SURVEY OF HIGHWAY CONSTRUCTION MATERIALS
IN THE TOWN OF ADDISON, ADDISON COUNTY, VERMONT

Prepared by

Engineering Geology Section, Materials Division

Vermont Department of Highways

in cooperation with

United States Department of Transportation

Federal Highway Administration

Montpelier, Vermont

January, 1976

TABLE OF CONTENTS

Acknowledgments

The work of this Project was implemented with 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 Division and Mapping Section and the Materials Division.

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, Federal Highways Administration.

History

The Materials Survey Project was formed in 1957 by the Vermont Department of Highways with the assistance of the Federal Highway Administration. Its prime objective was to compile an inventory of highway construction materials in the State of Vermont. Originally, investigations for highway construction materials were conducted only as the immediate situation required and only limited areas were surveyed; thus, no over-all picture of material resources was available. Highway contractors or resident engineers were required to locate the materials for their respective projects and samples were tested by the Materials Division. The additional cost of exploration for construction materials was passed on to the State bringing about higher construction costs. The Materials Survey Project was established to eliminate or minimize this factor by enabling the State and the contractors to proceed with information on available material resources and to project cost estimates. 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 are used 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 together.

Enclosures

Included in this report are two surface-geology maps, one defining the location of tests on bedrock, the other defining the location of tests on granular materials. These maps are based on 15-minute or 7-1/2-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 formations and types in the township. This information was obtained from: Vermont Geological Survey Bulletins, Vermont State Geologist Reports, United States Geological Survey Bedrock Maps, Centennial Geological Map of Vermont, the Surficial Geologic Map of Vermont and other references.

The granular materials map shows 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 conducted by Professor D. P. Stewart of Miami University, Oxford, Ohio, who mapped the glacial features of the State of Vermont during the summer months from 1956 to 1966. Further information is obtained from the Soil Survey (Reconnaissance) of Vermont (conducted by the Bureau of Chemistry and Soils of the United States Department of Agriculture), 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. The number and location of tests taken in each area represented by an Identification

Number is determined by the nature of the material or its topographic feature.

Also included in this report 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 an active card file compiled and updated by the Engineering Geology Section of the Materials Division over a period of years. Transfer of information from the cards to the data sheets was made and the location of the deposits was plotted on the maps. However, some cards in the file were not used because of incomplete or unidentifiable information on the location of the deposit. Caution should be exercised wherever this information appears incomplete.

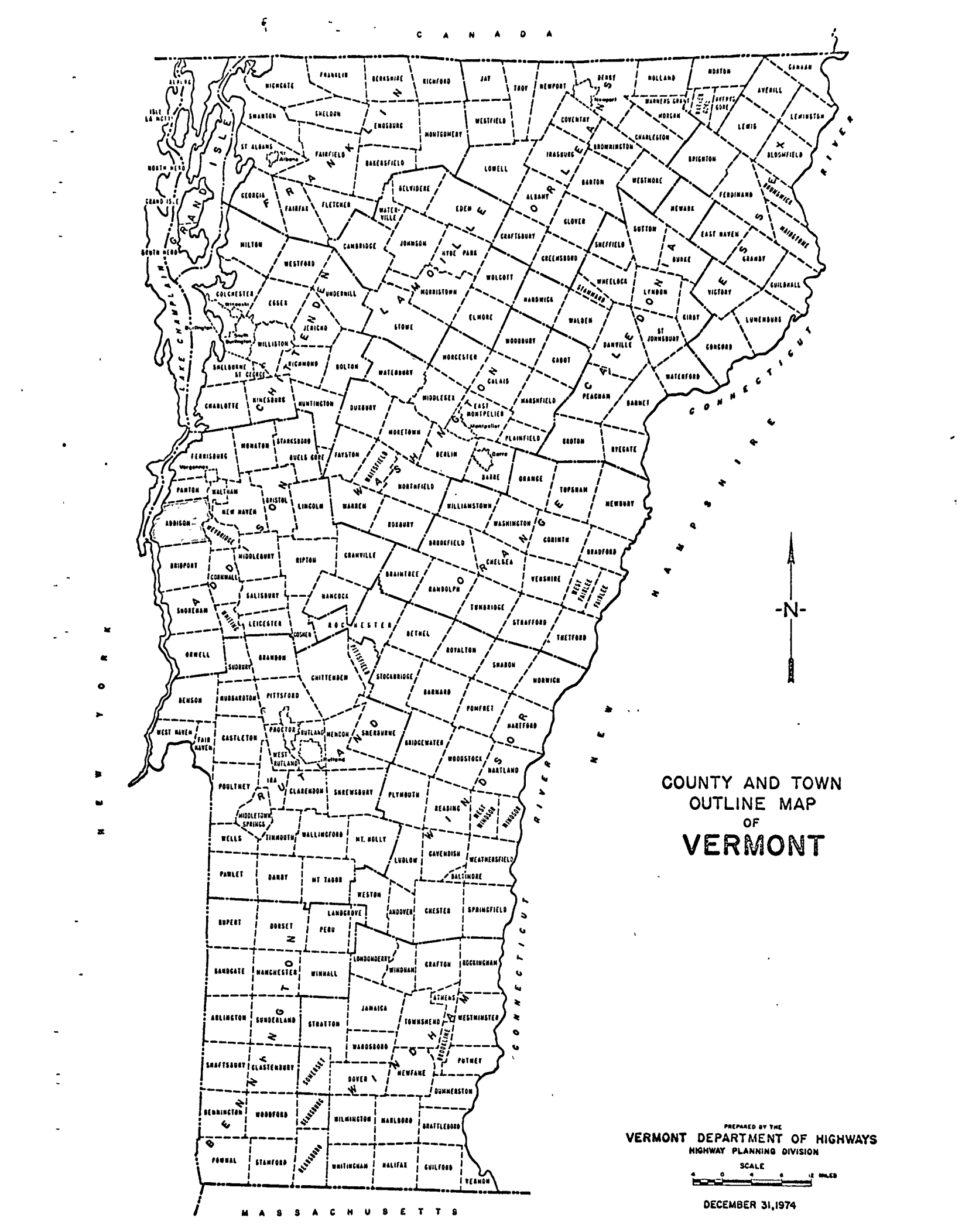
Work sheets, containing more detailed information and a field sketch of the area represented by the Identification Number, and laboratory reports are on file in the Materials Division of the Vermont Department of Highways.

