SURVEY OF HIGHWAY CONSTRUCTION MATERIALS
IN THE TOWN OF WEST HAVEN, RUTLAND COUNTY, VERMONT

prepared by

Engineering Geology Section, Materials Division
Vermont Department of Highways

in cooperation with

United States Department of Commerce
Bureau of Public Roads

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Acknowledgments

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

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

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

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

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

History

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

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

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

Inclosures

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

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

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

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

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

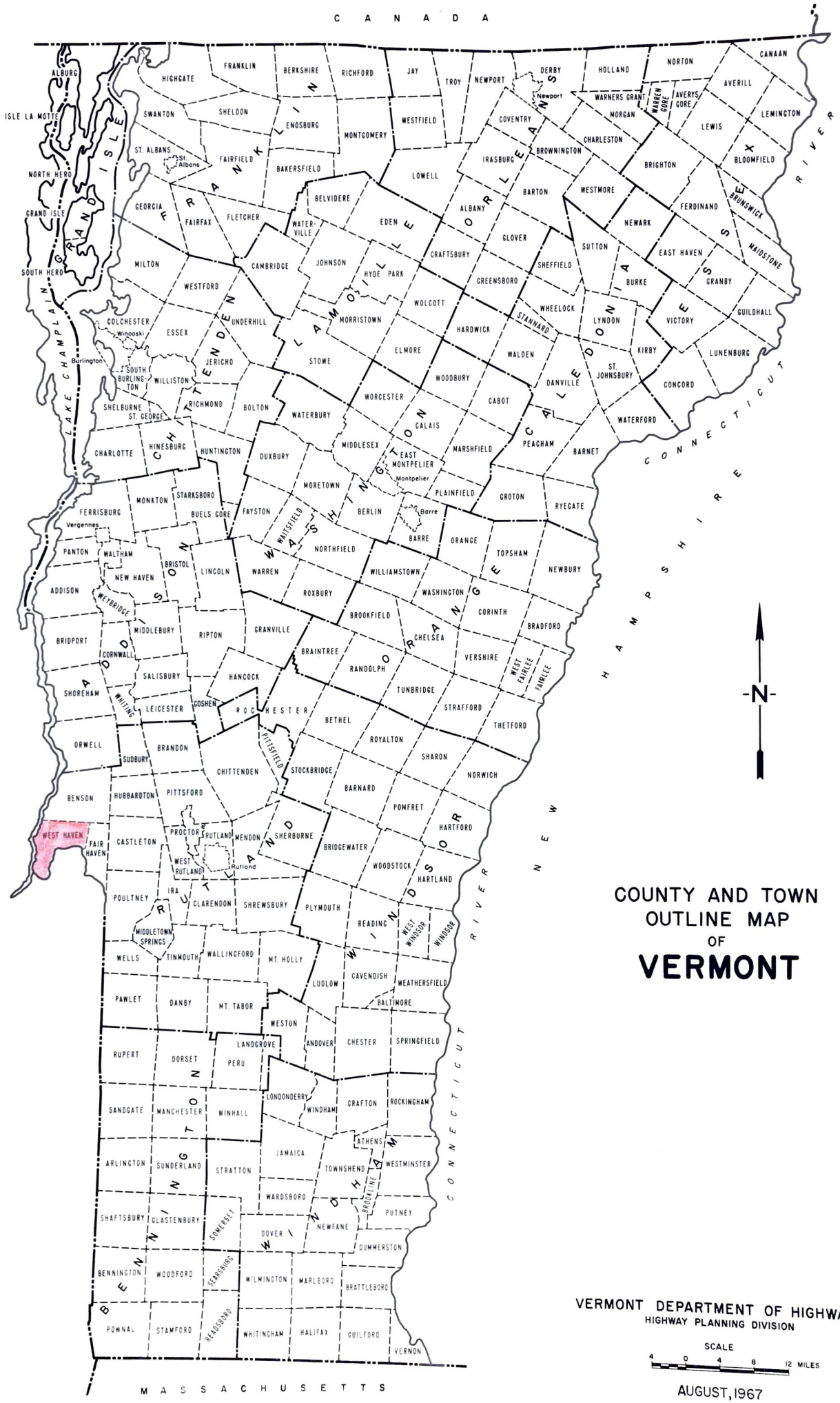
LOCATION

The town of West Haven is located in Rutland County on the extreme west side of the State. The Poultney River and Lake Champlain form its south and west boundaries, respectively, with the State of New York. The town of Benson lies to the north, and Fair Haven bounds it on the east. (See County and Town Outline Map of Vermont on the following page).

It is in the Champlain Valley Physiographic Region of Vermont and has rolling to abrupt relief, with elevations generally below 550 feet. However, in the southwest corner of West Haven, on a peninsula of the town lying between the south-flowing Poultney River and Lake Champlain, there is very rugged relief culminating in Bald Mountain with an elevation of 1,045 feet.

In the northeast part of town the eastern edge of the broad, flat Hubbardton River valley rises precipitously over 400 feet to the top of The Great Ledge. This line of cliffs, consisting of slates and quartzites of the Taconic Sequence, is the boundary between the Taconic Mountains Physiographic Region and the Champlain Valley Physiographic Region.

Drainage in West Haven is into the Poultney River via Hubbardton River and Coggman Creek and their tributaries. The Hubbardton River drains a broad, flat area in the northeast part of town, and flows through a deep, narrow valley from State Aid Highway No. 1 southwest to the Poultney River. Coggman Creek and its tributaries drain broad, plateau-like areas, low rolling hills, and broad, nearly flat valleys in the central part of town. Other small tributary streams drain Bald Mountain and the low, rolling hills along Lake Champlain.



