[illegible] CONSERVATION [illegible]

[illegible] OF [illegible], [illegible]

Prepared by

[illegible] Survey Section, [illegible]

[illegible] Department of Highways

in cooperation with

United States Department [illegible]

Bureau of Public [illegible]

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

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

3. Prof. Charles G. Doll, Vermont State Geologist, University of Vermont, Burlington, Vermont.

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

History

The Material 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 object was to compile an inventory of highway construction materials in the State of Vermont. Prior to the efforts of the personnel of this survey as described in this and other reports, searches for highway construction material 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 on their respective projects and have samples tested by the Highway Testing Laboratory. The additional cost of exploration for construction material is passed on to 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, keeping in mind their intended use. The 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 quadrangles of the United States Geologic Survey enlarged 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; i.e., Vermont Geological Survey Bulletins, Vermont State Geologist Reports, United States Geological Survey Bedrock Maps, as well as other references. The Granular Materials Map depicts areas covered by various types of glacial deposits (outwash, moraines, kames, kame terraces, etc.) by which potential sources of gravel and sand may be recognized. This information was obtained primarily from a survey being conducted by Prof. D. P. Stewart of Miami University, Oxford, Ohio who, since 1956, has been mapping the glacial features of the State of Vermont during the summer months. 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 tested or by 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, including an active card file compiled by the Highway Testing Laboratory. It was readily apparent that 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 in the cards varied widely in completeness. Transfer of information from the cards to the Data Sheets was made without elaboration or verification. The locations of the deposits listed in the card files have also been plotted on the maps. However, caution should be exercised wherever this information appears incomplete. Some cards in the file were not used because the information on the location of the deposit was incomplete or unidentifiable. This project does not assume responsibility for the information taken from the card files.

Work Sheets containing more detailed information of each test including a detailed sketch of each Identification Number Area are on file in the office headquarters of the Project, together with the respective Laboratory Reports.

Location

The Town of Colchester is located in Chittenden County in the northwest section of the state, on Lake Champlain, approximately 30 miles south of the northern

boundary of the state. For the purpose of this report, the City of Winooski is included with the Town of Colchester. The town is bounded on the north by Milton, on the east by Essex, on the south by the Winooski River, and on the west by the Lake. It is in the "Champlain Valley" physiographic division, an area of relatively smooth relief. The western half of the valley is fairly level, broken mainly by shallow stream valleys, which in places are V-shaped. The land is well-drained except for the marshlands along Lake Champlain.

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; the 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. Since, at present, the mapping of bedrock geology in the State of Vermont is incomplete, 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 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 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. Should the result of this test prove satisfactory, further samples are taken by drilling to a depth of 3 feet and blasting across the strike or trend of the outcrop. Occasionally, because of the uniformity of the material and a satisfactory test result from the chip sample, no further drilling, blasting, or sampling is done, and the material source is included as being satisfactory.

Discussion of Rock and Rock Sources

In general, the area included in this report is comprised chiefly of dolomites, limestones and quartzites, of which the dolomites predominate. These rocks are found in ten different formations, the Dunham Dolomite, Monkton Quartzite, Winooski Dolomite, Danby Formation, Clarendon Springs Dolomite, Shelburne Marble, Georgia Slate, Parker Slate, Gilman Quartzite, and West Sutton Formation, from west to east.

The Dunham Dolomite extends along a north-south strike, north and south of Malletts Bay, including Malletts Head and Coates Island. It dips rather gently to the east, extending almost to the eastern shore of Malletts Bay, and is about 2 miles wide (east to west). The rock is a red to buff-colored siliceous dolomite (in general, meeting the abrasion requirements for sub-base of crushed rock, Item 204, according to the Vermont Department of Highways specifications). Identification No. 4, as shown on the Rock Map is representative of this dolomitic rock.

East of the Dunham Dolomite, the Monkton Quartzite outcrops along a north-south strike, dipping easterly. Approximately ½ mile in width (east-west), the Monkton forms the eastern shoreline of Malletts Bay, extending from the northern to southern boundaries of the town. There are many good outcroppings of the Formation, particularly in the northern part of Colchester. This rock is very hard and has good abrasion qualities. The quartzite sampled, as denoted by Identification Nos. 3, 5, and 13 on the Rock Map, is from the Monkton Formation, and has percent of wears ranging from 2.0% to 3.2%.

East of the Monkton Quartzite is the Winooski Dolomite, another north-south striking formation, dipping easterly. Just west of Colchester Village and extending northward it is approximately one mile in width (east-west). It extends from the northern boundary of the town of Colchester, including Chimney Corner, to far below the southern boundary, through Winooski City. The rock is a light-gray colored dolomite, in places separated into thin beds by thin dark siliceous partings. Identification Nos. 2, 6, 7, and 10 are representative of the Winooski Dolomite, abrasions ranging from 2.4% to 3.4%.

The Danby Formation occurs east of the Winooski Dolomite. Pinching out appreciably at the southern boundary of Colchester, the Danby widens at the northern boundary, and reaches its greatest width north of Colchester Village. The Danby Formation consists of interbedded quartzites and dolomites, strikes north-south, and dips easterly. Identification Nos. 11 and 12 are representative of the dolomites in the Danby Formation, having a percent of wear of 5.0% and 3.0% respectively.

The third formation of dolomites is the Clarendon Springs Dolomite, east of the Danby Formation. Running from the southern boundary of Colchester, and including the Winooski Reservoir, the Clarendon Springs Dolomite widens out above

Colchester Village, which it includes, and dies out about ½ mile from the northern boundary of Colchester. The rock is a massive, smooth-weathering gray dolomite characterized by numerous geodes and knots of white quartz. The Clarendon Springs Formation outcrops sporadically along its north-south strike. Identification No. 9 is representative of the formation, abrasion being 2.8%.

