

Selected Bibliography, Index to Geologic Mapping, and preliminary
Compilation of Bedrock Geology: Boston Two-Degree Sheet

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PRELIMINARY LIST OF REFERENCES

BOSTON 2° SHEET

Abu-moustafa, A.A., and Skehan, J.W., S.J., 1976, Petrology and geochemistry of the Nashoba Formation, east-central Massachusetts, in Lyons, P.C., and Brownlow, Arthur, Editors, Contributions to the geology of New England: Geol. Soc. Am. Memoir 146, p. 31-70.

Source of modes and chemistry of rocks of the Nashoba formation, - samples from the Wachusett-Marlborough Tunnel. Also includes detailed geologic cross-section.

Alvord, D.C., Bell, K.G., Pease, M.H., Jr., and Barosh, P.J., 1976, The aeromagnetic expression of bedrock geology between the Clinton-Newbury and Bloody Bluff fault zones, northeastern Massachusetts: U.S. Geol. Survey Jour. of Research, v. 4, no. 5, p. 601-604, 1:125,000.

Paper shows the close correspondence between aeromagnetic anomalies, on 1/2-mile spacing flight lines, with recently mapped metamorphic rock units in northeastern Massachusetts.

Barosh, P.J., Fahey, R.J., Pease, M.H., Jr., 1977, Preliminary compilation of the bedrock geology of the land area of the Boston 2° sheet, Mass., Conn., R.I., and New Hampshire, U.S. Geol. Survey open-file report 77-285, 1:125,000.

Compilation of mapping to about 1975, no topographic base

Barosh, P.J., Pease, M.H., Jr., Schnabel, R.W., Bell, K.G. and Peper, J.D., 1974, Geologic interpretation of the lineaments on the aeromagnetic map of southern New England: U.S. Geol. Survey, 6p. map scale 1:250,000. Misc. Field Studies Map MF 985

Compiled about 1972, shows mapped and inferred faults and their extensions, major areas of igneous rock, and lineaments associated with an aeromagnetic map of southern New England.

Bell, K.G., and Alvord, D.C., 1976, Pre-silurian Stratigraphy of northeastern Massachusetts: Geol. Soc. America Mem. 148, pp. 179-216.

A detailed description of the composition, stratigraphy, probable correlation and origin of metamorphosed stratified rock sequence north and west of the Boston Basin.

Billings, M.P., 1976, Bedrock geology of the Boston Basin, in Cameron, Barry, editor, Geology of southeastern New England: New Eng. Intercollegiate Geol. Conf., 68th Ann. Meeting: Sci. Press, Princeton, New Jersey

Summary of geology of the Boston Basin, Discusses probable Age and stratigraphic relationships of the volcanic and sedimentary rocks and revision of earlier interpretation of geologic structure.

Billings, M.P., and Wolfe, C.W., 1945, Spodumene deposits in the Leominster-Sterling area, Massachusetts: USGS open-file rept., 10 p., 3 maps. (=MDPW-USGS Coop. Proj. Inf. Circ.3)

Detailed maps of granodiorite sills and pegmatite bodies in the area extending southward from Long Hill in Leominster. Description of granodiorite and metasediments.

Billings, M.P., 1956, The geology of New Hampshire; Pt. 2, Bedrock geology: N.H. State Plan. and Devel. Comm., Concord, N.H., 203p.

General summary work on the geology of New Hampshire - description of the stratigraphy, of the metamorphosed sedimentary rock sequence, location of relevant fossil localities. Includes summary discussion of igneous rocks and series. Includes 1:250,000 geologic map on topographic base.

Callaghan, Eugene, 1931, A contribution to the structural geology of central Massachusetts: New York Acad. Sci. Annals, v. 33, p. 27-75.

Detailed description and generalized interpretation of rock units in the Quabbin Tunnel. Includes a section through the Fitchburg Granite.

Castle, R.O., 1964, Geology of the Andover Granite and surrounding rocks, Massachusetts: USGS open-file rept., 550p., 50 pls., 30 figs., 28 tables.

Chemistry, modes, petrographic features of the Andover granite; discussion of origin.

Castle, R.O., Dixon, H.R., Grew, E.S., Griscom, Andrew, and Zietz, Isidore, 1975, Structural dislocations in eastern Massachusetts: U.S. Geological Survey Bull. 1414.

