SURVEY OF HIGHWAY CONSTRUCTION MATERIALS

IN THE TOWN OF WEST FAIRLEE, ORANGE 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

Montpelier, Vermont

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TABLE OF CONTENTS

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.

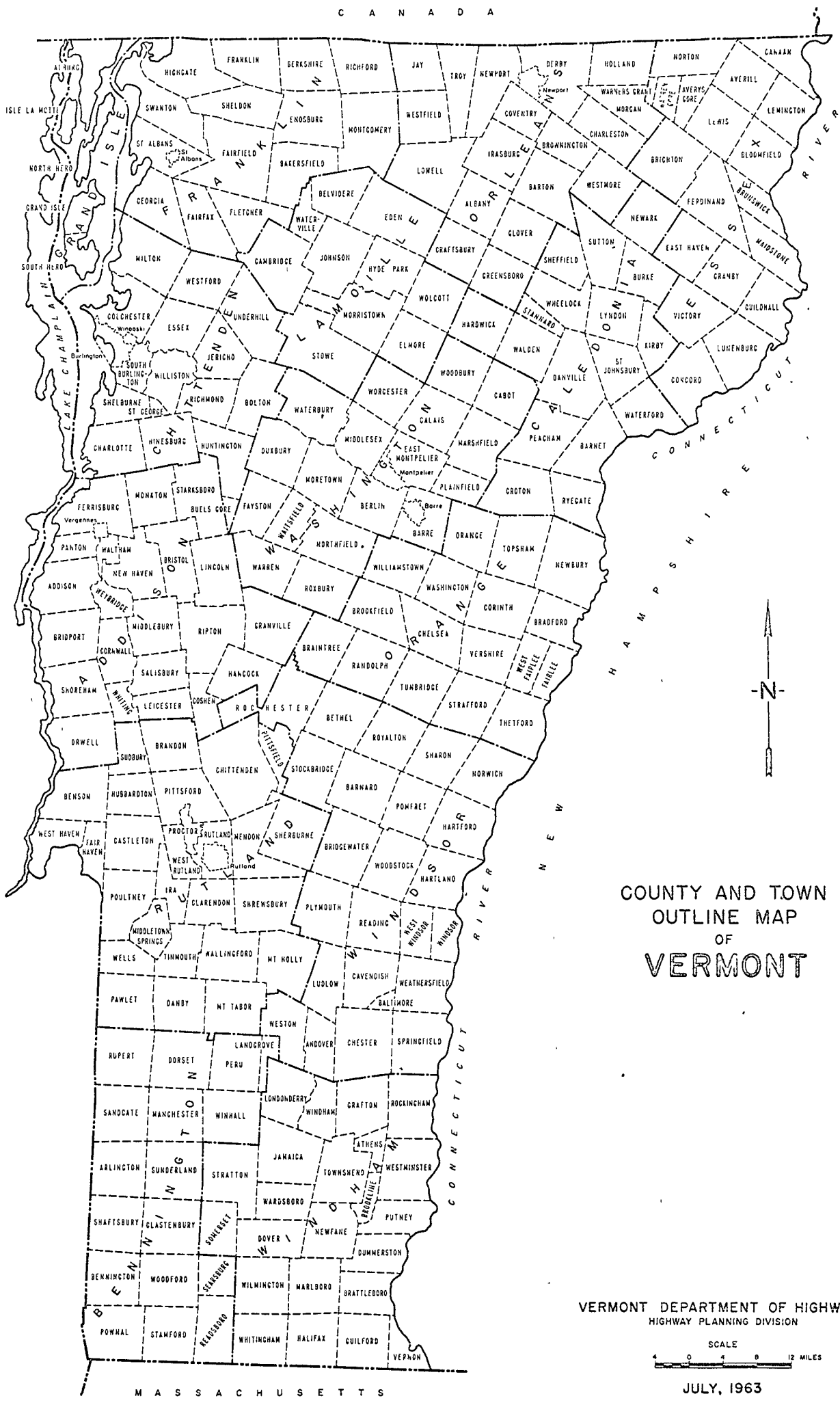
Work sheets contain more detailed information on each test and a detailed sketch of each Identification Number Area. The work sheets and laboratory reports are on file in the office headquarters of this Project.

LOCATION

The town of West Fairlee is located in Orange County in the east part of the State. It is bounded on the east by Fairlee, on the south by Thetford, on the southwest by Strafford, on the west by the towns of Vershire and Corinth, and on the north by Bradford. It is in the Vermont Piedmont or Eastern Hill Physiographic Region, often described as an area of uplifted surface that has been dissected by streams and modified extensively by glaciation.

West Fairlee is quite hilly with steep to moderate slopes and moderate relief. The north central part is especially rugged. Drainage is south to southeast in narrow valleys. Blood Brook and Middle Brook-Bear Notch Brook drain south-southeast into Lake Fairlee located at the southeast corner of the town. The Ompompanoosuc River flows south through West Fairlee Village on the west side of town into Thetford and eventually into the Connecticut. A number of small streams drain into the larger valleys from the intervening hills.

Elevations of the northern hilly section range from about 1,200 feet to a high of 1,793 feet. The lake shore area along Lake Fairlee is between 680 feet and 691 feet above sea level.



COUNTY AND TOWN OUTLINE MAP OF VERMONT

VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION

SCALE
4 0 4 8 12 MILES

JULY, 1963

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

It will be observed that the information on the surface-geology bedrock map in regard to rock type is simplified. For a more detailed description of the respective rock formations, a summary is included in this report. It is apparent from this summary that each formation may not be composed of one distinct rock type, but may be a complex mixture of rock types blending into one another. For this reason, the data sheets may describe the rock tested as differing from the designation on the map.

The bedrock in the town of West Fairlee consists chiefly of quartz muscovite phyllite or schist and micaceous quartzite of the Gile Mountain Formation. This formation is reported to have been intruded by small scattered bodies of basic igneous rock in the central part of town, south and southwest of West Fairlee Center. (See Vermont Geological Survey Bulleton No. 1; Jarvis B. Hadley; 1950.) This area was investigated by the Material Survey Party for possible sources of Item 204, Sub-base of Crushed Rock. However, no igneous rock was found, and no quartzite exposures extensive enough for a quarry site were seen.

The quite hilly and rugged terrain in the north part of town was searched for quarry sites. No extensive exposures were found. A location east of Tebbetts Notch seemed the most promising. Here a thin bedded quartzite outcropped over a small area. It was not sampled due to its remoteness, thick tree cover, and low relief.

Two areas east of the Ompompanoosuc River were sampled as possible sources of Item 204 (See Plate II). Map Identification No. 1 was located about 350' northeast of its junction with Vermont Route 113. This area had good access and plenty of area and relief for a quarrying operation. The rock, however broke thinly, and would be of questionable worth as Sub-base of Crushed Rock.