The Shelburne Marble Formation occurs at the eastern end of Colchester Village, and extends north for approximately half a mile, pinching out southward for about one and one-half miles. Another area of Shelburne Marble occurs from the Fort Ethan Allen Reservation Boundary south to, and including St. Michael's College. Shelburne Marble is defined as white marble, dove-colored limestone, or light-gray dolomite. Identification No. 8 on the Rock Map is representative of the northern exposure. In this case, the rock is a gray dolomite, percent of wear being 4.6%.

The next formation encountered in the Town of Colchester is the Georgia Slate. It strikes generally north-south, along the Central Vermont Railroad just west of Colchester Pond. This formation is comprised of dark slates and limestone pebble conglomerates. Due to the poor abrasion qualities, softness, and tendency to split into thin elongated pieces, the rock type was not sampled.

Continuing eastward, the rock formation becomes more complex. In the area north and south of Colchester Pond is the Gilman Quartzite which is a white-to-gray-weathering quartzite or an impure quartzite. Within the boundaries of the Gilman Quartzite are outcrops of the Dunham Dolomite and Parker Slate Formations. No samples were taken from the Gilman Quartzite because of the lack of accessible outcrops. The Gilman Quartzite is bounded on the east by two formations, the Parker Slate and the West Sutton. The Parker Slate borders the Gilman to the north, and the West Sutton Formation borders it on the south.

The Parker Slate is comprised of black to gray slates which are interbedded with sandy layers in places. Due to the poor abrasion qualities, tendency to split in flat elongated pieces, and the lack of uniformity, this rock was not sampled.

The West Sutton Formation is similar to the Parker in that it is comprised of gray-black shale or phyllite which is extremely variable. No samples were taken in this rock for the same reasons that none were taken in the Parker Slate.

Just east of the Parker Slate Formation, in the extreme northeastern corner of Colchester is a reoccurrence of the Dunham Dolomite. It can be assumed that the properties of the rock here are somewhat similar to the Dunham Dolomite occurring farther to the west.

At the time of this report, there are two commercially operating quarries in the town, denoted on the map as Identification Numbers 1 and 2. The samples taken in the town are intended to be representative of the various rock formations. It should not be assumed that acceptable sources of rock are limited to the Identification Numbers herein described. With the aid of the Bedrock Map, other sources may be located. For example, west of Station 2290 of the proposed Interstate, there appears to be a likely source for Item 204, in a low ridge of Monkton Quartzite.

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 Prof. 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, when known, are mapped. 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 at a depth of approximately 12 feet and again 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 of this area are found primarily in marine deposits and are predominantly sands. The sand shown on the Granular Map ranges from fine to pebbly. The best sand occurs in the area north of Half Moon Cove, south of Malletts Bay, and west of Malletts Bay Avenue. It is represented by Identification Numbers 15, 16, 18, & 20. Two other good sand areas were found; one on the route of the Interstate system in the vicinity of the Winooski Reservoir and the other in the extreme northwestern corner of the town, from Walnut Ledge to Great Back Bay. The area adjacent to the Winooski City Reservoir, as indicated by Identification Numbers 28, 29, & 30, is quite shallow. The area in the northwest part of town contains some good sand which may not be available due to the building

up of this area as a vacation spot. Much of the remaining sand, as mapped, is too fine for sub-base of sand (Item 202), but is acceptable for granular borrow (Item 102A). However, sand acceptable for Item 202 may possibly be found elsewhere in the sand areas.

There are six small areas of sand and gravel as shown on the Granular Map, which are of marine origin. Three of these areas could not be verified in the field, and a fourth was the site of a country club golf course. These areas contain no Identification Numbers on the map. The other two areas were sampled; one area (see Identification No. 4) contains a limited amount of gravel acceptable for Item 201, and the other (Identification Numbers 17 & 19) contains acceptable sand (Item 202 and granular borrow, 102A).

This sand and gravel area, the largest shown on the map, does have gravel in it, which has previously been used. None of the material sampled in this area in 1960 passed the specifications for Item 201 (sub-base of gravel).

Glossary of Selected Geologic Terms

Alluvial--Pertaining to material carried or laid down by running water.

Breccia--A rock consisting of consolidated angular rock fragments larger than sand grains.

Calcareous--Consisting of or containing calcium carbonate. As combined with rock names indicates a considerable proportion, say 50 percent, of calcium carbonate together with an equal or predominant amount of the material indicated by the rock name.

Delta--A predominantly alluvial deposit built out by a stream into the sea or other body of water. Usually having the typical form of the Greek letter delta.

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.

Drift--Rock material of any sort deposited in one place after having been moved from another; as river drift. Specif., a deposit of earth, sand, gravel, and boulders, transported by glaciers (glacial drift) or by running water emanating from glaciers (fluvio-glacial drift) and distributed chiefly over large portions of North America and Europe, esp. in the higher latitudes.

Dune--A heap of sand or other material accumulated by wind. The outward form may be that of a hill or a ridge.

Fluvial--Pertaining to streams or stream action.

Geode--As applied in this report, a rock cavity lined with crystals that are not separable from the surrounding rock.

Gneiss--A term originally applied to a more or less banded metamorphic rock with the mineral composition of granite. As now employed it designates a foliated metamorphic rock with no specific composition implied, but having layers that are mineralogically unlike and consisting of interlocking mineral particles that are mostly large enough to be visible to the eye. Usually gneiss displays an alteration of granular minerals and tabular or schistose minerals with the rock, tending to split along the planes where tabular or schistose minerals predominate.

