SURVEY OF HIGHWAY CONSTRUCTION MATERIALS

IN THE TOWN OF NEW HAVEN, ADDISON COUNTY, VERMONT

prepared by

Engineering Geology Section, Materials Division

Vermont Department of Highways

in cooperation with

United States Department of Transportation

Federal Highway Administration

Montpelier, Vermont

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Acknowledgments

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

1. Various departments and individuals of the Vermont State Department of Highways; notably the Planning Division and Mapping Section and the Materials Division.

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

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

4. United States Department of Commerce, Federal Highways Administration.

History

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

The sources of construction materials are located by this Project through ground reconnaissance, study of maps and aerial photographs and geological and physiographic interpretation. Maps, data sheets and work sheets for reporting the findings of the Project are used to furnish information of particular use to the contractor or construction man. For maximum benefit, the maps, data sheets and this report should be studied together.

Enclosures

Included in this report are two surface-geology maps, one defining the location of tests on bedrock, the other defining the location of tests on granular materials. These maps are based on 15-minute or 7-1/2-minute quadrangles of the United States Geological Survey enlarged or reduced to 1:31250 or 1" = 2604'. Delineated on the Bedrock Map are the various rock formations and types in the township. This information was obtained from: Vermont Geological Survey Bulletins, Vermont State Geologist Reports, United States Geological Survey Bedrock Maps, Centennial Geological Map of Vermont, the Surficial Geologic Map of Vermont and other references.

The granular materials map shows areas covered by various types of glacial deposits (outwash, moraines, kames, kame terraces, eskers, etc.) by which potential sources of gravel and sand may be recognized. This information was obtained primarily from a survey conducted by Professor D. P. Stewart of Miami University, Oxford, Ohio, who mapped the glacial features of the State of Vermont during the summer months from 1956 to 1966. Further information is obtained from the Soil Survey (Reconnaissance) of Vermont (conducted by the Bureau of Chemistry and Soils of the United States Department of Agriculture), Vermont Geological Survey Bulletins, United States Geological Survey Quadrangles, aerial photographs and other sources. On both maps, the areas tested are represented by Identification Numbers. The number and location of tests taken in each area represented by an Identification

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

Also included in this report are data sheets for both the Bedrock and Granular Materials Survey, which contain detailed information for each test conducted by the Project as well as information obtained from an active card file compiled and updated by the Engineering Geology Section of the Materials Division over a period of years. Transfer of information from the cards to the data sheets was made and the location of the deposits was plotted on the maps. However, some cards in the file were not used because of incomplete or unidentifiable information on the location of the deposit. Caution should be exercised wherever this information appears incomplete.

