A 6-1	6.13-18	Unnecessary. Adds nothing. Many features can be used to determine younging direction. Those chosen not necessarily unique or best to use. (Reverse graded bedding would give wrong impression)	Take out. Do not use
127	--	- Duly noted		6.2	For years I have used the strike & dip symbol with no number values without realizing such a symbol was officially sanctioned. In Illinois, we commonly map areas where the dip is large enough to be significant, but too gentle and irregular to measure in the field with a Brunton. Thus, I like to indicate the direction of dip, even when the dip value in degrees isn't accurately determined. Thanks for including this symbol	
128	AAS	- We redesigned symbols [see Ref. Nos. 6.13-16]		6.4	The ball on "Inclined bedding...Top direction of beds known from local features" is on the wrong end of the strike line. The reason? When digitizing,	Put the ball always at the leading end, so the dip is to the right

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					it is important to have consistency in indicating the leading end of the strike line (and thus avoid mistaken reversals of dip direction)	when facing in that direction
129	RAS	- To improve clarity, we modified "Notes on Usage" [see p. A-6-1] to say "Symbols that have a ball may be used to indicate a greater level of certainty in 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' (compare with ref. nos. 6.1-12)"		6.4,8	I don't understand the need for this symbol. If beds are right-side up, top is understood to be down dip; that is, as you walk in the dip direction, you encounter younger strata. If beds are overturned, top is up-dip. If, and only if the beds are vertical (symbol 6.6) might you need to indicate which side is up – although normally this would be indicated by the mapped stratigraphy	
130	--	- This comment has been listed twice -- see #126 above	A 6-1	6.13-18	Unnecessary. Adds nothing. Many features can be used to determine younging direction. Those chosen not necessarily unique or best to use. (Reverse graded bedding would give wrong impression)	Take out. Do not use
131	AAS	- We added symbols [see Ref. Nos. 6.33-38]		6.19	I frequently find it useful to use open bedding symbols (like 6.19) with a ball for observed top direction, and sometimes a loop to indicate overturned beds	Include these symbols. Show a dip number with open symbols
132	AIP	- We added many new cleavage symbols [see Ref. Nos. 7.1-36]	A-7-1	7.1,4	The simpler symbol should be used with the type 1 cleavage	Switch symbols 7.1 and 7.4
133	AAS	- We added symbols [see Ref. Nos. 8.1.1-6]	A-8		Symbol for foliation, origin unspecified: Not all foliations can be diagnosed as to their igneous versus metamorphic origin. The standard needs a symbol to accommodate this reality	
134	RAS	- We favor retaining so that user has the option of showing an absence of foliation in an otherwise foliated terrain	A 8-1	8.1.1	Seems like rather useless symbol	Take out. Do not use
135	RAS	- We oppose adding letters as the standard (this should be optional) [see Ref. Nos. 8.2.1-26]	A 8-1	8.1.2-6, 16-20	I would use open triangle for all igneous foliation and then subdivide with letters to determine what kind	Use fb = flow banding; c = compaction foliation; m = mineral foliation, etc. Gives more freedom and flexibility
136	AIP	- We added many new "secondary" foliation symbols [see Ref. Nos. 8.3.1-60]		8.1.17,18	Symbols for foliations in brittle or ductile deformed xlline rocks: In the Cordilleran Province, symbols proposed for ash-flow tuffs almost universally are used to show cataclastic or mylonitic fabrics in high-strain rocks. Nowhere do I see a symbol representing these specialized but ubiquitous deformational fabrics. Some geologists might argue that high-strain fabrics are metamorphic in origin, and they can be accommodated by traditional metamorphic symbology (Sec. 8.2). I disagree: in my own work, it is silly to use the same type of metamorphic icons to symbolize schists and gneisses of regional dynamothermal origin along with blueschists of high-pressure origin along with cataclastic and mylonitic fabrics generated by strain-dominated conditions. If 8.1.17 and 8.1.18 are universally used by the volcanic geologic-mapping community, then we have a deep conflict. Alternatively, get feedback from a volcanic type on the symbol they use for ash-flow tuffs. The hachured foliation symbol is globally used by the Cordilleran type, so there is going to be a conflict	
137	RAS	- We oppose adding letters as the standard (this should be optional)	A-8-2	8.2	Symbols are needed for second and third generation foliations. We have used 8.1.3 and 8.2.7 for this purpose	Add symbols for different generations of foliation. *Add text to label S1, S2, S3*
138	RAS	- We prefer to retain these symbols [see Ref. Nos. 8.3.8-13]	A 8-2	8.2.7-12	Is unnecessary proliferation of symbols. Can use normal bedding symbol and normal cleavage	Take out. Do not use. Bedding more likely transposed foliation
139	AIP	- We added many new lineation symbols [see Ref. Nos. 9.1-144]	A-9		Lineation symbols for metamorphic and (or) deformed rocks: In general, standard is weak on its diversity of symbol types for minor-structure lineations produced by metamorphism or high strain rates. I recommend that several prominent metamorphic mappers be locked in a room for half a day, or be sent just the metamorphic section, and tasked with identifying a broader range of fabric elements that commonly are symbolized on geologic maps. Some of the lineations are very clunky and unusual; I have never seen them used. In particular, those involving an alpha character (9.5–9.7 and their relatives) are very atypical. I suspect they also will prove difficult to plot out of a database, given the perplexities of getting the detached alpha characters to rotate and plot nicely along its arrow. But more to the point, I have never seen this kind of ornamentation. Ask the expert on this one. Out of my own limited experience, I can see the need for symbols to represent the following types of	