COUNTY AND TOWN OUTLINE MAP OF VERMONT

VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION

SCALE
4 0 4 8 12 MILES

AUGUST, 1967

SURVEY OF ROCK SOURCES

Procedure for Rock Survey

The routine employed by the project in the survey of possible sources of rock for highway construction is divided into two main stages: office investigation and field investigation. The first is conducted primarily during the winter months and comprises the mapping of rock types as indicated in various reference sources. Many different sources of information were utilized, as indicated in the bibliography. These references differ considerably in dependability due to new developments and studies contributing to the obsolescense of a number of reports. In addition, the results of samples taken by other individuals are analyzed, and the location in 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 second stage of the investigation is begun in the field by making a cursory preliminary survey over the entire area. The information obtained in this survey, together with the information assimilated in the first stage of the investigation, is employed to determine the areas in which the testing and sampling will be concentrated. When a promising source is encountered as determined not only by rock type but also by volume, accessibility, and the existence of a good working face, chip samples are taken with a hammer and submitted to the Highway Testing Laboratory for testing by the Deval Method (AASHO T-3). It is kept in mind that the samples taken by the chip method are often in the weathered zone of the outcrop and consequently may show a less satisfactory test result than the fresh material deeper in the body of the rock structure. When deemed necessary, further samples are taken by drilling to a depth of approximately 3 feet and blasting across the strike or trend of the outcrop. When the material is uniform and satisfactory tests result from the chip samples, no further drilling, blasting, or sampling is done, and the material source is included as being satisfactory.

Discussion of Rock and Rock Sources

The rocks of West Haven consist mainly of extensively exposed carbonates and quartzites characteristic of the Vermont Valley and Champlain Valley lithologies. In the northeast part of town the St. Catherine Formation of the Taconic Sequence underlies the Hubbardton River Valley and forms the line of cliffs named The Great Ledge. Precambrian gneisses form the rugged topography in the southwest part of town.

Although the Champlain Valley lithologies in West Haven are exposed throughout the township, and generally would be satisfactory for Item 204, Sub-base of Crushed Rock, the topography is predominantly of gentle to moderate relief and exposures of sufficient size for a quarry operation are rare. In most of the locations where rock was sampled for Item 204, it would be possible to develop large quarries. In many cases, cutting trees and constructing access roads would be required. A number of other areas were investigated by the materials survey party and may also be suitable as quarry sites. These were not sampled because accessibility, remoteness from currently proposed construction project, size of exposure, and amount of relief make them inferior to those sampled.

Of the seven areas sampled, Map Identification Numbers 3, 4, and 5 and their vicinities appear to be the most satisfactory sources of Item 204. (See Plate II and Table II). Large quantities of limestone and dolomite meeting the abrasion requirements are exposed over a sufficiently large area to open a deep quarry. Also, there is a wooded hill northwest of Map Identification No. 4 terminating in a long, 50-foot high southeast ledge (Map Identification No. 5), providing plenty of relief for a working face.

Limestones mapped as the Orwell Formation outcrop on Forbes Hill north of State Aid Highway No. 2 and in the highway cut. This area is wooded and appears difficult to develop. Dolomites of the Bridport and Beldens Members of the Chipman Formation are exposed in a road cut on the east side of State Aid Highway No. 3 south of West Haven Village. However, the area above the road cut is wooded and exposures are not extensive. Also, there is no good location for a quarry. The Bascom Formation is exposed in rolling terrain on the west side of State Aid Highway No. 3, but here the outcrops are smooth and difficult to sample, and there probably is not enough relief to warrant consideration of this area as a quarry site.

Map Identification No. 6, a small quarry used by the town, and No. 7, a wooded pasture slope, would be satisfactory sources of Item 204. They are located on State Aid Highway No. 3 in the western part of town and are quite distant from any proposed construction. There would be ample room to set up a crusher in both locations with the necessity of considerable clearing for large operations.

Map Identification No. 1 is the most convenient area because of its location adjacent to Vermont Route 22A. It is not known, however, if the owner would sell the wooded ridge for a quarry site. Also, the limestone is thinly bedded and somewhat soft; and although samples taken met abrasion requirements, the rock appears marginal for Item 204.

Outcrops of Precambrian gneiss, quartzite, and granulite are exposed in the rugged topography in the southwest part of town. However, exposures are quite remote and this area is very distant from any proposed construction projects.

SURVEY OF SAND AND GRAVEL SOURCES

Procedure for Sand and Gravel Survey

The method employed by the project in the survey of possible sources of sand and gravel for highway construction is divided into two main stages: office investigation and field investigation. 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 recognizing and locating physiographic features indicating glacial deposits and in studying drainage patterns. In addition, the location of existing pits are mapped when known. The locations in which samples were taken by other individuals are noted and mapped when possible.

The second stage of the investigation is begun in the field by making a cursory preliminary survey over the entire area noting area which show physiographic features giving evidence of glacial or fluvial deposits. These locations are later examined by digging test pits with a backhoe to a depth of approximately 11 feet and then sampling the material. The samples are submitted to the Highway Testing Laboratory where they are tested for gradation and stone wear, the latter by the Deval Method (AASHO T-4-35).

Discussion of Sand and Gravel Deposits

The granular materials in the town of West Haven occur in ice-contact features and in a small area of glaciolacustrine deposition. Map Identification Numbers 1, 2, and 3 are probably kame terraces and contain immense quantities of gravels and sands.