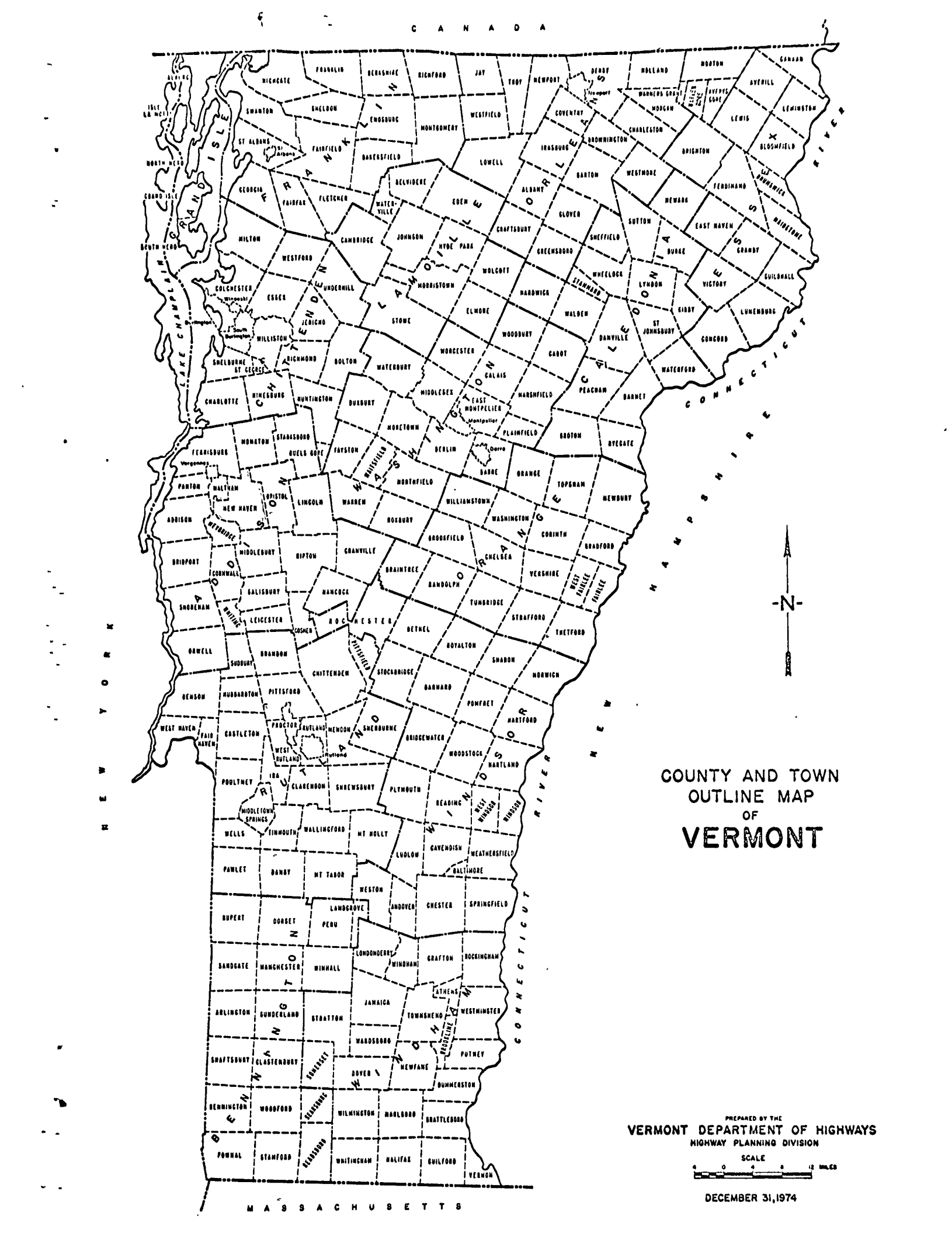
Work sheets, containing more detailed information and a field sketch of the area represented by the Identification Number, and laboratory reports are on file in the Materials Division of the Vermont Department of Highways.

LOCATION

The town of New Haven is situated in the center of Addison County in the west-central part of the state. It is bounded on the north by Ferrisburg and Monkton, on the east by Bristol, on the south by Middlebury, on the southwest by Weybridge, and on the northwest by Waltham. (See County and Town Outline Map of Vermont on the following page).

New Haven lies within the Champlain Lowland subdivision of the New England physiographic province. Topography is characterized by scattered hills on a gently westward sloping plain. Elevations range from 768 feet on a hill top, 1.1 miles northwest of New Haven Mills, to less than 130 feet, where Otter Creek borders the Waltham-New Haven town line.

Drainage is northward via Little Otter Creek and its tributaries, southward and westward via the New Haven River and its tributaries, and southwestward into Otter Creek by an unnamed stream network near the southwest corner of the town.


CANADA
MASSACHUSETTS
NEW YORK
NEW HAMPSHIRE
CONNECTICUT RIVER
LAKE CHAMPLAIN
GRAND ISLE
FRANKLIN
LAMOILLE
ORLEANS
ESSEX
CALEDONIA
WASHINGTON
ORANGE
WINDSOR
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BENNINGTON
RUTLAND
ADDISON
CHITTENDEN
-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.) Complex metamorphic and sedimentary rocks underlie the town of New Haven.

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.

The Rock Materials Map (Plate II) shows that bedrock in the town consists of an intensely folded sequence of dolomites, limestones and quartzites, which were sampled from four quarries, and from two undeveloped sources that may be favorable locations for opening future quarries.

Developed rock sources (quarries) listed are most favorable first: Map Identification Number 1 (Weybridge limestone), 4 (Shelburne Marble and limestone), and 3 (cutting dolomite).

Undeveloped sources are listed more favorable first: Map Identification Number 5 (Monkton quartzite), and 6 (Dunham dolomite).

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

As can be seen on the Granular Materials Map (Plate I), the town of New Haven has a very limited amount of material suitable for Gravel for Sub-base. Probably the most promising area is a kame terrace in the extreme southeast corner of the town; however, no permisssion was given to sample the area. A tiny kame terrace was sampled at Map Identification No. 3, on the east side of the town, and yielded acceptable Sand Borrow and Cushion. Material is not available from this source.