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

Kame Terrace--An accumulation of stratified drift laid down chiefly by streams between a glacier and an adjacent valley wall.

Lacustrine--Pertaining to lakes.

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

Marine Deposits--Sedimentary deposits laid down in the sea.

Megascopic--Characters of a material that can be perceived by the unaided eye.

Metamorphic Rocks--Rocks that owe their distinctive characters to the transformation of pre-existing rocks, either through intense heat or pressure or both.

Moraine--An accumulation of drift with an initial topographic expression of its own built within a glaciated region chiefly by the direct action of glacier ice.

Normal--Perpendicular to a surface.

Outwash--Stratified drift that is stream built beyond the glacier; laid down by meltwater streams issuing from the face of the glacier ice.

Pleistocene--The first epoch of the Quaternary Period, in general including the time and deposits of the last great glacial epoch, marked by repeated glacial advances and world-wide fluctuations of the sea level.

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.

Schist--A crystalline rock with a secondary foliation or lamination based on parallelism of platy or needle-like grains. The name refers to the tendency to split along the foliation.

Schistosity--The property of a foliated rock by which it can be split into thin layers or flakes. The property of splitting may be due to alternating layers of differing mineral composition or to preferred orientation and parallelism of cleavage planes of the mineral.

Siliceous--Containing or pertaining to silica (Silicon dioxide, SiO_2) or partaking of its nature.

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

Strike--The direction of a line formed by the intersection of a stratum with a horizontal plane.

Surface-geology Map--A map showing areas of outcrop of geologic formations, both consolidated rocks and the unconsolidated sediments. Its scale is large enough that pits and quarries can be accurately shown and indexed.

Terrace--A plain, natural or artificial, from which the surface descends on one side and ascends on the other. Terraces are commonly long and narrow, and they border seas, lakes, or interior valleys. A terrace may be built by deposition of sediment from water, it may be cut by the breaking of waves on a shore or the sweeping of currents, or it may be formed by the dislocation of rocks in crustal movements. The descent from river terraces toward the river may be very abrupt, especially in arid regions, the ascent on the other side may be only that of an extensive alluvial slope.

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

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COLCHESTER GRANULAR DATA SHEET NO. 1

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
1	1	1960	0.5-6	0-0.5	Yes		100	95.8	10.5	1.0	2	—	Sand	Owner: Camp Kiniya. (John Williams). Camp is built on sandy terrace. Test #1 taken in small pit across camp road from stables.
	2	1960	0.5-5	0-0.5	No		100	93.6	0.9	0.5	2	—	Sand	Test #2 taken at junction of stable road & road to main camp. Material passes for Item 202 (sub-base of sand). Owner not interested in selling at this time.
2	1	1960	0.5-6	0-0.5	No		100	96.9	2.9	0.5	1	—	Sand	Owner: Buff Ledge Camp. Test was taken near riding trail connecting Winnisquam Orchard road & Camp Kiniya road. Sand is uniformly graded coarse sand passing for Item 202.
3	1	1960	0-1.5	1.5-6.5	Yes		—	28.1	11.0	6.5	1	29.6	Gran. Borrow	Owner: Tousey. This is an old beach gravel deposit mostly depleted. Ledge bottom. Test taken in southeast face. Material rejected for 201 (sub-base of gravel) ok for Item 102A (granular borrow). Town has gravel right here.

COLCHESTER GRANULAR DATA SHEET NO. 2

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
4	1	1960	1-6.5	0-1	Yes		—	22.3	11.0	4.0	1	14.4	Gravel	Owner: William Darby. A series of shallow pits in an old beach. Test taken in southernmost pit. Material shallow--ledge showing, nearly depleted. Sample passed for Item 201 (sub-base of gravel).
5	1	1960	—	—	—		—	Not Sampled		—	—	——	——	Owner: Lucien Demers. This is a wash plant in an old pit area. A presumed source of fine granular materi
6	1	1960	2-9	0-2	Yes		100	96.9	10.0	0.5	1	——	Sand	Owner: Wilcox. This pit has been used as a source of hwy. mate rials. Test taken in south face. Sample passed for Item 202.
7	1	1960	0.5-4.5	0-0.5	No		100	99.6	16.9	3.2	3	——	Gran. Borrow	Owner: Town of Colche ster. This test was taken at edge of town road to show quality of sand throughout this area. Too fine for Item 202, but ok for 102A (gran. borr
8	1	1960	0.5-5	0-0.5	No		100	97.6	6.8	1.0	3½	——	Sand	Owner: Town of Col-chester. Test taken edge of town road to

COLCHESTER GRANULAR DATA SHEET NO. 3

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
														show quality of sand in this area. Acceptable for Item 202 (sub-base of sand).
9	1	1960	2-20	0-2	Yes		100	100	—	10.5	—	—	Gran. Borrow	Owner: Golden Glow Cabins. This is a ver small pit with bands of very fine sand and medium coarse sand.
10	1	1960	0.5-6	0-0.5	No		100	97.4	18.5	5.6	3	—	Gran. Borrow	Owner: R. H. Smith. This is a very small pit in the same sand area as Ident. #11 & #12. Test taken in north end of pit. Rejected for Item 202, ok Item 102A.
11	1	1960	0-9	0	No		100	100	—	20.5	—	—	Borrow	Owner: Curtis. Material just meets requirements for borro Item 102. (33.4% pas ing #200 screen, 35% maximum).
12	1	1960	0.5-4	0-0.5	No		100	100	56.0	18.8	3	—	—	Owner: Barcomb. This material is too fine for Item 102A (granu lar borrow).
13	1	1960	1-6	0-1	No		100	100	3.0	0.75	2½	—	Sand	Owner: B. A. Meunier This material is lim ed by bedrock outcro Acceptable for Item 202.