Map Identification No. 2 was on a steep, wooded hillside east of the Ompompanoosuc River about one-half mile southeast of the Vershire Town Line. This

rock area also has enough relief and extent for a quarry operation. The rock is similar to that of Map Identification No. 1 in hardness and break. Rock in both areas met AASHO T-3 and AASHO T-96 abrasion requirements for Item 204, Sub-base of Crushed Rock. The rock, a schistose quartzite of the Gile Mountain Formation, tends to produce thin, sharp pieces to a large extent. This factor will necessitate additional testing and close control during production of crushed rock from these areas.

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

The granular materials in the town of West Fairlee consist of sands and pebbly sands of glacial lake near-shore, deltaic, and beach origin. Sediments of probable glacial lake origin were sampled in Map Identification Numbers 4, 11, 12, and 17. These sands were too fine for Item 202, Sub-base of Sand.

The valley of the Ompompanoosuc River on the west side of town was sampled extensively. Gravel of fluvial origin at Map Identification No. 2 met requirements for Sub-base of Gravel, Item 201. Gravels with excess fine sand and silt for Item 201 requirements was sampled in Map Identification No. 3, a small pit. Deltaic gravels, also with excess fines were sampled east-southeast of West Fairlee Village at Map Identification Numbers 5 and 6.

Sand acceptable for Item 202 was sampled at two pits in a feature mapped as a beach gravel by D. P. Stewart. An easterly extent of these pits also had acceptable sand. (See Map Identification Numbers 7, 8, and 10.) This area of granular material appears to be in the extreme north end of an extensive glacial lake deposit extending into the town of Thetford.

The valley of Middle Brook, mapped as an arm of a glacial lake, gave sands acceptable for Item 202 at Map Identification Numbers 13, 16, and 19. Of these, only No. 16 would be available as a sand source. Gravel acceptable for Item 201 occurs in a small pit on the east side of Middle Brook at Map Identification Number 18. Gravels of probable fluvial origin, but possibly the result of ice-contact deposition, were sampled in Map Identification Number 20. These gravels did not meet Item 201 specifications, but would be satisfactory if modified, and would meet requirements for town highway use. Map Identification Number 20 was a poorly developed bank in the face of wooded knolls north of West Fairlee Center. Very bouldery material was encountered here, a shallow depth of which met requirements for Item 201.

A pebbly sand terrace exposed by a long, shallow pit gave sand acceptable

for Item 202 at Map Identification Numbers 14 and 15. This feature is probably of glacial lake origin, laid down in an arm of the lake extending up the valley of Blood Brook.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF WEST FAIRLEE

Gile Mountain Formation: Gray quartz-muscovite phyllite or schist, interbedded and intergradational with gray micaceous quartzite, calcareous mica schist, and locally, quartzose and micaceous crystalline limestone like that of the Waits River formation. The phyllite and schist commonly contain porphyroblasts of biotite, garnet, or staurolite, and locally kyanite, andalusite, or sillimanite.

Basic Igneous Intrusives: Sill-like or dike-like bodies of diorite or diabase that have been metamorphosed to amphibolite. The intrusives occur within the Gile Mountain Formation in the south-central part of town.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Beach - As used here the term applies to material of shoreline deposits which may consist of any grain size and gradation of sediment, but is usually well-sorted sand and pebbles.

Delta - A deposit built out by a stream into the sea or other body of water. Usually it has the typical form of the Greek letter delta.

Fluvial - Pertaining to streams.

Ice Contact - Refers to deposition in various topographic expressions that have accumulated in contact with wasting glacial ice.

Igneous Rock - Rocks formed by solidification of hot mobile rock material.

Intrusive - Igneous rock which has cooled before reaching the earth's surface. It contains small to large visible grains - opposed to extrusive - solidifying at the surface and containing small unrecognizable grains.

Kame - A conical hill of stratified drift, deposited at a glacial terminus by glacial streams flowing in or on the ice.

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

Phyllite - A fine-grained, foliated 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.

Physiographic - Pertaining to the physical divisions of the earth.

Quartzite - A compact rock composed of quartz grains so firmly cemented that fracture takes place across the grains and the cementing 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.

Till - An unsorted, unstratified, and unconsolidated heterogeneous mixture of clay, silt, sand, gravel, and boulders deposited directly by glacial ice.

BIBLIOGRAPHY

A survey of the glacial geology of Vermont being conducted by D. P. Stewart, the partial results of which are published in Vermont Geological Survey, Bulletin No 19; 1961.

Soil Survey (Reconnaissance) of Vermont, W. J. Latimer; 1930; Bureau of Chemistry and Soils, United States Department of Agriculture.

Soil Exploration and Mapping; 1950; Highway Research Board, Bulletin 28.

Survey of Highway Aggregate Materials in West Virginia; December, 1969; Engineering Station, West Virginia University, Morgantown, West Virginia.

Materials Inventory, Bangor Quadrangle, South Half; September, 1969; University of Maine.

Glacial Geology and the Pleistocene Epoch, R. F. Flint; 1947; John Wiley and Sons, Inc.

A Handbook of Rock, J. F. Kemp; June, 1946; D. Van Nostrand Company, Inc.

Rock and Rock Minerals, L. V. Pirsson; June, 1949; John Wiley and Sons, Inc.

Glossary of Selected Geologic Terms, W. L. Stokes and D. J. Varnes; 1955; Colorado Scientific Proceedings, Vol. 16.

Centennial Geologic Map of Vermont, C. G. Doll; 1961.

Mt. Cube Quadrangle, New Hampshire-Vermont; Geological Survey, United States Department of the Interior.

Strafford Quadrangle, Vermont; Geological Survey, United States Department of the Interior.

Geology of the Bradford-Thetford Area, Orange County, Vermont; Jarvis B. Hadley; Vermont Geological Survey, Bulletin No. 1; 1950.

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 ($3\frac{1}{2}$) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 1

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				
1	1	1969	1-20	0-1	Yes	100	100	65.5	42.0	10.0	1½	---	Gran. Borrow	Owner: Maurice Tucker. This area is a high bank from which material has been removed and used for fill. It is located 0.35 mile south of the Vershire Town Line on the west side of Vermont Route 113. The material is very rubbly - from pebble-size to boulders or blocks. From about 12'-17' is a fairly good looking gray sand. The bank is 55'-60' high. Its foot and top is inaccessible to a tractor-mounted backhoe. There is a small extension from west to north in the hill in which the bank was opened.
2	1	1969	0.5-4	0-0.5	No	85.4	68.3	53.8	9.0	2.0	1½	23.2%	Gravel	Owner: Maurice Tucker. This is a meadow lying east of a large bend of the Ompompanoosuc River about 0.5 mile south of the Vershire Town Line. The access involves a fairly steep field drive, north of the owner's barn, and a river ford. The granular material is probably confined to a 4-to 6- foot high fluvial gravel terrace beginning at the river bank at the south end of the meadow and extending northward in a 100-to 500- foot wide zone for about 585'-600'.