A small amount of acceptable Gravel for Sub-base was found in a shallow, nearly depleted pit at Map Identification No. 2. This material is probably an ablation till.

New Haven is within that part of the Champlain Valley that was inundated by post-glacial Lake Vermont which deposited lacustrine sands, silts and clays. These lake sediment deposits occur at several, small scattered locations and yielded acceptable Sand Borrow and Cushion only at Map Identification No. 1.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF NEW HAVEN

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.

Beldens member of the Chipman formation: Interbedded buff to brown heavily scored dolomite and white to blue-gray marble and limestone.

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

Burchards member of the Chipman formation: Blue-gray limestone with irregular spots of light buff dolomite that give weathered surface a mottled appearance.

Cheshire quartzite: Very massive, white to fairly pink or buff vitreous quartzite near the top in west-central and southwestern Vermont; predominantly a less massive appearing mottled gray, somewhat phyllitic quartzite; dolomitic sandstone and conglomerate near the base of the formation in west-central Vermont apparently grades into the Dalton Formation.

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 near the top.

Crown Point member of the Chazy formation: Lead-gray, compact massive limestone that weathers to gray surfaces; becomes more argillaceous and thinner bedded toward top.

Cutting dolomite: Typically, a massive, gray-weathered, non-descript dolomite with a finely laminated, calcareous sandstone at the base.

Danby formation: Comprised of white vitreous or glassy quartzite beds, often cross-laminated, interbedded with gray dolomite. White quartzite beds, more than a foot thick, separated by 10 to 12 feet of dolomite in eastern areas, increase westward to continuous sections of white to pink-weathered, massively bedded Potsdam quartzite, west of Orwell thrust.

Dunham dolomite: Buff-weathered siliceous dolomite, pink and cream mottled, or buff to gray on fresh surface; lower part is sandy and resembles the Winooski dolomite.

Hortonville-Glens Falls formations (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, carbenaceous, and pyritic slate and phyllite, locally sandy. Brown-weathered limy beds are common in the slates (Hortonville).

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

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

Shelburne formation: Chiefly a white marble or gray limestone characterized by raised reticulate lines of gray dolomite on the weathered surface.

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

Weybridge member of the Chipman formation: Gray limestone with thin interbeds of sandy limestone one-half to two inches thick, and one to four inches apart.

Winooski dolomite: Buff-weathered, pink, buff, and gray dolomite; beds four inches to one foot thick separated by thin, protruding, red, green, and black siliceous partings.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Ablation Till: Rock debris of all particle sizes released by melting glacial ice and deposited with little or no sorting.

Bedding: The arrangement of rock in layers, strata, or beds.

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

Cleavage: A tendency to split or cleave along difinite, smooth, parallel, closely spaced planes. As applied to rocks, cleavage is the property of splitting into thin parallel sheets.

Dip: The angle which a stratum, sheet, vein, fissure or similar geological feature makes with a horizontal plane, as measured in a plane normal to the strike.

Dolomite: As used in this report it applies to rocks approximating the mineral dolomite in composition or consisting predominantly of the mineral dolomite. Mineralogically, dolomite is a mineral of definite chemical composition, Ca Mg $(CO_3)_2$: carbon dioxide 47.7, lime 30.4, and magnesia 21.9 percent.

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

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.

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

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.

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

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

Lacustrine: Pertaining to lakes.

Lake Vermont: The series of lakes that existed in the Champlain Lowland during the recession of the glacier.

Ledge: A shelf-like ridge or projection of rock, usually horizontal and much longer than high.

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

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.

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.

Physiographic: Pertaining to the physical divisions of the earth.

Quartzite: A firm, compact rock composed of grains of quartz so firmly united that fracture takes place across the grains instead of around them. A metamorphosed sandstone.

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

Sandstone: A consolidated rock composed of sand grains cemented together. Sandstone fractures around the grains rather than through them as in quartzites; the broken surface of a sandstone therefore has a gritty feel and loose grains are usually present.

Weathered: Showing the effects of exposure to the atmosphere.

