

1-011-0017

SURVEY OF HIGHWAY CONSTRUCTION MATERIALS  
IN THE CITY OF NEWPORT, ORLEANS COUNTY, VERMONT

prepared by

Engineering Geology Section  
Materials Division  
Vermont Department of Highways

in cooperation with

United States Department of Commerce  
Bureau of Public Roads

Montpelier, Vermont

February, 1967

TABLE OF CONTENTS

Introduction

    Acknowledgements . . . . . 1

    History . . . . . 1

    Inclosures . . . . . 2

Location . . . . . 4

    County and Town Outline Map of Vermont

Survey of Rock Sources

    Procedure of Rock Survey . . . . . 5

    Discussion of Rock and Rock Sources . . . . . 6

Survey of Sand and Gravel Deposits

    Procedure for Sand and Gravel Survey . . . . . 7

    Discussion of Sand and Gravel Deposits . . . . . 8

Summary of Rock Formations in the City of Newport . . . . . 9

Glossary of Selected Geologic Terms . . . . . 10

Bibliography . . . . . 11

Partial Specifications for Highway Construction Materials . Appendix I

Newport City Granular Data Sheets . . . . . Table I

Newport City Property Owners - Granular . . . . . Supplement

Granular Materials Map . . . . . Plate I

Rock Materials Map . . . . . Plate II

### 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.

#### Incllosures

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

Newport City is located in the north-central part of Orleans County which bounds the north-central edge of the State. Newport City is bounded on the east by the town of Derby, on the southwest by the town of Coventry, and on the northwest by the town of Newport. (See County and Town Outline Map of Vermont on the following page.)

Newport City is in the Vermont Piedmont, a characteristically hilly to mountainous terrain, composed mainly of northeast-southwest trending argillaceous and calcareous metamorphic rocks that have been locally intruded by granitic dikes and domes.

Elevations vary from 682 feet at the shore of Lake Memphremagog, which divides the City into two parts, to a height of 1080 feet or more on Pine hill at the eastern town line. Drainage is into Lake Memphremagog via the Black River and minor tributaries.



## 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 obsolescence 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

It should be noted that information on the Rock Materials Map is somewhat simplified. (For a more detailed description of the respective rock formations see the Summary included in this report.) In the Summary it is apparent that complex metamorphic rocks make up all of the formations within Newport City.

No bedrock in Newport City was sampled for Item 204, Sub-base of Crushed Rock. A prior survey of the adjacent town of Derby discovered granitic sources of this Item that are more than adequate for the region. Therefore, Newport City is not considered necessary as a potential source.

## 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 areas 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 (AASHTO T-4-35).

Discussion of Sand and Gravel Deposits

The testing of granular materials within Newport City was restricted to known pits, and not even all of these were sampled.

Granular materials of economic value within the City are chiefly found at higher elevations on both sides of Lake Memphremagog. In general, materials at the higher elevations are coarser and show more evidence of ice-contact origin than those at the lower and middle elevations. Dr. D. P. Stewart in his preliminary reconnaissance of the City mapped as kamic all of the higher features where pits are located. (See Map Identification Numbers 1, 2, 5, 6, 7, and 8.) The Survey is in agreement with all of these areas but has found that the areal extent of his lake-sand designations does not concur with its test results at the lower and middle elevations. In addition, at least one pit (Map Ident. No. 4) and possibly another (Map Ident. No. 3) were not accounted for on his map.

It would seem that at the close of Pleistocene glaciation most granular features were deposited in the Lake Memphremagog region. Kames and kame moraines emarginate to the glacier were emplaced during initial stages of glacial recession. Subsequently, Lake Memphremagog inundated elevations much higher than its present level.

SUMMARY OF ROCK FORMATIONS IN NEWPORT CITY

Waits River Formation (Barton River Member)- Interbedded siliceous crystalline limestone and sericite-quartz-chlorite phyllite in northern Vermont; diopsidic limestone and cordierite hornfels at contacts with granitic dikes and sills. The limestone commonly weathers in places to a brown earthy crust.

Waits River Formation (Ayers Cliff Limestone Member) - Siliceous crystalline limestone containing thin beds of slate and phyllite north of the Lamoille River.

