SURVEY OF HIGHWAY CONSTRUCTION MATERIALS IN THE TOWN OF ROCHESTER, WINDSOR COUNTY, VERMONT

prepared by

Engineering Geology Section, Materials Division
Vermont Department of Highways

in cooperation with

United States Department of Transportation
Federal Highway Administration

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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.

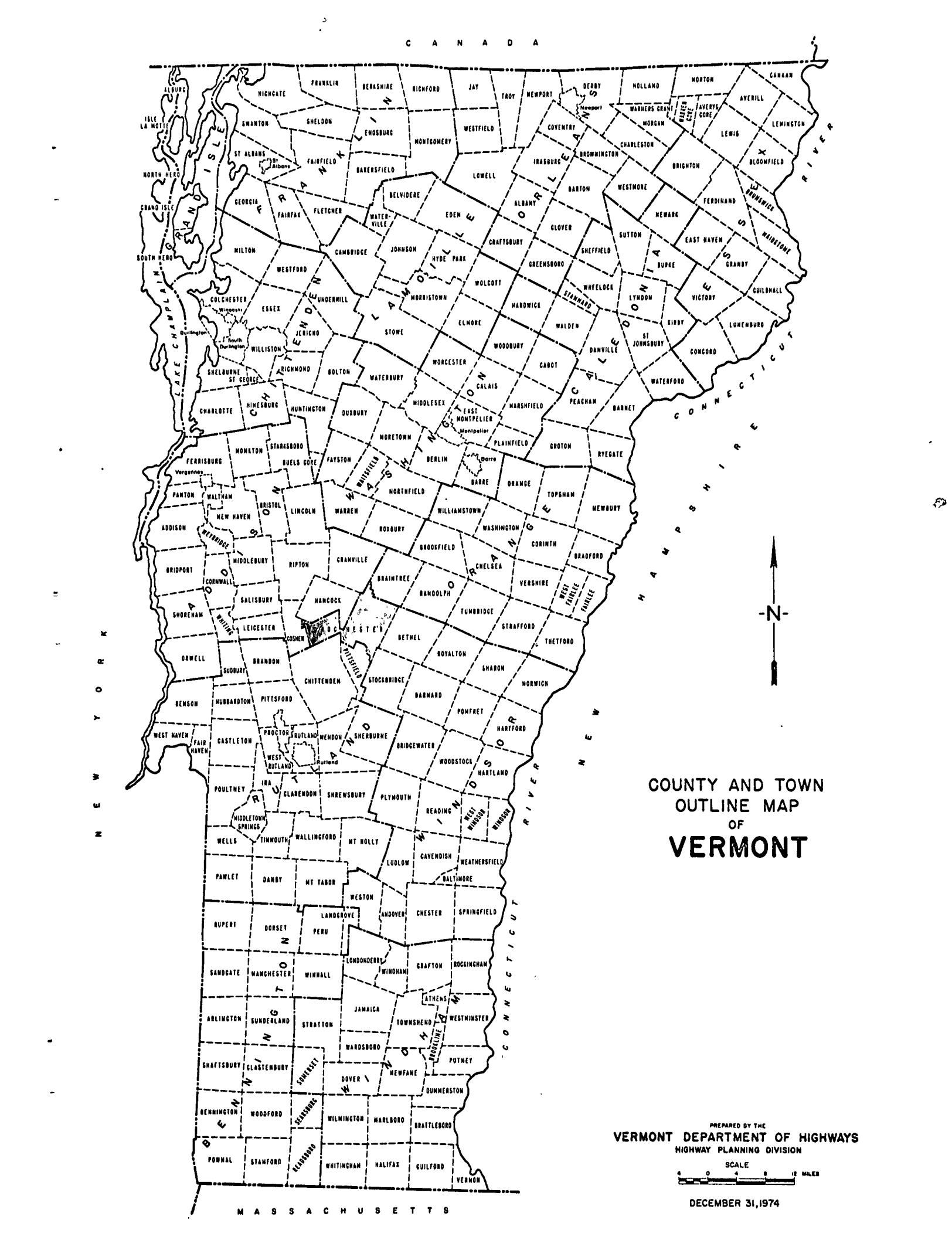
Work sheets, containing more detailed information and a field sketch of the area represented by the Identification Number, and laboratory reports are on file in the Materials Division of the Vermont Department of Highways.

