SURVEY OF HIGHWAY CONSTRUCTION MATERIALS

IN THE TOWN OF BRIDGEWATER, WINDSOR COUNTY, VERMONT

prepared by

Engineering Geology Section, Materials Division

Vermont Department of Highways

in cooperation with

United States Department of Commerce

Bureau of Public Roads

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Acknowledgments

The work of this Project was greatly implemented by the cooperation and assistance of many groups and individuals. The following were particularly helpful in carrying out the Project's objectives:

1. Various departments and individuals of the Vermont State Department of Highways, notably the Planning and Mapping Division and the Highway Testing Laboratory,

2. Professor D.P. Stewart of Miami University, Oxford, Ohio,

3. Professor C.G. Doll, Vermont State Geologist, University of Vermont, Burlington, Vermont,

4. United States Department of Commerce, Bureau of Public Roads.

History

The Materials Survey Project was formed in 1957 by the Vermont State Department of Highways with the assistance of the United States Bureau of Public Roads. Its prime objective was to compile an inventory of highway construction materials in the State of Vermont. Prior to the efforts of the personnel of the Survey as described in this and other reports, searches for highway construction materials were conducted only as the immediate situation required. Thus only limited areas were surveyed, and no overall picture of material resources was available. Highway contractors or resident engineers are usually required to locate the materials for their respective projects and have samples tested by the Highway Testing Laboratory. The additional cost of exploration for construction materials is passed onto the State in the form of higher construction costs. The Materials Survey Project was established to minimize or eliminate this factor by enabling the State and its contractors to proceed with information

on material sources available beforehand. Prior knowledge of locations of suitable material is an important factor in planning future highways.

The sources of construction materials are located by this Project through ground reconnaissance, study of maps and aerial photographs, and geological and physiographic interpretation. Maps, data sheets, and work sheets for reporting the findings of the Project were designed with their intended use in mind. These maps and data sheets were devised to furnish information of particular use to the contractor or construction man. For maximum benefit, the maps, data sheets, and this report should be studied simultaneously.

Inclosures

Included in this folder are two surface-geology maps, one defining the location of tests conducted on bedrock sources, the other defining the location of tests conducted on granular materials. These maps are derived from 15-minute or 7½-minute quadrangles of the United States Geological Survey enlarged or reduced to 1:31250 or 1" = 2604'. Delineated on the Bedrock Map are the various rock types of the area. This information was obtained from numerous sources: Vermont Geological Survey Bulletins, Vermont State Geologist Reports, United States Geological Survey Bedrock Maps, and the Centennial Geological Map of Vermont, as well as other references.

The granular materials map depicts areas covered by various types of glacial deposits (outwash, moraines, kames, kame terraces, eskers, etc.) by which potential sources of gravel and sand may be recognized. This information was obtained primarily from a survey being conducted by Professor D.P. Stewart of Miami University, Oxford, Ohio, who has been mapping the glacial features of the State of Vermont during the summer months since

1956. Further information was obtained from the Soil Survey (Reconnaissance) of Vermont conducted by the Bureau of Chemistry and Soils of the United States Department of Agriculture, and from Vermont Geological Survey Bulletins, United States Geological Survey Quadrangles, aerial photographs, and other sources. On both maps the areas tested are represented by Identification Numbers. Several tests are usually conducted in each area represented by an Identification Number, the number of such tests being more or less arbitrarily determined either by the character of the material or by the topography.

Also included in this folder are data sheets for both the Bedrock and Granular Materials Survey, which contain detailed information for each test conducted by the Project as well as information obtained from other sources, and including an active card file compiled by the Highway Testing Laboratory. The latter information was gathered over a period of years by many persons and consequently lacks the organized approach and detail required for effective use. The information on the cards varied widely in completeness. Transfer of information from the cards to the data sheets was made without elaboration or verification. When possible, the locations of the deposits listed in the card files have also been plotted on the maps; however, some cards in the file were not used because the information on the location of the deposit was incomplete or unidentifiable. Caution should be exercised wherever this information appears incomplete. This Project does not assume responsibility for the information taken from the card files.

Work sheets contain more detailed information on each test and a detailed sketch of each Identification Number Area. The work sheets and laboratory reports are on file in the office headquarters of this Project.

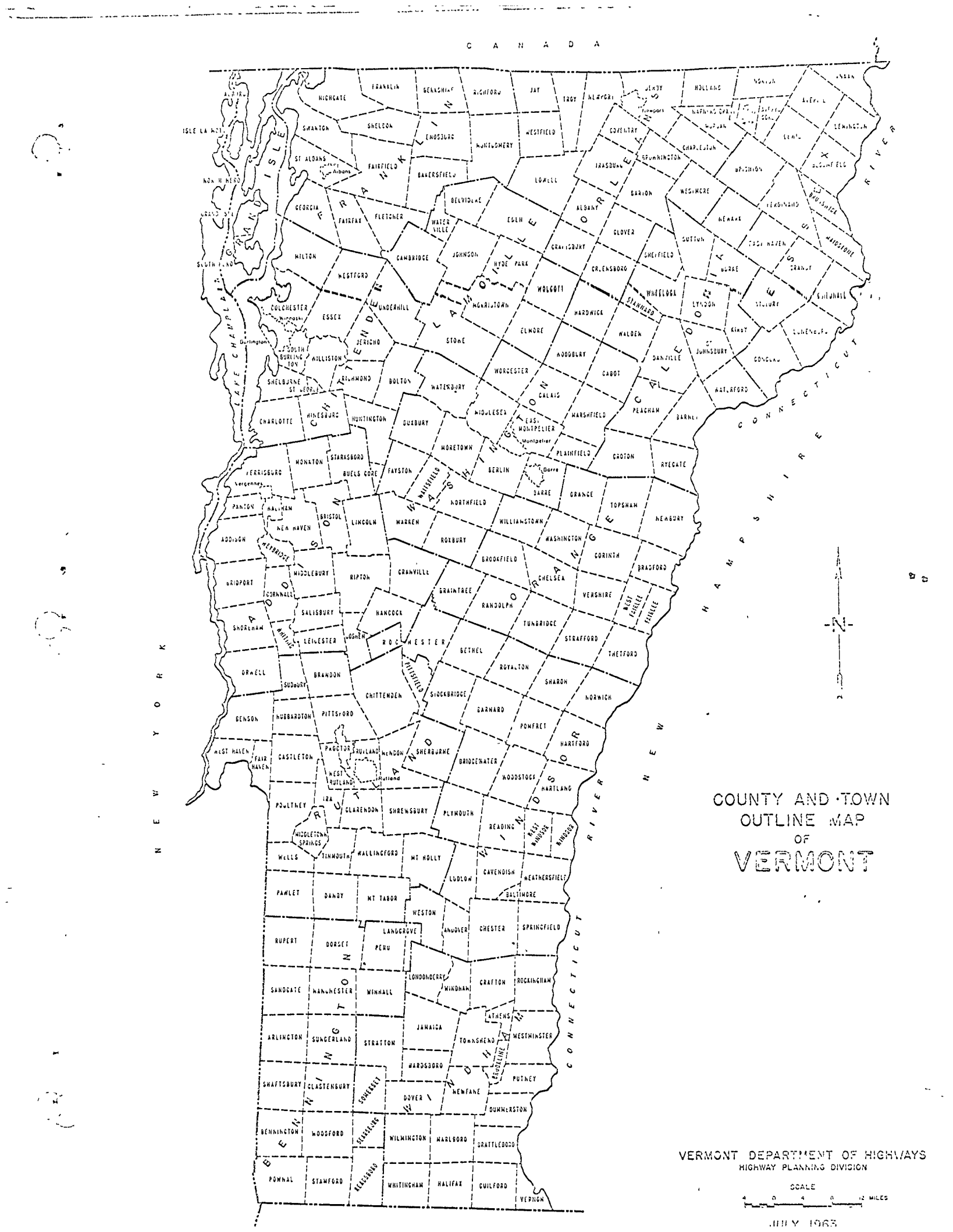
LOCATION

The town of Bridgewater is located in Windsor County in the south-central part of the State. It is bounded on the north by Barnard and Pomfret, on the east by Woodstock, on the south by Plymouth, on the northwest by Stockbridge, and on the west by Sherburne in Rutland County. See County and Town Outline Map of Vermont on the following page.

Bridgewater is situated in the Vermont Piedmont Physiographic Subdivision of the New England Upland. The town is characterized by rugged terrain, the elevation of which varies from 2,660 feet at the summit of an unnamed mountain near its northwestern corner to 820 feet where the Ottauquechee River crosses the Woodstock Town Line.