COLCHESTER GRANULAR DATA SHEET NO. 4

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing 1½"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
14	1	1960	1-3	0-1	No		100	100	4.0	7	2	—	Gran. Borrow (Sand)	Owner: Brigante. Test taken 100' left of Sta. 2384+00 (left lane) of I 89. Rej. for sand, Item 202, passes for granular borrow (Item 102A).
15	1	1960	1-6	0-1	No		100	97.0	2.8	0.5	2	—	Sand	Owner: Vince Mulac. This test taken to show quality of sand in this area. Sand from this particular site not available. Acceptable for Item 202 (sub-base of sand)
16	1	1960	0.5-5	0-0.5	Yes		100	98.9	2.0	0.5	1½	—	Sand	Owner: Hazelett Corp. This is a large sand area perhaps 20 to 40' deep. Several large pits dot the area. Acceptable for Item 202.
17	1	1960	1-10	0-1	Yes		—	17.1	11.0	4.5	1	27.0	Gran. Borrow (Grav.)	W. E. Paya. Test #1 taken in south face of pit. Only possible extension in this direction. Ledge exposed in east face, water standing on floor. Area west of pit is sand.
	2	1960	3-9	0-1	No		100	98.4	15.0	1.0	1	—	Sand	Test #2 is 50' south of pit 1-3' gravel (not sampled). 3-9'

COLCHESTER GRANULAR DATA SHEET NO. 5

Client. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing 1½"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
	3	1960	1-4	0-1	No		—	25.5	11.0	3.8	2	28.0	Gran. Borrow (Grav.)	(sand). Acceptable for Item 202 & 102A. Test #3 taken 126' SE of pit.
	4	1960	1-4	0-1	No		—	Not Sampled		—	——	—	—	Test #4 taken 250' SE of #3. Material is sand and stone.
	5	1960	2.5-6.5	0-2.5	No		100	96.7	8.0	0.3	1	—	Sand	Test #5 taken 95' south of #4. Acceptable for Item 202.
	6	1960	1.5-8	0-1.5	No		—	39.9	15.0	5.5	2	29.4	Gran. Borrow (Grav.)	Test #6 fails for Item 201.
18	1	1960	0.5-5	0-0.5	No		100	91.7	10.1	2.8	3½	—	Sand	Owner: G. Sheppard. This is part of an extensive sand area south of Mallets Bay. Acceptable for Item 202.
19	1	1960	2-5.5	0-2	Yes		—	28.4	8.0	3.0	1	30.6	Gran. Borrow (Grav.)	Owner: J. J. Wright. Test taken in westernmost pit. Water standing in bottom. Rejected for Item 201 ok for 102A. Material mostly depleted.
20	1	1960	2-20	0-2	Yes		100	100	33.0	5.5	1	—	Gran. Borrow (Sand)	Owner: I. Mercier. Test #1 was taken in pit behind Mercier house. This is a very fine sand. Too fine for Item 202.

COLCHESTER GRANULAR DATA SHEET NO. 6

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
	2	1960	0.5-15	0-0.5	Yes		100	88.1	1.8	0.2	2	--	Sand	Test #2 was taken in small pit near Fuller house at higher elevation than pit at Mercier house. Material acceptable for Item 202.
21	1	1960	0.5-5	0-0.5	No		100	100	29.0	1.8	2½	--	Gran. Borrow (Sand)	Owner: Leonel N. Paquette. Test taken at edge of road but represents large sand area adjacent to I 8 Rejected for Item 20 but ok for Item 102A.
22	1	1960	0.5-5	0-0.5	No		100	100	21.0	2.3	2	--	Gran. Borrow (Sand)	Owner: Leonel N. Paquette. Test taken at Sta. 2345+50 I 89. Rejected (too fine) for Item 202, but ok for Item 102A.
23	1	1960	1-5	0-1	No		100	100	22.0	4.3	2	--	Gran. Borrow (Sand)	Owner: Sam Mazza. Th is a ridge of fine sandy material gradi to silt & clay at th bottom. Rejected for sand, Item 202. Acceptable for Item 10
24	1	1960	1.5-3.5	0-1.5	No		100	97.1	--	8.2	--	--	Gran. Borrow	Owner: Thomas Fitzgerald. Test #1 take at east end of Pine Island.

COLCHESTER GRANULAR DATA SHEET NO. 7

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing 1½"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
	2	1960	1.5-6.0	0-1.5	No		100	85.8	3.4	0.4	2	—	Sand	Test #2 taken 50' NW of #1. Test #2 acceptable for Item 202, (sub-base of sand).
25	1	1960	0.5-5	0-0.5	Yes		100	100	16.0	4.0	2	—	Gran. Borrow (Sand)	Owner: O. J. Thibault This is an old pit in a granular knoll. Test #1 taken in 15' face (south). Sand rejected for 202, ok for 102A.
	2	1960	0.5-3	0-0.5	Yes		—	76.8	6.0	2.5	3	—	Gran. Borrow (Grav.)	Test #2 taken in lower portion of pit on east edge. Material rej. for 201 (not enough stone) ok for 102A. Clay-silt bottom.
	3	1960	1-8	0-1	Yes		100	99.2	19.8	0.4	2	—	Gran. Borrow (Sand)	Test #3 taken in south face, at highest point 20' west of #1. Seems to be an acceptable source of gran. borrow Item 102A.
26	1	1960	0.5-4.5	0-0.5	Yes		—	70.8	12.0	4.5	3	—	Gran. Borrow (Sand)	Owner: Mrs. A. S. C. Hill. This is a pebbly sand area on the edge of a fine sand area. Small pit has 5' face with alternate bands of gravel, sand & fine sand. Floor of pit is sand. Test #1 taken in north face of pit.
	2	1960	0.5-5	0-0.5	Yes		100	92.0	2.8	0.5	4	—	Gran. Borrow	Test #2 taken south of Test #1 in floor. Rej