Northfield Formation - Dark gray to black quartz-sericite slate or phyllite with fairly widely-spaced interbeds a few inches thick of siltstone and silty crystalline limestone like that of the Waits River formation; calcareous slate north of the Lamoille River.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Argillaceous - Containing or consisting of clay.

Calcareous - Pertaining to, or containing, calcium carbonate.

Dike - A sheet-like body of igneous rock that fills a fissure in older rocks which it entered while in a molten condition. Varies from less than an inch in width and a few yards in length to thousands of feet in width and many miles in length. May radiate in groups from a center or occur singly and isolated from other igneous bodies.

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

Granitic - Characteristic of, composed of, pertaining to, or like granite.

Hornfels - A general term for very dense, dark-colored, hard, sugary-grained rocks that have been recrystallized by the heat of an adjacent igneous intrusion.

Ice-contact Deposits - Sediments having various topographic expressions that have accumulated in contact with wasting glacial ice. Included are eskers, kame terraces, kames, and features marked by numerous kettle holes.

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

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

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

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

Metamorphic Rocks - Rocks that owe their distinctive characters to the transformation of pre-existing rocks, either 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 gives the rock a silvery appearance.

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

BIBLIOGRAPHY

- A survey of the glacial geology of Vermont being conducted by D. P. Stewart, the partial results of which are published in Vermont Geological survey Bulletin No. 19; 1961.
- Soil Survey (Reconnaissance) of Vermont, W.J. Latimer; 1930; Bureau of Chemistry and Soils, United States Department of Agriculture.
- Soil Exploration and Mapping; 1950; Highway Research Board, Bulletin 28.
- Survey of Highway Aggregate Materials in West Virginia; December, 1959; Engineering Station, West Virginia University, Morgantown, West Virginia.
- Materials Inventory, Bangor Quadrangle, South Half; September, 1959; University of Maine.
- Glacial Geology and the Pleistocene Epoch, R.F. Flint; 1947; John Wiley and Sons, Inc.
- A Handbook of Rocks, J.F. Kemp; June, 1946; D. Van Nostrand Company, Inc.
- Rock and Rock Minerals, L.V. Pirsson; June, 1949; John Wiley and Sons, Inc.
- Glossary of Selected Geologic Terms, W.L. Stokes and D.J. Varnes; 1955; Colorado Scientific Proceedings, Vol. 16.
- Microscopic Petrography, E.W. Heinrich; 1956; McGraw-Hill Book Company, Inc.
- Centennial Geologic Map of Vermont, C. G. Doll; 1961.
- Geology of the Memphremagog Quadrangle and the Southeastern Portion of the Irasburg Quadrangle, Vermont, Charles G. Doll; 1951; Vermont Geological Survey Bulletin No. 3.
- Memphremagog Quadrangle, Vermont; Geological Survey, United States Department of the Interior; Revised 1953.

## 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 complete list of specifications see "Standard Specifications for Highway and Bridge Construction" approved and adopted by the Vermont Department of Highways 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 (9) inch 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 (40) percent 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 AASHO T-4, or more than

forty (40) when tested by AASHO Method T-96.

"The stone portion of the gravel shall be uniformly graded from coarse to fine and the maximum size particles shall not exceed two-thirds (2/3) of the layer being spread.

"The sand portion, when tested by laboratory methods, using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Minimum Percent of Stone	Percent Passing Square Openings No. 100	Percent Passing Square Openings No. 270
40	0-15	0-3
50	0-15	0-4
60	0-15	0-5
70	0-15	0-6

"The sand shall show a color of not more than three and one-half (3½) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

Item 202, Sub-base of Sand

"Article 202.02 Materials. The sand shall consist of material reasonably free from silt, loam, clay or organic matter. It shall be obtained from approved sources and meet the following requirements:

"The sand, when tested by laboratory methods, using Method AASHO T-27, shall meet the grading requirements set up in the following table:

Square Openings	Percent Passing
1½"	95-100
5/8"	80-100
No. 4	70-100
No. 100	0-18
No. 270	0-5

"The sand shall show a color of not more than three and one-half ( $3\frac{1}{2}$ ) 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, 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
1 $\frac{1}{2}$ "	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	4"	100
	Item 205-A	No. 4	25-50
	Fine-Graded	1½"	95-100
	Item 205-B	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 (35), 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 (3½) as determined by the colorimetric test described in the AASHO Method of Test, Designation T-21."