In addition to the Ottauquechee River which flows eastward across the southern part of the town, two of its tributaries, North Branch and Broad Brook, comprise the major drainage. A small area in the northeast corner of the town is drained by North Bridgewater Brook, a tributary of the Gulf Stream that joins the Ottauquechee River in Woodstock. Subsidiary drainage is generally accordant with the north-northwest trending metamorphic rocks that span the town.

Because exposed bedrock in the town consists chiefly of fissile schists and phyllites, Bridgewater is not a good source of crushed rock. Granular materials are largely to be found along the lower reaches of the principal streams, particularly in the vincinity of Bridgewater Center, Bridgewater Corners, and West Bridgewater.


CANADA
NEW YORK
NEW HAMPSHIRE
CONNECTICUT RIVER
LAKE CHAMPLAIN
GRAND ISLE
FRANKLIN
LAMOILLE
ORLEANS
ESSEX
CALEDONIA
WASHINGTON
ORANGE
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WINDHAM
RUTLAND
ADDISON
CHITTENDEN
BENNINGTON
COUNTY AND TOWN OUTLINE MAP OF VERMONT
VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION
SCALE
JULY 1965

SURVEY OF ROCK SOURCES

Procedure for Rock Survey

The routine employed by the project in a survey of possible sources of rock for highway construction is divided into two main stages; office and field investigations.

The office investigation is conducted primarily during the winter months and comprises the mapping and description of rock types as indicated in various reference sources. Many different sources of information are utilized, as indicated in the bibliography. These references differ considerably in dependability due to new developments and studies that have contributed to the obsolescense of a number of reports. In addition, the results of samples taken by other individuals are analyzed, and the location at which these samples were taken is mapped when possible. In other words, as complete a correlation as possible is made of all the information available concerning the geology of the area under consideration.

The field investigation is begun by making a cursory preliminary survey of the entire area. The information obtained in the preliminary survey, together with the information assimilated in the office investigation, is employed to determine the areas where testing and sampling will be concentrated. When a promising source has been determined by rock type, volume of material, accessibility, and adequate exposure and relief, chip samples are taken with a hammer across the strike or trend of the rock. The samples are submitted to the Material Testing Laboratory for abrasion testing both by the Deval Method (AASHO T-3) and the Los Angeles Method (AASHO T-96). It should be kept in mind that the samples taken by the chip method are often within the weathered zone of the outcrop and consequently may give a less satisfactory test result than fresh material deeper in the rock structure. When the material is uniform and acceptable abrasion tests result from the chip samples, the material source is included in this report as being satisfactory.

Discussion of Rock and Rock Sources

Nowhere within Bridgewater Township was this survey successful in its search for a new source of rock for Item 204 (Sub-base of Crushed Rock). Bedrock with good relief for quarry locations was exposed at a number of places, notably along U. S. Route 4 between Bridgewater Corners and West Bridgewater. However, at every place examined the rock was either schistose or thin-bedded with a closely spaced joint set parallel to the bedding. This survey examined materials from several of the stratigraphic units as follows:

(1) Plymouth member of the Hoosac Formation in West Bridgewater at Granular Map Identification Number 16 where it has been exposed by exploitation of much of the overlying granular material. Bedrock exposed is mainly thin-bedded quartzite.

(2) Ottauquechee Formation quartzite in Dailey Hollow at point north of Town Highway No. 4 about 2 3/4 miles west of its intersection with State Aid Highway No. 1. There is massive quartzite at this locality, but carbonaceous partings make it too flaky to be suitable as a source. Rock occurs as ledges in dense woodland.

(3) Stowe Formation chloritic phyllite north of U. S. Route 4 at point about 1.85 miles west of intersection with Vermont Route 100A. Rock shows many garnet porphyroblasts, but is too thin-bedded to be considered a possible source. It occurs in a massive road cut.

(4) Barnard volcanic member of the Missisquoi Formation west of Town Highway No. 3 at a point roughly one-half (½) mile north of Bridgewater Village. This was sampled by Dr. David P. Stewart in 1958. Because it

yielded 10 percent of wear when tested by Method AASHO T-3 it was unsuitable for Item 204.

(5) Waits River Formation micaceous limestone west of the highest point on Town Highway No. 9 that is 1.05 miles north of its intersection with Town Highway No. 3. Although the material at this location appears to be hard enough, it splits very readily into thin plates when struck parallel to the bedding.

SURVEY OF SAND AND GRAVEL SOURCES

Procedure for Sand and Gravel Survey

The method employed by the project in a survey of possible sources of sand and gravel for highway construction is divided into two main stages; office and field investigations.

The office investigation is conducted primarily during the winter months and comprises the mapping of possible potentially productive areas as indicated from various references. Of these references, the survey of glacial deposits mapped by Professor Stewart proves to be valuable, particularly when used in conjunction with other references such as soil-type maps, aerial photographs, and United States Geological Survey quadrangles. The last two are used in the recognition and location of physiographic features indicating glacial deposits and in the study of drainage patterns. In addition, the locations of existing pits are mapped when known. The locations in which samples were taken by other individuals are noted and mapped when possible.

The field investigation is begun by making a cursory preliminary survey of the entire town. All pits and other areas which show physiographic features that give evidence of glacial or fluvial deposition are noted. These locations are later investigated by obtaining samples of pit faces and other exposed materials. Tests pits, dug with a backhoe to a depth of approximately 11 feet, are also sampled. The samples are submitted to the Materials Testing Laboratory where they are tested for gradation and stone abrasion, the latter by the Deval Method (AASHO T-4).

Discussion of Sand and Gravel Deposits

Granular materials in Bridgewater suitable for highway and related construction purposes consist mainly of localized glaciofluvial deposits. They are confined to elevations below 1,200 feet with the possible exception of a kame terrace in the vicinity of Chateauguay (see Map Ident. No. 2). Above this elevation surficial granular deposition consists largely of glacial till.

A kame terrace notable for its gravel contents was emplaced north of Bridgewater Center (see Map Ident. Nos. 6, 7, and 8). Elsewhere, kame terrace deposition at Briggs (Map Ident. No. 10), West Bridgewater (Map Ident. Nos. 17, 18, and 19), Bridgewater Corners (Map Ident. Nos. 11, 12, and 13), and Bridgewater Village (Map Ident. Nos. 31 and 32) either contain gravels with stone too soft to meet the abrasion requirements for Item 201 or contain sand and silt. It should be noted that in Dailey Hollow there is a minor source of sand (Map Ident. No. 4) which is probably of kamic origin.

According to Dr. D. P. Stewart those materials in the Ottauquechee Valley near Bridgewater Corners and southward along Broad Brook were emplaced as glacial outwash. At the time of the present survey the town was exploiting the river bottom at a point west of the Vermont Route 100A bridge. Material being exploited appeared to be a cobbly gravel with considerable clay. Future sources tested by the survey include materials at Map Ident. Nos. 20, 22, 23, and 25. An additional source of sand is located at Map Ident. No. 30.

It should be emphasized that Bridgewater has only a limited potential as a source of sand and gravel. There are few areas suitable for exploitation and the local inhabitants in many instances are reluctant to exploit farmlands that might be of future value as real estate.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF BRIDGEWATER

Hoosac Formation - Quartz-sericite-albite-chlorite schist characterized by albite porphyroblasts - biotite and garnet porphyroblasts common southward; locally carbonaceous.

Hoosac Formation (Plymouth Member) - Quartzite, schistose quartzose, dolomitic quartzite; carbonaceous phyllite; buff to dark gray dolomite with partings locally of carbonaceous phyllite; quartz-sericite-chlorite-albite schist; carbonaceous albite schist.

Missisquoi Formation (Barnard Volcanic Member) - Fine- to medium-grained biotite gneiss, hornblende gneiss, and amphibolite.

Missisquoi Formation (Moretown Member) - Quartzite and quartz-plagioclase granulite in layers one-eighth inch to several inches thick, separated by "pinstripe" partings that contain muscovite, chlorite, epidote, biotite, and locally garnet; also greenish quartz-sericite-chlorite phyllite and schist, and minor carbonaceous phyllite. Schist and phyllite commonly contain biotite and garnet porphyroblasts in southern Vermont.

Missisquoi Formation (Whetstone Hill Member) - Carbonaceous black to light gray phyllite and schist containing porphyroblasts of biotite and garnet; beds of gray micaceous quartzite, fine-grained biotite gneiss and amphibolite.