LOCATION

The town of Addison is situated at the western edge of Addison County on the west side of the state. It is bounded on the west by Lake Champlain, on the north by Panton, on the northeast by Waltham, on the southeast by Weybridge, and on the south by Bridport. (See County and Town Outline Map of Vermont on the following page.)

Addison lies within the Champlain Lowland subdivision of the New England physiographic province; its topography is characterized by low, scattered hills on a gently westward sloping plain. Elevations range from 1,287 feet, at the summit of Snake Mountain near the southeast corner of the town, to 95 feet, the mean water level of Lake Champlain.

Principal drainage is northward via Dead and Otter Creeks and their tributaries. The southwest corner of Addison is drained southwestward into Lake Champlain via Hospitality and Whitney Creeks.



COUNTY AND TOWN OUTLINE MAP OF VERMONT

PREPARED BY THE
VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION

SCALE

DECEMBER 31, 1974

SURVEY OF ROCK SOURCES

Procedure for Rock Survey

The method 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 the many reference sources, as indicated in the bibliography. These references differ considerably in dependability due to new developments and studies that have contributed to the obsolescence 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. As complete a correlation as possible is made of all the available information concerning the geology of the area under consideration.

The field investigation is begun by making a cursory survey of the entire town. The information obtained from this preliminary survey, as well as that assimilated in the office investigation, is used to determine the areas where 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, and are submitted to the Materials Division for abrasion testing by the Deval Method (AASHTO T-3) and the Los Angeles Method (AASHTO T-96). 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 rock is uniform, and the chip samples yield acceptable abrasion test results, the material source is included in this report as being satisfactory.

Discussion of Rock and Rock Sources

It should be noted that information on the Rock Materials Map (Plate II) is somewhat simplified. (For a more detailed description of the respective rock formations, see the Summary of Rock Formations included in this report.) Complex metamorphic rocks underlie much of the town of Addison.

Occasionally, rocks belonging to the same formation and exhibiting similar characteristics (i.e., color, texture, etc.) produce different abrasion test results owing to different physical and chemical properties. Therefore, in no case should satisfactory test results obtained in an area be construed to mean that the same formation, even in the same area, will not later produce unsatisfactory material; this is especially true of metamorphic rocks.

Carbonate rocks with minor interbedded argillites underlie the town of Addison, with the exception of Snake Mountain which is capped by the durable Monkton Quartzite, a formation proven to have material acceptable for Crushed Stone for Subbase elsewhere in the state.

This survey sampled the carbonate rocks of the Orwell and Chazy Limestones, the Bridport Dolomite, and the calcareous slate of the Hortonville Formation. The calcareous slate was sampled from a quarry at Map Identification No. 3, and supplied Borrow for the Dead Creek Wildlife Management Area.

The best sources of rock are the Chazy Limestone Quarry at Map Identification No. 4 and the ledges of Bridport Dolomite at Map Identification No. 1. The Orwell Limestone source at Map Identification No. 2 is near Town Highway No. 5 and would require the relocation of several residents before large-scale development could take place.

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 potentially productive areas from various references. Of these references, the survey of glacial deposits mapped by Professor Stewart proves to be particularly helpful 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. The locations of existing pits are mapped, as are the locations in which samples were taken by other individuals.

The field investigation is begun by making a cursory survey of the entire town. All pits, and any areas that show evidence of glacial or fluvial deposition are noted, and later investigated by obtaining samples of materials from pit faces and other exposed surfaces. Test holes in pit floors and extensions are dug with a backhoe to a depth of approximately 11 feet to obtain samples which are submitted to the Materials Division where they are tested for stone abrasion by the AASHTO T-4 Method, and sieved for gradation.