*Percentage of Total Sample

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 2

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 #1 was a hand sample taken on the low scarp of the terrace at a point 360' from the south end of the meadow, 150' east of the river bend, and 275' west of bedrock exposures on the meadow's east side. The material is a fine somewhat dirty looking gravel that appears less stony in the bottom.
	2	1969	1-9	0-1	No	95.6	78.6	72.2	18.1	6.0 4.3*	1½	---	Gran. Borrow (Sand)	Test #2 was a hand sample of the river bank near the southeast corner of the meadow about 120' southeast of the point where the terrace scarp meets the river bank. The terrace is about 150' wide at the south end of the meadow. Log of the test follows: 0-1', overburden; 1'-3', fine gravel; 3'-4', pebbly coarse sand; 4'-9', fine sand; 9'-, stony silt clay probably over bedrock. The sample had excess large pebbles and excess very fine sand for Item 202, Sub-base of Sand.
	3	1969	1-8.5	0-1	No	84.0	73.4	55.3	15.0	4.0	2	32.7%	Gran. Borrow (Grav.)	Test #3 was dug by backhoe a few feet east of Test #1. The material is a fine, somewhat 'dirty' looking gravel with very few cobble-size stones There are some tabular stones, and many sub-angular granitic

*Percentage of Total Sample

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 3

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				
														stones. Below 4' it is quite clean, and below 6' it is very fine. Water hit at 8.5'. The width of the granular deposit, as estimated by the pebbly nature of the surface, is about 100' in the vicinity of Test #3.
	4	1969	1.5-8.5	0-1.5	No	74.9	69.6	58.6	9.0	1.8	1½	19.8%	Gravel	Test #4 was dug 165' northeast of Test #3 in a line with a lone elm tree. The material is gravel with cobbles to 5', underlain by gravelly sand to 8', and bottoming in pebbly coarse sand with water at 9'. This deposit is probably of fluvial origin. The water level would limit the depth the gravel could be worked.
3	1	1969	1.5-5	0-1.5	Yes	88.4	78.2	61.6	12.0	4.0	1½	24.0%	Gran. Borrow (Grav.)	Owner: Gladys Barker. Area is a small pit at east side of alluvial meadow, north of West Fairlee Village. It is a narrow pit, 110' north-south with 6-to 8-foot faces. There is much slough and the pit has been used as a dump. The extension seems to be confined to a low knoll 80' north-northwest x 35'-40', east-northeast lying northwest of the pit. Test #1 was a hand sample on face in northwest corner. The material is a fine gravel or gravelly sand with few cobble stones. Only 5'-sampled on

*Percentage of Total Sample

TABLE WEST FAIRLEE GRANULAR DATA SHEET NO. 4

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
														8-foot face because of too much slough.
4	1	1969	1.5-4	0-1.5	No	100	100	97.6	51.7	12.0 11.7*	1½	---	---	Owner: Russ Blake. Area is knolly pasture above the east side of the Ompompanoosuc River at West Fairlee. Test #1 was a hand sample taken 375' north of Town Highway No. 28 on second knoll. The material is sand with a few small round pebbles. D. P. Stewart has indicated lake sediments occupy the flanks of the knolls for 300'-400' north of the road.
	2	1969	1-4.5	0-1	No	100	100	100	53.0	13.0	1½	---	---	Test #2 was a hand sample taken northwest of and 25' below Test #1, 110' from the river's east bank. The material is very fine or silty sand, 2' of brown over at least 1.5' of gray. Both samples taken were too fine for Granular Borrow, Item 105.
5	1	1969	1.5-10	0-1.5	Yes	66.0	54.0	43.2	25.0	6.0	1½	19.6%	Gran. Borrow (Grav.)	Owner: Russ Blake. This area is a terrace in the meadow east of the Ompompanoosuc River south of Town Highway No. 28. D. P. Stewart has mapped the general area as lake sediments. The terrace may be of fluvial origin. A hand sample was taken of a small 13-foot high bank on the

*Percentage of Total Sample

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 5

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				
														terrace about 800' south of the road, 125' east of the river. The material is a sandy gravel with sub-angular stones and includes cobbles and boulders. A southeast-dipping sand seam also is included. The bank bottomed in fine sand. Overall, a dirty gravel with some tabular stones. No backhoe test allowed on the terrace. The material appears confined to an area 100' wide extending north to the owner's buildings. A wet area lies on the east side of the meadow. The terrace loses elevation southward in the meadow, becoming merely a low roll.
6	1	1969	1-6	0-1	No	84.7	72.4	51.6	16.0	3.0	1	24.6%	Gran. Borrow (Grav.)	Owner: Mr. and Mrs. George Comstock. Area is a large field in two terrace levels above the west side of the Ompompanoosuc River, at the southeast side of West Fairlee Village. A delta gravel has been mapped in the west part of the meadow, and this feature may include the lower terrace level as well. Lake sands are mapped in the east and lowest part of the area along the river. The escarpments are rounded and of gentle slope.

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
	2	1969	1.5-7	0-1.5	No	86.2	72.7	59.2	22.0	5.0	2½	23.9%	Gran. Borrow (Grav.)	Test #1 was dug on the low wooded bank of a tributary entering the main river. The test represents material in the lower terrace and was dug at a point 155' southwest of junk cars in the northeast corner of the field. The material is interbedded fine gravel and sand with pebbles. The sand looks fairly clean in spots. Test #2 was a hand sample on upper terrace slope taken 175' northwest of Test #1. The material is a somewhat dirty looking gravel with no +3-inch stones. A fine sand was found on the slope 7' vertically below the top. The owners would not allow backhoe sampling. The area seems to show promise for gravels. Access to east side of meadow is about 0.15 mile from Vermont Route 113, along field road.
7	1A	1969	0.5-9.5	0-0.5	Yes	100	87.7	79.0	4.0	1.5 1.2*	1½	---	Sand	Owner: Francis J. O'Brien (formerly John Colburn). Area is the westernmost of two pits north across John Colburn's small meadow from State Aid Highway No. 1. Feature is a small, low ridge trending northwest-southeast lying against the southwest and south sides of a bouldery pasture