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					deformation and metamorphic minor structures: rodding lineation, crushing and streaking lineation in high-strain rocks, ridging lineation, boudinage lineation, intersection of two foliations, symbol that allow different generations of minor-structures to be represented, metamorphic fold structures (as distinct from those in Sec. 5.6)	
140	AAS	- We added symbols [see Ref. Nos. 9.37-48]	A 9-1	General	No symbol for "non-structural" mineral lineation in igneous/volcanic rocks	
141	AAS	- We added symbols [see Ref. Nos. 9.9-12, 61-76]	A 9-1	General	No symbols/letters for rodding, parting lineation, mullions, etc	
142	RAS	- We oppose adding letters as the standard (this should be optional)	A 9-1	General	Have different symbol for a vs. b lineations. Many times do not know which it is	Use symbols 9.5-9.7 with "a" or "b". If no "a" or "b" then just lineation. Eliminate 9.9
143	AAS	- We deleted duplicate symbols	A 9-1	9.8	Already have symbols 5.6.14 to 5.6.16. Why add more?	Do not use
144	AAS	- We deleted symbol	A 9-1	9.11	This is not a lineation. (Is like sed x-bedding)	Redraft/redraw and put in igneous rock Sec. A 8-1
145	AAS	- We deleted symbol	A 9-1	9.12	This is not a lineation. Is a direction of transport indicator	Belongs in volcanic section
146	AAS	- We deleted symbol	A 9-1	9.13	Need some idea of what is being measured. Also, these lineations are generally not as regular as most that are discussed. Maybe should have some idea of number of measurements that were averaged	Add letters, etc. to explain what is being measured - elongate pumice, mineral, etc.
147	AAS	- We agree -- we deleted symbol	A 9-1	9.14	Not a lineation - it is an indication of plastic (rheomorphic) flowage after deposition. Welding only indicates slope of surface (i.e., gravity flowage). Belongs in igneous volcanic rock section. If want to keep, would generalize to "axis of flow folds in volcanic - igneous rocks irrespective of type of rock"	Redraft and redraw and put with volcanics
148	AAS	- We modified symbols [see Ref. Nos. 9.77-96]	A 9-1	9.15,16	Probably ok for most, but may be inadequate for multiply deformed regions where have up to 4 or more S fabrics	Label to indicate which generations of surfaces intersect
149	AAS	- We deleted symbol	A 9-1	9.18	Redundant symbol. Adds nothing	Take out
150	AAS	- We agree -- we deleted symbol	A 9-1	9.19	Unclear meaning. Also, not necessarily a lineation. Doesn't belong here	Break into parts - plastic flow direction, creep, lava flow direction, sediment transport direction - put on proper pages
151	AIP	- We modified symbols [see Ref. Nos. 9.17-20]	A-9-1	9.19,20	We do not use S with our slickenline symbol (we use symbol 9.19)	Consider changing symbols 9.19 and 9.20
152	AAS	- We modified symbol description [see Ref. Nos. 9.17-20]	A-9-1	9.20	Slicken*side* is the fault surface	Change the description to "Slip lineation or slicken*line* on a fault or shear surface…"
153	NLA	- We overhauled fossil symbol section [see Ref. Nos. 10.2.1-61]	A-10-1		We prefer the fossil symbols on the attached list because they are more visually representative of their respective fossils	Consider replacing and/or adding fossil symbols from attached list (PGSFossils.pdf)
154	--	- Duly noted	A-10		I like this table of symbols for various kinds of fossils. I don't visualize using these symbols on a map, but they look just right for use in stratigraphic columns. The introductory text should expound on the fact that symbols presented here may be used not only in maps, but in a wide range of geologic charts, tables, and illustrations, whether or not they directly accompany a map. Over the years I have seen a bewildering variety of symbols used on illustrations in journals for various kinds of fossils and sedimentary structures. The USGS should lobby the journals and their authors to adopt standard symbols such as those shown here	
155	AIP	- We deleted "bones" in favor of "vertebrates" [see Ref. No. 10.2.26]	A-10-1	10.2.6,58	A symbol for bones and one for vertebrates seems redundant	Clarify the usage or remove one of the symbols
156	RAS	- We oppose deleting symbol for "larger" forams ("fusulinids") because of their biostratigraphic significance		10.2.23-26	Much as I like Forams, are 4 categories really necessary? Seems a bit out of proportion considering single entries like 'vertebrates'. Is 'larger' really necessary? How about just 'general', 'benthic', and 'pelagic'	
157	RAS	- We favor retaining "benthic" and "pelagic" (now called "planktonic") forams because the distinction between these environments is important		10.2.25-26	'Small and benthic' seems confusing. If you mean small benthics, why 'and'? (Ditto for 'small and pelagic') If 'benthic' is key here, consider changing symbol to something other than a classic pelagic form (Globigerinid). Perhaps a simple (4 or 5 overlapping chambers), biseral form of the Genus Bolivina - would still be less detailed than some other symbols. Curved substrate would be optional but best retained for universal clarity	
158	RAS	- We oppose adding letters for abundances	A-10-1	10.2.27,	Use letters to indicate abundance of fossils. Can do this for individual types as	Use A for abundant, C for

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		as the standard (this is optional and can be given in explanation)		29	well	common, F for few, R for rare
159	AIP	- We agree -- however, we favor a simpler "bone" symbol rather than a more complex "3 vertebrae segment"		10.2.58	The 'vertebrate' symbol is somewhat lacking. I know simplicity is important here, but something resembling an uncilliated Paramecium doesn't really connote vertebrates to most people	Use simple, stylized, 3 vertebrae segment. 3 closely spaced little squares in a line, with concave outer sides (those parallel to the axis of alignment) to differentiate it from the 'algae ladder' symbol. Sketch it out. It works better than it sounds
160	AAS	- We added symbol [see Ref. Nos. 26.5.9-12]	A-11-1		A line symbol is needed for water-table contour	
161	AIP	- We modified "Notes on Usage" [see p. A-11-1] to say "Negative values must be preceded by a minus (–) sign"	A-11-1	11.1.6	According to "NOTES ON USAGE," there should be a plus sign in this symbol. We prefer not to use plus signs	Change notes to read that a negative change is preceded by a minus sign, and that a change is assumed positive if the number is not preceded by a minus sign
162	AAS	- We increased lineweight difference between index & intermediate contours to .125 mm, and we added hachures to all contours [see, Ref. Nos. 11.1-9]. We also modified "Notes on Usage" to read "Add hachures to indicate closed areas of low values or if it is unclear that contour values are decreasing"	A-11-1	11.2	Many people prefer to put hachures on ALL contours of closed lows rather than just the bottommost contour. This can make it much easier to understand the map. The line thicknesses given may not permit suitable differentiation between different line types when viewed on a computer monitor of printed on a typical 300dpi printer	Permit hachures on more than just the lowest contour of a closure. Permit line weights appropriate for the intended display. Specify ratios of line weights
163	AAS	- We added example showing abbreviation for datum [see Ref. No. 11.2]	A-11-1	11.2.7-14	We use abbreviations beside the structure contour numbers to indicate datum used	Add use of abbreviations as option for identifying multiple structure surfaces
164	--	- In order to consider this suggestion, we would need example symbols	A-12		The limited number of symbols related to alluvial landforms is striking when compared to the rich symbology for glacial and landslide geology. One point is illustrative, there is a symbol for debris-flow levees, but not for the landform from which the term was borrowed, the floodplain levee!	
165	--	- In order to consider this suggestion, we would need an example symbol	A-12		Delta face: We've used a line of square dots for a small delta foreset face	
166	--	- In order to consider this suggestion, we would need an example symbol		12.1	One of our maps distinguishes between large and small cutbanks of Pleistocene meltwater streams using big and small symbols like this	
167	--	- In order to consider this suggestion, we would need an example symbol			Glacial-tectonic features: In the Upper Midwest, a variety of symbols may be needed for 'hill-hole pairs', thrust moraine' with thrust faults and overturned anticlines, strike-slip faults, etc	
168	AIP	- We modified symbol for "ice-contact slope" [see Ref. Nos. 13.15-16]		Sec. 13	Add symbol for ice-contact face. We use a line with arrowheads pointing down slope and attached by their wings – the reverse of our medium-size moraine symbol. We use this for head of outwash plain against active-ice margin	
169	AIP	- We added patterns for "hummocky topography" [see Ref. Nos. 13.26-28]		Sec. 13	Add symbol for collapse hummocks. We use a pattern of subcircular spots for areas of hummocky collapsed outwash and a 'negative' one for hummocky collapsed till. Both have lighter areas to suggest the dry hilltops and darker areas to suggest the wet organic depressions. The 'positive' pattern uses the spots for the hills to suggest the regular round shape for till hummocks. We've used a fainter pattern for low-relief hummocky areas and darker ones for higher-relief hummocky areas. Doughnut-shaped hummocks are distinguished in some areas	
170	AIP	- We modified symbols [see Ref. Nos. 13.3-9]		13.1-3	What's the difference between a channel and a spillway and a stream? A stream flows in a channel? A spillway is a channel out of a lake?	
171	AAS	- We modified symbol as suggested [see Ref. No. 13.8] -- we deleted "abandoned"		13.1	Our maps use two 12.1 symbols facing each other. This reduces the number of symbols needed. Why abandoned? Aren't most of the things in this list abandoned?	
172	--	- In order to consider this suggestion, we would need an example symbol		13.2	Is this for meltwater channels that are too small to show both banks as in 13.1? We use line with arrowheads, like symbols 13.5, or with crossbars like railroad symbol	
173	RAS	- We prefer retaining stems to improve		13.3	We use arrowheads without stems. It results in less clutter	