Discussions and synthesis of faulting and fault system on southeast side of Worcester Basin in eastern Massachusetts.

Chute, N.E., 1964, Trip G -Geology of the Norfolk basin Carboniferous sedimentary rocks, and the various igneous rocks of the Norwood and Blue Hills quadrangles: New England Intercollegiate Geol. Conf., 56th Ann. Mtg., Chestnut Hill, Mass., Oct. 2-4, 1964, Guidebook, p. 91-114.

Summary of Chutes mapping and geologic work along and south of the south edge of the Boston Basin.

Clapp, C.H., 1921, Geology of the igneous rocks of Essex County, Massachusetts: U.S. Geol. Survey Bull. 704, 132 p.

Early reference work on igneous rock in the northeastern part of Massachusetts; source of petrochemistry and petrologic description.

Gore, R.Z., 1976, Ayer crystalline complex of Ayer, Harvard, and Clinton, Mass., in Lyons, P.C., and Brownlow, A.H., eds., Studies in New England Geology: Geol. Soc. of America Mem. 146, pp. 103-124.

Detailed petrographic description of the Ayer granite, its contacts, and internal phases, in the eastern part of the Worcester basin in central Massachusetts.

Dennen, W.H., 1976, Plutonic series in the Cape Ann area, in Cameron, Barry, Editor, Geology of southeastern New England: New Eng. Intercollegiate Geol. Conf. 68th Ann. Meeting: Sci. Press, Princeton, New Jersey

Describes distribution, petrochemistry, contacts, relative ages, origin, and emplacement of the igneous rocks of Cape Ann,

Dowse, A.M., 1949, Geology of the Medfield-Holliston area, Massachusetts, Radcliffe College, unpub. Ph.D. thesis. 125 p.

Describes igneous rocks and metasediments; petrography. Separates granitic gneisses.

Emerson, 1917, Geology of Massachusetts and Rhode Island: U.S. Geol. Survey Bull. 597, 289 p.

Basic summary reference on the geology of the map area as known about the turn of the last century. Includes description of fossil localities, occurrences of geologic features, many of which have been lost by later urbanization.

Greene, R.C., 1970, The geology of the Peterborough quadrangle, New Hampshire: New Hampshire Dept. Resources and Econ. Devel., Bull. no. 4, 88 p.

Describes subdivision of the Littleton Formation, problems of stratigraphic synthesis and age. Describes granitic rocks of the Massabesic gneiss, includes modes of metasediments and igneous rocks; discusses metamorphism, includes map 1:62,500

Grew, E.S., 1970, Geology of the Pennsylvanian and pre-Pennsylvanian rocks of the Worcester area, Massachusetts: Unpub. Ph.D. Thesis, Harvard Univ., 263 p.

Describes fossiliferous rocks at Worcester, maps these separately from surrounding older rocks. Describes, probable correlation and stratigraphy and structure of Worcester area. Includes 1:24,000 geologic maps of Worcester region.

Grew, E.S., 1973, Stratigraphy of the Pennsylvanian and pre-Pennsylvanian rocks of the Worcester area, Massachusetts: Am. Jour. Sci., v. 273, no. 2, p. 113-129, illus. (inclu. geol. sketch maps).

More formal presentation of fossil stratigraphy and stratigraphic arguments with regard to the fossiliferous rocks at Worcester, Mass.

Hanson, W.R., 1956, Geology and mineral resources of the Hudson and Maynard quadrangles, Massachusetts: U.S. Geol. Survey Bull. 1038, 104 p.

Detailed geologic map 1:31,680 - description of Nashoba rocks, structure.

Hussey, A.M., II, 1968, Stratigraphy and structure of southwestern Maine, in Zen, E-an, White, H.S., Hadley, J.B., and Thompson, J.B., Jr., Editors, Studies of Appalachian geology, northern and maritime: New York, Interscience Publishers, P. 291-301.

Recent summary of the stratigraphy age correlation of the Kithery, Eliot, and Berwick Formations in southeastern Maine adjoining the Boston two-degree sheet area. Interpretation of structure and structural synthesis.

Kaktins, U. (1976) Stratigraphy and petrography of the volcanic flows of the Blue Hills area, Mass.: In P. Lyons and A. Brownlow, eds. Contributions to the Geology of New England, Geol. Soc. Amer. Mem. 146

Detailed petrography and chemical analyses of rhyolitic flows, stratigraphy of the flows.