Discussion of Sand and Gravel Deposits

The town of Addison was under water, or subjected to very little glacio-fluvial sorting and deposition during the recent glacial era, because of subdued relief, low elevation and proximity to Lake Champlain. The present shoreline of the lake is considered youthfully emergent because of regional post-glacial uplift.

According to Stewart and MacClintock, beach gravels were emplaced at three localities in the town during stages of inundation by "Lake Vermont". One area, designated as a possible beach gravel, was sampled at Map Identification No. 1. The other two sites were not sampled because their owners (Mrs. Arthur Andrews and Ella Wilmarth) would not allow back-hoe digging. However, gravel was seen on the surface of Andrews' recently plowed field, south of Vermont Route 17 and 1,500 feet west of its junction with Town Highway No. 6.

The gravel pit sampled at Map Identification No. 4, is located in a kame terrace that extends southeastward into Bridport.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF ADDISON

Bascom Formation: Interbedded dolomite, limestone or marble, calcareous sandstone, quartzite and limestone breccia; irregular dolomite layers, then sandy laminae, and slaty or phyllitic partings of the Bascom, respectively.

Bridport Member of the Chipman Formation: Buff to brown weathered, sharply defined and laterally persistent beds chiefly of medium bedded to massive, scored dolomite.

Chazy Limestone: Dark blue-gray, somewhat nodular and granular limestone with buff dolomite and shaly interbeds a fraction of an inch thick and two to four inches apart. The Middlebury, which is east of Champlain and Orwell thrusts, and the Youngman, which is east of Highgate Springs, are, due partly to deformation, more slaty in appearance than the Chazy, which is west of the major thrusts.

Crown Point Member of the Chazy Limestone: Massive, characterized by abundant Maclurites magnus.

Cutting Dolomite: Typically, a massive gray weathered, nondescript dolomite with a finely laminated calcareous sandstone at base.

Hortonville-Glens Falls Undifferentiated: Combined where the formation contact is widely covered by surficial deposits. Thin beds of dark blue-gray, coarsely granular, and highly fossiliferous limestone (Glens Falls) are succeeded by beds of black carbonaceous, and pyritic slate and phyllite, locally sandy. Brown weathered limy beds are common in the slates (Hortonville).

Iberville Formation: Noncalcareous black shale interbedded with occasional dolomite beds and in the lower part with calcareous shale.

Monkton Quartzite: Distinctively red quartzite interbedded with lesser buff and white quartzite and relatively thick sections of dolomite like that of the Winooski, the quartzites thin to the east, and they become gray and phyllitic to the east and south.

Orwell Limestone: Smooth-ledged, sublithographic and lithographic, dove-gray weathered limestone commonly cut by veins of white calcite; beds filled with fossil shell fragments are characteristic.

Stony Point Formation: Predominantly calcareous black shale that grades upward into argillaceous limestone and rare dolomite beds.

Valcour Member of the Chazy Limestone: Dark gray calcarenite succeeded by medium to light gray, buff weathered silty, partly coquinal limestone.

Whitehall Formation: Chiefly a white marble or gray limestone characterized by raised reticulate lines of gray dolomite on the weathered surface. Interbedded massive dolomite increases westward and predominates west of the Champlain and Orwell Thrusts.

GLOSSARY OF SELECTED GEOLOGIC TERMS

ARGILLITE: A rock derived either from siltstone, claystone or shale that has undergone a somewhat higher degree of induration than is present in those rocks. Argillite holds an intermediate position between the rocks named and slate.

CALCARENITE: Fragmental rock of sand size grains cemented with calcite.

CALCAREOUS: Pertaining to or containing calcium carbonate.

CARBONACEOUS: Containing carbon.

CARBONATE ROCKS: Products of a process of chemical decomposition by which carbon dioside contained in water combines with the oxides of calcium, magnesium, potassium, sodium, and iron. As a result of this union carbonates or bicarbonates of these metals are produced, including dolomite, siderite, calcite and other less plentiful minerals.

CEMENT: The material that binds the particles of a consoliated sedimentary rock together. Various substances may act as cement, the most common being silica, calcium carbonate and various iron oxides.

DOLOMITE: A rock consisting predominantly of the mineral calcium magnesium carbonate (dolomite), containing carbon dioxide 47.7%, lime 30.4% and magnesia 21.9%.

DRAINAGE: The manner in which the water of an area passes off by surface streams and rivers, or by subsurface channels.

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

HARDPAN: A term loosely applied to any subsurface soil layer that offers great resistance to digging and drilling. Correctly, and as used in this report, it is gravel cemented by carbonates so as to form an impenetrable layer. It is commonly found in gravels having a preponderance of particles derived from carbonate rocks.

INTERBEDDED: Occurring between beds or lying adjacent and parallel to other beds usually of a different nature.

JOINT SET: A group of joints (fractures or parting planes) that are parallel in strike and dip over a considerable area.

KAME TERRACE: An accumulation of stratified drift laid down chiefly by streams between a glacier and an adjacent valley wall.