LOCATION

The town of Rochester is situated in the northwest corner of Windsor County in the central part of the state. It is bounded on the northeast by Braintree, on the east by Bethel, on the southeast by Stockbridge, on the south by Pittsfield and Chittenden, on the west by Goshen, and on the northwest by Hancock and Granville. (See County and Town Outline Map of Vermont on the following page)

West of the White River, the town lies within the Green Mountain subdivision of the New England physiographic province and has rugged mountainous terrain with sharp crests and generally steep slopes. The portion of the town east of the White River lies in the Vermont Piedmont subdivision of the New England Upland, its topography is undulating-to-rough, and has numerous steep-sided valleys. Elevations vary from more than 3,000 feet in the western part, to less than 750 feet where the White River crosses the Stockbridge town line, in the south corner of town.

Drainage in the eastern corner of Rochester is southeastward via Gilead Brook. The remainder of the town is drained by the White River and its tributaries: the West Branch and Brandon Brook on the west, and Marshs, Nason, Rogers and Breakneck Brooks on the east.


CANADA
ALBURG
ISLE LA MOTTE
NORTH HERO
GRAND ISLE
SOUTH HERO
LAKE CHAMPLAIN
NEW YORK
MASSACHUSETTS
CONNECTICUT RIVER
NEW HAMPSHIRE
CONNECTICUT
-N-
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.) Very complex metamorphic rocks underlie most of the town of Rochester.

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.

Schist and phyllite with interbedded quartzite underlie the east-central part of town; the only significant outcrop of quartzite found was sampled at Map Identification Number 3, in the vicinity of the old Williams Mine.

Serpentinite was sampled at Map Identification Number 2, a Vermarco Quarry, and represents a lens-shaped body no more than 1,200 feet long and 325 feet wide. Fibrous asbestos is adjacent to the serpentinite.

The Mount Holly Gneiss is poorly exposed in Rochester except for a south-facing escarpment on Mt. Horrid which was sampled at Map Identification Number 1, in the Green Mountain National Forest.

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

All of the granular materials in the town of Rochester are found in the valleys of the West Branch and the White River below 1,000 feet elevation, with the exception of Map Identification No. 12, a gravel pit in a kamic feature above 1,470 feet in Rochester Hollow. These valleys may have been the site of several small lakes, which formed during the final melting stage of the recent glaciation, and produced minor localized deposits of lake sands at several places, see orange colored areas on the Granular Materials Map (Plate I). Larger amounts of granular material were deposited in more than twelve kame terraces which flank both sides of the White River and its West Branch.

Many of the kame terraces north of Rochester village are on land owned or leased by Martin Farms; sampling was not allowed because the fields were planted to corn or hay at the time of the survey. Kame terraces were sampled south of Rochester village from pits at Map Identification Numbers 6,7, and 11. Another kame terrace was sampled at Map Identification Number 2, south of the West Branch near Corporation Brook.

In the past, gravel bars in the White River supplied material for Highway projects; however, this practice is no longer allowed. At the owner's request, a gravel bar in the White River was sampled at Map Identification Number 10; however, this bar was noted as being underwater at a later date.

The better source of Gravel for Sub-base is Map Identification No. 7, a pit with material extending 750 feet west to a line fence. A power line R.O.W. will have to be considered in plans for development. This area is the only source of acceptable Sand Borrow and Cushion in town. Another source of gravel is the pit at Map Identification Number 12, but the gravel is limited to less than a yard in thickness, and it is interbedded with sand and silt seams.

Pits at Map Identification Numbers 6 and 11 yielded material suitable for Granular Borrow.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF ROCHESTER

Battell member of the Underhill formation; Carbonaceous sericite-quartz-albite-chlorite schist and schistose quartzite, also carbonaceous and noncarbonaceous limestone; quartz-sericite-chlorite-albite schist.

Brackett member of the Stowe formation: Greenstone and amphibolite; epidote-albite-chlorite rocks contain actinolite and hornblende where more metamorphosed.

Hazens Notch formation: Interbedded carbonaceous and noncarbonaceous quartz-sericite-albite-chlorite schist; grades to quartzite and gneiss.

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

Mount Holly complex: Mainly fine-to medium-grained biotitic gneiss, locally muscovitic, and in western areas chloritic; massive and granitoid in some localities, fine-grained or schistose and compositionally layered in others; also abundant amphibolite and hornblende gneiss, and minor beds of mica schist, quartzite and calc-silicate granulite; includes numerous small bodies of pegmatite and gneissoid granitic rock.