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														hillside (probably glacial till over bedrock). Feature is mapped by D. P. Stewart as beach gravel. Test #1A was a hand sample on upper part of northeast face in the pit's west lobe. The face is about 24' high and shows some pebbles in its slough. The material is mainly coarse sand interbedded with a little fine sand and 3 or 4 pebbly sand layers.
	1B	1969	10-18	---	Yes	100	100	97.3	40.9	8.0 7.8*	1	---	Gran. Borrow (Sand)	Test #1B to 18' was exposed by backhoe. The bottom 5'-6' had excess slough to dig through. The material is fine sand with silt laminae and occasional small pebbles. Laminae dip south to southwest.
	2	1969	1-8	0-1	No	87.4	87.4	85.3	23.9	7.0 6.0*	1	---	Gran. Borrow (Sand)	Test #2 was dug on rounded crest of ridge above pit, 68' southeast of Test #1A. The crest is about 100'-115' southwest of and 6'-8' above the apparent contact between the granular feature and the glacial till. The top 1' of the ridge at Test #1 is stony loam; from 1'-3' is coarse sand with pebbles; from 3'-8' is tan fine and silty sand. Hole bottomed in sand against a large boulder which prevented further digging. The sample had excess fines for

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
	3	1969	N	O	T	S	A	M	P		L	E	D	Item 202. Test #3 was dug in floor of northwest lobe of pit, 35' north of pit's lower level, on the north face of which bedrock shows. Bedrock or huge blocks were hit in the test hole at 1.5'.
	4	1969	0.5-5.5	0-0.5	Yes	100	100	100	9.0	2.0	1	---	Sand	Test #4 dug in small lobe of pit in its lower level at its southeast end. A fine sand to 5.5', bottoms in silt clay over ledge blocks. The contact dips northwest. Pit floor is 175' northwest-southeast x 66' northeast-southwest in its lower level. Its northwest lobe measures about 80' north-south x 40' east-west. The length of the ridge between the northwest lobe and the north face of the eastern pit is about 225'. The gravels seen in this area are confined to a thin cap atop the ridge, and to an occasional layer in the sands. Access to this area is north across the west end of the Colburn meadow from State Aid Highway No. 1. The pit floor shows a few boulders or blocks - probably dug out of lower lift.

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
8	1A	1969	1-12	0-1	Yes	96.9	90.1	74.6	3.7	1.0 0.8*	1	---	Sand	Owner: Francis J. O'Brien. Area is a eastern pit in ridge south of pasture hillside on which boulders and bedrock are exposed. A pit, 75' north-south x 60' east-west is located at the southeast end of the ridge, 70' from a line of woods. Test #1A was on upper part of northwest face in direction of pit's extension. Log of test: 0-1', overburden; 1'-4', pebbly sand; 4'-8', quartzose coarse sand with thin reddish laminae; 8'-12', pebbly coarse clean sand.
	1B	1969	12-23	---	Yes	100	100	99.2	16.9	1.5*	1	---	Sand	Test #1B was exposed by backhoe and sampled to the floor. From 12'-23' was fine sand with an occasional small pebble.
	2	1969	1-6.5	0-1	Yes	100	100	100	21.0	2.0*	1	---	Gran. Borrow (Sand)	Test #2 was dug in pit floor at its southeast end. Fine sand encountered to 4'; very fine sand hit from 4' to at least 6.5' where a huge block prevented further digging.
	3	1969	1-6.5	0-1	No	100	100	100	71.0	18.0*	1	---	---	Test #3 was dug 68' north of the pit face, 45' northeast of, and 6' below rounded crest of ridge that extends northwest. This test is only a few feet from base of bouldery pasture slope. To 6.5' is a tan-brown

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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				
	4	1969	1.5-9	0-1.5	No	100	97.5	91.7	10.1	2.0 1.8*	1½	---	Sand	silty sand with a silty clay seam. Test shows that granular material does not extend beyond the ridge. Test #4 dug on crest of ridge, 80' north-northwest of top of pit. Stony sand was noted in scars on the ridge and in an old test trench 35' northwest of the test. Material in the test hole is a 2-foot thick lens of stony sand over southward dipping fine and coarse sand. The test bottomed in coarse sand. This area appears to have better sand than the pit at the northwest end of the ridge. The access would be the same as for the west pit. Additional access could be built from the east, through Map Ident. No. 10, and through a corner of the intervening woods.
9	1	1969	1-3.5	0-1	No	100	100	100	23.0	4.0	1	---	Gran. Borrow (Sand)	Owner: John Colburn. Area is a small meadow mapped as pebbly sand by D.P. Stewart. It is located on the north side of State Aid Highway No. 1 across from a large pit area in the town of Thetford. The east end of the field is 4'-6' higher than the west end which has a few wet spots. Test #1 was dug by hand

*Percentage of Total Sample

TABLE I WEST FAIRLEE GRANULAR DATA SHEET NO. 11

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				
														near the center of the east end of the field. The material is uniform very fine sand with excess passing the No. 100 mesh sieve for Sub-base of Sand, Item 202.
	2	1969	1.5-4	0-1.5	No	100	100	100	21.0	4.0	2	---	Gran. Borrow (Sand)	Test #2 was dug in the north-east part of the field, 170' east of and about 2' below Test #1. The material is still a very fine sand, but perhaps a little coarser than Test #1 in the bottom.
10	1	1969	0.5-9.5	0-0.5	No	100	91.6	82.1	11.5	1.5 1.2*	1	---	Sand	Owner: Francis J. O'Brien. Area is narrow flat terrace, 18'-20' above meadow (Map Ident. No. 9), and on the southwest side of rocky pasture hillside. This terrace is continuation eastward of beach gravel in Map Ident. No. 7 and No. 8, as mapped by D. P. Stewart. The granular material is estimated to be confined to an area 75' northeast-southwest x about 525' northwest-southeast. Test #1 was dug in a stripped area about 150' from the north-west end of the terrace. About 2.5' of very fine gravel over-lies fine sand to 7.5'. Coarse sand continues to at least 9'.
	2	1969	1-9.5	0-1	No	100	97.8	87.9	5.3	1.5 1.3*	2½	---	Sand	Test #2 was dug near the top of the terrace scarp, about

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														215' from a stone wall at the southeast end of the terrace. The top 2.5' is a pebbly or gravelly sand overlying a coarse sand. Area looks like a good but small source of sand. Access is by a pasture drive from State Aid Highway No. 1 near a small white house east of the terrace. The hill northeast of the terrace is very bouldery and may be glacial till.
11	1	1969	1-6	0-1	Yes	100	100	99.0	55.4	9.0 7.9*	1	---	Gran. Borrow (Sand)	Owner: Parker Hill. This is a small diggings on the west side of the owner's horse exercise track, north of State Aid Highway No. 1. The owner has used some of the material. The faces are 3'-5' high. One sample taken had pebbly fine sand for 2' over at least 4' of fine sand. D.P. Stewart has mapped a large area in this vicinity as pebbly sand. The east side of the owner's track has silty clay soil. The material in this area would probably not be available. The owner has horses buried about 200' north of the diggings.
12	1	1969	1-4.5	0-1	No	100	100	99.3	36.7	10.0 9.9*	1	---	Gran. Borrow (Sand)	Owner: A. E. Stevens. Area is a fairly large, slightly domed pasture lying northwest of the horse exercise