Map Identification No. 1 is accessible only through the town of Benson and is a large pit high above Lake Champlain. Cemented coarse gravels and pebble gravels comprise the material. Map Identification Numbers 2 and 3 are located on opposite sides of the Hubbardton River south of State Aid Highway No. 1. Map Identification No. 2 is a large high pit with cemented gravels and a north extension which is tree covered and which has a silty sand blanket above the gravel. Four samples of gravel acceptable for Item 201 were taken here. Map Identification No. 3 is mainly a sand pit and area with a narrow extension to the north limited by ledge on the east, and a possible southeast extension into an open pasture. Two samples of sand acceptable for Item 202 were taken in the upper and lower floors of the pit. The high face had a slight excess of stones for Item 202.

Map Identification Numbers 5, 6, 7, and 8 are on Town Highway No. 15 in the southeast part of town. Numbers 6, 7, and 8 are small or nearly depleted pits in which a thin layer of gravel overlies silty sand. Map Identification No. 5 is a field in which pebbly sands acceptable for Item 202 were sampled in two locations. This particular area shows promise as a source of sand.

Map Identification No. 4 is a large field at the end of Town Highway

No. 13 in a mapped glaciolacustrine deposit. Only two samples could be taken because of the hay crop. Both samples contained excess very fine sand for Item 202 requirements. Another mapped glaciolacustrine area north of Map Identification No. 4 was investigated. However, exposures of bedrock were seen in places, silts or clays were exposed in others, and no samples were taken.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF WEST HAVEN

Taconic Sequence

St. Catherine Formation - Purple, gray-green, and variegated slate and phyllite containing minor interbeds of white to green quartzite; locally albitic. Purple and green chloritoid-bearing slate and phyllite is in northern Taconic Range, but not separated farther south.

Bomoseen Member (of the St. Catherine Formation) - Green to olive-colored arkose and graywacke that weathers pale red to white; contains visible flakes of mica and rock fragments.

Zion Hill Member (of the St. Catherine Formation) - White weathered green, vitreous chloritic quartzite and graywacke spotted with limonite.

Champlain and Vermont Valley Sequence

Hortonville-Glen Falls Formation (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.

Root Pond Member (of the Orwell Formation) - Massive quartz sandstone overlying the Orwell Limestone.

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

Middlebury Limestone - Dark blue-gray, somewhat nodular and granular limestone with buff dolomite and shaly interbeds a fraction of an inch thick and 2 to 4 inches apart.

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

Beldens Member (of the Chipman Formation) - Interbedded buff to brown heavily scored dolomite and white to blue-gray marble and limestone.

Burchards Member (of the Chipman Formation) - Blue-gray limestone with irregular spots of light buff dolomite that give weathered surface a mottled appearance.

Bascom Formation - Interbedded dolomite, limestone or marble, calcareous sandstone, quartzite, and limestone breccia. Irregular dolomitic layers, thin sandy laminae, and slaty or phyllitic partings characterize limestone and marble of lower, middle and upper parts of the Bascom, respectively. Very thin interbeds are common in the West Haven area.

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

Shelburne Formation - Chiefly a white marble or gray limestone, characterized by raised reticulate lines of gray dolomite on the weathered surface, interbedded with a hard, massive to medium bedded, fine grained gray dolomite, that predominates west of Champlain and Orwell thrusts.

Clarendon Springs Dolomite - Fairly uniform, massive smooth-weathered gray dolomite characterized by numerous geodes and knots of white quartz; quartz sandstone and irregular masses of chert are near the top.

Dalton Formation - Schistose quartzite containing pebbles of feldspar and blue quartz; impure dolomite containing pebbles of quartz and feldspar occurs locally; conglomerate common near base.

Pre-Cambrian Gneiss - Gneiss, quartzite and granulite.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Alluvial - Pertaining to material carried or deposited by running water.

Arkose - A special variety of sandstone containing more than 25 or 30 percent of feldspar and usually derived from the disintegration of granite or other acid rocks of granular textures.

Breccia - A rock consisting of consolidated angular rock fragments larger than sand grains. There may be fault, talus, and volcanic Breccia.

Calcareous - Pertaining to or containing calcium carbonate.

Carbonaceous - Containing carbon.

Carbonate Rocks - Rocks composed of the molecule CO_3 combined with calcium, magnesium, etc. Includes limestones and dolomites.

Delta - A predominantly alluvial deposit built by a stream entering the sea or other body of water. Usually it has the form of the Greek letter delta.

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

Esker - A long, narrow winding ridge of mixed sand and gravel deposited by a stream of meltwater flowing in a tunnel or crevasse in stagnant glacial ice.

Glaciolacustrine - A term used to denote formation by, or deposition in quiescent waters of glacial lakes.

Gneiss - A foliated metamorphic rock with layers mineralogically unlike and consisting of interlocking mineral particles visible to the naked eye. Usually gneiss displays an alternation of granular minerals and tabular minerals with the rock tending to split along the planes where tabular minerals predominate.

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.

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.

Ice Contact - Refers to sediments which have accumulated in contact with stagnant or wasting glacial ice. They assume the varied topographic forms expressed by eskers, kames, and kame terraces.

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

Kame Moraine - An accumulation of material deposited directly from the frontal portions of melting glacial ice and partly sorted by water action. Deposits may take the form of coalescent knolls, hummocks, ridges, etc..

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

Limestone - A bedded sedimentary rock consisting chiefly of calcium carbonate. The most important and widely distributed of the carbonate rocks.

Lithographic Stone - Fine grained, compact and homogeneous limestone formerly used for engraving.

Marble - A soft, white rock being the metamorphic form of limestone in which the calcium carbonate (calcite) is recrystallized and the calcite crystals are overgrown and interlocked with additional calcite. Commercially it is a trade name applied to any carbonate rock of good color and texture and hard enough to take a polish.