Northfield Formation - Dark gray to black quartz-sericite slate or phyllite with fairly widely-spaced interbeds a few inches thick of siltstone and silty crystalline limestone like that of the Waits River Formation; phyllite passes into gray quartz-sericite schist containing abundant porphyroblasts of biotite and garnet in southern Vermont.

Ottauquechee Formation - Black carbonaceous phyllite or schist containing interbeds of massive quartzite commonly criss-crossed by veins of white quartz; quartzite is dark gray and carbonaceous, light gray, or white; also includes light green quartz-sericite-chlorite phyllite or schist and sericitic quartzite. Schist contains abundant porphyroblasts of garnet and biotite from Ludlow south.

Ottauquechee Formation - Greenstone schist; actinolitic greenstone.

Pinney Hollow Formation - Pale green quartz-sericite (muscovite-paragonite)-chlorite phyllite and schist with abundant magnetite, chloritoid phyllite and schist, quartz-sericite-albite-chlorite schist, and rare beds of carbonaceous and schistose quartzite; garnet porphyroblasts common south of Ottauquechee River.

Stowe Formation - Quartz-sericite (muscovite-paragonite)-chlorite phyllite and schist; porphyroblasts of albite, garnet, chloritoid or kyanite are common locally. Schist contains abundant segregations of granular white quartz.

Waits River Formation - Gray quartzose and micaceous crystalline limestone weathered to distinctive brown earthy crust; interbedded and intergradational with gray quartz-muscovite phyllite or schist. Where more metamorphosed, the limestone contains actinolite, hornblende, diopside, wollastonite, and garnet, and the phyllite and schist, biotite, garnet, and locally andalusite, kyanite or sillimanite.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Amphibolite - A metamorphic rock, the distinguishing characters of which that it consists partly or largely of amphibole (i.e., tremolite, actinolite, hornblende, or arfvedsonite), and that it possesses a more or less pronounced schistose structure. Color varies from green to black.

Fissile - The tendency possessed by some rocks to split into thin sheets along either bedding plane or cleavage planes induced by fracture or flowage.

Glaciofluvial - A term used to denote formation by or relation to streams within, upon or emerging from glacial ice.

"Gulf Stream" - The name of a brook that is geographically located in the towns of Pomfret and Barnard. It takes its name from Barnard Gulf.

Joint Set - A group of joints (fractures or parting planes) that are parallel in strike and dip over a considerable area.

Kame - A conical hill of generally poorly stratified drift deposited in contact with glacial ice by streams flowing in or on the ice.

Kame Terrace - Stratified sands and gravels deposited by streams between a glacier and an adjacent valley wall.

Limestone - A bedded sedimentary rock consisting chiefly of calcium carbonate.

Outwash - Stratified sands and gravels that are stream-built beyond the glacier; deposited by meltwater streams issuing from the face of the glacial ice.

Phyllite - A fine-grained, foliated metamorphic rock intermediate between the mica schists and slates, into which it may grade. The foliation is made possible by the development of a large amount of potash mica, sericite, which also gives the rock a distinctive silvery appearance.

Piedmont - An area lying at the foot of mountains.

Porphyroblasts - Large crystals which have grown in place within the fine-grained groundmass of a metamorphic rock. They have been formed by action of heat, pressure and infiltrating solutions occurring later than the rocks in which they form.

Quartzite - A compact metamorphic rock composed of quartz grains so firmly united that fracture takes place across the grains and the uniting material with equal ease.

Schist - A crystalline rock with a secondary foliation or lamination based on parallelism of platy or needle-like grains. The name refers to the tendency to split along the foliation.

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PARTIAL SPECIFICATIONS FOR HIGHWAY CONSTRUCTION MATERIALS

Listed below are partial specifications for Highway Construction Materials as they apply to this report at date of publication. For a complete list of specifications see Standard Specifications for Highway and Bridge Construction, approved and adopted by the Vermont Department of Highways in April, 1964.

Item 105, Granular Borrow

"Article 105.02 - Materials. The granular borrow shall be obtained from approved sources and shall consist of satisfactorily graded, free-draining, hard durable stone and coarse sand practically free from loam, silt, clay, and organic matter.

"The sand portion (material passing the No. 4 screen) shall have not more than ten percent (10%) passing the No. 270 mesh sieve and shall show a color of not more than three and one-half (3½) as determined by the colorimetric test described in AASHO Method of Test, Designation T-21.

"When used in connection with fine grading or in fills where piling is to be driven, the granular material shall all pass the nine-inch (9") square-opening screen."

Item 201, Sub-base of Gravel

"Article 201.02 - Materials. The gravel shall consist of material reasonably free from silt, loam, clay or organic matter. It shall be obtained from approved sources and meet the following requirements:

"Not less than forty percent (40%) stone shall be retained on No. 4 sieve.

"The percent of wear shall be not more than twenty-five (25) when tested by laboratory methods using Method T-4 or more than forty (40) when tested by AASHO Method T-96.

"The stone portion of the gravel shall be uniformly graded from coarse to fine, and the maximum-size particles shall not exceed two-thirds (2/3) of the layer being spread.

"The sand portion, when tested by laboratory methods using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Minimum Percent of Stone	Percent Passing Square Openings No. 100	Percent Passing Square Openings No. 270
40	0-15	0-3
50	0-15	0-4
60	0-15	0-5
70	0-15	0-6

"The sand shall show a color of not more than three and one-half (3½) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

Item 202, Sub-base of Sand

"Article 202.02 - Materials. The sand shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and meet the following requirements:

"The sand, when tested by laboratory methods using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Square Openings	Percent Passing
1½"	95-100
5/8"	80-100
No. 4	70-100
No. 100	0-18
No. 270	0-5

"The sand shall show a color of not more than three and one-half (3½) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

Item 204, Sub-base of Crushed Rock

"Article 204.02 - Materials. The materials for sub-base, filler, and sand cushion shall be obtained from approved sources and meet the following requirements:

A - Crushed Rock. "The crushed rock shall be uniformly graded, crusher-run material and shall be free from dirt. The ledge from which this material is obtained shall be stripped and cleaned before blasting. Conical stockpiling, or any other method of stockpiling which causes segregation of aggregates, will not be permitted.

"The crushed rock, when tested by laboratory methods using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Square Openings	Percent Passing
4"	95-100
1½"	25-50
No. 4	0-15

"The percent of wear shall not be more than eight (8) when tested by laboratory methods using Method AASHO T-3 or more than forty (40) when tested by AASHO Method T-96."

Item 205, Sub-base of Crushed Gravel

"Article 205.02 - Materials.

A - Crushed Gravel. "The crushed gravel shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and produced by a crusher adjusted to deliver a product uniformly graded from coarse to fine.

"When tested by laboratory methods using Method AASHO T-27, it shall meet the grading requirements as set forth below:

		Square Openings	Percent Passing
Sub-base of Crushed Gravel	Coarse-Graded Item 205-A	4"	100
		No. 4	25-50
	Fine-Graded Item 205-B	1½"	95-100
		No. 4	30-60

"At least thirty percent (30%) by weight of the stone content of the crushed gravel, that is, the material retained on the No. 4 screen, shall have a minimum of one (1) fractured face as determined by actual count from the sample submitted to the laboratory.

"The percent of wear shall not be more than twenty (20) when tested by laboratory methods using Method AASHO T-4 or more than thirty-five when tested by AASHO Method T-96.