*Percentage of Total Sample

TABLE I WEST FAIRLEE GRANULAR DATA SHEET NO. 13

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				
														track. Access is northeast for about 0.25 mile from State Aid Highway No. 1 via a pasture road. The pasture is about 600' north-south x 400' east-west. Test #1 was a hand sample dug near its center in a bulldozer test scar. The material is a fine or very fine sand with an occasional small pebble to 2.5' over a moist fine or very fine dark-colored sand.
	2	1969	1-9.5	0-1	No	100	100	100	69.0	11.0	1	---	---	Test #2 was dug at west side of pasture 135' south of road. The material is very fine sand, micaceous and moist from 6.5'-9.5', and bottoming in silt to clay. Sample had excess passing 270 sieve for Item 105. Owner seemed not too interested in selling material; he wants to build a pond in the pasture. This area is also included in pebbly sand deposit mapped by D. P. Stewart.
13	1	1969	1.5-13	0-1.5	Yes	100	100	99.6	19.9	2.0*	1½	---	Gran. Borrow (Sand)	Owner: Herbert W. Schlichting. Area is a pit on the east side of State Aid Highway No. 2, 0.45 mile north of Vermont Route 113. It is north of former school. Quite a bit of sand had been removed from the pit. Its only extension is

*Percentage of Total Sample

TABLE I WEST FAIRLEE GRANULAR DATA SHEET NO. 14

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
														westward toward the highway for about 140'-150' through a knoll. This area has been set out to small trees. The material in this area would not be available. The pit floor measures 300' north-south x 155' east-west. It is only a few feet above a brook to the east and appears wet in places. Test #1 was a hand sample on 10-foot main face and on 3-foot face in floor, 20' east of the face. The upper face is quite badly sloughed. From 1.5'-6' is hard-packed fine sand. From 6'-13' is a gray-tan medium quartzose sand. The pit floor has the same sand. A few pebbles were seen scattered about the pit.
	2	1969	1-9	0-1	Yes	100	89.7	85.9	6.0	1.3 1.1*	2+	---	Sand	Test #2 was sampled on the badly sloughed 10-foot face 175' north of Test #1. The face at the north end is offset 10'-15' from the face at the south end. From 1'-3.5' is coarse red-black sand with pebbles, from 3.5'-9'+ is medium sand.
14	1	1969	1-10	0-1	Yes	100	100	97.5	16.6	3.0 2.9*	3½	---	Sand	Owner: Russell Bragg. Area is a meadow south of pit on a low terrace west of Blood Brook, 0.10 mile north of Town Highway No. 26. The

*Percentage of Total Sample

TAPLE I

WEST FAIRLEE 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 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														area has been mapped as pebbly sand by D. P. Stewart. The meadow is the pit's south extension, surface of which is flat. Test #1 was dug 110' south of pit, 12' east of road up through meadow. The material is mainly medium sand with an irregular south dip. From 1'-5' is pebbly; from 5'-10' is coarse sand; below 10' is a moist fine sand.
	2	1969	1-10.5	0-1	No	100	99.4	94.7	10.4	1.5 1.4*	1	---	Sand	Test #2 was dug 185' S40°E of Test #1, near east side of the meadow, 45' north of an old test pit. Log of test: 0-1', overburden; 1'-3', horizontal sand beds; 3'-5.5', southward dipping sand beds; 5.5'-10.5', fine and coarse sands with a fairly steep south dip.
	3	1969	1-10	0-1	No	100	100	95.3	27.6	6.0 5.7*	1	---	Gran. Borrow (Sand)	Test #3 was dug at extreme south end of meadow, 155' S50°W of Test #2. The material is interbedded coarse sand with a few small pebbles and very fine sand with some silt. Some lenses, irregular beds noted. This terrace has a gently rounded edge standing 4'-6' above the marsh along Blood Brook. The meadow extends 130' west of Test #1 and narrows to 115' wide in the south end. A

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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				
														good sand source with a shallow depth, probably wet in the bottom.
15	1	1969	1-8	0-1	Yes	100	100	95.5	5.7	1.5 1.4*	2	---	Sand	Owner: Russell Bragg. This area is a long, narrow, shallow pit in a meadow terrace west of Blood Brook, 0.15 mile north of Town Highway No. 26. The pit is about 370' long x 60' wide (east-west), and is wet in the floor. The pit is practically on the east edge of the terrace. The faces vary from 6'-10'. Test #1 was a hand sample on 8-foot south face. Material is mainly a pebbly coarse sand-looks pretty good.
	2	1969	1.5-6	0-1.5	Yes	100	98.9	90.7	10.0	1.5 1.4*	1½	---	Sand	Test #2 was a hand sample taken on 7-foot east face, 190' from north end. Overburden varies from 1'-2'. From 1.5'-4' is pebbly sand; 4'-6'+, medium quartzose sand. An extension on the east side of the pit varies from 10'-20'. Material would be quite thin.
	3	1969	1.5-8	0-1.5	Yes	100	99.0	92.0	6.4	1.5 1.4*	3½	---	Sand	Test #3 was dug on 9-foot west face of pit, 135' from the north end. South-dipping foreset beds noted underlie 2' of pebbly sands of varied orientations. The contact is irregular and abrupt.

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
	4	1969	1-10.5	0-1	No	100	100	99.1	23.8	4.0*	2	---	Gran. Borrow (Sand)	Overall the material is a coarse sand with pebbles. Test #4 was dug 150' west of north end of pit, 20'-25' from north edge of meadow. Material overall is fine sand with thin, moist interbeds of tan and gray, medium and fine sand.
	5	1969	1-4	0-1	No	100	100	94.9	4.8	0.5*	4	---	---	Test #5 was dug 175' south 40° west of Test #4, at west edge of meadow, and 165' west of the pit face. The top 1'-4' is coarse sand that bottoms in gray silt to clay. Sample appeared very organic at the top and failed for this reason. This area would be source of some sand from around the pit, southward and westward for an unknown distance. Tests #4 and #5 indicate an increase in fine material, and a rise in silt to clay base of the deposit, respectively. The deposit is probably of near-shore glacial lake origin.
16	1	1969	2.5-10	0-2.5	No	100	100	99.6	18.9	1.5*	3	---	Gran. Borrow (Sand)	Owner: Melvin Stever. Area was a newly seeded field in rolling terrain north of a small private pond on Middle Brook. D. P. Stewart has mapped the general area as lake sediments.