"LAKE VERMONT": The series of lakes that existed in the Champlain Lowland during the recession of the glacier.

LIMESTONE: A bedded sedimentary deposit consisting chiefly of calcium carbonate. The most important and widely distributed of the carbonate rocks. The percentage of calcium carbonate ranges from 40 percent to more than 98 percent. Common impurities are clay and sand.

OUTCROP: A part of a body of rock that appears, bare and exposed, at the surface of the ground. In a more general sense the term applies also to areas where the rock formation occurs next beneath the soil, even though it is not exposed.

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.

PHYSIOGRAPHIC: Pertaining to the physical divisions of the earth.

POST-GLACIAL UPLIFT: The generally accepted theory that an upward warping of the earth's crust is now taking place in those regions that are known to have been covered by recent massive continental glaciers.

QUARTZITE: A compact metamorphic rock composed of quartz grains so firmly cemented that fracture takes place across the grains and the cementing material with equal ease.

RECENT EPOCH: The latest and current epoch of the Quaternary Period. It includes roughly the lapse of time since the retreat of the last ice sheet.

RELIEF: The term used to designate the difference in elevation between the summits and the lowlands of a particular region.

SHALE: A general term for lithified muds, clays and silts that are fissile and break along planes parallel to the original bedding. Shale differs from mudstone, claystone, and siltstone in the possession of marked fissility (tendency to split into thin sheets along the bedding plane).

SILICATES: Minerals having silicon and oxygen as major ingredients. A three-dimensional network of SiO_4 Tetrahedra yields quartz and feldspar; chain structures, the amphiboles and pyroxenes; and sheet structures, the easily split mica and clay minerals.

SLATE: A homogeneous metamorphic rock, so fine-grained that no mineral grains can be seen. Slate splits with a foliation so perfect that it yields slabs having plane smooth surfaces.

WEATHERED: Showing the effects of exposure to the atmosphere.

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.

The Surficial geology and Pleistocene history of Vermont, David P. Stewart and Paul Mac Clintock; 1969; Vermont Geological Survey Bulletin No. 31.

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, 1959; Engineering Station, West Virginia University, Morgantown, West Virginia.

Materials Inventory Bangor Quadrangle, South Half; September, 1959; University of Maine.

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

A Handbook of Rocks, 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, J. L. Stokes and D. J. Varnes; 1955; Colorado Scientific Proceedings, Vol. 16.

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

Surficial Geologic Map of Vermont, C. G. Doll; 1970.

Late Glacial and Post-Glacial History of the Champlain Valley, Donald H. Chapman; Report of the State Geologist on the Mineral Industries and Geology of Vermont; 1941-1942.

Bedrock Geology of The Central Champlain Valley of Vermont, Charles W. Welby; 1961; Vermont Geological Survey Bulletin No. 14.

Port Henry Quadrangle, New York-Vermont: Geological Survey, United States Department of the Interior, 1945.

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, January, 1972.

DIVISION 700 - MATERIALS

703.03 SAND BORROW AND CUSHION. Sand borrow shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and shall meet the requirements of the following table:

TABLE 703.03A - SAND BORROW AND CUSHION

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
2"	100	
1½"	90-100	
½"	70-100	
No. 4	60-100	100
No. 100		0- 30
No. 200		0- 12

703.05 GRANULAR BORROW. Granular borrow shall be obtained from approved sources, consisting of satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from loam, silt, clay, or organic material.

The Granular Borrow shall meet the requirements of the following table:

TABLE 703.05A - GRANULAR BORROW

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-100	100
No. 200		0- 15

The maximum size stone particles of the Granular Borrow shall not exceed 2/3 of the thickness of the layer being spread.

704.05 GRAVEL FOR SUB-BASE. Gravel for Sub-base shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and shall meet the following requirements:

(a) Grading. The gravel shall meet the requirements of the following table:

TABLE 704.05A - GRAVEL FOR SUB-BASE

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-60	100
No. 100		0- 18
No. 200		0- 8

The stone portion of the gravel shall be uniformly graded from coarse to fine, and the maximum size stone particles shall not exceed 2/3 the thickness of the layer being placed.

(b) Percent of Wear. The percent of wear of the gravel shall be not more than 25 when tested in accordance with AASHTO T-4, or more than 40 when tested in accordance with AASHTO T-96.

704.06 CRUSHED STONE FOR SUB-BASE. Crushed stone for sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material, pieces which are structurally weak and shall meet the following requirements:

(a) Source. This material shall be obtained from approved sources and the area from which this material is obtained shall be stripped and cleaned before blasting.

(b) Grading. This material shall meet the requirements of the following table:

TABLE 704.06A - CRUSHED STONE FOR SUB-BASE

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE
4½"	100
4"	90-100
1½"	25- 50
No. 4	0- 15

(c) Percent of Wear. The percent of wear of the parent rock shall be not more than 8 when tested in accordance with AASHTO T-3, or the crushed stone a percent of wear of not more than 40 when tested in accordance with AASHTO T-96.