COLCHESTER GRANULAR DATA SHEET NO. 8

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Existing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing 1½"	#4	#100	#270	Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
	3	1960	0.5-5	0-0.5	Yes		100	98.3	3.9	0.5	3	—	(Sand) Sand	on color. Test #3 is resample o #2, barely passes on color for sand, Item 202.
27	1	1960	1-4.5	0-1	No		—	64.5	5.0	0.8	3	10.6	Gran. Borrow (Grav.)	Owner: Memorial Park. Assoc. This is a larg area under the play-ground. Test taken at edge of terrace. Not enough stones for Item 201, ok for 102A
28	1	1959	1-5	0-1	No		100	81.4	3.2	0.8	1	—	Gran. Borrow (Sand)	Owner: Winooski Grade School District. This is a large shallow sand area (areas 28, 29, & 30). Adj. to I 89. Material rej. for Item 202, ok for Item 102A.
29	1	1960	0-3	0	Yes		100	99.5	69.0	11.3	1	—	Borrow	Owner: Frank & Maria Bernardini. This is a large shallow sand pit located on the route of I 89 at Sta 2218-2221. Test #1 taken at centerline. Sta. 2220+00 in floo of pit. Material get finer with depth. Water at 3'. Rej. fo Items 202 & 102A.
	2	1960	1-5.5	0-1	Yes		100	91.7	3.0	0.5	2	—	Sand	Test #2 taken in west face of pit 100' left

COLCHESTER GRANULAR DATA SHEET NO. 9

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
														of Sta. 2220+00. This sample represents the material remaining in the vicinity of the pit. Material: coarse sand over fine sand & silt. Water at bottom (5').
	3	1960	0-2	0	Yes		100	100	83.0	8.3	2	—	Gran. Borrow (Sand)	Test #3 taken 150' right of Sta. 2220+00 in floor of pit. Mate rial: fine sand & sil (wet).
	4	1960	0.5-6	0-0.5	Yes		100	90.5	2.7	0.7	1	—	Sand	Test #4 taken at centerline Sta. 2218+00 in the south face of pit at edge of trail. Material: bands of fine & coarse sand. Accept. for Items 202 & 102A.
30	1	1959	1-4	0-1	No		100	89.3	9.8	1.0	3	—	Sand	Owner: Winooski Grade School District. This is a large shallow sand area adj. to the I 89 route. Accept. for Item 202 (sub-bas of sand).
31	1	1960	0.5-4.5	0-0.5	No		100	97.5	15.6	1.5	2½	—	Gran. Borrow (Sand)	Owner: Burlington Riding Club. This is large area of fine sand. Test #1 barely fails for Item 202.
	2	1960	0.5-5	0-0.5	No		100	100	14.0	1.0	2½	—	Sand	Test #2 taken at side of road near Essex

COLCHESTER GRANULAR DATA SHEET NO. 10

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
														town line. Accept. fo Item 202 & 102A.
32	1	1960	1-7.5	0-1	Yes		100	100	24.0	0.8	2	—	Gran. Borrow (Sand)	Owner: Lucien Thibaul This is an area of fine sand. Test was taken in old pit be-hind barn. Material rej. for Item 202 but ok for 102A.
33	1	1960	1.5-16.5	0-1.5	Yes		100	97.2	23.3	1.5	1	—	Gran. Borrow (Sand)	Owner: Jack Keyser. A small pit in 20' sand bank with bands of fine & coarse sani Rej. for Item 202 but ok for 102A.
34	1	1960	1-17.5	0-1	Yes		100	99.4	7.9	1.0	1	—	Sand	Owner: Thompson. This is a granular area on the Colchester-Milton town line. Test #1 taken in east face of pit. Bedrock bottom at 17.5'.
	2	1960	1-21	0-1	Yes		—	Not Sampled		—	—	—	—	Test #2 taken in the NE corner of pit 80' west from the barn. Material same as #1. Ledge at 21'.
	3	1960	1-2	0-1	Yes		—	Not Sampled		—	—	—	—	Test #3 taken in flo of pit near western face. Material clay silt. Ledge at 2'.
	4	1960	1-10	0-1	Yes		—	Not Sampled		—	—	—	—	Test #4 taken betwee barn and pit 60' eas of #2. Material: san