*Percentage of Total Sample

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 18

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				
														The field sampled is on fairly fine material that has undergone some erosion. Test #1 was a hand sample taken on the steep bank of the field above the northeast side of the pond, about 350' west of State Aid Highway No. 2. The material is fine to medium sand with an occasional small pebble. The sample had excess passing the No. 100 mesh sieve for Item 202, Sub-base of Sand.
	2A	1969	2-15	0-2	No	100	98.4	91.9	11.0	2.0 1.8*	3	---	Sand	Test #2A was a hand sample of upper part of very steep bank above the pond, taken 80' from the northwest end of the feature. (The more or less flat area atop the feature is about 400' northwest-southeast x 150' northeast-southwest.) Log of test: 0-2', overburden; 2'-6', reddish tan sand with pebbles; 6'-11', tan to gray pebbly sand; 11'-12', fine sand; 12'-15', coarse quartzose gray sand with a few pebbles.
	2B	1969	15-24	---	No	100	100	99.3	18.9	4.0*	1-	---	Gran. Borrow (Sand)	Test #2B was sampled on lower part of bank, the bottom 6' of which had excess slough to dig through. Overall this sand looked fairly good, but had excess passing the No. 100 mesh

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														sieve for Item 202. The test bottomed in fine sand. Backhoe testing was not allowed in this area. Test #2 was about 500' west-northwest of Test #1. This would be a fairly large granular area with the probability that specification sand would be found in the northwest part of the field.
17	1	1969	0.5-5	0-0.5	No	100	100	99.6	75.7	1.5*	1½	---	Gran. Borrow (Sand)	Owner: Melvin Stever. Area is the north part of a large field on the east side of Middle Brook, north of the abandoned part of Town Highway No. 26. The area is mapped as lake sediments or lake sands by D. P. Stewart. One hand sample was taken on the side of a broad, low knoll in the north corner of the field. The test was 12'-15' above the swamp along the brook, and a few feet from the northeast property line fence. The material is fine to silty sand that bottoms in the same. From 0.5'-1' is pebbly sand. This area does not look good as a sand source. The material would be quite thin. The field drops in elevation to the south and east. No backhoe tests were allowed.

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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				
18	1	1969	0.5-9	0-0.5	Yes	78.6	68.9	56.0	7.0	2.0	1½	18.5%	Gravel	Owner: Mrs. Roger DeBaun. This is a 65-x 40-foot pit in a knoll 10'-12' above a marshy area along Middle Brook. Access is via an old road, now without bridges, south-south-east about 650' from State Aid Highway No. 2. The pit is 430' north of the Stever property. The north extension is about 175' long by about 140' wide. The pit faces are 8'-9' high. Test #1 was a hand sample on north face. The top 5' is a pebble gravel above a cobble layer. From 6'-9' is a gravelly sand. Bottom is in the same. Overall, a pretty good looking gravel. Area has difficult access and is quite small. A south extension of the pit seems to be more sandy than stony.
19	1	1969	0.5-13	0-0.5	No	100	100	98.7	32.6	5.0 4.9*	3½	---	Gran. Borrow (Sand)	Owner: Maurice Eaton. Area is a narrow terrace on the east side of State Aid Highway No. 2, south of West Fairlee Center. Terrace is mapped as lake sands by D. P. Stewart. Test #1 was a hand sample taken on the 15-foot bank of the terrace, 135' from its south end. The edge is somewhat rounded, indicating an overall fine material. The

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
														terraces averages about 80' wide. Material in Test #1 varies from fine to medium sands with an occasional small pebble.
	2	1969	1-4.5	0-1	No	100	100	97.3	16.5	1.0*	3	---	Sand	Test #2 sampled beside a woodchuck hole about 600' north of Test #1. The feature continues north another 210' to where it widens to 180' east-west. There is about 1' of coarse sand with a few pebbles overlying fine sand to at least 4.5'. The terrace at this point is about 9'-10' above the meadow lying along Middle Brook. This area would not be available as a sand or granular borrow source.
20	1	1969	1-9.5	0-1	No	100	100	98.6	46.3	1.2*	1	---	Gran. Borrow (Sand)	Owner: Earl Pape. This area is a low terrace with a low, short ridge on its southwest part. It is located on the east side of Middle Brook, at the southeast side of West Fairlee Center. The area is mapped by D. P. Stewart as alluvium, but may be a fluvial deposit. The ridge is wooded, and the terrace is used as pasture. One or two old diggings were worked at one time for gravel. Test #1 was dug 205' from the south end of the ridge, and

*Percentage of Total Sample

TABLE I

WEST FAIRLEE 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				
														30' east of it. Log of test: 0-1', overburden; 1'-1.5', pebbly sand; 1.5'-5', silt; 5'-6', coarse sand; 6'-9', fine sand; 9'-9.5', coarse sand; silt to clay at 9.5'. Sample overall is too fine for Item 202.
	2	1969	0.5-7.5	0-0.5	No	84.4	73.0	56.6	14.0	4.0	1½	26.8%	Gran. Borrow (Grav.)	Test #2 was dug on north end of ridge, 150' northwest of Test #1 and about 10' above the brook. The ridge is 25'-40' wide and a maximum of 15' above the brook. The top 3' of test hole was a dirty looking gravel with low stone content, overlying a clean fine gravel. Below 6' is stony sand. There are many soft stones and many tabular stones in the material. The ridge, being about 250' long, would have a fair amount of gravel. It would have to be cleared of trees and stumps.
	3	1969	0.5-9.5	0-0.5	No	94.0	73.7	54.9	18.0	5.0	3	31.0%	Gran. Borrow (Grav.)	Test #3 was dug on west edge of pasture terrace, 275' north 70° east Test #1. The terrace is 5'-6' above the marsh to the west. Pasture land, 105' east-west, is separated by a fence from a field on the east part of the terrace. The terrace continues north-northeast for about 400' from Test #3. The material is fine gravel in

*Percentage of Total Sample

TABLE I WEST FAIRLEE 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				
														beds separated by silty sand seams. Below 5.5' is gravelly sand. Water enters at 9.5'; still in gravelly sand. It is estimated that gravels represented by Test #3 would get thinner to the east and would bottom in water. Access to the pasture and ridge would be about 0.2 mile via pasture drive south from Town Highway No. 24. Material in the pasture and on the ridge would be availabe - that in the field would not.
21	1	1969	1-11.5	0-1	No	58.5	53.5	48.2	12.0	4.0	1½	---	Gran. Borrow (Grav.)	Owner: Britton Lumber Co. (formerly the Ball Farm). Area is wooded knolls east of Town Highway No. 17, 1 mile north-northwest of West Fairlee Center. The south sides of the knolls have been exposed. Boulders, rubble, and gravel show. Test #1 was dug on face of knoll nearer the town road. The top 6' is very bouldery cobbly, mainly unsorted with both silty clay and sand as filler. Bottom 5.5' is clean coarse sand with cobbles and boulders. Estimate 30%-35% of material exceeds 6".
	2	1969	0.5-3.5	0-0.5	No	63.1	52.2	40.2	11.0	3.0	1	23.2%	Gravel	Test #2 dug in floor beside trail, 20' out from Test #1. About 10%-15% exceeds 6" -