Metamorphic Rocks - Rocks that owe their distinctive characteristics to the transformation of preexisting rocks through intense heat or pressure or both.

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.

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.

Slate - A very fine-grained homogeneous metamorphic rock which splits smoothly along parallel cleavage planes and yields roughly similar slabs.

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PARTIAL SPECIFICATIONS FOR HIGHWAY CONSTRUCTION MATERIALS

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

Item 105, Granular Borrow

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

"The sand portion (material passing the No 4 screen) shall have not more than ten percent (10%) passing the No 270 mesh sieve and shall show a color of not more than three and one-half ($3\frac{1}{2}$) 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 ($3\frac{1}{2}$) 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
$1\frac{1}{2}$"	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 ($3\frac{1}{2}$) 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 HAVEN 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	1967	3-33	0-3	Yes	96.4	86.5	59.2	10	7.0	1	19.6%	Gran. Borrow (Grav.)	Owner: Hollis and Clyde Bartholomew Cold Spring Gravel Pit on Lake Champlain. Area is a kame terrace and pit is about 100' above the lake. The best access is through the town of Benson. The pit is huge with an extension to the south into George Sheldrick property. North extension may be limited by a deep wooded gully, but the gravels may continue again in the woods along the west side of the haul road. Large ledge blocks and cobbles show on the east face. A gravel slope on the west face stands above the lake, but much sloughed material prevented sampling. The depth to which the pit can be excavated would be limited by a maximum grade that trucks could negotiate coming out of the pit. Possibly a lower level could be started at a few feet above the lake level. Test #1 was dug on the face at the south end of the pit. The top 19' is a fine gravel and gravelly sand. The lower 14' is a pebbly sand. Composite of the face has excess silt for Item 201.

*Percentage of Total Sample

TABLE I

WEST HAVEN 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				
	2	1967	2-26.5	0-2	Yes	---	---	---	---	---	---	---	---	Test #2 dug on the lower face on the south end of the pit and continued in the floor. The 16-foot face shows a very fine gravel that is partially cemented. The face is representative of an 80-foot by 160-foot area. The material in the lowermost floor is the same as on the face. Overall, a very fine gravel. (Test results were misplaced, so no sive analysis was available).
	3	1967	3-40	0-3	Yes	70.6	61.6	37.8	7	4.0	1	24.6%	Gravel	Test #3 was taken on the north face. Clay overlying hardpan caps the face in places. Gravels are partially cemented in places, and vary from fine to coarse. The face is between 160' and 195' long and an area available for extension is between 80' and 120', being limited by a wooded gully. At the time sampled, the town of Benson was loading gravel from the northwest corner of the lower level. This is a source of huge quantities of gravel. In-place gravels can be seen standing above the sloughed material on the west face. Problems involved include the location of a haul road, working hardpan layers, disposal or use of sloughed material on the west

*Percentage of Total Sample

TABLE I

WEST HAVEN 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				
														slope, and an extension to the south, which would involve co-operation between two owners, in that there is no right-of-way provided for the Sheldrick property.
2	1	1967	0-12	---	Yes	55.1	42.7	28.7	4	2.0	1	14.0%	Gravel	Owner: Ralph Bishop. Area is a huge pit with north to northeast extension along a large hill on the northwest side of the Hubbardton River. The pit is located west of the owner's buildings, off Town Highway No. 14, and is reached by a 0.10 mile haul road and a ford of the Hubbardton River. Top of the pit is accessible to bulldozer and 4-wheel drive. Gravels are bulldozed off the upper level and pushed over the high east face of the pit. Bedrock is exposed on the south part of the upper level.
	2	1967	30-55	0-6	Yes	65.9	56.9	42.4	4	1.0	1	10.8%	Gravel	Two tests were taken on the upper level; Test #1 from the side of a bulldozer trench formed in fine, compact gravels and pebbly sands; Test #2 from 30'-55' on the lower 55-foot high north face. The lower face consists of partially cemented gravels with cobbles and beds of sand. The upper face has 6' of silt at the top overlying 15'-20' of sand with in-

*Percentage of Total Sample

TABLE I

WEST HAVEN 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					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														terbeds of fine gravel. Both samples met requirements for Item 201. Very likely the composite material from about 10' to 55' on the north face has enough stones for Item 201, but probably would have too much fine sand or silt. About 10' would have to be stripped from the north face and the trees cut to extend the pit to the north-northeast. The size of the upper level at the time sampled was about 380' x 260'.
3	1967	4-40	0-4	Yes	69.6	58.6	45.2	5	1.0	1	16.4%	Gravel		Test #3 dug on the extreme east end of a 40-foot high north face in the lower level of the pit. Beds of gravelly sand, pebbly sand, and silty cobbly gravel were sampled.
4	1967	4-10	0-4	No	52.3	36.4	24.1	5	2.0	1	21.2%	Gravel		Test #4 dug in the bulldozer test trench on the east side of the hill north of the pit. About 10' of the material was exposed. The top 4' is overburden and silt and stones; from 4'-5' is pebbly sand; from 5'-10' is cemented cobbly gravel. This test represents the extension of the pit along the east side of the hill. Access is via a log road and a ford of the river.
5	1966	1-30	0-1	Yes	100	95.5	76.5	6.1	1.3 0.9*	1	---	Sand		Test #5 was sampled on the east face of the pit. The