B - Sand. "The sand content of the crushed gravel, that is the material passing the No. 4 screen, when tested by laboratory methods using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Square Openings	Percent Passing
No. 100	0-18
No. 270	0-8

"The sand shall show a color of not more than three and one-half (3½) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 1

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
1	1	1969	1-5	0-1	No	N O T S A L P L E D								Owner: Pentti Nerikaarto. Area is a long meadow, largely grown up with brush, that extends westward along the southside of Town Highway No. 5 from the Nerikaarto studio in Chateauguay. Test #1 was near the west end of the meadow opposite a large pine tree on the town highway. Materials in a five-foot test hole that was not sampled are as follows: 0-1', sod and saplings; 1'-5', angular to round cobbles and small boulders and less than 10% silt.
2	1	1969	2-12	0-2	Yes	65.1	54.3	38.3	11.0	7.0	1	33.0%	Gran. Borrow (Grav.)	Owner: Pentti Nerikaarto. Area consists of a small circular water-filled gravel pit north of Town Highway No. 5 at point 0.09 mile west of Nerikaarto studio. Lower seven feet of 19-foot high face were heavily sloughed over and inaccessible to backhoe sampling. Test #1 was in the upper west face of the pit. Materials are as follows: 0-1', sod; 1'-2', silt and stones; 2'-12', dirty fine cobbly gravel that is acceptable for Item 105, but fails to meet both gradational and abrasion

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 2

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														requirements for Item 201.
3	1	1969	2-10	0-2	No	94.0	83.6	65.2	46.0	22.0	2	---	---	Owner: John and/or Julia McDill. Area is a clearing in a wooded terrace above and west of the first "dive" in Dailey Hollow at point south of Town Highway No. 4 and 0.73 mile west of its intersection with Town Highway No. 33. Test #1 was near the south-east end of the clearing overlooking a steeply wooded slope at point about 100' from the town highway. Materials are: 0-2', sod and silt; 2'-10', silty sand with small stones and an occasional cobble that fails to meet requirements for Item 105 because of a great excess passing the No. 270 mesh sieve.
4	1A	1969	1-21	0-1	Yes	80.1	59.6	38.7	16.0	4.0	1	34.8%	Gran. Borrow (Grav.)	Owner: Gordon and Seymour Robinson. Area consits of a pit in woodlands of Dailey Hollow near the end of Town Highway No. 33 at point 0.65 mile from its intersection with Town Highway No. 4. Test #1A was of upper 33-foot high northwest face. Materials are: 0-1', thin sod and silt; 1'-3', fine gravel; 3'-5', fine sand; 5'-12', medium gravel

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 3

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														with cobbles; 12'-15', gravelly cobbles; 15'-21', gravel. Apart from a slight excess of material passing the No. 100 mesh sieve which failed this test for the gradational requirements of Item 201 and excessive wear, it met the requirements for Item 105.
	1B	1969	21-33	---	Yes	100	91.1	74.4	9.7	2.0 1.5*	1½	---	Sand	Test #1B was below Test #1A in lower northwest face. Materials are: 21'-30', silt and sand; 30'-33', fine gravel. Test #1B materials meet Item 202 specifications.
	2	1969	0.5-5.5	0-0.5	Yes	91.1	85.4	67.9	14.0	4.0	1½	---	Gran. Borrow (Grav.)	Test #2 was in floor about 25 feet east of Test #1B. Materials are: 0-0.5', silt overburden; 0.5'-5.5', fine gravel with an occasional stone that failed to meet gradation requirements for Item 201 because of insufficient stone content. From 5.5'-8', a silty sand occurs which was not tested.
	3A	1969	0.5-5	0-0.5	Yes	88.9	73.6	32.5	3.0	1.5	1½	---	Gran. Borrow (Grav.)	Tests #3A and #3B were next to woods in possible extension 75' west of Test #1A. Test #3A materials are: 0-0.5', sod; 0.5'-5', slaty gravel that meets gradational requirements for Item 201, but there was insufficient proper size stone for the percent of wear test.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 4

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	3B	1969	5-10	----	Yes	100	100	100	16.2	2.0 1.8*	1	---	Sand	Test #3B was below Test #3A in backhoe hole. Material is: 5.0'-10', fairly clean sand that is acceptable for Item 202.
5	1A	1969	16-19	0-4	Yes	97.5	84.5	58.4	8.0	4.0	1½	---	Gran. Borrow (Grav.)	Owner: Gordon and Seymour Robinson. Area in Dailey Hollow woodlands consists of a northwest trending ridge west of Town Highway No. 33 at point 0.62 mile from its intersection with Town Highway No. 4. 95-foot long ridge is truncated at east end by a 23-foot high face that is largely inaccessible because of sloughing. Tests #1A and #1B were in lower north face. Materials are: 0-4', silt overburden; 4'-16', not exposed; 16'-19', clean gravel that fails to meet requirements for Item 201 because of a slight excess passing the No. 270 mesh sieve (Test #1A). There was insufficient proper size stone for the percent of wear test.
	1B	1969	19-23	---	Yes	100	100	100	73.0	9.0*	1	---	Gran. Borrow (Sand)	From 19'-23' is very fine sand that fails to meet requirements for Item 202 because of excesses passing the No. 100 and #270 mesh sieves (Test #1B). Bottom of face and floor is clay.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 5

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	2	1969	3-12	0-3	Yes	96.2	86.5	66.6	17.0	3.0	1½	---	Gran. Borrow (Grav.)	Test #2 was of upper face of second grown-in pit that truncates west end of same ridge, and that faces pit at Map Ident. No. 4. Materials are: 0-3', sod and silty stones; 3'-12', alternating layers of slaty gravel and sand that fail to meet gradational requirements for Item 201 because of excesses passing the No. 4 screen and the No. 100 mesh sieve. There was insufficient proper size stone for the percent of wear test.
6	1	1969	2.5-9	0-2.5	No	79.8	69.1	54.4	3.0	1.0	2	28.1%	Gran. Borrow (Grav.)	Owner: Herod Webb. Area consists of a large field with rolling terraces west of Town Highway No. 5 and north of the LeGendre farm. Test #1 was located just south of the upper end of a field road that "ramps" to the north terrace. Materials are: 0-1', sod; 1'-2.5', silt and stones; 2.5'-9', cobbly gravel with estimated 20% +4" stones that meets the gradational requirements, but fails the abrasion requirements for Item 201. Test #1 barely missed a one-inch water line.
	2	1969	1-4	0-1	No	N O T S A L P L E D								Test #2 was at northeast corner of terrace 225' north of Test #1. Materials are: 0-1',

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 6

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														sod; 1'-4', silty cobbles that were not tested.
	3	1969	1-7	0-1	No	62.6	46.0	30.3	5.0	2.5	3½	34.8%	Gran. Borrow (Grav.)	Test #3 was near south end of north terrace at point 225' S15°W of Test #1. Materials are: 0-1', sod; 1'-7', cobbly gravel and sand that meets the gradational requirements, but fails the abrasion requirements for Item 201.
	4	1969	1-7.5	0-1	No	100	---	76.7	56.1	---	---	---	---	Test #4 was near high point of south terrace 275' S15°W of Test #3. Materials are: 0-1', sod; 1'-7.5', silty clay. This test was classified as an A-4 silt.
	5	1969	2-5.5	0-2	No	67.3	58.7	46.9	4.0	1.0	1½	29.2%	Gran. Borrow (Grav.)	Test #5 was at lower level of south terrace at point 50' N15°E of Test #4. Materials are: 0-2', sod and silt; 2'-5.5', stony coarse sand that meets gradational requirements, but fails the abrasion requirements for Item 201.
7	1	1969	2.5-10	0-2.5	Yes	84.2	68.1	47.2	12.0	3.5	1	24.1%	Gravel	Owner: Jim Oldenburg. Area comprises a large pit north of the east terminus of Town Highway No. 10 near Bridgewater Center. Possible extension of the pit to the east and northeast was not accessible to the backhoe. A great deal of silt and stones that are not in place have been pushed into the north end of the pit

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 7

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing* 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														from up above. Test #1 was in upper north-east face at south edge of aforementioned silt and stones. Materials are: 0-2.5', sod and overburden; 2.5'-10', fine gravel with 10% cobbles that meets the requirements for Item 201; bottom is cobbles.
	2	1969	1.5-10	0-1.5	Yes	95.9	83.2	68.3	15.0	3.0	1	29.6%	Gran. Borrow (Grav.)	Test #2 was in floor about 40' southwest of Test #1. Materials are: 0-1.5', silty gravel (not in place); 1.5'-10', steeply southward dipping gravel beds with cobbles that fail to meet either gradational or wear requirements for Item 201. Water was encountered at a depth of 9 feet.
3	1	1969	2.5-7	0-2.5	Yes	82.5	73.0	58.1	24.0	5.3	1	32.0%	Gran. Borrow (Grav.)	Owner: Jim Oldenburg. Area is a gravel pit in the woods reached by a steep road at the end of Town Highway No. 10 near Bridgewater Center. Possible extension is into a hillside north and northeast of the pit. Test #1 was of upper north face below 16½-foot high point. Materials are: 0-0.5', sod; 0.5'-2.5', silt and stones; 2.5'-7', coarse tabular gravel over fine gravel over sand that fails to meet gradational and wear requirements for Item 201.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 8