TABLE I

## NEWPORT CITY GRANULAR DATA SHEET NO. 1

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Overburden (Ft)	Existing 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	1966	3-13	0-3	Yes	76.1	68.6	55.5	9.0	3.8	1	20.5%	Gran. Borrow (Grav.)	Owner: Arthur Palin. Area contains a pit about 0.25 mile N-30-W of barn. Feature is an ice-contact deposit with an occasional boulder, many small cobbles, and lenses of cobbles and coarse gravel imbedded in cross-bedded sands. Feature appears to be part of a large rounded ridge trending north-west from pit. Test #1 represented upper part of south-east face. Material is cobbly gravel with sand and cementation which barely fails to meet grading requirements for Item 201 because of a slight excess passing the #270 sieve. It meets requirements for Item 105.
	2	1966	2-20	0-2	Yes	47.3	41.7	29.3	14.0	8.0	1½	---	Gran. Borrow (Grav.)	Test #2 represented southwest face. Material is similar to that of Test #1 but matrix has more silt or clay. It fails to meet grading requirements for Item 201 because of an excess passing the #270 sieve. There was insufficient proper size stone for percent of wear test. It meets requirements for Item 105.
2	1	1966	2.5-27.5	0-1	Yes	55.0	47.6	34.6	22.0	8.0	1	21.4%	Gran. Borrow (Grav.)	Owner: Mrs. Marjorie Meader. Area contains a pit behind new houses east of the intersection of Robin Hill Street with Severens Drive. This pit ex-

\*Percentage of Total Sample

TABLE I

NEWPORT CITY 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
						1 1/2"	5/8"	#4	#100	#270				
														poses ice- contact deposition as is evidenced by boulders and an extensive cobbly gravel deposit of irregular outline in the north end. Relief appears to be the expression of the western edge of an extensive kame moraine that could extend one-half mile east to Map Identification No. 1. Test #1 was at north end of pit. Material is 0-1' sod; 1'-9.5' cobbly gravel; 9.5'-27.5' silty-sand with stones. It fails to meet grading requirements for Item 201 because an excess passes the #100 and #270 sieves. It meets requirements for Item 105.
3	1	1966	29-53	0	Yes	100	100	100	86.0	35.0*	1	---	---	Owner: Otil Leitheid. Area contains a pit that is located east of the intersection of Hill Street with Cliff Street. This pit probably exposes a lake sand deposit. The face consists principally of horizontally oriented fine and silty sand beds with cross-bedding, and a large cobbly-gravel lens near the top. Upper 29 feet of face was inaccessible. Test #1 was of lower north-central face. Material sampled is principally silty-sand with silty-clay

\*Percentage of Total Sample

TABLE I

## NEWPORT CITY GRANULAR DATA SHEET NO. 3

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Overburden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														present. It fails to meet requirements for Item 105.
4	1	1966	0.5-16	0-0.5	Yes	89.3	78.8	50.3	12.0	4.0	1	19.8%	Gran. Borrow (Grav.)	Owner: John Labrecque. Area contains a pit southwest of house on State Aid Highway #2 (Lake Road). Pit apparently exposes an ice-contact deposit. Test #1 was in south face. Material consists of fine gravel interbedded with fine sand and having silt or clay toward the bottom. It barely fails to meet gradation requirements for Item 201 because of a slight excess passing the #270 sieve. It is acceptable for Item 105.
	2	1966	0-4	0	Yes	82.1	67.4	39.7	7.0	3.0	1	---	Gravel	Test #2 was of lift level in center of pit. Material consists of gravel with a diagonal sand layer. It meets grading requirements for Item 201. There was insufficient proper size stone for percent of wear test.
5	1	1966	12-51	0-12	Yes	100	100	88.7	7.1	2.0 1.8*	1	---	Sand	Newport City Pit. Area contains a large pit south of Vt. Rte. #105 near hospital. Test #1 was in center of south face. Material has enough ice-contact characteristics to indicate possible kame moraine origin. Material is 0-12' silt (not sampled); 12'-37' medium sand with a few pebbles; 37'-51' cobbly