Ottauquechee formation: Black carbonaceous phyllite or schist containing interbeds of massive quartzite commonly criss-crossed by veins of white quartz; quartzite is dark gray and carbonaceous, light gray, or white; also includes light green quartz-sericite-chlorite phyllite or schist and sericitic quartzite; beds of phyllitic graywacke and feldspar granule conglomerate are north of Lamoille River. Schist contains abundant porphyroblasts of garnet and biotite from Ludlow south.

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

Pinney Hollow formation (greenstone member): Greenstone and actinolitic greenstone.

Stowe formation: Quartz-sericite (muscovite-paragonite)-chlorite phyllite and schist; porphyroblasts of albite, garnet, chloritoid, or kyanite are common locally; includes phyllitic graywacke north of Lamoille River. Schist contains abundant segregations of granular white quartz.

Ultramafic rocks: Serpentinite, carbonate rock, talc-carbonate rock and steatite.

Underhill formation: Silvery, gray-green, quartz-sericite-albite-chlorite-biotite schist containing abundant lenticular segregations of granular white quartz; locally quartz-sericite-albite-chlorite phyllite; porphyroblasts of albite, garnet, and magnetite are common and locally very abundant in gneissic facies of the Green Mountain anticlinorium.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Amphibolite: A more or less schistose metamorphic rock containing mostly amphibole (i.e., tremolite, actinolite, hornblende, or arfvedsonite). The color varies from green to black.

Anticlinorium: A large composite fold consisting of a series of anticlines and synclines which taken as a group have the general form of an arch or anticline. The term is applied only to relatively large features having a width of at least several miles.

Bedrock: The more or less solid, undisturbed rock in place either at the surface or beneath superficial deposits of gravel, sand, or soil.

Carbonaceous: Containing carbon.

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

Complex: An assemblage of rocks of any age or origin that has been folded together or intricately mixed, involved, or otherwise complicated.

Conglomerate: The consolidated equivalent of gravel. The constituent rock and mineral fragments may be of varied composition and of a wide size range. The matrix of finer material between the larger fragments may be sand, silt, or any of the common natural cementing materials such as calcium carbonate, silica, clay, or iron oxide.

Escarpment: A long cliff or steep slope facing one general direction and continuing for a considerable distance.

Facies: In general, the term designates the aspect or appearance of a mass of earth material different in one or several respects from surrounding material.

Flood Plain: A strip of relatively smooth land bordering a stream, built of sediment carried by the stream and dropped in slack water beyond the influence of the swiftest current.

Flow Cleavage: A tendency to split or cleave along definite, smooth, parallel, closely spaced planes as the result of flow and recrystallization in consolidated rocks.

Gneiss: Originally meaning a more or less banded metamorphic rock with the mineral composition of granite. The term now designates a foliated metamorphic rock with no specific composition implied, but having layers that are mineralogically unlike and consisting of particles visible to the eye. Usually gneiss displays an alternation of granular minerals and schistose minerals with the rock tending to split along the schistose bands.

Granitoid: A term applied to those igneous rocks having the characteristic texture of granite. The mineral grains may be fine or coarse but are nearly uniform in size.

Granulite: A quartz feldspar rock, poor or lacking in mica, and characterized structurally by a single regular plane of schistosity easily visible to the eye. The schistosity is determined mainly by parallel orientation of flat lenses of coarse-grained quartz set in a quartzose matrix of smaller equidimensional grains.

Graywacke: An old rock name loosely applied. Most writers now apply it to a dark-colored, hard sandstone consisting of angular grains of quartz, feldspar, and rock fragments embedded in a fine, compact matrix composed of micas, clay minerals, and chlorite.

Greenstone: A field name for rocks that have been so metamorphosed or otherwise so altered that they have assumed a distinctive color owing to the presence of chlorite, epidote, or actinolite.

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.

Limonite: The common secondary mineral formed by oxidation of iron or iron-bearing minerals at ambient pressures and temperatures. Color from yellow to nearly black but commonly dark brown.

Metamorphism: The mineralogical and structural adjustment of solid rocks to physical or chemical conditions different from those which produced the original rock. These changes occur below the surface zones of weathering and cementation.

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.

Pegmatite: A vein-, pipe-, dike-like, or irregular igneous body associated with large intrusives of similar composition. It is characterized by interlocking texture, and unusually great range in grain size.

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 gives the rock distinctive silvery appearance.

Physiographic: Pertaining to the physical divisions of the earth.

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

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.

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.

Schistose: Of, or pertaining to, schist; having a tendency to split along the foliation because of parallelism of platy or needle-like grains.

Seam: A thin layer or stratum.

Serpentinite: A metamorphic rock consisting primarily of the mineral serpentine derived mainly from the alteration of igneous rocks containing olivine or other magnesium-rich minerals. This process is known as serpentinization.