(d) Thin and Elongated Pieces. Not more than 30 percent, by weight, of thin and elongated pieces will be permitted.

Thin and elongated pieces will be determined on the material coarser than the No. 4 sieve.

(e) Filler. The filler shall be obtained from approved sources and shall meet the requirements as set up for Sand Cushion, Subsection 703.03.

(f) Leveling Material. The leveling material shall be obtained from approved sources and may be either crushed gravel or stone screening produced by the crushing process. The material shall consist of hard durable particles, reasonably free from silt, loam, clay or organic matter.

This material shall meet the requirements of the following table:

TABLE 704.06B - LEVELING MATERIAL

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE
3/4"	100
1/2"	70-100
No. 4	50- 90
No. 100	0- 20
No. 200	0- 10

704.07 CRUSHED GRAVEL FOR SUB-BASE. Crushed gravel for sub-base shall consist of material reasonably free from silt, loam, clay or organic matter. It shall be obtained from approved sources and shall meet the following requirements:

(a) Grading. The crushed gravel shall be uniformly graded from coarse to fine and shall meet the requirements of the following table:

TABLE 704.07A - CRUSHED GRAVEL FOR SUB-BASE

GRADING	Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
COARSE	4"	100	
	No. 4	25- 50	100
	No. 100		0- 20
	No. 200		0- 12
FINE	2"	100	
	1½"	90-100	
	No. 4	30- 60	100
	No. 100		0- 20
	No. 200		0- 12

(b) Percent of Wear. The percent of wear of the parent gravel shall be not more than 20 when tested in accordance with AASHTO T-4, or the crushed gravel a percent of wear of not more than 35 when tested in accordance with AASHTO T-96.

(c) Fractured Faces. At least 30 percent, by weight, of the stone content shall have at least one fractured face.

Fractured faces will be determined on the material coarser than the No. 4 sieve.

704.09 DENSE GRADED CRUSHED STONE FOR SUB-BASE. Dense graded crushed stone for sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material and pieces which are structurally weak, and shall meet the following requirements:

(a) Source. This material shall be obtained from approved sources and the area from which this material is obtained shall be stripped and cleaned before blasting.

(b) Grading. This material shall meet the requirements of the following table:

TABLE 704.09A - DENSE GRADED CRUSHED STONE FOR SUB-BASE

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE
3½"	100
3"	90-100
2"	75-100
1"	50- 80
½"	30- 60
No. 4	15- 40
No. 200	0- 10

(c) Percent of Wear. The percent of wear of the parent rock shall be not more than 8 when tested in accordance with AASHTO T-3, or the crushed stone a percent of wear of not more than 40 when tested in accordance with AASHTO T-96.

(d) Thin and Elongated Pieces. Not more than 30 percent, by weight, of thin or elongated pieces will be permitted.

Thin and elongated pieces will be determined on the material coarser than the No. 4 sieve.

704.10 GRAVEL BACKFILL FOR SLOPE STABILIZATION. Gravel backfill for slope stabilization shall be obtained from approved sources, consisting of satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from loam,

silt, clay, and organic material.

The gravel backfill shall meet the requirements of the following table:

TABLE 704.10A - GRAVEL BACKFILL FOR SLOPE STABILIZATION

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-50	100
No. 100		0- 20
No. 200		0- 10

The stone portion of the gravel backfill shall be uniformly graded from coarse to fine, and the maximum size stone particles shall not exceed 2/3 the thickness of the layer being placed.

704.11 GRANULAR BACKFILL FOR STRUCTURES. Granular backfill for structures shall be obtained from approved sources, consisting of satisfactorily graded, free draining granular material reasonably free from loam, silt, clay, and organic material.

The granular backfill shall meet the requirements of the following table:

TABLE 704.11A - GRANULAR BACKFILL FOR STRUCTURES

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
3"	100	
2½"	90-100	
No. 4	50-100	100
No. 100		0- 18
No. 200		0- 8

TABLE I

ADDISON 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
1	1	1975	1-12	0-1	Yes	100	100	100	89	31	17	---	---	Owner: G. Gosliga. Area is a 50-acre field with 100' x 80' pit. Area is south of Town Highway No. 15 and east of Owner's farmhouse. There was much water on pit floor. Test No. 1 was taken in southeast face. Material was: 1' - 5', hardpan; 5' - 6', silty sand; 6' - 10', hardpan; 10' - 12', sand; bottom, same.
2	1	1975	0.5-7	0-0.5	No	74	74	65	55	62	46	---	---	Owner: Robert Ranney. Area is a triangular field northeast of Town Highway No. 28 with Fish and Game parking area at southeast corner of field, and 1000 feet along Town Highway No. 28. Field is separated into upper and lower parts by a north-south tree line. Test No. 1 was in the center of the east side of the upper part of field. Material was: 0.5' - 4.5', hard-packed silty sand with small stones; 4.5' - 5.5', sand and cobbles; 5.5' - 7', cemented cobbles; bottom, boulders.
	2	1975	0.5-7	0-0.5	No	100	100	100	56	58	43	---	---	Test No. 2 was near the upper end of the lower part of the field, 550 feet southeast of Test No. 1. Material was:

ADDISON GRANULAR DATA SHEET NO. 2

TABLE I

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
														0.5' - 2.5', fine sand; 2.5' - 4', cobbles; 4' - 5', gravel; 5' - 7', pebbly silt.
3	1	1975	3-29.5	0-3	Yes	89	86	63	48	22	15	21.7%	Granular Borrow (Gravel)	Owner: Walter Buchanan. Area is an active pit in woods above pasture. The access road is 0.19 mile from the junction of Bridport Town Highways No. 11 and 12, near the southeast end of Addison Town Highway No. 28. The 47-foot high northeast face represents possible extension which was inaccessible to the backhoe. Pit had a stockpile and boulders on the floor. Test No. 1 was in the northwest face. Material was: 3' - 29.5', hard-packed silt and rock fragments with fine-to-medium gravel.
	2	1975	33.5-47	0-3	Yes	69	61	45	33	15	9	21.4%	Granular Borrow (Gravel)	Test No. 2 was in northwest end of face, below and 45 feet northwest of Test No. 1. Material was similar to, but more cobbly than Test No. 1.

ADDISON GRANULAR DATA SHEET NO. 3

TABLE I

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	3	1975	0.5-7	0-0.5	Yes	87	78	59	45	11	6	14.6%	Gravel	Test No. 3 was in floor of pit 30 feet southeast of Test No. 2. Material was: 0.5' - 7', poorly sorted, hard-packed sandy coarse-to-medium gravel; bottom, sand, cobbles, and boulders.
	4	1975	0.5-5.5	0-0.5	Yes	82	75	57	42	20	13	19.0%	Granular Borrow (Gravel)	Test No. 4 was in floor 140 feet southeast of Test No. 3. Material was: 0.5' - 5.5', hard-packed, sandy coarse-to-medium gravel; bottom, boulders.
	5	1975	34-47	0-3	Yes	83	77	57	41	13	8	21.4%	Gravel	Test No. 5 was in lower central face, 40 feet southeast of Test No. 3. Material was: 34' - 47', tightly packed, coarse-to-medium sandy gravel, which was cemented in several places by natural leaching processes.

TABLE I

SUPPLEMENT

ADDISON PROPERTY OWNERS - GRANULAR

	Map Identification No.
Buchanan, Walter	3
Gosliga, G.	1
Ranney, Robert	2

ADDISON ROCK DATA SHEET NO. 1

Table II

Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHTO T-3	Abrasion AASHTO T-96	Remarks
1	1-A	1975	Dolomite	No	Chip	---	17.8%	Owner: Marcel Dubois. Area is a northeast-southwest ridge in a pasture south of an open field next to Vermont Route 17. A 0.25 mile field road connects the northeast corner of the ridge to Town Highway No. 5 near its junction with Vermont Route 17. Outcrops extend 425 feet along the ridge, have a maximum width of 100 feet, and height of 18 feet. Durable, brown-weathered, gray Bridport dolomite is well-exposed at numerous places. Rock is thick-bedded and has two well-developed joint sets; one set dips 40°S. 50°E. and the other dips 63°N. 55°W. Fragments are blocky and sub-angular. Test No. 1-A started at the north toe of slope 11 feet south of fence and continued 75 feet S.33°W. along the ridge.
	1-B	1975	Dolomite	No	Chip	---	18.0%	Test 1-B extended an additional 75 feet along the same bearing.
2	1	1975	Limestone	No	Chip	---	21.2%	Owner: Lawrence Gevry. Area is a pasture with ledges of Orwell limestone that trend 1,000 feet S.35°W. from a point on Town Highway No. 5, 0.75 mile south of its junction with Vermont Route 17. The ledges are wooded and have a 300-foot long access road. Rock is a black, crystalline, thick-bedded limestone which dips 11°S. 80°E. and has two joint sets; one strikes N.10°E., and the other N.70°E. Test No. 1 was taken for 150 feet northward from the northwest corner of a small barn.