LaForge, Laurence, 1932, Geology of the Boston area, Massachusetts: U.S. Geol. Survey Bull. 839, 105 p.

Early summary of the geology of the Boston area.

Lyons, P.C., 1977, Report on the bedrock of the Narragansett basin, Massachusetts and Rhode Island: U.S. Geol. Survey open-file report 77-816, 42 p., 24 pls., scale 1:31,250.

Recent synthesis of the structure, stratigraphy and areal geology of the Narragansett Basin - synthesizes reconnaissance mapping and recent fossil work.

Lyons, P.C., and Krueger, H.W., 1976, Petrology, chemistry and age of the Rattlesnake Pluton and implications for other alkalic granite plutons of southern New England: in Lyons, P.C., and Brownlow, A.H., Studies in New England Geology: Geol. Soc. Am. Memoir 146, p. 71-102

Detailed petrographic, chemical, and radiometric study of an alkalic granite intruding the Dedham granodiorite. Argues for two ages of alkalic granite intrusion in eastern Massachusetts.

Novotny, R.F., 1961, A regional fault in east-central Massachusetts and southern New Hampshire: U. S. Geol. Survey Prof. Paper 424-D, p. D48-D49.

Describes distribution of silicified rocks along northeast trending zone through the Worcester Basin east of the Fitchburg granite; Argues that zone is a fault zone on the basis of displacement of strata.

Novotny, R.F., 1968, Geology of the Sea Coast Region, New Hampshire: Concord, New Hampshire Division of Economic Devel. Quadrangle Report. 46 p.

Detailed map (1:62,500) of the seacoast region. Bulletin describing separation of Rye, Kittery and Elliot for motions in eastern New Hampshire; Petrology of exeter quartz diorite.

Page, L.R., 1968, Devonian plutonic rocks in New England, in Zen, E-an, White, W.S., Hadley, J.B., and Thompson, J.B., Jr., eds., Studies of Appalachian geology--Northern and maritime: New York, Interscience Pubs., p. 371-383.

Summary work on Devonian plutonic rocks. Describes similiar groups of salient petrographic features that distinguish the igneous rocks in relation to time of metamorphism, and style of emplacement.

Peck, J.H., 1975, Preliminary bedrock geologic map of the Clinton quadrangle, Worcester County, Massachusetts: U.S. Geol. Survey open-file report 75-658

Map showing rock sequence northwestward from edge of Nashoba Formation to central part of Worcester Basin.

Peper, John D., and Wilson, Frederick A., 1978, Reconnaissance bedrock geologic map of the Fitchburg quadrangle and part of the Ashby quadrangle, North-central Massachusetts: U.S. Geol. Survey Misc. Field Studies Map MF 959 (in press)

Map and text subdivides Emerson's Fitchburg granite into younger (weakly-foliated) and older (strongly-foliated) granites. Discusses stratigraphic relationships and sequence of deformation.

Perry, J. H., and Emerson, B.K., 1903, Geology of Worcester, Massachusetts: Worcester Nat. Hist. Soc., 166p.

Early work of the geology of Worcester area, describes many locals since lost to urbanization.

Quinn, A.W., 1971, Bedrock geology of Rhode Island, U.S. Geol. Survey Bull. 1295, 68 p.

Summary work on the bedrock geology of Rhode Island -- correlation of igneous rocks and metasediments

Robinson, G.R., Jr., 197_, Bedrock geologic map of the Pepperell, Shirley, Townsend quadrangles and part of the Ayer quadrangle, Mass. and N.H.: U.S. Geol. Survey Misc. Field Studies Map MF-957 (In press).

Four 7 1/2 minute quadrangle maps (1:48,000) showing distribution of rock units, metamorphism, and structural elements of the Worcester Basin. Includes eastern lobe of Fitchburg granite, and new mapping of Chelmsford and Ayer granites.

Shaler, N.S., 1889, Geology of Cape Ann, Massachusetts: U.S. Geol. Survey Ninth Ann. Rept., p. 529-611.

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Shaler, N.W., Woodworth, J.B., and Foerste, A.G., 1899, Geology of the Narragansett Basin, Monograph, U.S. Geol. Survey, v. 33, 402p.