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		clarity				
174	AIP	- We revised terminology to "ice-contact slope" [see Ref. Nos. 13.15-16]		13.4	Isn't a kame-terrace scarp the same thing as an ice-contact slope (13.47)?	
175	--	- Duly noted		13.6	We've always used esker #2	
176	--	- Duly noted		13.8-27	We don't show these on our 1:10,000 maps	
177	AAS	- We modified lineweights [see Ref. Nos. 13.49-57, 13.64-72]	A-13-1,2	13.8-13, 13.20-27	Glacial limit should be more prominently featured than a retreatal position	Switch lineweights so limit is .4 mm, retreatal position is .3 mm
178	RAS	- We prefer leaving "as is"		13.20-27	I'm not sure what this means. Where stagnant ice has been buried by outwash, we distinguish between collapsed (hummocky topography) and uncollapsed (flat topography) outwash. Our stagnant ice margins are highly complex lines, just contact lines between collapsed and uncollapsed map units. Collapsed till also has hummocky topography, but till with flat topography might also have had stagnant ice on it	
179	RAS	- We favor retaining so that user has option of showing moraine symmetry - In order to consider the other suggestions, we would need examples of symbols		13.28-31	We never show symmetry (our moraines are steeper on either the up- or down-glacier side). Instead, for medium-size moraines we use a ridge-crest line with arrowheads attached to the line by their tips, pointing down glacier. But very small moraines ('washboard moraines') are too close together to use arrowheads; once we used just a solid line (like symbol 13.32). For large moraines we use a pattern rather than a line symbol – we've used a pattern of small irregular spots to suggest the typically abundant boulders. We need a way of showing small (a metre or less to a few metres high and metres or tens of metres wide), medium (several metres to a few tens of metres high and several tens of metres wide), and large (a few metres to tens of metres high and up to 2 km wide) moraines	
180	AAS	- We added symbol [see Ref. Nos. 13.23-24]		13.33,34	In many areas, arrow shaft has to indicate length of drumlin, which is highly variable in some drumlin fields. It would be misleading to show one 20 km long next to one 200 m long using the same symbol. The oval is misleading. It suggests that drumlin has an oval shape, which commonly isn't true (many are more like railroad embankments), and a single central summit – but many drumlins have several summits scattered along their crests. Also, crest lines of some drumlins are curved, which should be shown for those that are several km long	
181	AAS	- We added symbol [see Ref. No. 13.22]	A-13	13.33,34	These symbols seem better suited to large-scale maps like 1:24,000. However for 1:100,000 maps (northern NJ for example) this symbol is too big	Add a solid blue ellipse, smaller than present symbol, centered over a horizontal blue stem. Solid blue provides more legibility while the smaller size allows for less congestion and easier showing of closely spaced drumlins
182	AAS	- We modified "Notes on Usage" to say "Point of observation is at the midpoint of the bearing line" [see Ref. Nos. 13.20-22, 13.29-36]		13.35	needs marginal note from 9.1 regarding the point of observation of arrow symbols	
183	AAS	- We added symbols [see Ref. Nos. 13.29-36]		13.35-38	In areas of rare striations, it is useful to be precise about the location of the observation (with a dot in middle of the shaft)	
184	AAS	- We deleted side bars [see Ref. No. 13.9]		13.46	The arrowheads indicate flow direction, but what are the two side bars?	
185	AAS	- See response in #186 below			Which way is down slope? North or south?	
186	AAS	- We changed pattern to a nondirectional one [see Ref. No. 13.16]	A-13-3	13.47	Because there are no arrowheads on the lines, they do not "point"	Change description to "Ice-contact slope—Lines *parallel general* downslope *direction*"
187	AAS	- We added symbol [see Ref. No. 14.8]		14.8	We commonly map polygons, but in patches too small for an pattern, so we use a spot symbol (5-point star)	
188	--	- See #190 below	Plate A, series 600		Did you all address---marine surface sediments---Holocene/Quaternary material that one would normally associate with the shelf. Did you use Folk (1968) parameters?	
189	-- AIP	- In order to consider these suggestions, we would need example symbols - Regarding last item ("Lastly, some hydrologic features ... "), we moved such symbols from the "hydrology section" into a new "topographic and hydrographic	A-15	General	Symbols for marine and lacustrine features are inadequate. There are only 21 symbols, mostly related to shorelines, to represent features in an environment that covers 2/3 of planet. I find the symbol for "sand in open water" (26.1.67-68) especially useful, and could be expanded with additional symbols that depict seafloor materials in map form. Bottom materials are essential controls on fish habitat, sources for beach nourishment,	Add symbols: 1) historic shoreline positions— changes due to erosion, artificial fill, etc; 2) armored shoreline (coastal segments with seawalls, revetments, etc); 3) tsunami and

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		features" section [see Ref. Nos. 30.2.1-48 and 30.3.1-24]			construction aggregate, etc	storm deposits (limit of run up) (see 26.1.7); 4) shallow natural gas— gas-charged sediment is common on continental shelf and in estuaries, typically occurs in shallow subsurface (1-10 m depth). Escape of gas excavates large depressions (pockmarks) on many areas of seafloor, constitutes a major hazard to offshore drill rigs and seabed pipelines, and supports exotic communities of chemosynthetic organisms; 5) pockmark fields (not individual features). Some features are better classified as lacustrine and marine: mangrove area, 26.1.14; tidal, mud, sand, or gravel flats, 26.1.17; coastline of bay, estuary, gulf, or sea, 26.1.18; shoal, 26.1.19; coral reef, 26.1.66
190	AIP	- We agree that patterns for marine sediments should be same as those for terrestrial sediments, and any pattern usage should be defined in map explanation and database	A-15	General	Regarding symbols for geologic features on and beneath the sea floor, [someone] recently asked me if I knew whether the Survey has a set of symbols dedicated strictly to this purpose. As far as I know the answer is no; I think it is assumed that geologic features whether onshore or offshore should have the same symbology. However, I am going only on my own knowledge and a few conversations; I haven't taken a poll. Neither do I know what is used on oil- and mining company offshore maps	Add a sentence saying something like, "Geologic features offshore will be shown using the same symbols as used for onshore features." In proposing this I am assuming this is the Survey's intent
191	AAS	- We added example for labeling shorelines [see Ref. No. 15.21]	A.15-1	15.1	In Utah, early shorelines are commonly named and labeled (e.g., "B" for Bonneville shoreline)	— B —
192	AAS	- We added new symbol [see Ref. No. 15.1]		15.14	We've used a line of round dots for a beach	
193	AAS	- We added as 2nd option [see Ref. No. 15.4]		15.21	We've used a pattern similar to 502-K for exhumed marine-erosion surfaces	
194	AIP	- We clarified difference between landslide contact [see Ref. No. 17.11] and landslide geomorphic features [see Ref. Nos. 17.1-8, 17.12-19]	A-17		Landslide contact: I believe that slope-failure features need to be split up into those that form the boundaries of map units (i.e., contact) and those that are just geomorphic features (i.e., scarps within units). For example, 17.8 through 17.14 commonly form the boundaries between slope-failure masses and bedrock map units. As such, they are a type of geologic contact, and in my view (from a database point of view) they should be identified within the suite of contact types (Sec. 1). Where they are properly geomorphic features and not rock-unit boundaries, they can be archived and symbolized as in Sec. 17	
195	AAS	- We added many new landslide symbols [see Ref. Nos. 17.1-65] - Note that a curved, barbed landslide arrow *was* included in standard (see *original* Ref. No. 17.3) [see Ref. Nos. 17.10-11]	A-17	General	Landslide symbols section is weak; there is a robust symbology used in California. Standard does not show typical curved arrows with barbs showing the direction of movement of the slide. There are symbols (ref. #17.13, 17.14) showing movement of the toe of the slide but not entire slide. There are no symbols for active, dormant or inactive landslides. The symbols do not differentiate between types of slides (debris flow, earthflow, block slides)	The widespread use of such symbology requires that special landslide symbols be included in your standards
196	AAS	- We added symbol [see Ref. No. 17.34]	A-17-1	17.1	This is somewhat scale dependent; on detailed maps we generally prefer to represent major tension cracks as closed polygons that mimic the shape and width of the crack	Allow use of closed polygons for major cracks when the scale of the map is sufficient to permit it
197	AAS	- We added symbol [see Ref. Nos. 17.38-39]		17.2	Fine for individual cracks, provision needed for en echelon cracks	Add en echelon tension cracks with arrow to show sense of lateral movement (see example