Till: Unsorted drift, or the mixture of rock fragments and fine materials left by melting glaciers.

Vein: A fissure in a rock filled by mineral matter. The mineral mass has length, width, and depth and is clearly distinguishable in content and structure from the enclosing rock.

Bibliography

A survey of the glacial geology of Vermont conducted by D.P. Stewart, the partial results of which were 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 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 Pleistoncene 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.

The Green Mountain Anticlinorium in the Vicinity of Rochester and East Middlebury, Vt; Philip Henry Osberg-, 1952; Vermont Geological Survey Bulletin No. 5.

Bedrock Geology of the Randolph Quadrangle, Vermont; Ernest Henry Ern, Jr.; 1963; Vermont Geological Survey Bulletin No. 21.

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

Bread Loaf Quadrangle, Vermont; 7.5' series; Geological Survey, United States Department of the Interior, 1970.

Mount Carmel Quadrangle, Vermont; 7.5' series; Geological Survey, United States Department of the Interior, 1970.

Randolph Quadrangle, Vermont; 15' series; Geological Survey, United States Department of the Interior, 1926.

Rochester Quadrangle, Vermont; 15' series; Geological Survey, United States Department of the Interior, 1917.

Rochester Quadrangle, Vermont; 7.5' series; Geological Survey, United States Department of the Interior, 1970.

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

ROCHESTER 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
1	1	1975	1-26	0-1	yes	100	100	100	77	31	13	-------	Gran. Borrow (Sand)	Owner: U.S. Forest Service. Area is a small (60'x35') pit at the east end of Town Highway No. 58 in West Rochester. Pit is over-grown with red pines and brush. Access across the West Branch is via Bridge (B27) which is in good condition. Test No. 1 was in the 26-foot high north face. Material was: 1'-3', yellow-orange silty sand; 3'-18', gray fine sand; 18'-26', coarse sand to fine gravel.
2	1	1975	1-6	0-1	No	64	55	37	24	18	10	16.8%	Gran. Borrow (Grav.)	Owner: Lloyd B. McGuffin. (former owner: Robert Lyons) Area is a (375'x350') field separated by tree line from an inactive gravel pit owned by Robert Lyons. Permission to sample the Lyons pit was refused and McGuffin would allow only one sample, this sample represents a possible extension of the Lyons pit. Test No. 1 was at the northeast corner of the field, and 30 feet west of the stone wall boundary between McGuffin and Lyons. Material was: 1'-6', bouldery coarse gravel that was very hard digging. Less than 25% of the stones were larger than 4" and were not included in the sample.

ROCHESTER 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
3	1	1975	4-6	0-4	No	85	78	56	39	24	21	------	------	Owner: Barry Bowen. Area is a small plot on flood plain terrace east of Vermont Route 100 with access road 0.54 mile north of junction with Town Highway No. 61. Field was planted to corn at time of survey. Test No. 1 was at foot of bank 90 feet north of the Bowen residence. Material was: 0.5'-4', clay (not sampled); 4'-6', gravel; bottoms in clay.
4	1	1975	1-9.5	0-1	No	86	76	50	38	29	18	32.0%	----	Owner: Martin Farms. Former owner was George Martin. Area is a sloping terrace 750 feet S 25°W. of the Dean Martin farmhouse. Test No. 1 was near southwest corner of pasture 150 feet S 50°E. of an old, inactive pit. Material was: 1'-9.5', cobbly coarse gravel (less than 5% of the stones were larger than 4" and were not included in sample.)
5	1	1975	2-10	0-2	No	90	73	43	31	51	22	31.2%	-----	Owner: Martin Farms. Area is a partially cleared hillside crossed by a power line. Access to field road was north of Dean Martir farmhouse 0.21 mile northwest of the junction of Town Highway

TABLE I

ROCHESTER 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														No. 61 with Vermont Route 100. Test No. 1 was 55 feet S 40°E. of power pole No. 4/28. Material was: 2'-10', loosely consolidated, poorly sorted, cobbly, coarse gravel. (less than 10% of the stones were more than 4" and were not included in sample).
	2	1975	1-7	0-1	No	67	65	47	32	21	12	38.0%	Gran. Borrow (Gran.)	Test No. 2 was 55 feet N 65°W. of, and 10' above, test No. 1. Material was: 1'-7', loosely consolidated, poorly sorted, cobbly coarse gravel. Less than 5% of the stones exceed 4" and were not included in sample.
6	1	1972	20-30	0-20	Yes	100	93	71	51	13	7	32.4%	Gran. Borrow (Gran.)	Owner: Merle V. Severy. Area is a large (900'x350'), multi-level active pit, 0.3 mile northwest of the junction of Vermont Route 73 with Vermont Route 100. The owner believed the pit to be largely depleted and will allow no further excavation to the south. Probably the best extension is more than 400 feet N 70°W. toward the foot of Austin Hill. In 1972, Test No. 1 was taken in the center of the northwest face. Material was: 20'-30', poorly sorted gravel, sand and cobbles. 8% of the stones were coarser