Table II

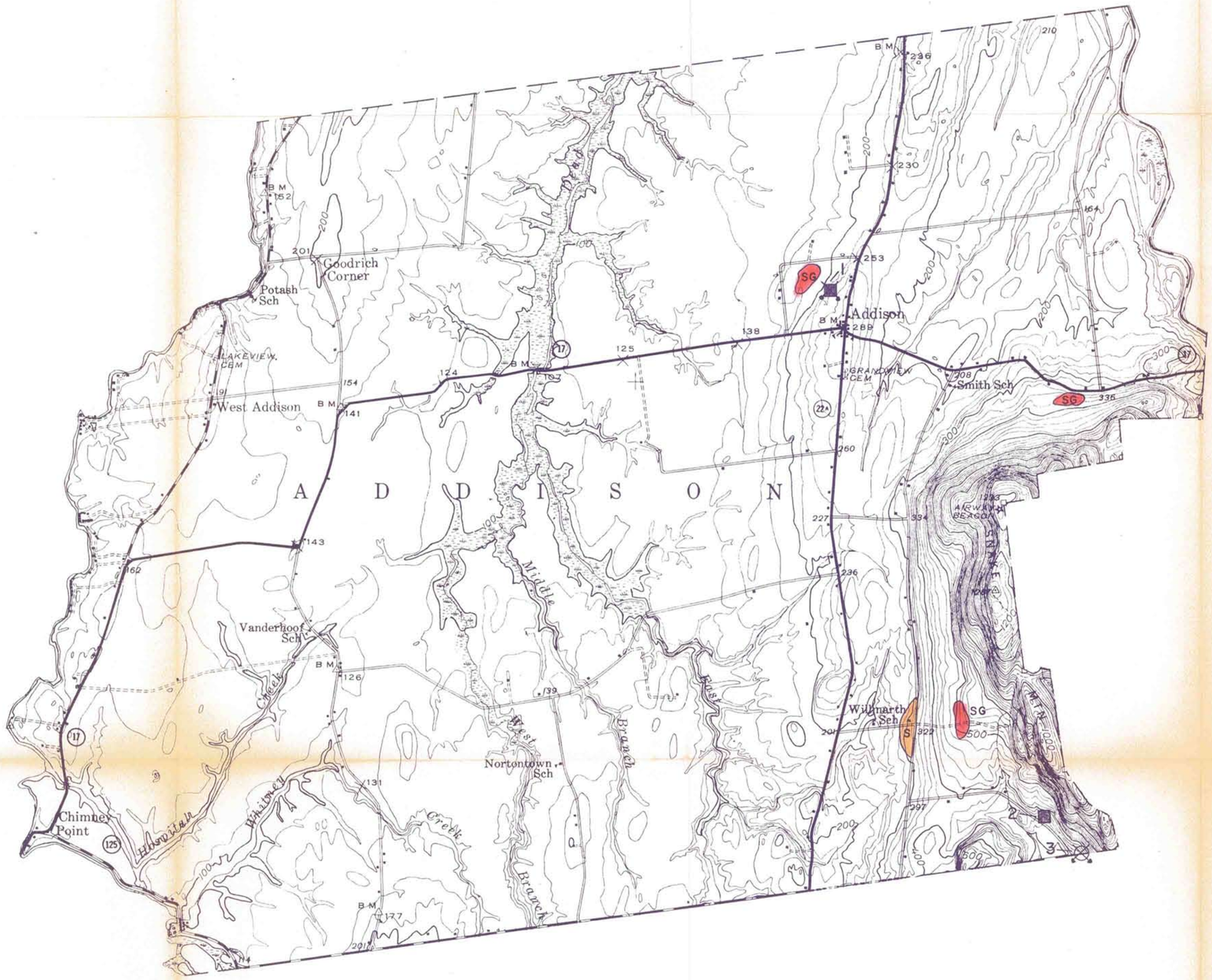
Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHTO T-3	Abrasion AASHTO T-96	Remarks
3	1	1975	Slate	Yes	Chip	---	22.4%	Owner: Robert H. Myers. Area is a quarry, in the Hortonville Formation, with 0.06-mile access road east of the junction of Town Highway No. 17 with Town Highway No. 5. Quarry is 200' x 50', with a 32-foot high face which represents an eastward extension sloping uphill for 150 feet. Rock is thin-bedded carbonaceous slate, which is brittle and highly-fractured, and produces many thin and elongate pieces. Test No. 1 was from center of east wall, southward for 75 feet.
	2	1975	Slate	Yes	Chip	---	22.1%	Test No. 2 continued southward for 30 feet along east wall, and then westward for an additional 45 feet.
4	1	1975	Lime-stone	Yes	Chip	---	19.8%	Owner: Bernard Vanier. Area is a 250' x 180', water-filled quarry with 34-foot high east wall. 0.09-mile long access road is west of Vermont Route 22-A, 0.7 mile south of its junction with Town Highway No. 4. It is less than 50 feet north of the Parkinson property line fence where the owner has no intention of allowing development. Rock is thick-bedded, hard, gray Chazy limestone that yields blocky fragments. Test No. 1 was sampled for 150 feet from the southwest to the southeast corner of the quarry.
	2	1975	Lime-stone	Yes	Chip	---	18.0%	Test No. 2 was sampled for 75 feet from the center of the north side, to the northeast corner of the quarry.