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	2	1969	8.5-15	0-8.5	Yes	92.7	79.6	57.7	20.0	5.0	3½	---	Gran. Borrow (Grav.)	Bottom is clay. Test #2 was of lower northeast face. Materials are: 7'-8.5', clay (not tested); 8.5'-15', fine gravel with silt and a cobble that failed to be acceptable for Item 201 because of excesses passing the No. 100 and No. 270 mesh sieves. There was insufficient proper size stone for the percent of wear test.
	3	1969	1-4	0-1	Yes	85.9	71.3	43.8	16.0	3.0	1	23.1%	Gran. Borrow (Grav.)	Test #3 was in floor about 40' southwest of Test #2. Materials are: 0-1', silt and stones (not in place); 1'-3', clean gravel; 3'-4', silt and stones; bottom, boulders. Interval from 1'-4' barely failed to meet requirements for Item 201 because of a slight excess passing the No. 100 mesh sieve.
	1A	1969	14.5-29.5	0-14.5	Yes	100	100	100	27.0	2.3	1	---	Gran. Borrow (Sand)	Owner: Jim Oldenburg. Area comprises a 71-foot high sand pit southeast of end of Town Highway No. 10 near Bridgewater Center. Possible extension is eastward. Test #1A was of upper east face. Materials are: 0-2', sod; 2'-14.5', silt and stones (not tested); 14.5'-29.5', westward dipping fine sand beds that fail to meet requirements for Item 202 because of an excess

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 9

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														passing the No. 100 mesh sieve.
	1B	1969	29.5-44.5	---	Yes	100	100	100	38.0	4.8	1	---	Gran. Borrow (Sand)	Test #1B was of central east face. Material is: 29.5'-44.5', westward dipping fine sand beds that fail to meet requirements for Item 202 because of an excess passing the No. 100 mesh sieve.
	1C	1969	44.5-55.5	---	Yes	100	100	100	44.0	6.3	1	---	Gran. Borrow (Sand)	Test #1C was of lower central east face. Material is: 44.5'-55.5', westward dipping fine sand beds that fail to meet Item 202 requirements because of excesses passing the No. 100 and No. 270 mesh sieves.
	2	1969	3-8.5	0-3	Yes	90.4	77.9	52.4	3.0	1.5	3	---	Gran. Borrow (Grav.)	Test #2 was of possible extension in woods road east of pit. Materials are: 0-3', silt; 3'-8.5', clean orange gravel with stones that meets gradational requirements for Item 201. There was insufficient proper size stone for the percent of wear test.
	3	1969	1.5-9	0-1.5	Yes	100	100	97.8	33.3	7.0 6.8*	2½	---	Gran. Borrow (Sand)	Test #3 was in floor of pit. Materials are: 0-1.5', silt (not in place); 1.5'-9.5', sand and silt with cobbles that fails to meet the requirements for Item 202 because of excesses passing the No. 100 and No. 270 mesh sieves. Water was encountered at 9 feet.
10	1	1969	1.5-10	0-1.5	No	85.3	65.9	45.3	10.0	2.3	2	33.3%	Gran. Borrow (Grav.)	Owner: Harold Perkins. Area consists of a terrace

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 10

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														east of State Aid Highway No. 1 at point about 0.6 mile south of its intersection with Town Highway No. 35. Test #1 was at edge of terrace 70' north of an old barn. Materials are: 0-1.5', sod; 1.5'-10' brown to gray silty to sandy gravel with a few cobbles and two boulders. This sample meets the gradation requirements, but fails the abrasion requirements for Item 201.
	2	1969	1.5-5	0-1.5	No	100	100	56.5	13.0	3.8	3½	---	Gran. Borrow (Grav.)	Test #2 was on terrace at point 150' northwest of Test #1. Material is: 0-1.5', sod; 1.5'-2.5', gravelly sand; 2.5'-5', small cobbles and sand; bottom in boulders. This material too non-uniformly graded from coarse to fine to be acceptable for Item 201. There was insufficient proper size stone for the percent of wear test.
11	1A	1969	5-21	0-1	Yes	100	100	100	43.0	13.8	1	---	---	Owner: Leon Webb. Area comprises a 28.5-foot excavated bank in a poorly defined terraced hillside northeast of Webb farmhouse on State Aid Highway No. 1. Test #1A was in southeast face of bank. Materials are: 0-1', sod; 1'-5', silty sand

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 11

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														(not sampled); 5'-21', fine sand with silt and clay lenses that fails to be acceptable for Item 105 because of excesses passing the No. 100 and No. 270 mesh sieves.
	1B	1969	21-28	---	Yes	100	100	100	36.0	5.3*	1	---	Gran. Borrow (Sand)	Test #1B was in lower southeast face of bank. Material is: 21'-28', fine sand that is unacceptable for Item 202 because of excesses passing the No. 100 and No. 270 mesh sieves. Bottom of face and floor is clay.
	2	1969	2-10	0-2	No	100	96.6	87.8	19.3	11.0 9.7*	1	---	---	Test #2 was on top of terrace 25' S70°W of utility pole No. 874. Materials are: 0-2', sod and silt; 2'-3', fine gravel; 3'-10', sand; bottom, in boulders. Interval from 2'-10' fails to meet requirements for Item 105 because of excesses passing the No. 100 and No. 270 mesh sieves.
	3	1969	3.5-6	0-3.5	No	N O T S A M P L E D								Test #3 was located 180' S25°W of Test #2. Materials are: 0-1' sod; 1'-3.5', silt and clay; 3.5'-6', cobbles. Materials were not tested.
12	1	1969	2-10	0-2	No	100	96.5	96.5	81.1	33.0 31.8*	1	---	---	Owner: Leon Webb. Area consists of a knoll S27°E of Webb farmhouse on State Aid Highway No. 1. Test #1 was on top of knoll. Material is: 0-2', sod and

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 12

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														silt; 2'-10', very fine sand with infrequent stones that is unacceptable for Item 202 because of excesses passing the No. 100 and No. 270 mesh sieves.
13	1	1969	1-5	0-1	Yes	78.2	64.8	47.5	3.0	1.0	1½	29.5%	Gran. Borrow (Grav.)	Owner: Holiday Farm. Area consists of a shallow pit at east edge of terrace south of Town Highway No. 36 at point 0.25 mile from State Aid Highway No. 1. Test #1 was in center of west face. Materials are: 0-1', sod and silt; 1'-5', silty gravel with stones that fails to meet the abrasion requirements for Item 201.
	2	1969	0-9.5	---	Yes	100	100	100	32.0	9.0	1	---	Gran. Borrow (Sand)	Test #2 was in floor about 20' east of Test #1. This test was taken two weeks after Test #1 and geologist noted that some material had been stripped from the floor during the interim. Test #2 material is: 0-9.5', very fine sand that fails to meet requirements for Item 202 because of excesses passing the No. 100 and No. 270 mesh sieves.
14	1	1969	0.5-3.5	0-0.5	No	100	---	84.9	65.0	---	---	---	---	Owner: Joseph Krusas. Area is a field on the bluff above the Ottauquechee River south of U. S. Route 4 at point about 2 miles west of Bridgewater Corners.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 13

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														Test #1 was at point 90' N70°W of utility pole. Materials are: 0-0.5', sod; 0.5'-3.5', silty-clay; 3.5'-4.5', fine gravel; 4.5'-9.5', silt-clay. This test was classified as an A 4 silt.
15	1	1969	4-9.5	0-4	Yes	100	100	44.4	45.0	30.0	1½	---	---	Owner: Lynn Goodnough. Area consists of a large depleted borrow pit north of U. S. Route 4 at point about a mile east of West Bridgewater. Test #1 was in face north of upper level near far west end of area. Materials are: 0-1.5', sod; 1.5'-4', silt and stones; 4'-9.5', stones, silt and sand that is unacceptable for Item 105.
	2	1969	2-10	0-2	Yes	100	100	74.4	67.0	37.0	1	---	---	Test #2 was in floor of upper level a few feet southwest of Test #1. Materials are: 0-2', silt (not in place); 2'-6.5', silt to sand; 6.5'-10', dirty gravel. Interval from 2'-10' is unacceptable for Item 105.
	3	1969	0.5-3.5	0-0.5	Yes	100	100	66.3	37.0	18.0	1½	---	---	Test #3 was in lowest part of lower floor at point about 150' southeast of Tests #1 and #2. Materials are: 0-0.5', thin sod; 0.5'-2', silty sand and gravel; 2'-3.5', clay and stones. Interval from 0.5' to