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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, 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 1

New 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
1	1	1975	3-8	0-3	yes	100	100	100	100	20	5		Sand	Owner: Ralph Farnsworth. Area is a small, inactive pit south of town Highway No. 20, 0.41 mile west of State Aid Highway No. 6. Material from this pit was used as a refractory ingredient at local lime kilns. Test No. 1 was in the 6-foot high east face, and 2 feet into the floor. Material was: 3'-8', dry fine-to-medium sand; bottoms, clay and stony hardpan.
2	1	1975	1.5-6	0-1.5	yes	91	83	70	56	12	8		Gravel (Grading only)	Owners: Miss Charlotte Leach and Mrs. Elsie L. Rodgers. Area is an inactive, 320' x 150' pit with 8-foot high face extending to the southwest. Material from pit was used on Town Highway No. 6, 0.35 mile to the southwest, and 1.09 mile north of its junction with Town Highway No. 33. Test No. 1 was in the west face. Material was: 1.5'-6', poorly sorted, loosely consolidated red sandy gravel bottoms, same.
	2-A	1975	1.5-3.5	0-1.5	yes	92	82	51	42	17	13	10.3%	Gran. Borrow (Gravel)	Test No. 2-A was in Pasture 60 feet southwest of pit. Material was: 1.5'-3.5', poorly sorted, loosely consolidated, red, sandy gravel; bottoms, same.

Table 1

New 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	2-B	1975	3.5-9	0-1.5	yes	77	62	43	34	40	30	16.4%	-----	Test No. 2-B was below Test No. 2-A. Material was: 3.5'-9', poorly sorted, loosely consolidated, brown, silty gravel; bottoms, boulders.
	3	1975	1.5-4.5	0-1.5	No	86	79	73	61	7	4	-----	Gran. Borrow (Gravel)	Test No. 3 was in field, 185 feet S.10°W. of test No. 2-A. Material was: 1.5'-4.5', poorly sorted, dirty, tan gravel; bottoms, bedrock.
	4	1975	1-4.5	0-1	yes	100	75	75	71	31	10	-----	Gran. Borrow (Sand)	Test No. 4 was in northeast floor of pit. Material was: 1'-1.5', sandy gravel; 1.5'-4.5', sand; bottom silt-clay.
3	1	1975	2-11	0-2	yes	100	100	86	77	18	8	-----	Sand	Owner: Charles R. Smith. Property was to be sold to Frank Cousino for new house site and requested that no back-hoe tests be dug. Area is a pasture with a narrow excavation in the northeast corner 90 feet west of Town Highway No. 22, and 0.31 mile north of State Aid Highway No. 2. Pit is 35 feet south of property line fence. Test No. 1 was in west face of pit. Material was: 2'-6', fine to medium sand; 6'-8', fine gravel with a few 1" to 2" stones; 8'-11', fine to medium sand.

Table I
Supplement

NEW HAVEN PROPERTY OWNERS - GRANULAR

	Map Identification No.
Farnsworth, Ralph	1
Leach, Charlotte (Miss)	2
Rodgers, Elsie L. (Mrs.)	2
Smith, Charles R.	3

Table II

NEW HAVEN 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	1975	Marble + Limestone	yes	Chip	---	15.7%	Owner: L.A. Demers. Formerly owned by LaRochque then Quesnel. Area is the Haven Construction quarry east of the Vermont Railway, 0.5 mile north of Town Highway No. 6. Quarry is 850' long and with a 215' maximum width 200 feet south of the north end. Recent blasting in south end of lowes level supplied blocks of fresh rock which were sampled. An extensive crushed stone pile was east of quarry. Test No. 1 was taken from east to west across the southern end of the quarry floor. Material is white to blue-gray marb le and limestone of the Beldens member of the Chipman formation.
	2	1975	Marble + Limestone	yes	Chip	---	17.9%	Test No. 2 was taken for 130 feet northward in the southeast corner of the lowest level. Material sampled was similar to that of test No. 1.

Table II

NEW HAVEN 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
2	1-A	1975	Dolomite	yes	Chip	----	20.2%	Owner: O.W. Stone. Area is an inactive quarry in open field 200 feet south of Vermont Route 17 with access road 0.21 mile west of junction with U.S. Route 7. Quarry is 150' x 30' with sporadic outcrops southward, and a 190'-foot long ledge parallel to and west above the quarry. Material is dolomite from the Bascom formation. Test No. 1-A was taken for 65 feet wouth along the northwest end of the quarry.
	1-B	1975	Dolomite	yes	Chip	----	18.3%	Test No. 1-B was south from Test No. 1-A, along the base of the west face for 75 feet.
	1-C	1975	Dolomite	yes	chip	----	20.8%	Test No. 1-C was taken south from Test No. 1-B along the base of the west face and south extension for 75 feet.