TABLE I

ROCHESTER GRANULAR DATA SHEET NO. 4

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Existing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
														than 4" and were not included in sample.
	2	1975	3-33	0-3	Yes	87	81	68	59	28	16	25.6%	---	Test No. 2 was from the northwest face at the north end of the pit. Material was: 3'-12', sandy gravel; 12'-14', silty sand seam; 14'-33'; poorly sorted, loosely consolidated, silty gravel with sand lenses.
	3	1975	3-10.5	0-3	Yes	75	66	48	34	14	7	------	Gravel (Gradation only)	Test No. 3 was in face near southwest corner of the pit. Material was: 3'-9.5', well-graded, iron oxide-cemented, coarse-to-medium gravel; 9.5'-10.5' gravelly sand.
	4	1975	0-10	---	Yes	100	100	100	100	66	20	----	----	Test No. 4 was in floor of the southeast side of pit. Material was: 0-10', sand with silt lenses.
	5	1975	0.5-9	0-0.5	Yes	100	100	100	95	54	20	-----	----	Test No. 5 was in southwest corner of pit floor 10 feet east of test No. 3. Material was: 0.5'-9', medium-to-fine sand; bottom, silt seam.
	6	1975	1-6.5	0-1	No	82	73	51	37	24	14	20.2%	Gran. Borrow (Grav.)	Test No. 6 was in northwest edge of field, 350 feet N 70°W. of Test No. 1. Material was: 1'-6.5', sandy coarse gravel; bottom, boulders.

TABLE I

ROCHESTER 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
7	1-A	1975	2-12	0-2	Yes	60	53	38	27	14	5	18.0%	Gravel	Owner: Martin Bowen. Area is a 5- or 6- acre meadow with an active pit in its southeast corner, 25 feet west of the Harvey Brothers' line fence. Pit is 0.09 south of Town Highway No.35, and 0.15 mile west of Vermont Route 100. The meadow is crossed by power line 150 feet west of the pit Test No. 1-A was in northwest face of pit. Material was: 2'-10', loosely consolidated, medium-to-coarse, sandy gravel; 10'-12', fine gravel.
	1-B	1975	12-20	0-2	Yes	100	100	94	94	19	6	----	Sand	Test No. 1-B was below Test No. 1-A Material was: 12'-18', hard-packed sand with silt seams; 18'-20', gravelly sand.
	2-A	1975	0-4	---	Yes	83	75	53	39	11	4	23.3%	Gravel	Test No. 2-A was in floor of pit, 50 feet south of Test No. 1-B. Material was: 0-4', hard-packed gravel.
	2-B	1975	4-7		Yes	100	100	100	96	31	11	---	Gran. Borrow (Sand)	Test No. 2-B was below Test No. 1-A Material was: 4'-7', loosely consolidated, wet sand; (water table at 5'); bottom, same.

TABLE I

ROCHESTER 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	3	1975	4.5-9	0-4.5	Yes	85	83	60	45	12	6	18.8%	Gravel	Test No. 3 was in extension near north end of east face, 25 feet west of property line fence. Material was: 4.5'-9', gravel.
	4	1975	0.5-9	0-0.5	No	72	70	45	30	12	5	17.8%	Gravel	Test No. 4 was in a terrace above the level of the meadow, south-west of the pit. Material was: 0.5'-1.5', silty gravel; 1.5'-9', loosely consolidated, clean, coarse gravel. From 5% to 10% of the stones were coarser than 4" and were not included in sample.
	5	1975	1-9	0-1	No	88	79	52	35	11	5	19.0%	Gravel	Test No. 5 was in a depression at the east end of a roll in the uncut meadow,410 feet northwest of Test No. 4. Material was: 1'-9', loosely consolidated, coarse, cobbly gravel. 5% of the stones were coarser than 4" and not included in sample.
	6	1975	2.5-7	0-2.5	No	85	77	70	59	4	2	---	Gravel (Gradation only)	Test No. 6 was at west end of the roll in the uncut meadow, 350 feet west of Test No. 5. Material was: 2.5'-7', loosely consolidated, fine gravel.