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 14

Map Ident. No.	Field Test No.	Year Field Test	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														3.5' is unacceptable for Item 105. Test bottomed on bedrock.
16	1	1969	1.5-6	0-1.5	Yes	100	100	99.5	64.7	12.0 11.0*	1½	---	---	Owner: Edward Dwyer. Area is a conspicuous high pit north of the Ottauquechee River near the village of West Bridgewater. The pit floor as well as possible extension to the north have been completely depleted. Test #1 at the left edge of the entrance uncovered material in place as follows: 0-1.5', sod and silt; 1.5'-6', fine sand that fails to meet the requirements for Item 105. Test bottomed on bedrock.
17	1	1969	1.5-10	0-1.5	Yes	86.0	72.9	54.8	25.0	11.0	1	29.6%	---	Owner: John Z. Pek. Area comprises a large pit about one-quarter mile south of West Bridgewater that was largely depleted when owned by Addison Pinney. Test #1 was in the floor about 100' from the northeast end. Material consists of: 0-1.5', sod and silt; 1.5'-10', fine gravel that fails to meet requirements for Item 105.
	2	1969	3.5-6	0-3.5	Yes	N O T S A M P L E D								Test #2 was on top about 36' from the southwest end where crushed gravel shows on the surface. Materials are: 0-1', sod; 1'-5', angular slate cobbles (that were not sampled)

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 15

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	3	1969	3.5-6	0-3.5	Yes	60.2	47.1	34.5	12.0	5.0	2	26.2%	Gran. Borrow (Grav.)	and silt-clay. Test #3 was in field below and about 75' northwest of Test #2. Materials are: 0-3.5', sod and clay; 3.5'-6', coarse gravel that is acceptable for Item 105, but barely fails to meet the abrasion requirements for Item 201.
18	1A	1969	6-16	0-6	Yes	81.6	66.4	44.9	16.0	7.0	1	27.3%	Gran. Borrow (Grav.)	Owner: Edward Stevens. Area consits of a 60-foot high pit about 7/8 mile south of West Bridgewater, northeast half of which has been depleted to bedrock. Test #1A was in upper south face. Materials are: 0-1', sod; 1'-6', clay and cobbles (not tested); 6'-16', dirty cobbly gravel that is acceptable for Item 105 but fails to meet both gradational and abrasion requirements for Item 201.
	1B	1969	16-26	---	Yes	100	100	97.7	13.6	3.0 2.9*	1½	---	Sand	Test #1B was in upper middle of south face beneath Test #1A. Materials are: 16'-26', sand and fine gravel with stones that is acceptable for Item 202.
	2A	1969	1.5-5.5	0-1.5	Yes	100	100	98.7	6.9	2.5*	1	---	Sand	Test #2A was in floor of pit near low point. Materials are: 0-1.5', sod, 1.5'-5.5', sand that is acceptable for Item 202.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 16

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	2B	1969	5.5-9.5	---	Yes	79.8	59.2	40.0	15.0	7.0	1	16.4%	Gran. Borrow (Grav.)	Test #2B was below Test #2A in floor. Material is: 5.5'-9.5', clean gravel that is acceptable for Item 105, but barely fails to meet requirements for Item 201 because of a slight excess passing the No. 270 mesh sieve.
19	1	1969	2-10	0-2	Yes	100	96.3	88.9	32.0	6.0 5.3*	1	---	Gran. Borrow (Sand)	Owner: Edward Stevens. Area is a pit high in the woods about 1 3/10 miles south of West Bridgewater. This pit was formerly used as a source of crushed gravel. Much material is questionably in place. Test #1 was on top of slope at west end of clearing. Materials are: 0-1', sod; 1'-2', cobbles (not tested); 2'-10', sand with a few pebbles that is acceptable for Item 105.
	2	1969	1-10.5	0-1	Yes	100	99.5	99.0	49.5	5.0*	1	---	Gran. Borrow (Sand)	Test #2 was in floor of upper level about 75' east of Test #1. Materials are: 0-1', stones and silt; 1'-2.5', pebble sand; 2.5'-10.5', fine sand. Interval tested from 1'-10.5' is acceptable for Item 105, but fails for Item 202.
	3	1969	7-12	0-7	Yes	100	100	100	6.0	1.0	1	---	Sand	Test #3 was in north face of upper level about 20' from Test #2. Materials are: 0-2', sand (questionably in place); 2'-7', cobbles (not tested); 7'-12', sand that meets the

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 17

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				requirements for Item 202.
20	1A	1969	1-5	0-1	No	100	100	99.5	43.8	10.0*	1½	---	Gran. Borrow (Sand)	Owner: Mrs. Margaret Wright. Area is the west end of a field south of U. S. Route 4, west of Vermont Route 100A, and north of the Ottauquechee River. Test #1A was 50' S45°E of utility pole #680 at west end of field. Materials are: 0-1', sod; 1'-5', silty fine sand that is acceptable for Item 105, but fails for Item 202.
	1B	1969	5-10	---	No	64.5	51.6	39.3	19.0	7.0	1	29.0%	Gran. Borrow (Grav.)	Test #1B was below Test #1A at west end of field. Material is: 5'-10', coarse silty gravel that is acceptable for Item 105, but fails both gradational and abrasion requirements for Item 201.
21	1	1969	0.5-12	0-0.5	Yes	100	100	87.6	8.8	3.7 3.2*	1	---	Sand	Owner: Ferris Ayer. Area is a sand pit west of schoolhouse on Town Highway No. 58 at point 0.07 mile west of Vermont Route 100A. Test #1 was in east face of pit at point 30' south of woodshed under a high tension line. Materials are: 0-0.5', silt and stones (not sampled); 0.5'-3', fine sand; 3'-7', silty stony sand with boulders; 7'-12', clean pebbly sand. Meets the requirements for Item 202.
22	1	1969	0.5-5.5	0-0.5	No	N O T S A M P L E D								Owner: Ed Putnam. Area is a field south of the

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 18

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														Ottauquechee River and east of Broad Brook. Test #1 was at east end of field. Materials are: 0-0.5', sod; 0.5'-1.5', uniformly clean fine gravel; 1.5'-5.5', roots, silt and stones. These materials are apparently fill and not in place, so they were not tested.
	2	1969	2.5-4.5	0-2.5	No	N O T S A M P L E D								Test #2 was at west end of field. Materials are: 0-2.5', sod and silt; 2.5'-4.5', silty cobbles that were not tested.
	3A	1969	0.5-5.5	0-0.5	No	91.7	86.2	74.4	30.0	10.0	3½	---	Gran. Borrow (Grav.)	Test #3A was in center of field about 50' from road. Materials are: 0-0.5', sod; 0.5'-1.5', fine gravel; 1.5'-5.5', sandy clay. Interval from 0.5'-5.5' is acceptable for Item 105, but fails for Item 201 because of insufficient stone content.
	3B	1969	5.5-9	---	No	89.1	76.8	61.6	30.0	8.0	3	---	Gran. Borrow (Grav.)	Test #3B was below Test #3A in center of field. Material is: 5.5'-9', silty gravel that is acceptable for Item 105, but fails for Item 201 because of insufficient stone content. Hole bottomed in water, cobbles, and boulders.
23	1A	1969	2-5	0-2	No	100	100	98.7	3.0	0.5*	1	---	Sand	Owner: Ed Putnam. Area is a field south of the Ottauquechee River and west of Broad Brook.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 19

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														Test #1A was at east end of field. Materials are: 0-1', sod; 1'-2', silt (not tested); 2'-5', clean quartz sand that is acceptable for Item 202.
	1B	1969	5-7	---	No	98.1	84.5	70.0	5.6	2.5	1	25.9%	Sand	Test #1B was below Test #1A at east end of field. Material is: 5'-7', silty very fine gravel that is acceptable for Item 202.
	2	1969	2.5-7.5	0-2.5	No	90.6	82.3	64.6	16.0	4.0	2½	---	Gran. Borrow (Grav.)	Test #2 was at west end of field. Materials are: 0-0.5', sod; 0.5'-2.5', silt and small stones; 2.5'-5', sandy gravel; 5'-7.5', cobbly gravel. Interval from 2.5'-7.5' is acceptable for Item 105, but fails to meet gradational requirements for Item 201. There was insufficient proper size stone for the percent of wear test. Water table was encountered at 5.5'.
24	1	1969	2-5	0-2	Yes	100	100	99.6	29.9	11.0*	1	---	---	Owner: Ed Putnam. Area is a shallow borrow pit at northeast end of large pasture east of Putnam farm. Test #1 was in west face near north end of pit. Materials are: 0-1', sod; 1'-2', silt (not tested); 2'-5', silt grading into a sand bed that is unacceptable for Item 105. Bottom was a clean stony gravel that was not tested. Material is of limited aerial extent.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 20