Table II

NEW HAVEN ROCK DATA SHEET NO. 3

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	Dolomite	yes	Chip	---	18.6%	Owner: Anthony Bolduc, former owner: Grace Fisher. Area is a small quarry northeast of U.S. Route 7. 0.15 mile long access road joins Route 7 0.1 mile southeast of Town Highway No. 8 junction. Northern part of quarry is nearly full of junk, and southern part has blocks below the south west and south walls. The southwest wall is 130 feet from R.O.W. fence. The Rock was sampled from blocks of the Cutting dolomite and laminated sandstone was noted in the southeast corner of the quarry. Dolomite bedding strikes N.15°W and dips 80° to the NE. Major joint systems dip 86°N.10°E. and 85° S.60°W. Fragments are blocky to sub-angular and seemed fairly hard. Test No. 1-A was taken from blocks along the 65 foot south end of the 25-foot high quarry.
	1-B	1975	Dolomite	yes	Chip	---	22.8%	Test No. 1-B was taken for 85 feet from blocks in the southwest corner.

Table II

NEW HAVEN ROCK DATA SHEET NO. 4

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
4	1-A	1975	Marble	yes	Chip	---	41.4%	Owners: Dennis + Sara Sparling (Former owner: Vermont Associated Lime Industries). Area is a 65 foot high quarry 100 feet northeast of Town Highway No. 20, 0.15 mile southeas of its junction with Town Highway No. 8. There is 150 foot extension remaining north of 100-foot long north face. West face is close to little Otter Creek and has little extension. The 150-foot long east face has much thin-bedded, fissile material. The Rock sampled from blocks below the west and north faces was light gray, thick-bedded marble of the Shelburne formation. The major joint set dips 43° S 60°E. Test No. 1-A was from the blocks along the west wall for 120 feet south to north.
	1-B	1975	Marble	yes	Chip	---	42.5%	Test No. 1-B was taken from west to east for 100 feet along the blocks below the north face. This material would be available. However, a quarry, owned by the Sparlings, southwest of Town Highway No. 20, is now cultivated as a rock garden and permission to sample was refused.

Table II

NEW HAVEN ROCK DATA SHEET NO. 5

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
5	1-A	1975	Quartzite	No	Chip	----	23.6%	Owner: Julius Larrow. Area is a ridge of Monkton quartzite 900 feet long, 200 feet wide, and 54 feet high south of Vermont Route 17, 0.6 mile east of junction with Town Highway No. 6. A possible quarry site would be on the east side of the ridge, 300 feet south of Route 17. Test No. 1-A was taken for 75 feet westward up slope from the major outcrops.
	1-B	1975	Quartzite	No	Chip	----	24.5%	Test No. 1-B continued 120 feet westward along the top of the ridge. Rock was the dark red facies which is thick-bedded. There were two well-developed joint sets; one dips 61° S 75°W, and the other dips 82° S 25°E.

Table II

NEW HAVEN ROCK DATA SHEET NO. 6

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
6	1-A*	1975	Dolomite	No	Chip	---	----	Owner: Melvin A. Cousino. Area is the north end of long ridge 175 feet west of Town Highway No. 22 with access through gate to pasture 0.45 mile north of its junction with State aid Highway No. 2. Ridge extends southward for 650 feet on Cousino's property is 75 feet wide and 80 feet high. Test No. 1-A was taken for 75 feet southward from the north end of the ridge.
	1-B	1975	Dolomite	No	Chip	---	20.4%	Test No. 1-B continued southward for 75 feet. Rock was buff-weathered gray dolomite of the Dunham and has two well-developed joint sets. One set dips 66° N 85°W. and the other dips 35° N 60°E.

* Insufficient stone for wear test submitted

Table II
Supplement

NEW HAVEN PROPERTY OWNERS - ROCK

	Map Identification No.
Bolduc, Anthony	3
Cousino, Melvin A.	6
Demers, Lucien A.	1
Larrow, Julius	5
Sparling, Dennis and Sara	4
Stone, O.W.	2