\*Percentage of Total Sample

TABLE I

## NEWPORT CITY GRANULAR DATA SHEET NO. 4

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Overburden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
														and pebbly sand and fine gravel. It meets requirements for Item 202.
6	1	1966	85.5-93	See Test #2 & #3	Yes	100	100	98.4	17.8	3.0 2.9*	1	---	Sand	Owner: Madeline Collins. This is a pit area east of the Newport City pit (Map Identification No. 5). Test #1 was in face of lift level at west end of deep pit. Material is 85.5'-87' pebbly sand; 87'-93' fine sand. One foot of silty sand at bottom was not sampled. It meets the requirements for Item 202.
	2	1966	3-46	0-3	Yes	100	94.2	80.3	4.0	2.0 1.6*	1	---	Sand	Test #2 was in upper part of south face. Material is 3'-33' coarse or medium sand with pebbles; 33'-46' interbedded sands and fine gravels. It meets requirements for Item 202.
	3	1966	46-90	See Test #2	Yes	95.0	88.6	71.4	3.6	2.0 1.4*	1	---	Sand	Test #3 was in west-facing west end of south face. Material is 46'-49' sand; 49'-90' pebbly to gravelly sand. It meets requirements for Item 202.
7	1	1966	1-27	0-1	Yes	69.4	45.1	17.3	6.0	3.0	1	15.0%	Gravel	Owner: Evangeline Lewis. (Leased from Judge Andrew Pepin) Area contains a double-level pit immediately south of the intersection of State Aid Highway #4 (Glen Road) with Well Street. This pit shows evidence of both lake sand and ice-contact deposition.

\*Percentage of Total Sample

TABLE I

## NEWPORT CITY GRANULAR DATA SHEET NO. 5

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Overburden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	2	1966	1-35	0-1	Yes	100	100	97.0	39.8	13.0 12.6*	1	---	---	Upper face has exposures of coarse gravel lenses with much washed-in overburden. Test #1 was in center of upper face. Material is 1'-5' pebbly sand; 5'-27' silty gravel. It meets requirements for Item 201. Test #2 was in center of lower face, which has bedded lake sands that are truncated by cobbly gravel wedges in some places. Material is 1'-3' pebbly sand; 3'-35' cross-bedded silty sand with clay layers. It fails to meet the requirements for Item 105.
8	1	1966	3-57	Stripped	Yes	90.3	76.8	49.5	7.0	2.5	1	14.4%	Gravel	Owner: Sisters of Charity. (Sacred Heart Convent) (Paul Bouffard leases east end of pit.) Eastern one-third of pit consists of ice-contact gravels and silty clayey truncated sands. Test #1 was below a point on east face that was estimated to be 63' high. Material is 0-10' pebbly sand; 10'-57' gravel becoming dirtier and more clastic with depth. It is acceptable for Item 201.
	2	1966	2-38	Stripped	Yes	71.1	58.5	34.0	4.0	2.0	1	---	Gravel	Test #2 was below point on east face about 50' north of Test #1. Material is coarser with less sand than Test #1. It meets grading requirements for Item 201. There was in-

\*Percentage of Total Sample

TABLE I

## NEWPORT CITY GRANULAR DATA SHEET NO. 6

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Overburden (Ft)	Existing Pit	Sieve Analysis % Passing					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						1½"	5/8"	#4	#100	#270				
	3	1966	12-39	0-4	Yes	100	100	99.2	5.0	1.5*	1	---	Sand	sufficient proper size stone for percent of wear test. Test #3 was in west-center of south face. Material is 0-4' sod; 4'-12' fine sand with pebbly layers (not sampled because of inaccessibility); 12'-39' fine to medium sand with a few thin pebbly sand beds. It meets requirements for Item 202.
9	1A	1966	62-47	See Remarks	Yes	100	100	99.3	65.5	7.8 7.7*	1	---	Gran. Borrow (Sand)	Owner: Judge Andrew Pepin. Area consists of high bluff overlooking South Bay on State Aid Highway #4 (Glen Road). A 187' vertical section of interbedded fine sands, pebbly sands, and clay seams was measured; but only the lower one-third was sampled. Material becomes finer toward the base and there are ripple marks and clay pebbles. It would appear that this section is glaciolacustrine in origin. Test #1A was comprised of fine-silty sand, 15' in thickness. It fails requirements for Item 202 because of an excess passing the #100 and #270 sieves. Material is acceptable for Item 105.
	1B	1966	47-26	See Test 1A	Yes	100	100	95.9	48.0	10.0 9.6*	1	---	---	Test #1B consisted of pebbly fine sand, 21' in thickness. It fails requirements for Item