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
25	1	1969	1.5-7.5	0-1.5	No	87.3	74.0	51.5	20.0	7.0	3½	36.1%	Gran. Borrow (Grav.)	Owner: Ed Putnam. Area comprises a large pasture east of Putnam farm. Test #1 was at top of slope in south corner of pasture. Materials are: 0-1.5', sod and stony silt; 1.5'-7.5', cobble gravel with estimated 50% plus 4" stones that is acceptable for Item 105, but fails to meet both gradation and abrasion requirements for Item 201.
	2	1969	1.5-7.5	0-1.5	No	78.6	57.2	38.3	12.0	5.0	1½	36.1%	Gran. Borrow (Grav.)	Test #2 was on top of slope overlooking brook at point 500' N60°E of Test #1. Material is similar to that of Test #1. It meets the gradation requirements, but has too great a percent of wear to meet Item 201 specifications. It is acceptable for Item 105.
	3	1969	6-10	0-6	No	100	100	100	41.0	10.0*	1	---	Gran. Borrow (Sand)	Test #3 was at southwest corner of pasture. Materials are: 0-1.5', sod and silt; 1.5'-6', cobble gravel (not tested); 6'-8', fine sand; 8'-10', sand; bottom, clay. Interval from 6'-10' meets requirements for Item 105, but fails for Item 202.
	4	1969	0.5-3.5	0-0.5	No	83.1	69.7	52.0	23.0	7.0	1½	28.8%	Gran. Borrow (Grav.)	Test #4 was located in center of pasture 190' N20°E of Test #1. Materials are: 0-0.5', sod; 0.5'-3.5', fine gravel that is acceptable for Item 105, but fails both gradation and abrasion requirements for

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 21

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														Item 201. Test hole bottomed in bedrock.
26	1	1969	1-13	0-1	Yes	100	100	98.5	78.8	33.0 32.5*	2	---	---	Owner: Carroll Earle. Area is a conical knoll in pasture on west slope of Richmond Hill at point S55°E of owner's barn. Knoll appears to be an isolated kame surrounded by boulder till. Test #1 was in southwest face of a tiny pit in knoll. Materials are: 0-1', sod; 1'-13', silty fine sand with occasional 1½" quartz stones and much limonite altered fine material that is unacceptable for Item 105.
27	1	1969	3.5-6.5	0-3.5	No	100	100	99.3	94.0	---	---	---	---	Owner: Ernest Earle. Area is a terrace in the field northeast of the junction of Town Highway No. 49 with Town Highway No. 44. Test #1 was at south end of 350-foot long terrace. Materials are: 0-0.5', sod; 0.5'-3.5', brown silt and elongate cobbles (not tested); 3.5'-6.5', silt-clay. This test was classified as an A-4 silt.
28	1	1969	1-19	0-1	Yes	100	100	52.8	41.0	13.0	1	---	---	Owner: Floyd and Lena Merriam. Area comprises a northeast facing double level pit west of the farm (occupied by Lena Merriam at the time of field survey) on Town Highway No. 26. Test #1 was a composite of

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 22

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														both faces. Materials are: 0-1', sod; 1'-9', fine gravel with silt and stones (upper level); 9'-19', silt and sand layers with stones and clay lenses (lower level). Interval from 1'-19' was unacceptable for Item 105.
	2	1969	4-10	0-4	Yes	100	100	97.2	54.4	9.0 8.8*	1½	---	Gran. Borrow (Sand)	Test #2 was in floor of lower level about 40' east of Test #1. Materials are: 0-4', silt with stones (not tested); 4'-10', silty fine sand that is acceptable for Item 105, but fails for Item 202.
29	1A	1969	1-6	0-1	No	92.6	92.6	82.2	5.6	1.0 0.8*	1	---	Gran. Borrow (Sand)	Owner: Leon Merriam. Area is a narrow field north of a cellar hole that is 270' south of the pit at Map Ident. No. 28. Test #1A was at point 20' north of cellar hole in middle of field. Materials are: 0-1', sod; 1'-6', sand with a few large stones that meets requirements for Item 105, but an excess of stones retained on the 1½" screen fail it for Item 202.
	1B	1969	6-11	---	No	89.5	75.8	54.2	6.0	2.5	1	30.1%	Gran. Borrow (Grav.)	Test #1B was beneath Test #1A. Material is: 6'-11', fine gravel with large stones at bottom that is acceptable for Item 105, but fails to meet abrasion requirements for Item 201.

*Percentage of Total Sample

TABLE I

BRIDGEWATER GRANULAR DATA SHEET NO. 23

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	2	1969	1-9	0-1	No	74.1	---	60.6	25.8	---	---	---	---	Test #2 was located 135' north of Test #1A near top of the slope. Materials are: 0-1', sod; 1'-9', mostly stony silt and clay with a little sand that was classified as A-1-b silty gravel.
30	1A	1969	2-24	0-2	Yes	100	100	100	7.0	1.5*	1	---	Sand	Owner: Town of Bridgewater. This is a sand pit near current landfill reached by private road 0.95 mile east of Grange hall in Bridgewater Corners. Test #1A was in upper 52-foot high face. Materials are: 0-2', sod; 2'-24', fine sand that meets requirements for Item 202.
	1B	1969	24-46	---	Yes	100	100	100	56.0	11.0*	1	---	---	Test #1B was in lower face below Test #1A. Material is: 24'-46', fine sand that is unacceptable for Item 105 because of an excess passing the No. 270 mesh sieve.
31	1	1969	1-10	0-1	Yes	100	100	98.6	24.7	3.0*	1	---	Gran. Borrow (Sand)	Owner: Congregational Church. Area is a 70-foot high sand pit west of old beaver pond at end of Town Highway No. 45. Test #1 was in upper face. Materials are: 0-1', sod and pebbly silt; 1'-10', fine sand with a little brown silt that is acceptable for Item 105, but fails for Item 202 because of an excess passing the No. 100 mesh sieve.