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						in USGS Map I-2672)
198	AAS	- We clarified symbols [see Ref. Nos. 17.1-11]		17.4-7	This group of symbols is potentially confusing. If I understand correctly, this symbol indicates the downslope edge of an exposed slip surface and a scarp would represent the upslope edge	Rename to clarify. A slip surface is a surface, not a line. This line shows the edge of the slip surface where it dives under the landslide mass, not the extent of exposed surface as its name suggests
199	AAS	- We added many new symbols from USGS I-2672 and USGS B-2059-A [see Ref. Nos. 17.12-55]		17.13-14	The meaning of these symbols is somewhat unclear and is not consistent with what has been used on recent maps by USGS authors. See USGS Map I-2672 and USGS Bulletin 2059-A for some recent examples	Represent landslide toes by a line ornamented with sawteeth that point into landslide. A plain line with arrows that show which side is moving downslope should represent the lateral boundaries (remove 45 degree hachures from symbols 17.13, 17.14 for lateral boundaries). The margins of debris flow and similar deposits should be shown by contacts, with structural symbols being reserved for features formed by sliding and deformation
200	RAS AAS	- We favor keeping "as is" because there are enough differences to tell symbols apart (lineweight; hachure length, spacing) - We closed sag pond [see Ref. No. 17.49]		17.15	This symbol is easily confused with the scarp symbol. Also, a sag pond should be a closed feature, rather than an open one	Use standard topographic symbols for perennial or intermittent ponds/lakes
201	RAS AAS	- We favor retaining because symbol also may be used for hummocks not surrounded by scarps - We also added symbols for soft-sediment folding [see Ref. Nos. 17.40-43]		17.17	This symbol should be reserved for hummocks that are surrounded by a scarp. Hummocks that formed as soft sediment folds should be represented by symbols for anticlines or similar structures. Where the origin is uncertain, hummocks should be shown only by topographic contours	Limit use of this symbol to hummocks surrounded by scarps. Add symbol similar to those in Sec. 5 to represent features that have formed by folding and diapiric processes. A different color could be used if there is concern that these features would be confused with similar structures of tectonic origin
202	AAS	- We changed "type" to "option" [see Ref. Nos. 17.44-45]		17.20-21	Confusing, what are type one and type two lateral levees?	Define type one and type two levees or eliminate symbols
203	AAS	- We added symbol from USGS I-1804 [see Ref. No. 17.45]	A-18-2	18.24	The symbol chosen for a lava tube is interesting, but not practical in many cases. The trace of a lava tube is typically marked by collapses, skylights, and ridges over caves. The skylights and collapses need to be mapped as part of the lava tube and the strictly defined circles along the line may conflict with depiction of the tube. We dealt with this on our map USGS I-1804	Allow symbol to show actual skylights and collapses rather than constraining the small circle size to an exact dimension
204	AAS	- We added symbol for hornito [see Ref. Nos. 18.57-58]	A-18-3	18.44	Hornitos are rootless spatter vents, not directly related to location where magma is venting out of ground. Instead, they typically form over lava tubes where pressure is high. In my opinion, hornitos should not be shown with same symbol as real vent. Real spatter cones and cinder cones should have their own symbols	Use different symbol for rootless vents including hornitos. I note that there is a symbol for rootless vent areas (see 18.41 on p. A-18-2), but most hornitos are so small that the symbol shown could not possibly depict the hornitos I have seen

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205	AAS	- We added symbols [see Ref. Nos. 18.55-56, 59]	A-18-3	18.46	The star symbol that I typically use for a volcanic vent is indicated as only for use on "active" volcanoes. Does this mean potentially active volcanoes? Most volcanoes are not active long enough to be continuing to erupt after a geologic map showing them is published. One of the difficulties in depicting volcanic vents on a map occurs when multiple small vents are located close to each other. In the case of our map of Lava Beds National Monument (USGS Map I-1804) we resolved this by using a star for a typical vent such as a cinder cone, and a row of "pluses" to show a spatter rampart or line of small spatter cones	Rethink star symbols for volcanic vents to allow more flexible use. Do not constrain any symbol to indicate active vent, as these typically are active for only short times. Encourage vent symbols of a variety of sizes depending on the vents portrayed
206	AAS	- OK	A-18-2	18.21	Omit the period at the end of the description	Omit period
207	AAS	- We added "D" [see Ref. No. 18.69]	A-18-3	18.49	This could be confused with an oil well	Add D beside the bullet
208	AAS	- We added symbol [see Ref. No. 30.3.4]	A-19		This standard includes many natural features defined on topographic maps. A cave is one such feature not shown	Add symbol for cave
209	--	- In order to consider this suggestion, we would need an example symbol	A-19-1		Did not see drill holes for geotechnical properties	Add drill hole symbol for geotechnical properties
210	AAS	- We deleted symbol -- we also revised description for veins so that it now reads "Vein, veinlet, or mineralized stringer" [see Ref. Nos. 19.1.1-6]	A-19-1	19.1.2,8	The symbol used for 19.1.2 is traditionally used for a mineralized stringer (19.1.8). On a map, symbol differences would be unclear	Change symbol 19.1.8 to that currently shown as symbol 19.1.2
211	RAS	- We oppose deleting these categories -- see new standard for locational accuracy	A-19-1	19.1.2-3	We do not have approximately located veins. If we know they exist, we know where	Consider deleting categories 19.1.2, 19.1.3
212	--	- In order to consider this suggestion, we would need an example symbol	A 19-1	>19.1.7	Might want to add symbol showing direction/plunge of ore shoot, if known	
213	--	- In order to consider this suggestion, we would need an example symbol	A 19-1	>19.1.8	Need symbol for series of veinlets, stockwork veinlets, etc. Can somewhat modify pattern if systematic relationship (e.g., orthogonal)	
214	AAS	- We corrected lineweight [see Ref. Nos. 19.1.12-13]	A-19-1	19.1.9-10	We do not show measurements on minor veins. If shown in black, these are identical to minor fault symbols (p. A-2-1). If color symbols were photocopied, the distinction would be unclear	Consider deleting symbols 19.1.9. 19.1.10. Otherwise, make distinct from minor faults
215	--	- We prefer to keep it	A 19-1	19.1.9-10	Seems redundant, but keep in if want	
216	--	- In order to consider this suggestion, we would need an example symbol	A 19-1	>19.1.10	Need symbol for massive mineralization - VMS, limestone replacement	
217	RAS	- We think this is not really necessary	A 19-1	19.1.12-13	Might want to mention that these two patterns are commonly used for disseminated mineralization	
218	--	- In order to consider this suggestion, we would need an example symbol		19.2	I suggest adding "reclaimed lands" or something to that effect. Disturbed, abandoned, artificial fill and dump for example are given but these have much different physical and other properties than reclaimed lands. For the most part also have little potential use. Reclaimed lands have relatively permanently changed soil profiles, internal physical properties, changed hydrologic conditions, recharge and discharge changes, fertility and are suitable for many land uses. They are an easily mapped unit although not as apparent, eye sore for example, as are the abandoned lands. A number of state agencies would have maps of such lands as well as some federal agencies. Normally, these records include some physical properties. Makes them an easy unit to transfer to geologic map data	
219	--	- In order to consider this suggestion, we would need an example symbol	A-19-2		Red dog of varying size and shape occurs in our bituminous and anthracite fields	Add symbol for red dog. Suggest outlined area with stipple pattern
220	AAS RAS	- We deleted hachured line [see Ref. no. 19.2.2] - We are unsure what is meant by "deep mine" -- in order to consider this suggestion, we would need an example symbol	A-19-2	19.2.2	Except for the heavy line with hachures, this is our symbol for a deep mine. We show strip mines with the diagonal lines down to the right. What does the hachured line represent? If it is from open pit symbol 19.2.5, then the hachures should be on the side of the mined-out area	Add symbol for deep mines. We would prefer it matches our usage (see comment). If symbol for strip mine is maintained, clarify meaning of the heavy hachured line in "NOTES ON USAGE"
221	AAS	- We added symbols for different levels [see Ref. Nos. 19.2.10-15]	A 19-2	19.2.6	May need to add additional comments if projecting many levels to the surface	