\*Percentage of Total Sample

TABLE I

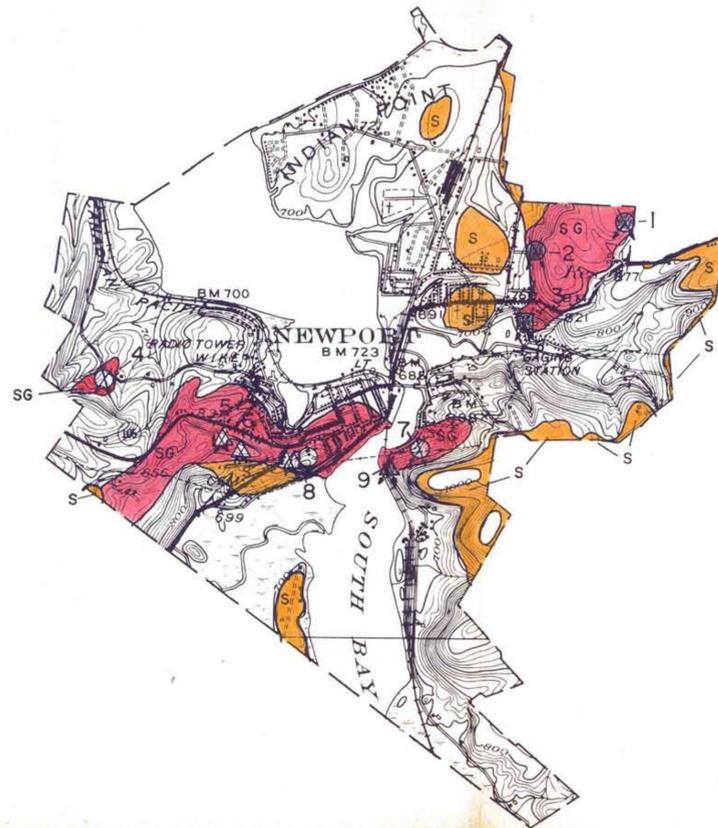
## NEWPORT CITY GRANULAR DATA SHEET NO. 7

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over- burden (Ft)	Exist- ing Pit	Sieve Analysis					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						% Passing								
						1½"	5/8"	#4	#100	#270				
	1C	1966	26-5	See Test 1B	Yes	100	100	98.4	66.9	19.0 18.7*	1	---	---	105 because of an excess passing the #100 and #270 sieves. Test #1C consisted of fine sand with clay pebbles and clay beds. It fails requirements for Item 105 because of an excess passing the #100 and #270 sieves. There are two small pits at the base of the bluff. Above the measured section material contains much cementation with gravel, cobbles, and hematite-limonite zones. There is also a good deal of silt evident, some bedded and some sloughed over emplaced material.

\*Percentage of Total Sample

TABLE I  
Supplement

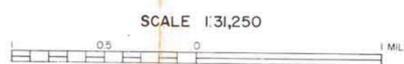
CITY OF NEWPORT PROPERTY OWNERS - GRANULAR	Map Ident. No.
Bouffard, Paul	8
Collins, Madeline	6
Labrecque, John	4
Leitheid, Otil E.	3
Lewis, Evangeline	7
Meader, Marjorie	2
Newport, City of	5
Palin, Arthur	1
Pepin, Andrew	7, 9
Sisters of Charity (Sacred Heart Convent)	8



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
- 3 IDENTIFICATION NUMBER (refer to data sheets)