*Percentage of Total Sample

TABLE I

WEST HAVEN 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				
														material is pebbly sand acceptable for Item 202. Much material left in the pit. Extension to the north would be difficult to develop with woods and silty sands to be stripped, but could be done. Possibly another pit could be opened near Test #4.
3	1	1967	3-23	0-3	Yes	67.1	55.6	38.9	10	3.0	1	21.2%	Gravel	Owner: Ralph Bishop. This is a pit below cliffs of limestone located northeast of the owner's buildings on the east side of Town Highway No. 14. The feature is probably a narrow kame terrace that extends north along the east side of the road. Bishop owns up to the cliffs, but along the road only a short distance to the north. The upper level of the pit has been stripped and has a face on the northeast side. Test #1 on this face encountered sandy gravels, stony sand, and a bed of cemented pebbly sand. The sample met requirements for Item 201. About 90' of the steep slope comprises the eastward extension of this face. The north extension would be a long narrow, steep, wooded area above the east side of Town Highway No. 14. Extension

*Percentage of Total Sample

TABLE I

WEST HAVEN 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				
														was too steep to get the back-hoe on.
	2	1967	0-42	---	Yes	91.0	84.3	69.3	9.0	2.0 1.4*	---	---	Gran. Borrow (Sand)	Test #2 was taken on the high, lower face of the pit in the northeast corner. The face to the east of this test consists of fine sands and pebbly sands. The top 20' of the face sampled is very fine cemented gravels; lower 22' is interbedded fine sand, pebbly sand, and gravelly sand. The sample had excess 1½" and #4 stones for Item 202. However, the face on the whole, would probably meet the requirements for that Item, or could be screened.
	3	1967	0-12.5	---	Yes	100	100	83.3	8.3	1.5 1.3*	1	---	Sand	Test #3 dug in the lower floor. Interbeds of fine sand and pebbly sands — some cemented — encountered. Pebbly sands continue below 12'.
	4	1967	0-11	---	Yes	95.2	95.2	89.3	13.3	2.0 1.8*	1	---	Sand	Test #4 was dug in the upper stripped area, 85' south of the high, lower face of the pit. The stripped area represented by the test, is about 140' by 230'. The material is a fine sand with a few thin beds of pebbly coarse sand. Probably the pit is a sand source with a possibility of gravels in the narrow extension along the steep hillside below the cliffs. Extension may also

*Percentage of Total Sample

TABLE I

WEST HAVEN GRANULAR DATA SHEET NO. 7

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														occur to the southeast probably limited by the pasture dropping off to a deep gully. Sands would be found in this direction and below the elevation of Test #4 as well as Tests #2 and #3.
4	1	1967	2-10.5	0-2	No	100	100	100	23	3.0*	1	---	Gran. Borrow (Sand)	Owner: Scott Harrison. Area is flat fields at the end of Town Highway No. 13. The feature looks like lake sand terrace. Thorough testing could not be done because of the hay crop. Test #1 was dug in trace of continuation of the road just south of the owner's house. The top 4' is fine sand going to medium sand with interbeds of silt. Very fine sand is in the bottom.
	2	1967	1.5-10	0-1.5	No	100	100	98.1	22.7	3.0 2.9*	1	---	Gran. Borrow (Sand)	Test #2 dug about 1,150' south of Test #1 in the edge of the terrace where the road drops over the side of the terrace. The material is interbedded fine and coarse sand. From 9' to below the test is very fine sand. Both samples had excess passing the #100 mesh sieve for Item 202.
5	1	1967	2.5-11	0-2.5	No	100	93.3	76.0	6.1	3.0 2.3*	1	---	Sand	Owner: Paul Doran. The fields west of owner's buildings at the end of Town Highway No. 15 were sampled. The feature mapped as consisting of kamic material by D.P.

*Percentage of Total Sample

TABLE I

WEST HAVEN 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 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														Stewart. Tests were taken at the edge of hill field above a steep south-facing pasture slope. Test #1 is a pebbly sand with larger stones below 10.5'. Beds dip steeply to the south.
	2	1967	2.5-10	0-2.5	No	100	100	89.8	9.9	3.0 2.7*	1	---	Sand	Test #2 dug 135' northwest of Test #1 above southwest-facing slope of pasture. Ledge shows in the pasture a few hundred feet west of this test. The top 4' is a pebbly sand going to a coarse sand with a very few pebbles. Some silty sand laminae show from 3'-4'. The hole bottoms in coarse sand. Standing hay prevented further testing. This feature looks like a source of sand.
6	1	1967	0-8.5	---	Yes	88.5	69.7	54.1	25	10.0	1	---	Gran. Borrow (Grav.)	Owner: Paul Doran. This is a small pit in an orchard east-northeast of the house. The feature may be kame terrace extending northeast and including two small pits on Town Highway No. 15. The test was dug about 110' from the Doran-Lenke property line. The orchard drops off to the south and southeast so the ice-contact feature is quite narrow. Log of test hole: 0-4.5'-gravel; 4.5'-8.5'-coarse sand; 8.5'- sand. Composite material is a sandy or silty

*Percentage of Total Sample

TABLE I

WEST HAVEN 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 1½"	5/8"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
														gravel. Gravel bed thins toward the east end of the hole. Extension of this deposit is very limited and the material appears satisfactory only for Granular Borrow.
7	---	1967	---	---	Yes	N	O	T	S	A	M	P	L	E D Owner: Proctor. Permission to sample was denied. Feature is small pit on the northwest side of Town Highway No. 15, northeast of the Paul Doran property. Much sloughing on the faces. Extension appears to be to the west, northwest, and north. Apparently only thin gravels over silty sands.
8	---	1967	---	---	Yes	N	O	T	S	A	M	P	L	E D Owner: Lenke. This is a small pit across the road from the Proctor pit. The feature is a continuation north of the Doran property. However, the feature becomes very narrow at this pit and probably extends to the north across the road. The pit is depleted and a southwest extension of about 450' is set out to pine trees.
9	---	1967	---	---	Yes	N	O	T	S	A	M	P	L	E D Owner: Unknown. This is a small pit on a private road beyond the end of Town Highway No. 24 at the south end of the township. The pit is in a wooded ridge or

*Percentage of Total Sample

TABLE I

WEST HAVEN 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				
														knoll, backed by steep ledge, and overlooks Poultney River. The material in the pit is silt clay with a few stones.