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222	RAS	- We favor keeping it (symbol is sometimes used on USGS *geologic* maps)	A-19-2	19.2.7	Does not look like standard used on USGS topo maps	See USGS Mercur 7.5' quad (1993). Compare with 26.1.12
223	--	- See #224 below	A 19-2	19.2.8	Usually have line for surveyed crest and surveyed toe	
224	AAS	- We added new symbols [see Ref. Nos. 19.2.7-9]	A-19-2	19.2.8	Mine dumps in our state can have various levels (benches) and overlaps	Modify symbol to indicate benches. Could repeat same symbol with an added outer line separating benches (see PGSMiscSymbols.pdf)
225	AAS	- We added many new symbols [see Ref. Nos. 19.3.9]	A-19-3		Symbols are needed for a destroyed adit, an approximately located adit, an abandoned or inaccessible portal, a destroyed portal	See PGSMiscSymbols.pdf for suggestions on these symbols
226	AAS	- We added new symbols [see Ref. Nos. 19.3.13,18,24]	A-19-3		Symbols showing direction and degree of known slopes of inclined portals would be desirable	Add symbols for various portal orientations. Recommend using a V pointing downslope off the long lines of the portal symbol and, if known, a number for inclination, in degrees (see PGSMiscSymbols.pdf)
227	AAS	- We added new symbols for second type of adit [see Ref. Nos. 19.3.14-18]	A-19-3		A symbol is needed for a second type of adit. We have shown adits to coal mines and clay mines on the same map. The clay mine adits were distinguished by ticks on the ends of the shorter lines	Add symbol for second type of adit (see PGSMiscSymbols.pdf). All variations of symbols for first type of adit would apply to second type as well
228	RAS	- We clarified symbol usage [see Ref. Nos. 19.3.25-34] - At this time, we oppose adding symbols for approximately located drill holes because, as is discussed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text], specialized symbols are rarely used to show locational accuracy of point features		19.3.1	Open circles (also used for oil test hole in progress and for water well) presumably represent vertical boreholes. Symbols 19.4.14 and 19.4.15 on the following page represent inclined boreholes. Logically, the three symbols should be grouped together. Also, the caption for inclined holes should state that the open circle represents the surface location of the boring, and the cross T represents the bottom of the hole. In Illinois we commonly have a problem with the accuracy of borehole locations. Many water wells have locations accurate only to a 10-acre plot, which we may or may not be able to refine by field inspection and local inquiry. On recent maps, I have taken to using an open circle to represent holes that are approximately located, and a circle with a dot in the center for holes that are accurately located. Would you like to add this option to the table?	
229	AAS	- We clarified symbols [see Ref. Nos. 19.3.9-18]	A-19-3	19.3.2-3	Many adits are horizontal and some are abandoned but still accessible. This should be made clear in the descriptions	Change descriptions to "Tunnel or adit" and "Tunnel or adit—Abandoned or inaccessible"
230	AAS	- We clarified symbol descriptions [see Ref. Nos. 19.3.38-39]	A-19-3	19.3.9-10	Wording in "NOTES ON USAGE" is confusing (if not inaccurate)	Change note to "Orientation of symbol indicates orientation of shaft entry at surface"
231	AAS	- We revised and reorganized mine symbols [see Ref. Nos. 19.3.35-39, 19.4.1-3]		19.3.9	Inconsistency in inclined shaft between 19.3.9 and 19.4.2 - would suggest modifying 19.3.9 so it conforms with 19.4.2	
232	AAS	- We modified symbol descriptions [see Ref. Nos. 19.4.2-3]	A-19-4	19.4.2	E should point down shaft. The double E on this symbol doesn't make sense	Change symbol or clarify its meaning
233	--	- In order to consider this suggestion, we would need an example symbol	A 19-4	19.4.12	Might want to add additional figure when filled	Distinguish between filled, caved
234	AAS	- We clarified symbols [see Ref. Nos. 19.4.10-11]	A 19-4 *ln 1904,5*	19.4.13	This symbol is used for workings accessible below ground. I have a hard time visualizing what a "caved inaccessible working above ground" looks like and understanding the process that caused it to cave above ground *These symbols are really only one. See OFR 95-525 ref no. 2.30.13 and informal 1975 codes*	Change text description to read "open underground workings" *Not correct. Redraft as only one*
235	AAS	- We clarified symbol usage [see Ref. Nos. 19.3.25-34]	A 19-4	19.4.14	Not necessarily DDH - could be rotary, RC, etc	Change explanation. Drill hole - type abbreviation; DD, RC, etc
236	AAS	- We modified symbol description [see Ref.	A-19-4	19.4.14-	Circle should indicate position of collar	Note that circle is at position of

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		No. 19.3.31]		15		collar
237	AIP	- We clarified symbol usage [see Ref. Nos. 19.3.25-34]	A-19-4	19.4.14-15	Many diamond drill holes are vertical	Add symbol for vertical diamond drill hole
238	AAS	- We modified symbol description [see Ref. No. 19.4.9]	A 19-4	19.4.16	Not necessarily crosscut. Represents intersection of workings with cross section	Change explanation
239	NLA	- We deleted symbol	A 19-5	19.4.21	Most cross sections of dumps use different symbols - more self-explanatory. 19.4.21 could be confusing	
240	NLA	- We deleted symbol	A 19-5	19.4.22	Same as 19.4.21 Very confusing. Need to explain what is meant by rubble (e.g., cave, backfill)	Change symbol to something more representative of rubble
241	AAS	- We agree -- we deleted symbol to avoid confusion	A 19-5	19.4.25	Same as for 19.4.21. Need better symbol for backfilled stope. As shown, too easily confused with 19.4.23 - mined stope	
242	AAS	- We added many new symbols [see Ref. Nos. 19.5.7-102]	A-19-6		We have a standard set of oil and gas symbols in place	Consider adding categories from the attached list (PGSOilGas.pdf)
243	RAS	- We favor retaining so that user has option of showing "no data"	A-19-6	19.5.9	It is not necessary to flag a lack of information	Remove ND from symbol and change to "drill hole"
244	AAS	- We added symbols [see Ref. Nos. 19.5.91-96]	A-19-7		Add a Gas Storage Well symbol	
245	AAS	- We added symbols [see Ref. Nos. 19.5.92,94,96]	A-19-7		Add an Abandoned Gas Storage Well symbol	
246	AIP	- We modified "Notes on Usage" [see p. A-21-1] to say "The type of scale used for measuring earthquakes should be noted"	A-21-1	21.1-7	The type of scale being used for the earthquake measurements should be noted	Add note clarifying the scale (Modified Mercalli?) used
247	AIP	- We added symbols (and included them in "fault" section) [see Ref. Nos. 2.12.1-88]	A-21		I see that line types that symbolize fault scarps are specified only in this section. To me, this is inappropriate because it takes primary attributes of a fault (its morphologic character in the landscape and its tectonic history) and relegates them to a secondary or derivative position in the hierarchy – i.e., a hazard-associated feature, rather than a fault-related feature. This means that I cannot associate a Holocene thrust fault in southern California with its primary attribute (scarp-forming) without dipping into a totally different part of the hierarchy. From a database point of view and from a parent-child point of view in terms of fault attributes, this makes no kind of sense. Relative to this, there is only one kind of "fault scarp" with no specification as to what kind of scarp the fault is associated with. To address these issues (sure to be identified by the Science Language Technical Team of the NADMSC), I propose that the FGDC standard be revised in the following fashion: fault scarps should be removed from A-21 and placed as primary fault-line types in the fault sections (2.1– 2.6). Thus, all fault types can have scarps (generic faults, 2.1, normal faults, 2.2, strike-slip faults, 2.3, thrust faults, 2.4, detachment faults, 2.5 and 2.6). Again, not to be self-serving, but see how the SCAMP analysis has dealt with the issue of fault scarps as primary attributes of faults. To me, this makes more sense from a database point of view. Critically needed are new line types for thrust-fault scarps: This line type is not to be found in the standard anywhere that I have looked (fault, types, neotectonic features), yet thrust-fault scarps are common in southern California	
248	--	- In order to consider this suggestion, we would need an example symbol	A-23-1		Karst surface features are missing from the standards	Add symbols for disappearing streams, swallets, etc. Consult a karst expert
249	AAS	- We added symbol [see Ref. No. 23.9]	A-23-1	23.4	We use this symbol for closed depressions. Individual sinkholes are commonly much smaller and are shown as point locations (small bullet surrounded by circle) at 1:24,000 scale	Change description to "Collapse structure or closed depression" and add option of a point symbol for a sinkhole (see attached list of suggested symbols)
250	RAS	- We think existing patterns may be used for this purpose		23.4	I have seen geologic maps on which a crosshatch or stippled overlay was used to represent areas in which certain carbonate or gypsum beds have undergone extensive underground dissolution, which may not be manifest by surface depressions at the scale of mapping	
251	AAS	- We made corrections and we also added many new symbols [see Ref. Nos. 25.1-135]		Sec. 25, 25.43, 25.47	Attached are some symbols that may need to be added to the Digital Cartographic Standards and a couple of corrections	25.43 should be solid blue line; 25.47 should have 2 dots; add attached Mars & Venus symbols
252	AIP	- We revised symbols and descriptions to		26.1.2-4	I do see a few things like "dammed reservoir", "reservoir", "reservoir, small"	If you have a person who is an