TABLE I

ROCHESTER 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
8	1-A	1975	1-4	0-1	No	100	100	100	100	23	14	-----	Gran. Borrow (Sand)	Owner: Harvey Brothers. Area is a 5 acre terraced field, bounded on the west by Map Identification No. 7 and on the north by Map Identification No.9. Test No. 1-A was at the east edge of the field, 325 feet east of property line fence. Material was: 1'-4', silty sand.
	1-B	1975	4-8.5	0-1	No	92	81	59	43	29	22	19.6%	----	Test No. 1-B was below Test No.1-A. Material was: 4'-8.5', poorly sorted, loosely consolidated, sandy coarse gravel. (5% of the stones are coarser than 4" and were not included in sample).
9	1	1975	2-9.5	0-2	No	78	70	39	25	5	2	16.6%	Gravel	Owner: Vermont Department of Highways. Area is a narrow, 375-foot long field south of District Garage and other buildings. Area is 150 feet south of Town Highway No. 35, 0.11 mile wes of Vermont 100. Test No. 1 was at east end of top of low terrace. Material was: 2'-9.5', loosely consolidated, clean coarse gravel; bottom, boulders.
	2	1975	1-8	0-1	No	65	58	40	28	25	18	20.4%	------	Test No. 2 was at west end of strip on lower level of field,

TABLE I

ROCHESTER 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
														375 feet west of Test No. 1. Material was: 1'-8', cobbly coarse gravel. 7% of the stones were coarser than 4" and were not included in sample.
10	1	1975	0-5	--	No	59	49	34	22	8	4	15.4%	Gravel	Owner: Ray Braun. Area is a 350-foot long gravel bar on the east side of the White River a adjacent to a private golf course. The survey observed that the bar is periodically inundated. Bar is 1,000 feet west of Vermont Route 100, with access 0.2 mile north of junction with Town Highway No. 38, and was sampled at owner's request. Test No. 1 was at the north end of the bar. Material was: 0-5', loosely consolidated, coarse sandy gravel. More than 5% of the stones were coarser than 4" and we not included in sample.
	2	1975	0-5	---	No	89	82	64	48	4	2	17.8%	Gravel	Test No. 2 was at the south end of the bar, 350 feet southeast of Test No. 1. Material was: 0-5', loosely consolidated sandy coarse gravel.

TABLE I

ROCHESTER 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
11	1	1972	10-18	0-10	Yes	93	88	53	43	15	4	25.1%	Gran Borrow (Grav.)	Owner: Carroll G. Bowen. Area is a gravel pit (250'x185'), 100 feet east of Vermont Route 100; access road is 0.2 mile north of junction with Town Highway No.46. Eastward extension of this pit is limited by bedrock; the feature slopes steeply downward beyond the north face. Test No. 1 was in the northeast, face of pit. Material was:4'-10', coarse gravel (inaccessible); 10'-18', coarse gravel (more than 5% of the stones were larger than 6" and were not included in sample).
	2	1975	0-3.5	---	Yes	78	73	50	38	15	7	28.5%	Gran. Borrow (Gran.)	Test No. 2 was in stripped extension, 110 feet N 70°E. of Test No. 1. Material was: 0-3.5', poorly sorted, hard-packed boulder and gravel (25% of the sto were coarser than 4" and not incl-uded in sample); bottom, bedrock or large boulders.
	3	1975	0-4	---	Yes	70	65	42	32	10	4	26.6%	Gran. Borrow (Grav.)	Test No. 3 was in stripped extension, 55 feet N 70°E. of Test No. 1. Material was: 0-4', bouldery gravel (25% of the stones were coarser than 4" and not included in samples); bottom, bedrock.

ROCHESTER 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	4	1975	2.5-10.5	0-2.5	Yes	100	100	100	99	40	8	---	Gran. Borrow (Sand)	Test No. 4 was in northwest corner of pit floor. Material was: 2.5-10.5, clean sand, bottom, same.
12	1	1975	4-14	0-1	Yes	100	100	100	99	53	25	----	----	Owner: Kenneth Webster. Area is an irregularly-shaped pit in woods west of Town Highway No.2, 0.34 mile north of its intersection with Town Highways No. 13 and 67. Major extension is N 30°W. from the north-central face. Test No. 1 was in the north central face. Material was: 1'-4', silty gravel (inaccessible); 4'-14', gray-to-white, fine-to-medium sand with interbedded silt layers.
	2	1975	0.5-2	0-0.5	Yes	66	60	42	28	10	5	18.6%	Gravel	Test No. 2 was in northwest face, 30 feet west of Test No. 1. Material was: medium-to-coarse, gravel; bottom, sand.