Early description and synthesis of observations on the rocks of the Narragansett Basin.

Shride, A.F., 1971, Igneous rocks of the Seabrook, New Hampshire-Newbury, Massachusetts, area, Trip B-5, in Guidebook for field trips in central New Hampshire and contiguous areas: New England Intercollegiate Geol. Conf., 63rd Ann. Mts., Concord, N.H., 1971, Guidebook, p. 105-117.

Describes and synthesizes separation of igneous rocks in northeastern part of the Boston two degree sheet - includes discussion of subdivision of the Newburyport quartz diorite, separations of mafic igneous rocks from older mafic volcanic rocks

Shride, A.F., 1976, Stratigraphy and correlation of the Newbury Volcanic Complex, northeastern Massachusetts, in Page, L.R., Editor, Contributions to the stratigraphy of New England: Geol. Soc. America Mem. 148. (In press)

Detailed work on the Newbury Volcanics and their relationships to surrounding rocks.

Skehan, J.W., 1964, Folio of maps and cross sections of Wachusett-Marlborough tunnel, Clinton to Marlborough, Massachusetts; Unpub. Rept. for Metropolitan District Commission, 42 maps and sections, scale 1:24,000

Detailed summary of lithologic description of rocks exposed in the tunnel. Also map of faults, folds, orientation, joints.

Skehan, J.W., and Abu-moustafa, A.A., 1976, Stratigraphic Analysis of rocks exposed in the Wachusett-Marlborough Tunnel, East-central Massachusetts, in Page, L.R., Editor, Contributions to the Stratigraphy of New England: Geol. Soc. Am. Memoir 148.

Discussion of stratigraphic relations of metamorphic rock units based on evidence from the Tunnel.

Skehan, J.W., 1968, Fracture tectonics of southeastern New England as illustrated by the Wachusett-Marlborough, Tunnel, east-central Massachusetts, Chap. 21 in Studies of Appalachian geology, northern and maritime (Zen, E-an, and others, editors): New York and London, Interscience Publishers, P. 281-290, illus., table.

Earlier paper establishing a picture of systematic faulting in eastern Massachusetts, with general west over east movement sense.

Sriramadas, Aluru, 1966, Geology of the Manchester quadrangle, New Hampshire: Concord, New Hampshire Dept. Resources and Econ. Devel., Bull. 2, 92p.

Detailed map 1:62,500 and discussion of rocks in the Manchester quadrangle. Includes description of massabessic gneiss; early subdivision of Merrimack group metasediments, metamorphism.

Sundeen, D.A., 1971, The bedrock geology of the Haverhill 15' quadrangle, New Hampshire: Concord, New Hampshire Dept. Resources and Econ. Devel. Bull. 5, 125 p.

Detailed map 1:62,500, and discussion of igneous rocks in Haverhill quadrangle. Possible subdivision of Merrimack Group, structure.

Thompson, J.B., Jr., and Norton, S.A., 1968, Paleozoic regional metamorphism in New England and adjacent areas, in Zen, E-an, White, W.S., Hadley, J.B., and Thompson, J.B., Jr., Editors, Studies of Appalachian geology, northern and maritime: New York, Interscience Publishers, P. 319-327.

General source discussing distribution, overprinting, and contrasts in regional metamorphism and isograds. Inferences as to timing and significance of isograd distribution. Based on data available about 1967.

Toulmin, P., III, 1960, Composition of feldspars and crystallization history of the granite - syenite complex near Salem, Essex County, Massachusetts: Internat. Geol. Cong., 21st, Copenhagen, 1960, Rept., pt. 13, p. 275-286

Detailed discussion of crystalization sequence and history of igneous rocks near Salem

Toulmin, Priestly, 3rd, 1964, Igneous rocks of the Salem area, Massachusetts, Trip E, in Guidebook for field trips in the Boston area and vicinity: New England Intercollegiate Geol. Conf., 56th, Ann. Mtg., Chestnut Hill, Mass., 1964, Guidebook, p. 67-79.

Field guide emphasizes rock sequence and field relations of igneous rocks.

Toulmin, Priestly, III, 1964, Bedrock geology of the Salem quadrangle and vicinity, Mass.: U.S. Geol. Survey Bull. 1163-A, 79p.