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		conform to standards of USGS's Geography Discipline [see Ref. Nos. 30.2.36-40]			(with no added word "dammed") and "reservoir large, dammed". Other limited examples exist	editor with an eye for the most minute details and consistency, have that person as a reviewer. Simplify these terms as much as possible
253	AIP	- We clarified usage [see Ref. No. 30.3.12]		26.1.27	This symbol is redundant to symbols in 26.5, and should be cross-referenced, such as by adding, "For more symbols used for springs, see Sec. 26.5"	
254	--	- In order to consider this suggestion, we would need an example symbol	A-26-2	26.1.30	Did not see drill hole for geotechnical monitoring	Add symbols for piezometers, inclinometers, extensometers
255	NLA	- We revised symbols to conform to standards of USGS's Geography and Water Resources Disciplines [see Ref. Nos. 26.1.1,16, 26.3.1,13, and 27.1,3,4; also, Ref. Nos. 30.2.1-24]		26.1:47, 48;50,51; 52,53;54, 55;56,57; 58,59;60, 61;62,63 26.2.1,3; 26.3.1,4; 27.1,3	Differentiation by such only such a small difference in line weight is difficult to judge when two lines are not adjacent as in the explanation, especially for a layman. A short segment of a line, separate from the explanation would be extremely difficult to interpret	Either increase the difference in line weight between the two symbols or else modify the dashing instead of or in addition to modifying the line weight
256	NLA	- Note that "brown" *was* specified ("B" indicates brown ink)		26.1.64	no color specified	
257	RAS	- We think this should be choice of cartographer and not part of standard	A-26-4	26.1.68	Shouldn't word "sand" have pattern cleared behind it? Difficult to read	Clear pattern behind word "sand"
258	RAS	- We oppose adding letters as part of the standard -- we think that, in the unlikely instance if all these types of drill holes were to be shown on the same map, different colors could be used or labels added		26.2	Please note that symbol 26.2.1 is the same as for a mineral exploration borehole (19.3.1), and a drilling well for hydrocarbon exploration (19.5.7). Symbol 26.2.2, domestic water well, is the same symbol as for a producing oil well (19.5.17). Symbol 26.2.3, for a stock-water well, differs from 26.2.1 only in a slight difference in line width. Hard to detect difference. Symbol 26.2.18 is the same as for a dry petroleum test hole (19.5.13)	For oil and gas-related holes. use symbols from 19.5. For other types of boring, use open circles with a central dot added if hole is accurately located. Add letter symbol, such as m= mineral exploration borehole, s= stratigraphic test, w= water well
259	NLA	- We changed "abandoned" to "dry" to conform to standards of USGS's Water Resources Discipline [see Ref. Nos. 26.1.5,13,22,31,40]	A-26-5	26.2.7,13 -14	Please clarify the differences between (or the definitions of) unused, abandoned, and destroyed wells	Add definitions of unused, abandoned, and destroyed wells to the "NOTES ON USAGE"
260	RAS	- We used terms that conform to standards of USGS's Water Resources Discipline		26.2.14	"Destroyed water well" is a new term to me. We use "abandoned", "plugged" and the like. I would suggest "destroyed" is too much of a subjective identifier to be used as a symbolized feature. If this [editor] you select is also a geologist, he or she might find a few symbols precious to someone but still with courage scratch them off the list	
261	AAS	- We changed description to "flowing artesian well", which conforms to standards of USGS's Water Resources Discipline [see Ref. Nos. 26.1.8-9]	A-26-5	26.2.8-9	Although rare, it is possible to have a flowing well that is not artesian. If the purpose of this category is to flag wells producing from confined aquifers, then change the description for 26.2.8. If the purpose is to emphasize flowing vs. nonflowing wells, then delete 26.2.9 as it is unnecessary	Either change the description of 26.2.8 to "Flowing artesian well" or delete category 26.2.9
262	RAS	- We oppose changing -- term conforms to standards of USGS's Water Resources Discipline	A-26-5	26.2.19	Description of this symbol needs to be more specific. An observation well is also used to collect data, but it has a different symbol (i.e., 26.2.11)	Change description to "Well—Used for collection of water-quality data"
263	NLA	- We modified symbols to conform to standards of USGS's Geography Discipline [see Ref. Nos. 28.6-8]	ln 1227	28.4	It is not likely that this is really a divided, lanes separated symbol	Correct to Class 2 secondary route (drop the modifiers)
264	AIP	- We changed description to "4WD", which conforms to current standards of USGS's Geography Discipline [see Ref. No. 28.14]		28.8	Is the govt. being paid to advertise Jeep? "4WD" works on most private issue maps and does not provide free advertising *"Jeep trail" I guess "jeep" as an honored term in map symbolization will live thru the 21st century for geologists whose knowledge of WW II is that of*	Allow "4 WD" as an option