NEWPORT CITY



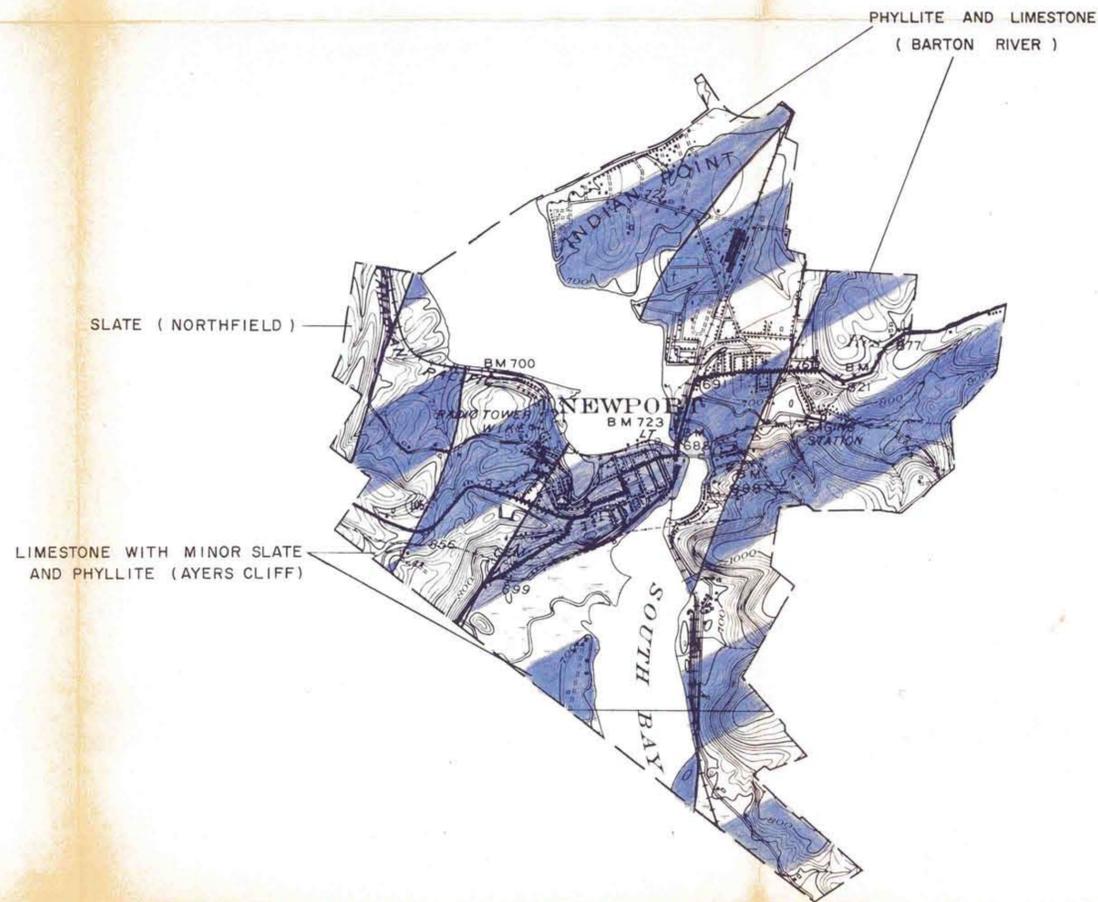
CONTOUR INTERVAL 20 FEET

1967

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

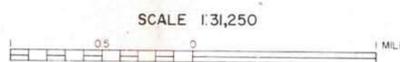
DATE					
BY					



LEGEND

-  ROCK, ACCEPTABLE FOR ITEM 204 (sub-base of crushed rock)
-  ROCK, NOT ACCEPTABLE FOR ITEM 204
-  EXISTING QUARRY
-  GRANITE TO DIORITE (light to intermediate igneous rocks)
-  AMPHIBOLITE, GABBRO, DIABASE, METADIABASE, GREENSTONE, TRAP DIKES (basic or dark igneous rocks)
-  PERIDOTITE, PYROXENITE, SERPENTINITE (ultra-basic igneous rocks)
-  GNEISS
-  QUARTZITE
-  DOLOMITE
-  MARBLE, LIMESTONE
-  SCHISTS, SLATES, PHYLLITES, SHALES, CONGLOMERATES
- 3** IDENTIFICATION NUMBER (refer to data sheets)

NEWPORT CITY



CONTOUR INTERVAL 20 FEET

1967

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

DATE					
BY					