ROCHESTER PROPERTY OWNERS - GRANULAR

	Map Identification No.
Bowen, Barry E.	3
Bowen, Carroll G.	11
Bowen, Martin	7
Braun, Ray	10
Harvey, the brothers	8
Lyons, Robert	2
McGuffin, Lloyd B.	2
Severy, Merle V.	6
U.S. Forest Service	1
Vermont Department of Highways	9
Webster, Kenneth	12

Table II

ROCHESTER ROCK DATA SHEET NO. 1

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	Gneiss	No	Chip		40.3%	Owner: U.S. Forest Service. Area was east of a private logging trail 0.35 mile north-northwest of the west end of Town Highway No. 37. Access to this area was via a logging road that was being improved during the survey. Material sampled was recently blasted rock. Gneiss and other rock types of the Mount Holly complex are exposed intermittently for 0.38 mile along the logging trail; Test No. 1-A began at first exposure. Area has moderate relief. Test No. 1-A started 50 feet west of the first switch-back and extended from 0 to 75 feet.
	1-B	1975	Gneiss	No	Chip	--	44.3%	Test No. 1-B continued for 75 feet (75'-150') westward from Test No. 1-A.
2	1-A	1975	Serpentinite	Yes	Chip	---	17.8%	Owners: Vermont Marble Company. Area is a verde antique serpentinite quarry east of Town Highway No. 61, 0.95 mile north of its junction with Town Highway No. 9. Quarry was operating at time of Survey. It was 165' long, 120' wide and 180' deep. A large amount of grout had been dumped southeast of the quarry and could be easily used. Test No. 1-A was taken at random from a grout pile due east of the quarry derrick and represents most recently quarried blocks. Grout pile was 50'x25' and was 10' high.
	1-B	1975	Serpentinite	Yes	Chip	---	17.8%	Test No. 1-B material was taken for 100 feet along quarry tracks used to transport grout to the piles. Rock was from the Ottauquechee formation.