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					history created the previous century	
265	RAS	- We oppose changing -- solid band at top of symbol no longer conforms to standards of USGS's Geography Discipline		28.9	Is the solid band of color traditionally shown at the top being discontinued?	Use traditional symbol or allow its use as an option
266	RAS	- We oppose adding symbols that do not conform to standards of USGS's Geography Discipline		28.9-11	Since variant forms are commonly used, would suggest showing the elongate oval form used for 3 digit routes and also the vertically stretched version for "ALT' or "BUS" routes	
267	AIP	- We deleted one of the two symbols in each pair		29.2,14; 29.3,15	too close to identify in place on a map	Vary width or dashing pattern to make more distinct
268	AAS	- We fixed this [see Ref. No. 31.13]	A-31-1	31.8	In the cartographic specifications column, note that the map-unit symbols are actually made up of one character from the StratagemAge font plus one from the Helvetica font	Point leaders from the S-8 label only to the two S-8 characters, not the Helvetica characters
269	AAS	- We added small "dot" symbol [see Ref. No. 31.22]	A-31-1		A symbol is needed to represent a field station (location where an observation or measurement was made)	Add symbol for field station. We have used an X for this purpose on some maps
270	AIP	- We changed title of the "volcanic" section to "Suggested range of map-unit colors for volcanic and plutonic rocks" [see Sec. 33.1] -- we also added more colors for volcanic and plutonic rocks -- note that the colors are "suggested"	A-33		Is there another page for "Suggested stratigraphic-age and volcanic map-unit colors" other than A-33-1? If not, then colors for plutonic map units are not identified. This is a problem. One cannot use the Mesozoic colors (green hues) because they would not logically apply to the "warm" feel of plutonic units (just as the reds and pinks for volcanic-rock units suggest the "warm" feel of volcanic rocks). I suspect that this chart of traditional "USGS" colors came largely out of the Rocky Mountain and Great Basin regions historically, where an abundance of Paleozoic through Tertiary sedimentary-rock units in the stratigraphic column drove the pioneers of this chart to select the colors they did. Geologists in the west traditionally use the "volcanic" colors for "plutonic" map units as well – a practice the FGDC might adopt. This would require modification of the bottom part of the chart, obviously. Line 702 refers to the use of pink for plutonic rocks, but this is not adopted by fig. A-033-1	
271	AIP	- We changed title of the "stratigraphic-age" section to "Suggested range of map-unit colors for stratigraphic ages of sedimentary and metamorphic rocks" [see Sec. 33.2] -- note that the colors are "suggested"	A-33		I have questions about the draft geologic map symbol standard regarding the suggested stratigraphic-age and volcanic map-unit colors. We often need more than the 5 suggested colors, depending on who is mapping, what can be reasonably mapped, and scale. We could map as many as 13 (or more) Pennsylvanian units, for example. The ISGS would like to adopt a standard set of colors, so that a specific color is tied to a specific formation. Are we "allowed" to choose/add other colors that are similar to the suggested colors? Another issue arises when the mappable unit is a Group (e.g., the New Albany Group) that overlaps both Devonian and Mississippian ages. Should we choose a suggested Devonian color, Mississippian color, a hybrid? Also, since we (the ISGS) are currently focused on surficial mapping, are there plans to develop a similar color scheme for the Quaternary?	
272	AIP	- See comment & response in #270 above -- see also, Sec. 5 in text		33.2	I have a gripe about the number of colors allotted to volcanic units. As a cartographer faced with the task of assigning colors to the multitude of individual flows of the Columbia River Basalt Group, ten colors does not come close to being adequate. If these are to be the standard, the volcanic color selection needs to be rethought. Or, as mentioned above, these ten colors are to be used as a guideline	
273	AAS	- We corrected typo	A-35-1		'Supplementary Countour Interval' should be 'Supplementary Contour Interval'	
274	--	- In order to consider this suggestion, we would need examples of fonts currently in use	A-38		The USGS should consider assigning letter symbols to the Tertiary epochs. Due to the large number of Tertiary units in California we have found it necessary to do so. This cuts down on long unwieldy symbols and provide the reader with more information at a glance. I admit there is confusion between M for Miocene and Mississippian (M?) and P for Pliocene, Permian (Pm?) and Pennsylvanian (IP?). With your special font system you should be able to work something out	
275	AIP	- We will pursue this issue once the standard has been formally approved (assuming we have the resources to do so)	A-38		I notice that on my Windows 2000 system, under Programs, Accessories, System Tools, Character Map, there is an Arial Unicode MS Font that has all the Unicode characters. Using Character Map, it is easy to insert any of these Unicode characters into documents on my system. Now that Adobe is redoing all of their Type 1 PostScript font families (Type 1 fonts will no longer be available) and releasing them as OpenType to incorporate Unicode (as well as other font enhancements), it is even more important that geologic symbols be included in the Unicode standard. Adobe fonts are standard for publishers. OpenType is developed jointly between Microsoft and Adobe and the same	Check the symbol fonts for Geologic Age against Unicode characters; submit characters not included in Unicode to the Unicode standards organization for inclusion. FGDC may wish to submit additional symbols as well (http://www.unicode.org); chemists, mathematicians, etc

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					font files will be used for all platforms	have seen that their special characters are included
276	AAS	- We reordered symbols [see Sec. 32]	A-38-1, 2		Most geologists think of stratigraphic or geochronologic units or in terms of time and layers, not alphabetical order	In order to be consistent with all published geologic time charts, whether Hansen (1991) or any other, redo chart so that it reads youngest to oldest from top to bottom and renumber symbols
277	RAS	- The patterns are not intended to be restricted to certain grain sizes, etc.	Plate B	Series 100, 200, 600	Define grain-size attributes for sedimentary soils	Add phi-size to sand, silt, clay, and combinations thereof
278	RAS	- See response in #277 above	Plate B	Series 100, 200, 600	Describe basis for grain-size classification	Specify grain-size classification
279	RAS	- See response in #277 above	Plate B	Series 100, 200, 600	Add common geotechnical symbols used by the Corps	Include the ASTM, Unified Soil Classification Symbols
280	NLA	- Note that the plates are no longer called "A" and "B"	Plate A, B		Missing Plate numbers on fold-outs	Add Plate Letters - A and B
281	AIP	- We modified pattern names to read "dolostone or dolomite" to reflect both modern and historic usage	Plate B	Series 600	The written descriptions For 641 through 648 all contain the term dolomite. The term dolomite is outdated and should be omitted and replaced by the term dolostone. All carbonate rock workers use dolostone in conjunction with carbonate rock textural terms of Dunham or Folk	
282	AIP	- We modified pattern name to read "phosphatic-nodular rock"	Plate B	Series 600	The written description and symbology for phosphatic rocks is limited to one with the implication that the phosphatic rocks are clastic. Well, only some phosphatic rocks are clastic. For example, there would be a real problem using this symbol (that implies conglomeratic) for phosphatic rock such as phosphatic-siltstone or -mudstone that contain only silt and clay-sized material. [Include] individual written descriptions and symbols for rocks classified as phosphatic-grainstones, -packstones, -wackestones, -mudstones, and boundstones, and also for phosphatic-shale, -siltstone, -sandstone, and conglomerate as well Each of these should be included with an individual symbol and individual written description	
283	--	- In order to consider this suggestion, we would need an example symbol	Plate B	652	In areas like Florida limestone varies in hardness. Corps geologists need to differentiate between "hard" and "soft" limestone	Add 2 symbols showing "hard" and "soft" limestone patterns
284	RAS	- See response in #277 above	Plate B	All Series	Don't know the differences in several patterns	Add descriptions to patterns that have an alpha/numeric name. Quantify difference in mineral content or sieve size
285	AIP	- We slightly modified original pattern to create a new "nonstratified" version [see pattern 682] -- we also combined this new pattern with 507-K to create a denser version [see pattern 681]	Plate B???	Series 600, symbol 604	604 (Diamicton/Till): Although the open circles, black dots, and horizontal dashes logically derive from the gravel, sand, and silt/clay patterns, the horizontality of the dashes suggests stratification. Since we can map both stratified and massive diamictons, I'd like to see an additional pattern that combines 604 with the dash pattern from 507-k to represent the massive diamicton category. I do like the cobbly bit on this one, though; reminds me of the Letraset patterns of yore	
286	AIP	- We removed horizontal lines and modified original pattern to create a new "nonstratified" version [see pattern 685] -- we also reduced this new pattern to create a denser version [see pattern 684]]	Plate B???	Series 600, symbol 615	615 (Loess): Odd that this and 604 (diamicton/till) are the only genetic categories of the standard, but I'll accept the argument that they are sufficiently distinctive and prevalent to warrant their own categories. I'm not fond of the pattern because (a) it implies stratification with paleosol development that is not always apparent or mappable, (b) the squiggly lines we like to reserve for actual soil occurrences. In cross-sections we show soil depth by line length. As an alternative, I'd suggest a light shade of gray, the same pattern as 134-k, but lighter	
287	AIP	- Yes, efforts are now being coordinated			Integration of FGDC Cartographic Standard with NADM activities: As you are aware, a multi-constituency North American Data Model Steering committee exists for the purpose of developing a standard geologic-map data model. This effort includes a Science Language Technical Team (SLTT) charged with developing standardized terminology for geologic materials and the structures that deform them. I know that the SLTT will be addressing the science language of planar and linear geologic structures, their hierarchical relations, and their storage in geologic-map databases. Some of the issues I have identified in my review of the FGDC proposed cartographic standard overlap between the purview of science language and the purview of cartographic symbology. I believe	