Detailed map, 1:24,000, of the granites and volcanics in the Salem-Peabody Massachusetts area; chemistry and modes of the igneous rocks

Warren, C.H., and McKinstry, H.E., 1924, The Granites and pegmatites of Cape Ann, Massachusetts: AAAS Proc. V. 59, no. 14, p. 315-357.

Early discussion of the igneous rocks of Cape Ann - source of petrography and modes, some petrochemistry.

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Weed, E.G.A., Minard, J.P., Perry, W.J., Jr., Rhodehamel, E.C., and Robbins, E.I., 1974, Generalized Pre-Pleistocene geologic map of the Northern U.S. Atlantic Continental Margin, U.S. Geol. Survey Misc. Inv. Series Map 1-861, 1:1,000,000.

Small-scale map showing distribution of off-shore units, as inferred from cores, seismic profiling.

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Establishes a Paleozoic age for these alkalic granites.

Index to Geologic mapping
Boston 2° sheet

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2. Alvord, D. C., Bell, K. G., Pease, M. H., Jr., and Barosh, P. J., 1976 The aeromagnetic expression of bedrock geology between the Clinton-Newbury and Bloody Bluff fault zones, northeastern Massachusetts: U.S. Geol. Survey Jour. of Research, v. 4, no. 5, p. 601-604, 1:125,000.
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4. _____ 1976, Preliminary bedrock geologic map of the Oxford quadrangle, Massachusetts-Connecticut-Rhode Island: U.S. Geol. Survey open-file report 76-622.
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* Barosh, Faye, and Pease were used as a general reference base for
the Boston 2° sheet.

Explanation to accompany a preliminary Compilation of
the Bedrock Geology of the Boston Two-Degree sheet

John D. Peper Compiler

JTrd	Diabase dikes and sills
Dp	Pegmatite and quartz monzonite
Pz-p&m	Massabesic Gneiss
Dgr	Granite
Dbqm	Binary quartz monzonite
Dpqm	Porphyritic quartz monzonite
Dsqd	Spalding Quartz Diorite
Dc	Chelmsford Granite
Dkqm	Kinsman Quartz Monzonite
Dfbg	Foliated binary granite
Dgg	Aluminous, granitic gneiss
DSac	Ayer Granite, Clinton facies
S0ad	Ayer Granite, Devens-Long Pond facies
D0a	Ayer Granite, undivided
DSf	Fitchburg Granite
DSff	Fitchburg Granite, gneissic facies
DSfg	Fitchburg Granite, granodiorite facies
DScE	Canterbury and Eastford Gneisses
DSd	Diorite and tonalite, includes Dracut Diorite, Exeter Diorite in New Hampshire
S0nq	Newburyport Quartz Diorite
S0nqp	Newburyport Quartz Diorite porphyritic facies
S0an	Andover Granite, includes Acton Granite

sp	Sharpners Pond Diorite
sh	Straw Hollow Diorite and Assabet Quartz Diorite
rd	Rowley Diorite
qm	Quartz monzonite in the Newbury area
gp	Fine grained granite and porphyry
ca	Cape Ann Granite
cas	Cape Ann Granite, quartz-poor facies; includes Beverly Syenite and Wenham Monzonite
cam	Squam Granite
pg	Peabody Granite
qg	Quincy Granite
rt	Rattlesnake Hill Granite
ag	Alkalic granite at Franklin
ng	Nahant Gabbro
sd	Salem Gabbro-diorite
ss	Sharon Syenite
ih	Indian Head Granodiorite
c	Cumberlandite
gb	Gabbro, Undiff
s	Serpentine
pEs	Scituate Granite Gneiss
pCh	Hope Valley Alaskite Gneiss
pEpo	Ponagansett Gneiss
pCe	Esmond Granite
pEm	Milford Granite

p&mm	Milford Granite, mafic facies
p&gr	Granite, transitional in texture and composition between Milford and Dedham Granites
p&d	Dedham Granite
p&an	Dedham Granite, Saugus and Lynnfield areas
p&gp	Porphyritic granite and gneissic inequigranular granite near Westport
p&t	Topsfield Granodiorite
p&gm	Grant Mills Granodiorite
p&wg	Westwood Granite
p&ag	Muscovite-garnet bearing gneissic Alaskite
p&di	Diorite metamorphosed in part to amphibolite and hornblende gneiss
p&gb	Gabbro - metamorphosed in part to amphibolite and hornblende gneiss
p&gu	Granite, gneiss, and schist undivided. May include granite of Paleozoic age.