TABLE I
Supplement

WEST HAVEN PROPERTY OWNERS - GRANULAR	Map Ident. No.
Bartholomew, Hollis & Clyde	1
Bishop, Ralph	2, 3
Doran, Paul	5, 6
Harrison, Scott	4
Lenke	8
Proctor	7
Unknown	9

TABLE II

WEST HAVEN 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	1	1967	Limestone	No	Chip	4.2%	Owner: Avery Kostenov. The area is a wooded ridge on the west side of Vermont Route 22A about 0.20 mile north of State Aid Highway No. 1. A road cut trending about 25° from the strike of the rock was sampled in two tests. The rock is a blue-gray-weathering black to dark blue-gray limestone in places with many calcite veins and in others very graphitic. A few buff-weathered dolomite beds were noted on the wooded ridge atop the rock cut. The rock is thinly to fairly thickly bedded and in places is highly fractured. (Some fracturing may be due to blasting). On the whole, the rock seemed a little soft and possibly marginal for Item 204, Sub-base of Crushed Rock. Both samples taken, however, met abrasion requirements for the Item. Test #1 was sampled at 10-foot intervals from 0-140' along the road cut. Test #2 was sampled at 10-foot intervals from 140'-235'. About 100' in width across the strike was represented in the 235-foot exposure at 25° from the strike. This exposure is mapped as the Orwell or Middlebury Limestone on the Centennial Geologic Map.
	2	1967	Limestone	No	Chip	6.4%	
2	1	1967	Dolomite	No	Chip	2.6%	Owner: Elmer Brown. Area is a small, rocky pasture on northwest side of Town Highway No. 13 between Shute property and State Aid Highway No. 1. Two tests were sampled along 140-foot southeast traverse beginning about 140' down-strike(southwest) from corner of small field, and ending at the edge of the town road at a point 290' from its intersection with the State Aid road. Test #1 was taken at 6-foot intervals for 75' across beds of buff-weathered, heavily scored light to dark blue gray dolomite. The rock is very hard and broke fairly blocky to angular. Test #2 was of gray-weathered, thinly bedded, soft marble or limestone that broke angular to tabular and one thin bed of buff-weathered dolomite. There is about 10' of relief across the test traverse, and a total relief of about 30' from the northeast corner of the pasture to the edge of the woods southwest of the test. Both samples
	2	1967	Dolomite & Marble	No	Chip	5.4%	

TABLE II

WEST HAVEN 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
							met abrasion requirements for Item 204. However, the pasture probably is not large enough for a quarry operation. The rock probably is in the Chipman Formation. Test #1 was a sample of what seemed to fit the description of the Bridport Member. The limestone or marble and the dolomite exposed on the east side of the pasture may be the Beldens Member.
3	1	1967	Dolomite & Limestone	No	Chip	5.0%	Owner: Gaylon Shute. The area is pasture on the northwest side of Town Highway No. 13 about 0.11 mile southwest of State Aid Highway No. 1. The pasture is covered with low exposures of buff-weathered, scored dolomite and light gray-weathered thinly bedded limestone. There may be 15'-20' of relief in the pasture. Test #1 was begun at the edge of the road at a point 130' from the Elmer Brown property line, and continued for 127' across the strike. The rock apparently strikes N50°E. The dolomite is very hard and breaks mainly blocky to angular, but is hackly in places. The limestone is fairly hard, but breaks into thin pieces. Measured intervals of the limestone show that this rock comprises about 30% of the section sampled.
	2	1967	Dolomite & Limestone	No	Chip	1.6%	Test #2 was a continuation of the sample traverse from 127' to 217'. Mainly dolomite was sampled. Overall, about 25% of the rock is limestone. The beds appear to dip southeast. The west end of the test traverse is about 45' from Elmer Brown's property. The area would probably be a good quarry location.
4	1	1967	Dolomite & Limestone	No	Chip	2.0%	Owner: Gaylon Shute. A pasture ridge northwest of the owner's buildings, and about 450' north of Town Highway No. 13 was sampled. The rock is continuously exposed across a 12-foot to 15-foot high ridge. Test #1 was a sample taken across the southwest end of the ridge beginning about 85' from the base of the wooded hill at the west side of the pasture. The sample traverse began in smooth-ledged, dove-gray-weathered