Table II

ROCHESTER ROCK DATA SHEET NO. 2

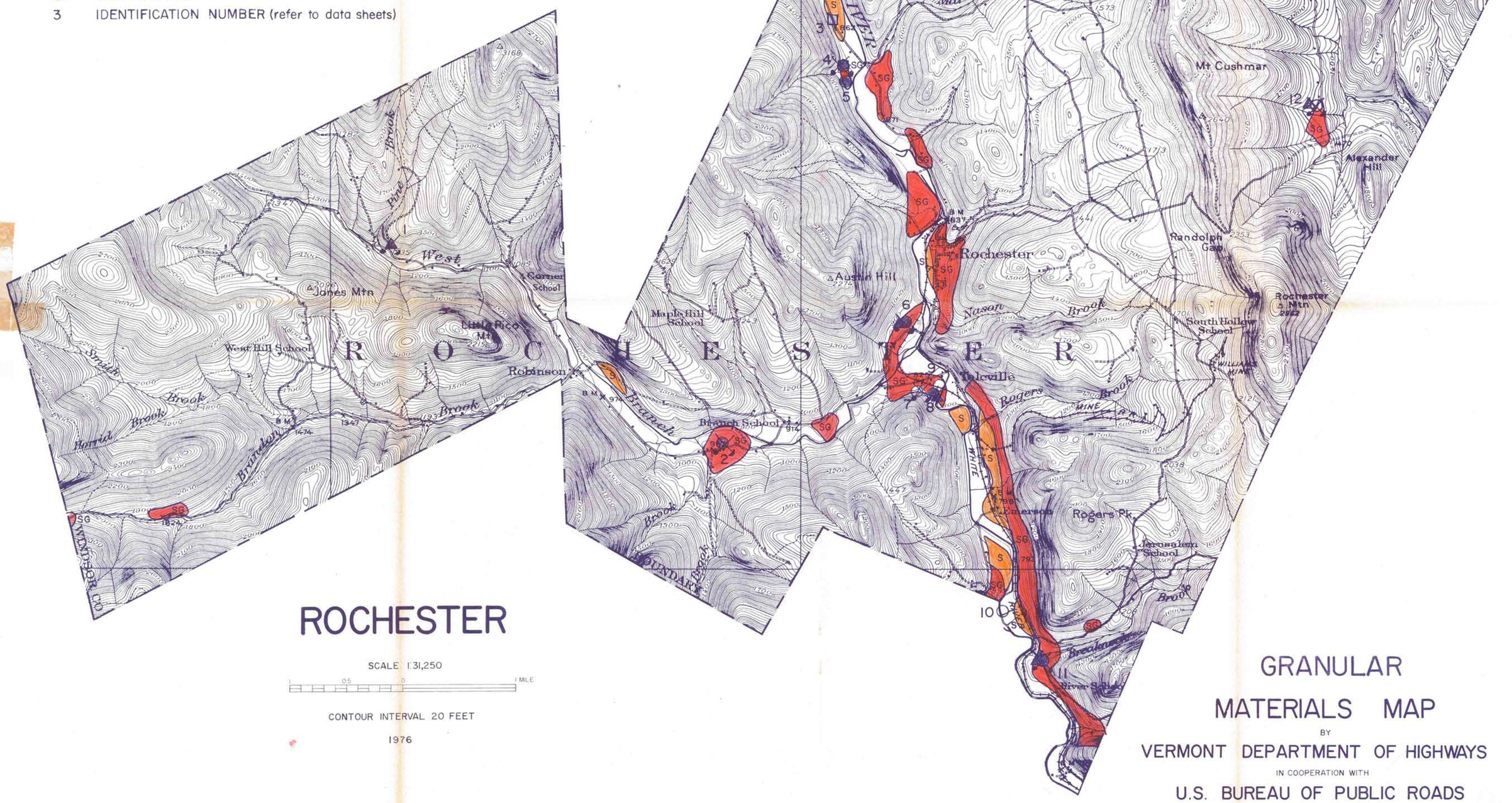
Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHTO T-3	Abrasion AASHTO T-96	Remarks
3	1-A	1975	Schist, Quartzite Quartz	No	Chip	____	61.8%	Owners: SHEPG, INC. Area is the site of the former Williams Mine on the wooded west slope of Rochester Mountain. Access is via a woods road north of State Aid Highway No. 1, 0.61 mile east of its junction with Town Highway No. 27. Rock of the Ottauquechee formation is exposed as numerous scattered ledges of low relief between the access road and the trace of an old railroad grade. Two major joint systems occur almost at right angles to each other. One system dips 53° to the southwest; the other dips 41° to the northeast. In places, the rock has contorted flow cleavage. The best access for a quarry would probably be eastward from the railroad grade towards the woods road. The outcrops trend N 65°E. and were sampled along the strike. Test No. 1-A was sampled for 75 feet beginning 60 feet west of the access road, 250 feet from the State Aid Highway, and continued 75 feet to the west-southwest.
	1-B	1975	Schist Quartzite Quartz	No	Chip	____	61.8%	Test No. 1-B extended for an additional 75 feet, and ended 20 feet east of the railroad grade and 100 feet, from the highway.

ROCHESTER PROPERTY OWNERS - ROCK

	Map Identification No.
SHEPG INC.	3
U.S. Forest Service	1
Vermont Marble Company	2

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)



GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

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

PLATE I

GRANULAR

WINDSOR COUNTY VT. HWY. DISTRICT NO. 4

REVISIONS

DATE						
BY						

ROCHESTER

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
- SCHISTS, SLATES, PHYLLITES, SHALES, CONGLOMERATES
- 3 IDENTIFICATION NUMBER (refer to data sheets)

SCHIST, PHYLLITE (UNDERHILL)

SCHIST (HOOSAC)

GNEISS (MOUNT HOLLY)

SCHIST (HAZENS NOTCH)

SCHIST, QUARTZITE, LIMESTONE (BATTELL)

PHYLLITTE SCHIST (PINNEY HOLLOW)

SCHIST (HAZENS NOTCH)

GREENSTONE (PINNEY HOLLOW)

PHYLLITE, QUARTZITE, SCHIST (OTTAUQUECHEE)

SCHIST, PHYLLITE (STOWE)

SERPENTINE, CARBONATE ROCK, TALC-CARBONATE ROCK, STEATITE (ULTRAMAFICS)

GREENSTONE (PINNEY HOLLOW)

SCHIST (HAZENS NOTCH)

GREENSTONE, AMPHIBOLITE (BRACKETT)

SCHIST, PHYLLITE (STOWE)

GREENSTONE (PINNEY HOLLOW)

SCHIST (HAZENS NOTCH)

ROCHESTER

SCALE 1:31,250

0.5 0 1 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

WINDSOR COUNTY VT. HWY. DISTRICT NO. 4

REVISIONS

DATE							
BY							