EXPLANATION

Stratified rocks

Pd	Dighton Conglomerate
Pfw	Fossiliferous strata at Worcester
Pr	Rhode Island Formation
Prc	Conglomerate in the Rhode Island Formation
Pw	Wamsutta Formation
Pwv	Volcanic rocks in the Wamsutta
Pb	Bellingham Conglomerate
DSn	Newbury volcanic complex undivided
DSnr	Micrographic rhyolite, intrusive
DSnu	Upper members - calcareous mudstone, red mudstone, and silicious siltstone
DSna	Porphyritic andesite member
DSnl	Lower members - volcanic rocks
Pzc	Cambridge Argillite and Dorchester Members of the Roxbury Conglomerate
Pzcc	Conglomerate and sandstone in the Cambridge Argillite
Pzr	Roxbury Conglomerate, Brookline and Squantum Members
Pzrv	Melaphyre in the Roxbury Conglomerate
Pzv	Felsic and intermediate volcanic rocks
Pzv1	Lynn Volcanic Complex
Pzvm	Mattapan Volcanic Complex

Pzvmi	Mattapan Volcanic Complex, intrusive rhyolite
Pzvb	Blue Hills Porphyry
DSl	Littleton Formation, undivided
DSlc	Crotched mountain member of the Littleton Formation of Greene, 1970
DSlp	Peterborough member of the Littleton Formation
DSlpv	Volcanics in the Peterborough Member
DSlpt	Thin-bedded mica schist in the Peterborough Member
DSlf	Franeestown Member of the Littleton Formation
DSls	Souhegan Member of the Littleton Formation
DSH	Holden Formation of Grew, includes Bee Hill Formation of Hepburn. Where complexly infolded with rocks of Paxton Group, mapped as DSH + Spqr
DSHm	Marble in Holden Formation of Grew
Sp	paxton Group, undivided
Sph	Lower Formation of Paxton Group
Sps	Schist in Paxton Group
Spss	Sulfidic mica schist in Paxton Group, includes some gray schist.
Spqr	Quartzite and rusty schist in Paxton Group
Spq	Gray mica schist and calc-silicate gneiss in Paxton Group
So	Oakdale Formation
Sb	Berwick Formation
Sbs	Schist in the Berwick Formation
Se	Eliot Formation
Sk	Kittery Formation
Sw	Worcester Formation
St	Tower Hill Quartzite of Grew

Sts	Phyllite in the Tower Hill Quartzite of Grew
Svh	Vaughn Hills Quartzite of Hansen, phyllite, quartzite conglomerate, and chlorite schist. Includes Harvard conglomerate of possible Pennsylvanian age
S0b	Boylston Schist of Grew, restricted to Boylston area
S0tb	Tadmuck Brook Schist, schist and phyllite
S0m	Merrimack Group, undivided
S0mp	Phyllite and schist in the Merrimack Group
0-p&t	Tatnic Hill Formation
0-p&n	Nashoba Formation
0-p&rv	Metavolcanic gneiss of the Rye Formation
0-p&rm	Metasediments of the Rye Formation
0-p&nb	Boxford Member of the Nashoba Formation
0-p&f	Fish Brook Gneiss
0-p&sh	Shawsheen Gneiss
0-p&q	Quinebaug Formation
0-p&m	Marlboro Formation
0-p&mg	Grafton Gneiss Member of the Marlboro Formation
Eg	Greenlodge Formation, upper Cambrian
Ebw	Braintree and Weymouth Formations, middle and lower Cambrian
Eh	Hoppin Formation, middle and lower Cambrian

pEp	Plainfield Formation
pEw	Westboro Quartzite, includes quartzite in the Saugus and Lynnfield areas
pEb	Blackstone Series
pEbq	Quartzite
pEbs	Schist and phyllite, includes some metavolcanic and meta- volcaniclastic rocks
pEv	Metavolcanic rocks, includes Kendall Green Formation, Middlesex Fells volcanic rocks, Cherry Brook Formation, Rice Gneiss, and meta-felsite near Plympton
pEvf	Felsic metavolcanic rocks
pEgn	Layered feldspathic gneiss in the New Bedford area