TABLE II

WEST HAVEN ROCK DATA SHEET NO. 3

Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
	2	1967	Limestone & Dolomite	No	Chip	4.2%	fine grained limestone, and continued across the ridge in beds of heavily scored light gray to light tan dolomite. An occasional interbed of buff-weathered dolomite also included in the sample. A section 185' across the strike was sampled. On the whole, the rock was very hard, but shattered into angular to hackly pieces with a few blocky fragments. It is mapped as the Bridport Member of the Chipman Formation. However, the limestone behind the ridge resembles the Orwell Formation, which is mapped as occurring on the hill west of the pasture. Test #2 begun at a point 340' N25°E of the west end of Test #1, and continued for 190' eastward across the strike. This test was taken in rock lying west of the strike of rock sampled in Test #1. There is probably about 10' of relief across Test #2. The rock is a gray-weathered, fine grained black or dark gray limestone with occasional interbeds of pale tan-or buff-weathered scored dolomite. The limestone is very hard, but has tendency to break angular to hackly, and the dolomite shatters. Both samples taken met abrasion requirements for Item 204, Subbase of Crushed Rock, but there might be difficulty in obtaining a crushed product with blocky pieces. There would be plenty of rock and plenty of area here for a quarry.
5	1	1967	Limestone & Dolomite	No	Chip	3.8%	Owner: Ralph Bishop - Gaylon Shute. The vertical ledge above the Bishop gravel pit marks the property line between the two owners. The face is about 50' high and over 150 yards long. A fault line forming the contact between the Hortonville-Glens Falls Formation and the Bridport Member of the Chipman Formation passes through the ledge a short distance south of the gravel pit. Test #1 was a sample of pieces picked at random from the rock fall. Blue-gray, gray, and black limestone and dolomite was sampled. The rock is hard and breaks mainly blocky to angular, but thin bedding in places

TABLE II WEST HAVEN ROCK DATA SHEET NO. 4

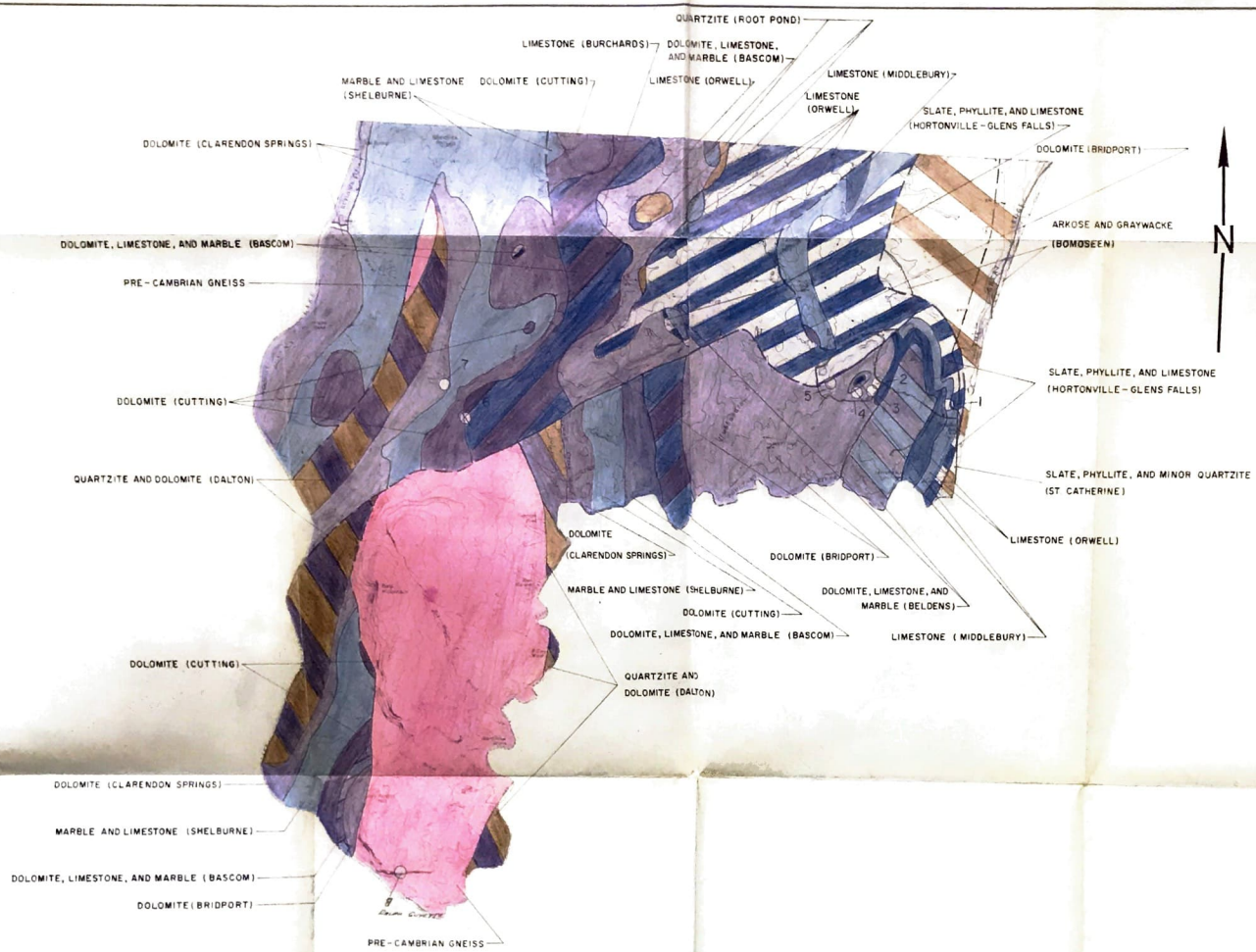
Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
							causes a hackly break resulting in some thin pieces. Sample met abrasion requirements for Item 204.
	2	1967	Limestone & Dolomite	No	Chip	3.6%	Test #2 was a continuous sample of the face. The top 8' is light buff-weathered, lightly scored dolomite. From 8'-19' - cream-to gray-weathered limestone and dark gray to black dolomitic limestone beds were sampled. The lower part of the face is light gray-weathered limestone and light tan-weathered dolomite. The limestone is lilac-to blue gray on fresh surface, and dolomite is gray to dark gray. Some of the dolomites shatter into angular pieces and the limestones are mainly thin-bedded, breaking angular to thin. The apparent dip is to the east-southeast. This sample also met abrasion requirements for Item 204.
	3	1967	Dolomite	No	Chip	3.2%	Test #3 was sampled across the strike for 125' beginning at a point 325' south of where Test #2 was taken. This area is thickly wooded and terrain is very rough with knobs and knolls where the rock is well exposed. The rock is dolomite, probably the Bridport Member of the Chipman Formation; is very hard, but broke angular. This sample also met requirements for Item 204. Access into this area would be by the steep road through the Bishop gravel pit or through the Shute property for over 600'. This access would involve the rough terrain atop the south end of the ledge.
6	1	1967	Limestone Dolomite Quartzite	Yes	Chip	3.0%	Owner: David Sheldrick. This is vertical ledge and rock fall on the east side of State Aid Highway No. 3 about 1 mile south of State Aid Highway No. 2. The town of West Haven was using some of the rock in place of gravel for town roads. The ledge is anywhere from 40' to 80' high with rock fallen from the ledge lying along its entire length, which is about 300'. Rock in place in thinly bedded and lies about horizontal. Two samples taken from the rock fall included very hard quartzite, limestone, dolomite, calcareous