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					this overlap zone requires the process of cartographic standardization be integrated with the process of science language standardization. To that extent, I hope that the activities and milestone sequences of the FGDC process can be meshed somehow with those of the SLTT	
288	--	- See Secs. 1.3, 1.5, and 1.6 in the text			How will the FGDC implement, archive, distribute, and update the cartographic standard? Will it (the digital libraries) be downloadable off the web? Will entities such as the National Cooperative Geologic Mapping Program and its National Geologic Map Database use the cartographic standard as a filter for databases that pass muster before entry into the database? Will users like myself be notified regularly regarding issues and updates that affect the standard? I am curious about some of these issues	
289	Beyond scope	- We agree that this document is targeted for professional publications staff, and for mapmaking geoscientists -- as a highly technical Federal standard, this is the intended audience. Further, we agree that, by reformatting and modifying the document, a wider readership might be obtained; however, this is not within the scope of the standard - Because this is an FGDC standard, we are limited as to what we can do stylistically -- many things mentioned such as section numbers and the like are required by the FGDC			As this manuscript if presented, it seems to be targeted for a small circle of professional publications staffers and software experts. With its blank cover, unattractive layout, and massive tables or lists of technical data, it is unlikely to appeal to many others. However, I believe the book potentially has a large readership encompassing the entire geologic profession, many geographers, and students in these fields. Widen the target by presenting an attractive, well-organized product with a more fluid, less formulaic style of writing! Easy-to-read text, liberal use of illustrations, and a colorful front cover could multiply sales	1) Title is too narrowly formulated and emphasizes the wrong thing, "digital" rather than "geologic map symbols". Earth scientists and students who see this title will assume book is intended solely for digital cartographers and will pass it by. Why not present a title such as "Geologic Map Symbols: A New Catalog for the Digital Age"? 2) Use slightly larger type font. 3) Bold-face chapter and section headings. Eliminate numbers such as 5.3.2, reminiscent of IRS documents (handy for reviewers, irrelevant for users). 4) Indent first line of paragraph, instead of skipping line between. 5) Sell book by its cover. The cover letter provides an idea, a full-color rendition of an interesting geologic map, with variety of prominent symbols displayed. Even more creative would be 3D block diagram with symbols applied to both map and cross-sectional views. 6) Add illustrations inside to break up monotony of text, dry tables.
290	AAS	- We agree -- see Secs. 3.1 and 3.2 in the text			We must agree upon a definition of the basic object "a geologic map" that we are using to record the results of our geologic investigations. Such a definition will say much about what this object is and what it is not. I recommend the various definitions of Varnes, 1974 as a starting point to arrive at the definition.	
291	AIP	- This is in our plan for the future			When the symbol standards finally are finally adopted, I recommend that soon after (if not concurrently) a methodology be developed that would tie this symbol standard with a "living or usable" geologic map database. The standard symbols are usable now from Adobe Illustrator or the like now. I realize the ongoing effort to caste the symbols into ARC/INFO line and symbol sets is making progress. This however, is not the tie I believe that needs to be made eventually. The tie must be to the database itself	
292	AIP	- We agree -- see Sec. 3.3 in text			On some 1:24,000-scale geologic maps for central Wyoming, the map areas were covered with surficial deposits obscuring the bedrock below. The mapper was able to record his interpretation of bedrock contacts under these deposits because locally small outcrops of bedrock were present. However, the	It seems that only polygons and lines can be used to symbolize rock units on a map in the standard. I recommend that point

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					outcrops were too small to show the areal extent. The mapper therefore used a small triangle filled with color and labeled to show what unit the triangle symbolized. Kentucky uses small "x"s to show local outcrops of coal	symbols can also be used for rock units and that the standard make a provision for this
293	AIP	- The symbols are scale-independent, meaning they are for use at any scale, and the standard allows for flexibility [see "Preface to Appendix A"]; however, differently scaled symbols should not be part of the standard			If the USGS provides shade, line, marker, and text sets, scale bar graphics, etc. in an ArcInfo compatible format prior to the adoption of the reviewed standards, we would certainly use them. Would there be different symbol sets for the various most commonly used mapping scales or would USGS include a ratio formula for a single comprehensive data set to scale the markers, lines, etc. for 1:24,000, 1:100,000, 1:200,000, 1:1,000,000 … ? *Are there provisions for variations in the size of symbols, especially point symbols, with the scale of the map or with the complexity of the geology? We have found that the absolute size of point symbols and at times widths of faults, must be adjusted to allow for the crowding on extremely complex geologic maps?*	
294	--	- In order to consider this suggestion, we would need an example of this symbol's usage -- we have not encountered it before			Limit of overturned strata (No current symbol) -- I suggest a purple dotted line of .35 mm thickness and a dashing pattern of 0.04 mm dash 0.71 mm gap with rounded caps and joins. This will generate a nearly circular dot pattern at this line thickness. The cmyk color specification is 90 60 00	
295	AIP	- We agree -- topic is addressed in new "Scientific Confidence and Locational Accuracy" section [see Sec. 4 in text]			There are ways to show that the position of a contact is uncertain but sometimes a contact's position is known but its nature is uncertain--whether it is a fault or a normal sedimentary contact. We need a symbol expressing this particular uncertainty--perhaps a line of alternating thick and thin segments	
296	--	- In order to consider this suggestion, we would need example symbols			Is there a reason why symbols for seismic and permanent GPS stations are not in the map symbol standards?	
297	AIP	- We agree in principle -- see Sec. 1.1 in the text			These may be standard for the USGS, but they are guidelines for the states. We believe that most states do like we do. We follow previously published guidelines for symbols, contact lines, and faults, but follow the color "standard" as close as we can given the color limitations inherent in it. We also change the symbol size and the position of the labels (e.g. dip) to fit the map. There are so many exceptions to the various standards set down that they really are more of a guideline than a standard, especially for states. Perhaps if you added USGS to the title it would distinguish it as a standard for the USGS, while at the same time being a guideline for the state surveys *Standards will have to remain flexible. Most new maps will have new things. Some will be reinterpretations. Some will be rare or unique things. Some will be common things that usually are not mapped. In some areas we will need to subdivide or lump in unusual ways. Many of the line and spot symbols will have to be variable in size because the features themselves range from small to large or because of emphasis – on some maps they may be the main attraction whereas on others they may be of minor significance*	
298	AIP	- We address this issue in our implementation efforts -- in general, we have tried to apply the "right-hand rule" concept to the symbols in this standard			Have you considered directionality of linework where the placement of symbols on the line is critical. For example, in Arc/Info the barbs on thrust faults can be placed on the left or right proceeding from beginning to end of the line). The direction of the line becomes critical to getting the barbs plotted on the correct side. On many maps where a common practice has not been used, we had to go back and flip arcs to get the correct relationship. Maybe this is not something you can establish, but a common procedure would help eliminate the problem	
299	Beyond scope	- This issue is not within the purview of this standard			Are references to horizontal and vertical datums, 1983 and 1988, if I recall the dates correctly, appropriate? I am not sure where that could fit in though with map symbolization but is relevant to map construction	
300	--	- Duly noted			It's a very thorough and well-constructed document. It will do an admirable job in serving as the standard for digital geologic maps. It also will serve as an excellent primer and training manual for geologic cartographers through its Guidelines Sec. 4, 5, and 6. Here at the Oregon Department of Geology and Mineral Industries, we try to follow USGS symbology and procedures in geologic map production. I found the guidelines very appropriate	
301	--	- If these are features that are missing or are being requested to be added, then we need examples			Shore collapse trenches; ice-walled-lake plains too small to show at 1:100,000; palimpsest features, especially palimpsest meltwater channels; tunnel channels; subglacial fluvial-scour forms; bedrock escarpments, badlands, and other erosional features of the Pleistocene landscape concentrations of glacial boulders; ice-drag marks on glacial-lake plains; spring pits; various erosional and depositional features of flood-scour areas	

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