COLCHESTER GRANULAR DATA SHEET NO. 11

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
														same as #1 & 2.
	5	1960	1-10	0-1	Yes		—	Not Sampled		—	—	—	—	Test #5 taken 50' ess of edge of pit & 35' southwest of barn. Material: sand same as #1-4.
	6	1960	1-10	0-1	Yes		—	64.3	4.0	1.5	1	—	Gran. borrow (Grav)	Test #6 taken 25' wes of western edge of pi Material: gravel, but not enough stones (35.7% not 40+) for sub-base of gravel (Item 201).
	7	1960	1-5.5	0-1	No		—	Not Sampled		—	—	—	—	Test #7 taken across town road from the pit 180' south of the road. Material: silt & stones.
	8	1960	3.5-9	0-3.5	No		—	25.2	4.0	1.8	1	33.4	Gran. borrow (Grav)	Test #8 taken south o #7 at the top of stee slope down to stream. Material: coarse bone gravel, poorly sorte Rej. on stone wear fo Item 201, ok for 102
35	1	1961	See Remarks		Yes	50,000	100	100	6.0	0.8	1	—	Sand	Owner: George Meunie leased to Atkins who runs pit. Material i a fine sand with few pebbles in places. Area around pit is part of a large sand area. Material was used as Sub-base of sand for I-89-3(13). Winooski and as
	2	1962	See Remarks		Yes	2,000	100	93.4	11.2	0.13	1	—	Sand	

COLCHESTER GRANULAR DATA SHEET NO. 12

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes V.H.D. Spec.	Remarks
							1½"	#4	#100	#270				
	3	1961	See Remarks		Yes	———	100	90.6	12.7	3.0	———	———	Gran. borrow (Sand)	Granular borrow for I-89-3(15), Winooski-Colchester.
	4	1961	See Remarks		Yes	———	100	99.3	13.9	3.5	———	———	Gran. borrow (Sand)	No depth of sampling or location of tests is known as samples were not taken by th Geologic Section.
	5	1961	See Remarks		Yes	———	100	100	10.8	3.1	———	———	Gran. borrow (Sand)	Samples were taken b Resident or Area Engineers for the Pr jects mentioned abov
36	1	1962	1-4.5	0-1	No	———	100	99.4	21.8	7.4	2	———	Gran. borrow (Sand)	Owner: Frank Santimo Test was taken at St 2472+50 to indicate quality of large are to the south. Materi had 100% passing 5/8 screen. Just failed for Sub-base of Sand due to an excess of 3.8% passing #100 screen. Sample taken by hand shovel. It i possible that materi would pass for Sub-base of Sand if test to a greater depth.
37	1	1962	See Remarks		No	———	—	54.5	8.0	2.25	2	17.0	Gravel	Owner: Paul Senesac. River Gravel. Sample taken from small sto pile. Quantity in river unknown, Mater ial has been used on construction in the

COLCHESTER GRANULAR DATA SHEET NO. 13

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample or Test (ft)	Over-burden (ft)	Exist-ing Pit	Volume Estimate (cu. yds)	Sieve Analysis % Passing				Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
							1½"	#4	#100	#270				
														Winooski area. Stones seem to be smaller than most river gravels.

COLCHESTER GRANULAR PROPERTY OWNERS

PROPERTY OWNERS	IDENT. NO.
Barcomb	12
Bernardini, Frank & Maria	29
Brigante	14
Buff Ledge Camp	2
Burlington Riding Club	31
Colchester Town	7
" "	8
Curtis	11
Darby, William	4
Demers, Lucien	5
Fitzgerald, Thomas	24
Golden Glow	9
Hazelett Corporation	16
Hill, Mrs. A.S.C.	26
Keyser, Jack	33
Kimiya Camp	1
Mazza, Sam	23
Memorial Park	27
Mercier, I.	20
Meunier, B.A.	13
Meunier, George	35
Mulac, Vince	15
Paquette, Leonel N.	21
" " "	22
Paya, W.E.	17
Santimore, Frank	36
Senesac, Paul	37
Sheppard, G.	18
Smith, R.H.	10
Thibault, Lucien	32
Thibault, O.J.	25
Thompson	34
Tousey	3
Wilcox	6
Winooski Graded School District	28
" " " "	30
Wright, J.J.	19

COLCHESTER ROCK DATA SHEET NO. 1

Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Distance Between Samples (ft)	Remarks
1	1	1956	Limestone	Yes	Blasted	3.8-4.2	--	Owner: Vt. Assoc. Lime Ind. Inc. This plant produces agricultural and commercial lime, crushed rock in limited quantities being a by-product. Rock passes wear requirements for Item 204 (sub-base of crushed rock).
2	1	1960	Dolomite	Yes	Blasted	3.1-4.0	--	Owner: Lucien Demers. This plant produces crushed rock for highway construction. Acceptable for Item 204 (sub-base of crushed rock) and Item 211 (crushed stone base coarse).
3	1	1960	Quartzite	Yes	Chip	3.2	--	Owner: J. E. Fitzgerald. This sample was taken from a small rock pit about 5' deep. The ledge rock outcrops throughout this area and adjacent to the proposed route of the Interstate highway. Owner apparently interested in selling. Rock type: red quartzite, very hard. Acceptable for Item 204 (sub-base of crushed rock).
4	1	1960	Dolomite	Yes	Chip	3.0	--	Owner: Chester Prim. This is an old abandoned quarry about 25' deep. Rock was sampled from the west face. Meets abrasion requirements for Item 204 (sub-base of crushed rock).
5	1	1960	Quartzite	No	Chip	2.0	--	Owner: Sam Brigante. This sample was taken east of Station 2383 + 50 from a rock ledge outcrop.