TABLE II WEST HAVEN ROCK DATA SHEET NO. 5

Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Exist-ing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
	2	1967	Limestone Dolomite Quartzite	Yes	Chip	2.7%	sandstone, and limestone breccia. All types are fine grained and break into more or less cubical or blocky pieces down to about 1" in size. Smaller pieces are somewhat sharp and thin. An estimated 80% of the rock breaks satisfactorily for Item 204, and the two samples taken met abrasion requirements for that item. An access could be constructed around by the south end to get to the top where the ledge might be blown. However, the top is thickly wooded. There is plenty of rock here, and once blown, could be loaded easily.
7	1	1967	Dolomite	No	Chip	3.3%	Owner: David Sheldrick. The area is a wooded hillside on the west side of State Aid Highway No. 3 about 0.4 mile south of State Aid Highway No. 2. There is ledge exposed on the steep, wooded hillside, and there are scattered outcrops across the flat pasture atop the ledge. Test #1 was a test traverse begun on the west side of the cleared pasture and continued down the ledge. The rock is a hard, massive- to medium-bedded, fine grained gray to dark gray siliceous dolomite breaking blocky to angular. The ledge is about 60' high. About 125' across the strike was sampled. The rock met abrasion requirements for Item 204.
	2	1967	Dolomite Limestone	No	Chip	3.4%	Test #2 was taken from random blocks at the foot of the ledge along the road. The rock includes siliceous dolomite and medium-grained dark gray limestone, and breaks blocky. This sample also met requirements for Item 204. It appears that there would be room to set up a crusher operation in the northeast corner of the pasture south of the ledge sampled. Trees on the ledge would have to be cut. An access up to top of the ledge would be up across the pasture past an old shed from the north-northeast. The bedding is nearly flat and the rock resembles that of the Shelburne Formation.

TABLE II
Supplement

WEST HAVEN PROPERTY OWNERS - ROCK	Map Ident. No.
Bishop, Ralph	5
Brown, Elmer	2
Kostenov, Avery	1
Sheldrick, David	6, 7
Shute, Gaylon	3, 4, 5



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, ARKOSE, GRAYWACKE
- 3 IDENTIFICATION NUMBER (refer to data sheets)

WEST HAVEN

SCALE 1:31,250

CONTOUR INTERVAL 20 FEET

1968

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 11

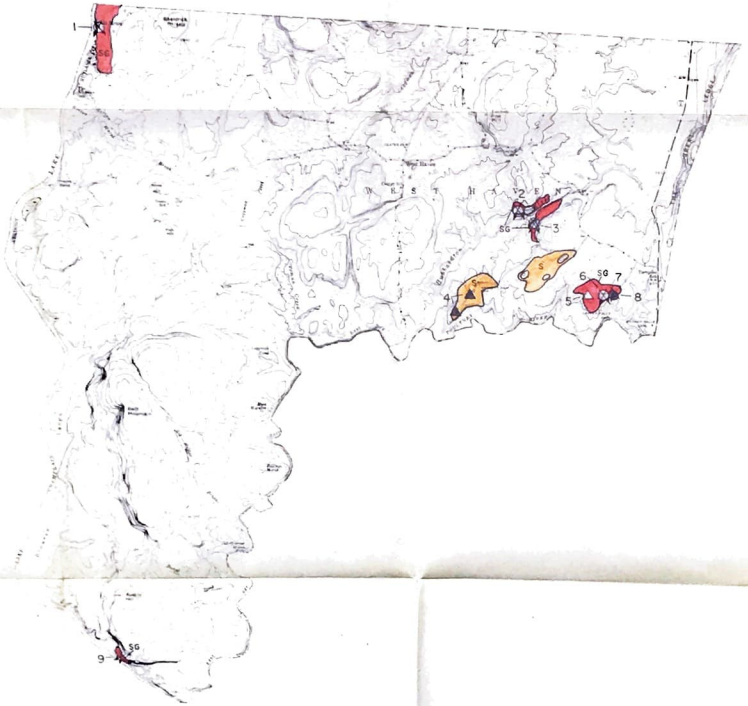
ROCK

WEST HAVEN

RUTLAND COUNTY VT.-HWY. DISTRICT NO. 3

REVISIONS

DATE					
BY					



N

LEGEND

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

WEST HAVEN

SCALE 1:31,250

1/2 0 MILE

CONTOUR INTERVAL 20 FEET

1968

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 1

GRANULAR

WEST HAVEN

RUTLAND COUNTY VT. HWY. DISTRICT NO. 3

REVISIONS

DATE						
BY						