*Percentage of Total Sample

TABLE I

WEST FAIRLEE GRANULAR DATA SHEET NO. 24

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				
														otherwise the gravel looks pretty good. Water enters at 3.5' still in gravel and boulders.
	3	1969	N	O	T	S	A	M	P	L	E		D	Tests #3 and #4 were dug on south side of trail. Huge boulders and silt prevented digging below 2.5' or 3'. No samples were taken. Gravel is probably confined to the knolls and beneath them, generally north of the trail. Many boulders would have to be screened out.
	4	1969	N	O	T	S	A	M	P	L	E		D	

*Percentage of Total Sample

TABLE I
Supplement

WEST FAIRLEE PROPERTY OWNERS - GRANULAR	Map Ident. No.
Barker, Gladys	3
Blake, Russ	4, 5
Bragg, Russell	14, 15
Britton Lumber Company (formerly the Ball Farm)	21
Colburn, John	9
Comstock, George (Mr. & Mrs.)	6
DeBaun, Roger (Mrs.)	18
Eaton, Maurice	19
Hill, Parker	11
O'Brien, Francis J.	7, 8, 10
Pape, Earl	20
Schlichting, Herbert W.	13
Stevens, A. E.	12
Stever, Melvin	16, 17
Tucker, Maurice	1, 2

TABLE II WEST FAIRLEE ROCK DATA SHEET NO. 1

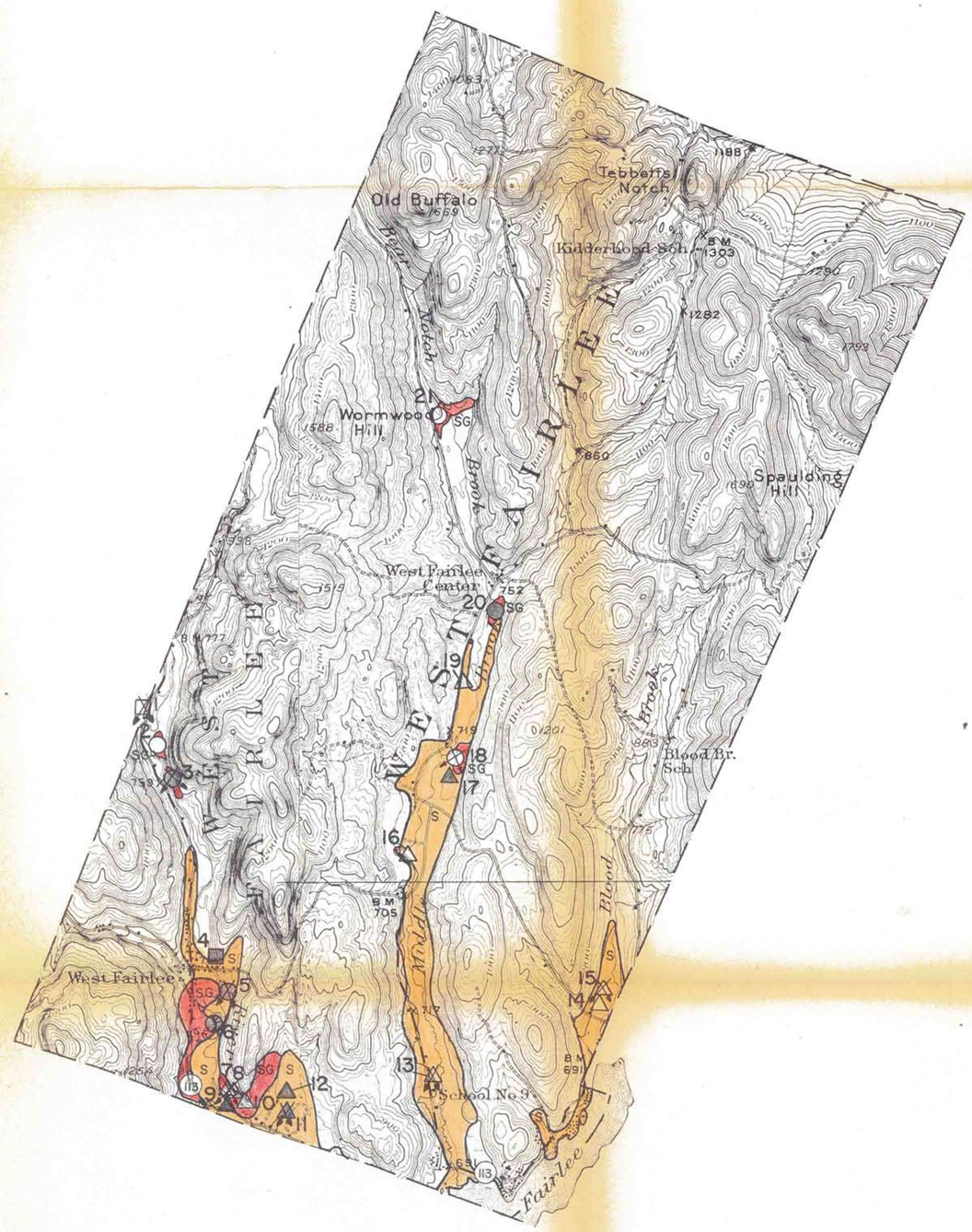
Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
1	1A	1969	Schistose Quartzite	No	Chip	2.6%	Owner: Fair Brothers. This area has series of steep 50-to 80-foot wooded scarps located about 0.07 mile east of Town Highway No. 20. The scarps trend N25°E, along the strike of the beds. They dip 25° east. The outcrops are mostly thin-bedded, fissile, and crumbly weathered. Test #1A was taken on an upper scarp (50'-60' high) and wooded slope below. A vertical height of 80' was included in the sampled distance of 200-to 250-feet across the strike. A wooded slope extends east from atop the upper scarp for about 200' to the base of a talus slope. The rock is a gray, thin bedded, fissile schistose quartzite. It was difficult to get pieces large enough to test. Some of the material breaks fairly blocky. The rock is mapped as the Gile Mountain Formation. This test was taken at intervals of 5'-10'. This sample met both AASHO T-3 and T-96 abrasion tests for Item 204.
	1B	1969	Quartz Mica Schist	No	Chip	5.7%	Test #1B was taken about 200' north of Test #1A, beginning on the wooded slope about 20' above the elevation of the lower end of Test #1A. The test was continued to the base of the lower steep escarpment which is about 60' high. A total of 90' in elevation was covered by the test. The rock is a quartz mica schist, being somewhat more schistose than the rock in Test #1A. The rock was sampled at intervals of 5'-10'. The sample met both the AASHO T-3 and AASHO T-96 abrasion requirements for Item 204. Access to the area is by a field road leading about .04 mile east from Town Highway No. 20 into a partially wooded field or pasture which is at the foot of the rock slope. There is plenty of area and relief for a quarry. The rock type, however, makes the area questionable as a source of Item 204, Sub-base of Crushed Rock, because of the tendency to produce sharp or flat pieces.
2	1A	1969	Schistose Quartzite	No	Chip	3.2%	Owner: Maurice Tucker. This area is a series of steep, wooded rocky scarps east of the owner's meadow. Access is about 0.3 mile