*Percentage of Total Sample

TABLE I

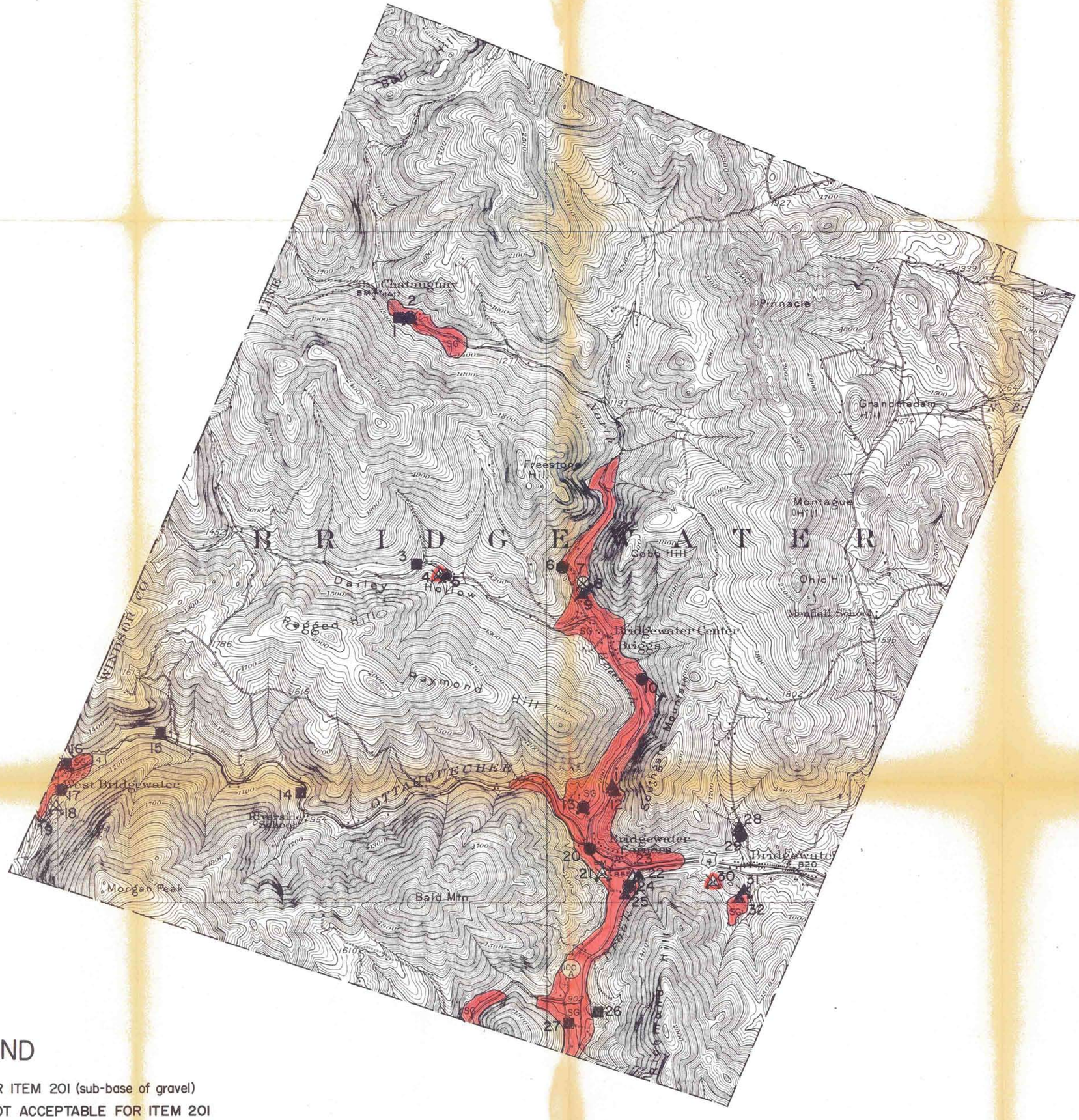
BRIDGEWATER GRANULAR DATA SHEET NO. 24

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
32	1	1969	1-11	0-1	No	100	100	100	43.0	11.0	1½	---	---	Owner: Mrs. Phyllis H. Quinn. Area is a large field northwest of the end of Town Highway No. 45. Test #1 was near southeast corner of field. Materials are: 0-1', sod; 1'-11', silty fine sand that is not acceptable for Item 105.
	2	1969	1-10	0-1	No	100	100	98.8	32.6	9.0 8.9*	1	---	Gran. Borrow (Grav.)	Test #2 was on crest of slope about 0.06 mile west of Test #1. Materials are: 0-1', sod; 1'-10', silty sand that is acceptable for Item 105, but not acceptable for Item 202.

*Percentage of Total Sample

TABLE I
Supplement

BRIDGEWATER PROPERTY OWNERS - GRANULAR	Map Ident. No.
Ayers, Ferris	21
Bridgewater, Town of	30
Congregational Church	31
Dwyer, Edward	16
Earle, Carroll	26
Earle, Ernest	27
Goodnough, Lynn	15
Holiday Farm	13
Krusas, Joseph	14
McDill, John and/or Julia	3
Merikaarto, Pentti	1, 2
Merriam, Floyd and Lena	28
Merriam, Leon	29
Oldenburg, Jim	7, 8, 9
Pek, John Z.	17
Perkins, Harold	10
Putnam, Ed	22, 23, 24, 25
Quinn, Phyllis H. (Mrs.)	32
Robinson, Gordon and Seymour	4, 5
Stevens, Edward	18, 19
Webb, Herod	6
Webb, Leon	11, 12
Wright, Margaret (Mrs.)	20



LEGEND

- ○ GRAVEL, ACCEPTABLE FOR ITEM 201 (sub-base of gravel)
- ◉ GRAVEL, DEPLETED OR NOT ACCEPTABLE FOR ITEM 201
- △ SAND, ACCEPTABLE FOR ITEM 202 (sub-base of sand)
- ▲ SAND, DEPLETED OR NOT ACCEPTABLE FOR ITEM 202
- □ GRANULAR BORROW, ITEM 105
- ▩ MATERIAL NOT ACCEPTABLE FOR ITEM 105
- ⤫ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

BRIDGEWATER

SCALE 1:31,250

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1969

GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

NOTE: BASED ON U.S.G.S. TOPOGRAPHIC MAPS

PLATE I

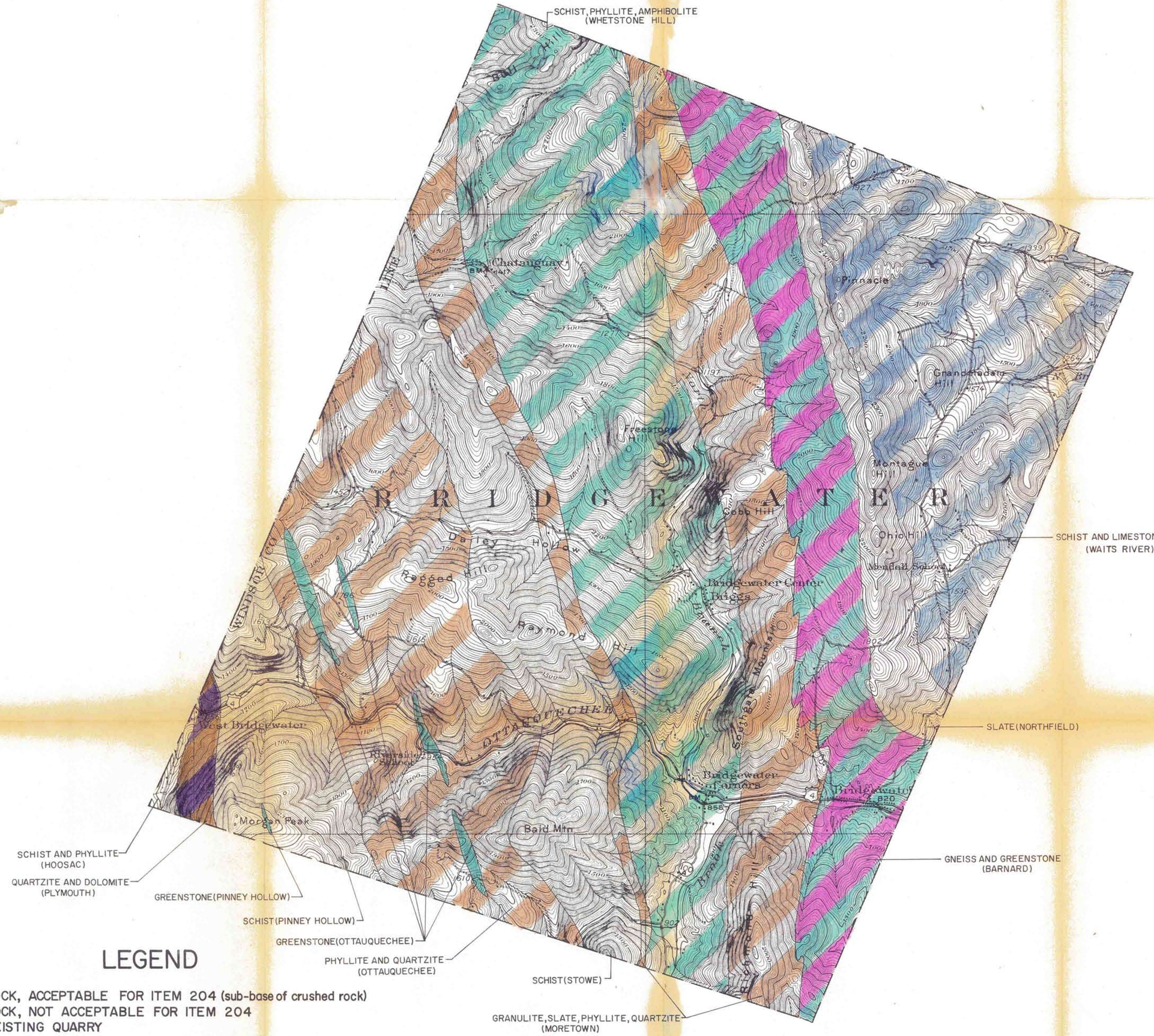
GRANULAR

WINDSOR COUNTY VT. HWY. DISTRICT NO. 4

REVISIONS

DATE							
BY							

BRIDGEWATER



N

LEGEND

- ROCK, ACCEPTABLE FOR ITEM 204 (sub-base of crushed rock)
- ROCK, NOT ACCEPTABLE FOR ITEM 204
- EXISTING QUARRY
- GRANITE TO DIORITE (light to intermediate igneous rocks)
- AMPHIBOLITE, GABBRO, DIABASE, METADIABASE, GREENSTONE, TRAP DIKES (basic or dark igneous rocks)
- PERIDOTITE, PYROXENITE, SERPENTINITE (ultra-basic igneous rocks)
- GNEISS
- QUARTZITE
- DOLOMITE
- MARBLE, LIMESTONE
- SCHISTS, SLATES, PHYLLITES, SHALES, CONGLOMERATES
- 3 IDENTIFICATION NUMBER (refer to text)

BRIDGEWATER

SCALE 1:31,250

0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1969

ROCK MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

NOTE: BASED ON U.S.G.S. TOPOGRAPHIC MAPS

PLATE II

ROCK

WINDSOR COUNTY VT. HWY. DISTRICT NO. 4

REVISIONS

DATE							
BY							