COLCHESTER ROCK DATA SHEET NO. 2

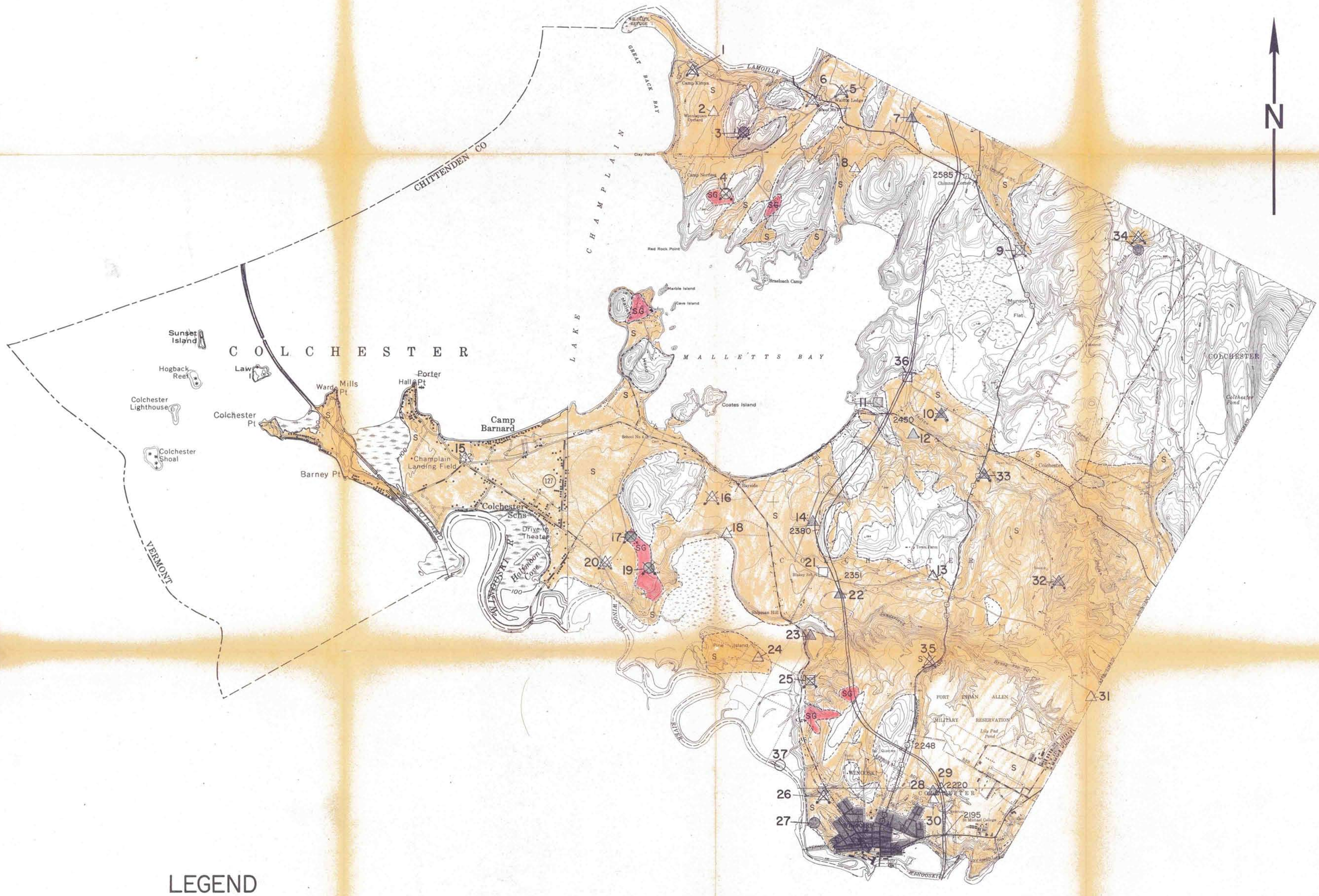
Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Distance Between Samples (ft)	Remarks
								Rock type: red quartzite (very hard). Meets abrasion requirements for Items 204, 211, & 361B (bituminous concrete aggregate).
6	1	1960	Dolomite	Yes	Chip	3.4	--	Owner: Carlson. This is a large rock outcrop which has been quarried in times past. The rock apparently was crushed on the site. Rock sampled meets abrasion requirements for Items 204, 211, and 361B.
7	1	1960	Dolomite	No	Chip	2.6	--	Owner: Lloyd Buttong. This ledge outcrop strikes approximately N 8° E along the west side of US Routes 2 & 7. The rock was sampled for some 350' across strike but extended even farther. Rock sampled meets abrasion requirements for Items 204, 211 & 361B.
8	1	1960	Dolomite	Yes	Chip	4.6	--	Owner: Helen Bennett. This is an extensive area of rock outcrops in which several small quarries have been opened. Sample was taken in a quarry with a 25' face. Rock type: a gray dolomite. Meets abrasion requirements for Items 204 & 211.
9	1	1960	Dolomite	No	Chip	2.8	--	Owner: D. Wright. This is a fairly large area of many outcrops. The rock sampled was taken from the ledges east of the Wright house. This rock meets the abra-

COLCHESTER ROCK DATA SHEET NO. 3

Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Distance Between Samples (ft)	Remarks
								sion requirements for Items 204, 211 and 361B
10	1	1960	Dolomite	No	Chip	2.4	--	Owner: Oscar Gratton. This is a large outcro of rock located at Sta. 2477 + 50 of the Interstate highway. The rock meets abrasion requirements for Items 204, 211 & 361B.
11	1	1960	Dolomite	No	Chip	5.0	--	Owner: Chapin. Test #1 was taken east of Chapin house. This area adjoins an extensive area of similar rock (dolomite) to the east. Meets abrasion requirements for Item 204 (sub base of crushed rock).
12	1	1960	Dolomite	No	Chip	3.0	--	Owner: LaCasse. This is a large area of ledge rock outcrop with a good relief. Sample was taken across strike, representing 300'. Rock type: interbedded gray quartzite and dolomite. Sample meets wear requirements for Items 204, 211, & 361B.
13	1	1960	Quartzite	No	Chip	2.8	--	Owner: Louis Gregoire. This is an extensive outcrop with good relief located on the south side of US Route 7. Seems to be a good location for a quarrying & crushing operation Rock sampled meets abrasion requirements for Items 204, 211, & 361B.
14	1	1962	Dolomite	No	Chip	4.2	--	Owner: Gerald Troville. A series of terrace-like ledges, totaling approximately 40' in elevation. Dolomite beds lying nearly flat with gentle east dip. Thin mantle covers ledg Outcrop located approximately 1100 feet west of Interstate at Sta. 2562 + 50. Sample meets wear requirements for Items 204, 211, & 361B.