TABLE I WEST FAIRLEE ROCK DATA SHEET NO. 2

Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
							east from Vermont Route 113, via a field road and a ford of the Ompompanoosuc River. The two tests taken represented only the westernmost and lowest of the three major scarps. There is much talus between outcrops. The rock generally is schistose quartzite, locally having the appearance of sandstone. The rock strikes nearly north and dips 40°-45° east. Test 1A was taken for 75' across the strike beginning about 200'-225' east of the point where the woods protrude somewhat into the meadow. The rock is fairly hard with much mica along the bedding or cleavage planes. The rock broke parallel to the bedding or cleavage in layers ¼" - 2 inches thick. These upper, more easterly (and younger) beds are not badly weathered. The sample met both AASHO T-3 and AASHO T-96 abrasion requirements for Item 204. Random pieces from the outcrops were sampled.
	1B	1969	Schistose Quartzite	No	Chip	4.8%	Test #1B was sampled for 75' across the strike on a lower rock scarp, west of and below Test #1A. The rock is more weathered than in Test #1A, but is again a schistose quartzite, breaking similarly to the other. Random outcrops were sampled. The sample met both the AASHO T-3 and AASHO T-96 abrasion requirements for Item 204. There is ample area and relief for a quarry in this location. Access to the upper rock would be difficult due to the steep and high slopes. Further testing and drilling should be done if this rock is to be considered as a source of Item 204, largely because of the thin break of the rock.

TABLE II
Supplement

WEST FAIRLEE PROPERTY OWNERS - ROCK	Map Ident. No.
Fair Brothers	1
Tucker, Maurice	2



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
- ■ MATERIALS NOT ACCEPTABLE FOR ITEM 105
- ✕ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

WEST FAIRLEE

SCALE 1:31,250

1 .5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1969

GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

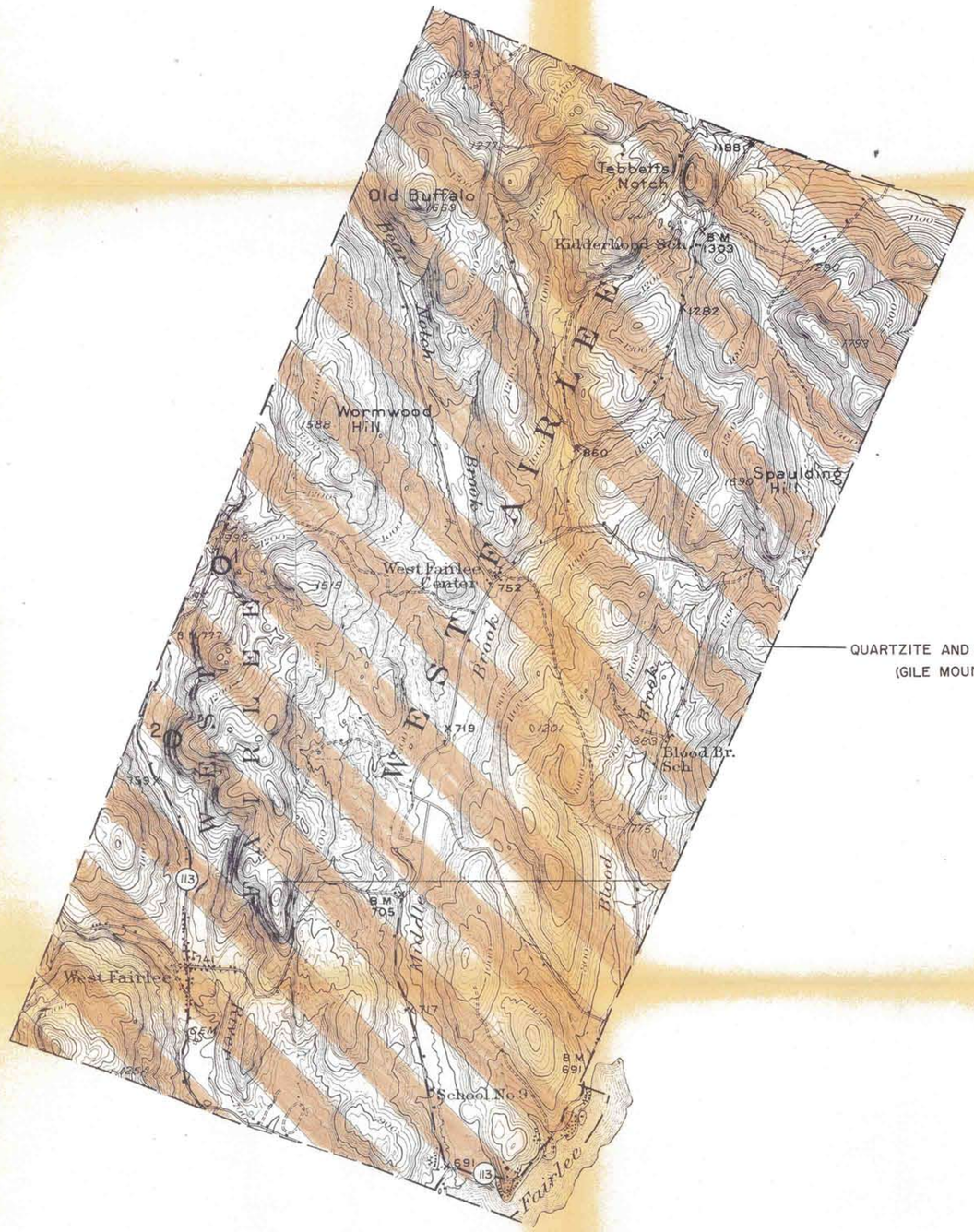
IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

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

PLATE I

GRANULAR



QUARTZITE AND SCHIST
(GILE MOUNTAIN)

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)

WEST FAIRLEE

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