TABLE II

SUPPLEMENT

ADDISON PROPERTY OWNERS - ROCK

	Map Identification No.
DuBois, Marcel	1
Gevry, Lawrence	2
Myers, Robert H.	3
Vanier, Bernard	4



LEGEND

- ○ GRAVEL, ACCEPTABLE FOR ITEM 704.05 (gravel for sub-base)
- ● GRAVEL, DEPLETED OR NOT ACCEPTABLE FOR ITEM 704.05
- △ SAND, ACCEPTABLE FOR ITEM 703.03 (sand borrow and cushion)
- ▲ SAND, DEPLETED OR NOT ACCEPTABLE FOR ITEM 703.03
- □ GRANULAR BORROW, ITEM 703.05
- ■ MATERIAL NOT ACCEPTABLE FOR ITEM 703.05
- ✕ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

ADDISON

SCALE 1:31,250

0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1976

GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

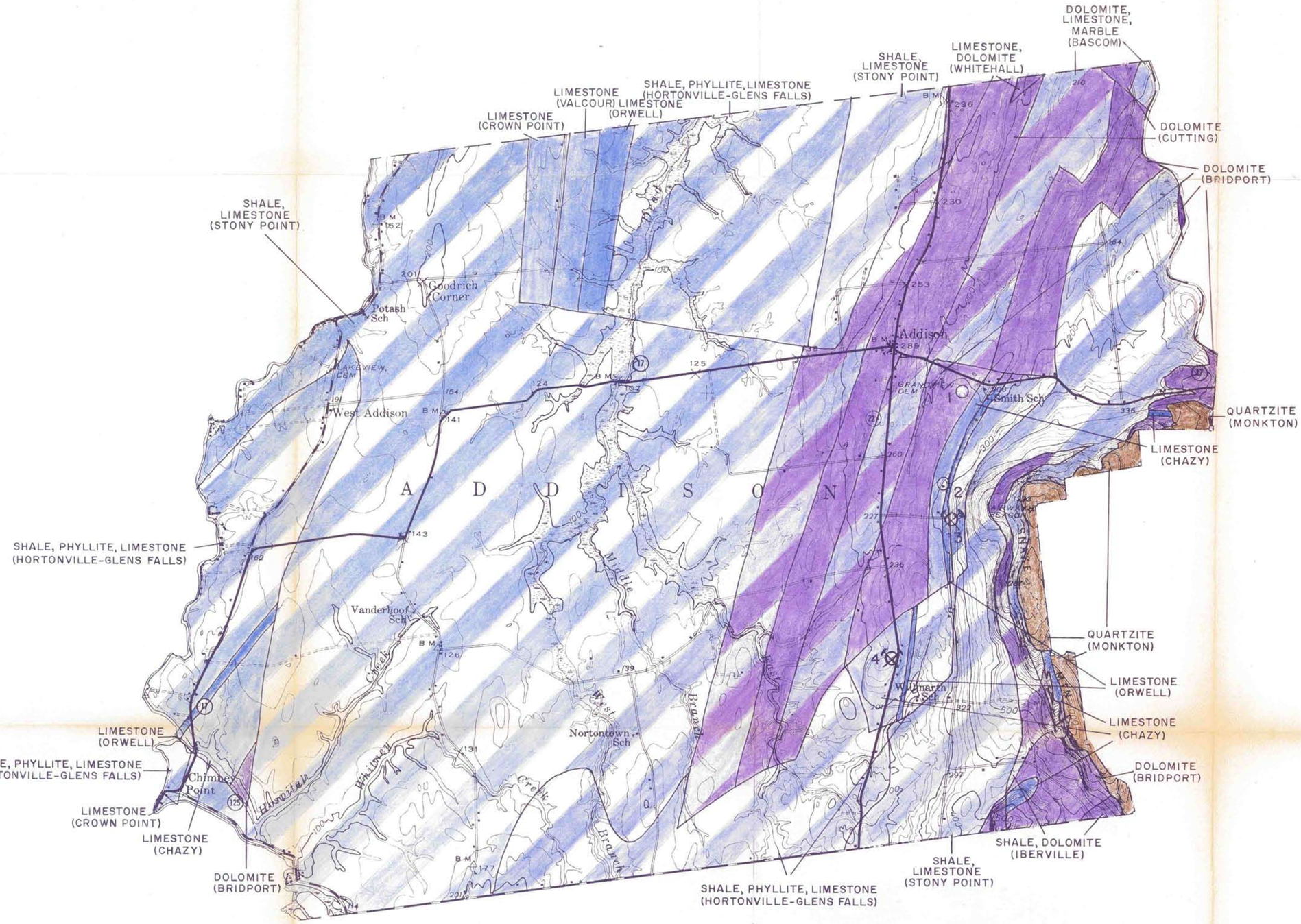
NOTE: BASED ON U.S.G.S. TOPOGRAPHIC MAPS

PLATE II

GRANULAR

ADDISON COUNTY VT. HWY. DISTRICT NO. 5

REVISIONS							
DATE							
BY							



LEGEND

- ROCK, ACCEPTABLE FOR ITEM 704.06 (crushed stone for sub-base)
- ROCK, NOT ACCEPTABLE FOR ITEM 704.06
- 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
- SCHIST, SLATE, PHYLLITE, SHALE, SANDSTONE, CONGLOMERATE
- 3 IDENTIFICATION NUMBER (refer to data sheets)

ADDISON

SCALE 1:31,250

0.5 0 MILE

CONTOUR INTERVAL 20 FEET

1976

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

ADDISON COUNTY VT. HWY. DISTRICT NO. 5

REVISIONS

DATE							
BY							