COLCHESTER ROCK PROPERTY OWNERS

PROPERTY OWNERS	IDENT. NO.
Bennett, Helen	8
Brigante, Sam	5
Button, Lloyd	7
Carlson	6
Chapin	11
Demers, Lucien	2
Fitzgerald, J.E.	3
Gratton, Oscar	10
Gregoire, Louis	13
LaCasse	12
Prim, Chester	4
Troville, Gerald	14
Vermont Association Lime Ind. Inc.	1
Wright, D.	9



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 102-A
- ■ BORROW, ITEM 102
- ⨯ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

COLCHESTER

SCALE 1:31,250

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1961

GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

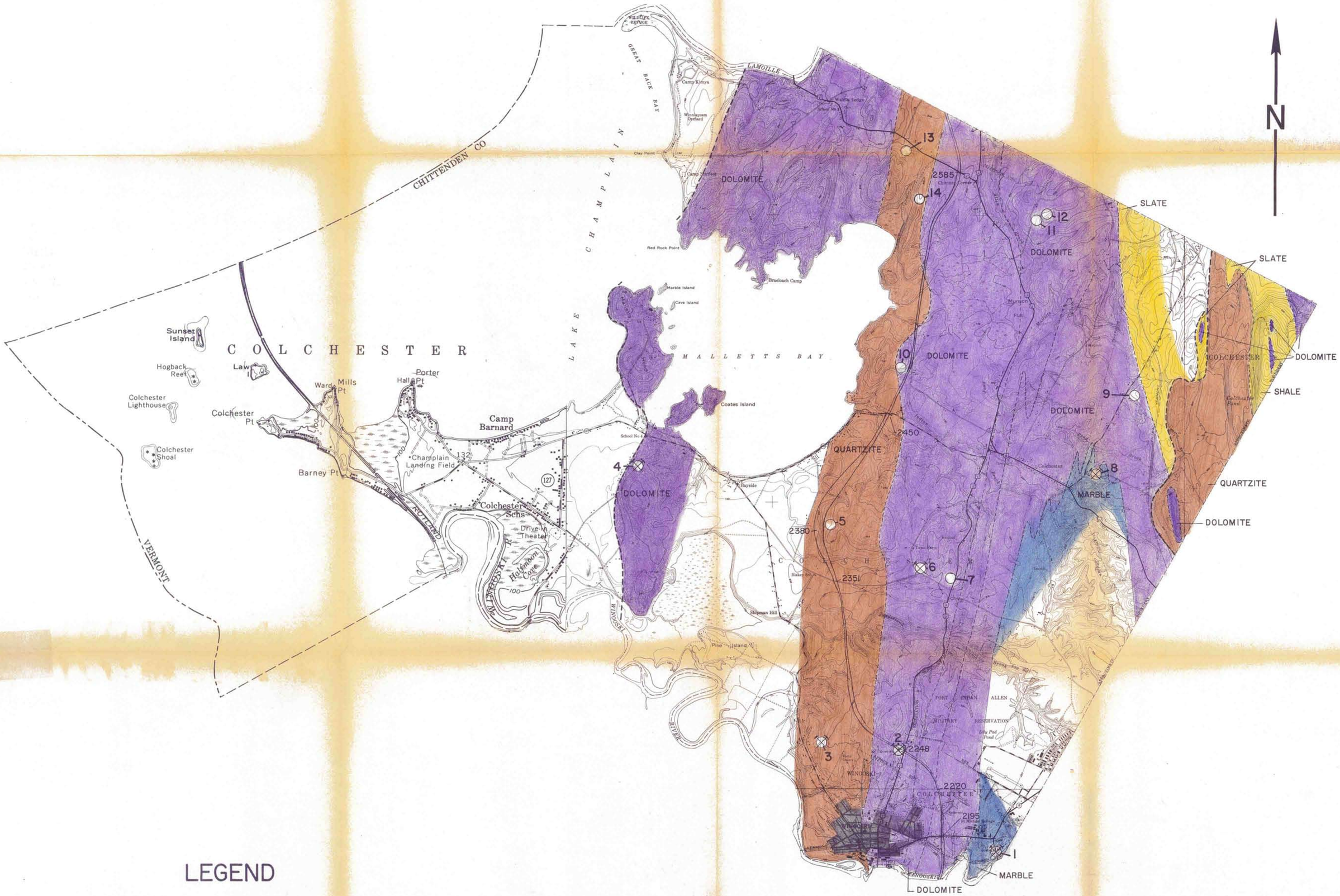
NOTE: BASED ON U.S.G.S. TOPOGRAPHIC MAPS

PLATE I GRANULAR

CHITTENDEN COUNTY VT. HWY. DISTRICT NO. 8

REVISIONS

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 sheet)

COLCHESTER

SCALE 1:31,250

0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1961

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 2

ROCK

CHITTENDEN COUNTY VT. HWY. DISTRICT NO. 8

REVISIONS

DATE							
BY							

COLCHESTER