

Williamstown/
Orange town. city.
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**SURVEY OF HIGHWAY CONSTRUCTION MATERIALS
IN THE TOWN OF WILLIAMSTOWN, ORANGE 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

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Acknowledgments

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

1. Various departments and individuals of the Vermont State Department of Highways, notably the Planning and Mapping Division and the Highway Testing Laboratory.
2. Professor D.P. Stewart of Miami University, Oxford, Ohio.
3. Professor Charles G. Doll, Vermont State Geologist, University of Vermont, Burlington, Vermont.
4. The 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 over-all 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 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. 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.

Inlosures

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 Geological 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, 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, 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, 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 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, 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 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 this Project, together with the respective Laboratory Reports.

Location

The Town of Williamstown is located in Orange County in the central portion of the state. It is bounded on the north by the towns of Berlin and Barre, on the east by the town of Washington, on the south by the towns of Brookfield and Chelsea, and on the west by the town of Northfield.

Drainage is generally northward into the Winooski River by way of Stevens Branch. A small area in the southern portion of the town drains southward into the Second Branch of the White River and thence into the Connecticut.

The town is in the central plateau physiographic region as defined by the "Soil Survey (Reconnaissance) of Vermont" published by The United States Department of Agriculture. "The central plateau is severely dissected, with narrow and V-shaped stream valleys and somewhat flattened ridge tops which are remnants of the old plateau," (Ibid.) However, the valley of Stevens Branch occasionally widens out into a fairly broad floodplain. South of Staples Pond the Second Branch enters the famous Williamstown Gulf, a deep gorge with steep walls rising approximately 600 feet.

The highest elevation in the town is Mount Pleasant in the northeast corner with an elevation of 2063 feet. The bed of the Second Branch at the southern edge of the town is approximately 750' above sea level.

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. 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 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 will be observed that the information on the surface-geology bedrock map in regard to rock type is simplified. For a more detailed description of the respective rock formations, a summary is included in this report. It is apparent from this summary that each formation may not be composed of one distinct rock type, but may be a complex mixture of rock types blending into one another. For this reason, the data sheets may describe the rock tested as differing from the designation on the map.

The town of Williamstown is underlain predominantly by impure limestones, schists, and impure quartzites. These rocks have been divided into three formations or units: the Barton River member of the Waits River Formation, the Gile Mountain formation, and the Waits River formation. Some geologists prefer to divide the Waits River into

western and eastern branches rather than use the term Barton River member for the western band. The only other rock type mapped within the town is a small portion of the Barre Granite which extends from Barre Town into the northeast corner of Williamstown.

The Barton River member of the Waits River formation underlies almost the entire western half of the town. Its contact with the Gile Mountain formation traverses the town from NNE to SSW along a line which passes just east of Williamstown Village. The siliceous limestone of this formation would make a good rock for crushing, but no outcrops were observed where the limestone beds were wide enough to quarry. These beds are generally one or two feet thick and interbedded with the softer schists or phyllites.

To the east of the Barton River lies the Gile Mountain formation in a band approximately five miles wide. The rocks of the Gile Mountain appear to be softer in Williamstown than elsewhere in the state, and no outcrops of hard, massive quartzite were found.

The only rock found in Williamstown which offers good potential for crushed rock is the Barre Granite. It is currently being used for crushed rock across the line in Barre Town. Numerous grout piles might be available for crushing and perhaps some of the granite near the contacts with the Gile Mountain could be economically drilled and blasted for use as crushed rock. Two samples of the granite were taken by the Materials Inventory. (see Rock Data Sheets)

The Waits River formation which underlies the eastern edge of the town is so poorly exposed that no outcrops of good size were readily available.

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, 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. The locations are later examined by digging test pits with a backhoe to a depth of approximately 11 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

The granular deposits of the town of Williamstown are primarily of glacial origin, occurring in the valley of the Stevens Branch as kames, kame terraces, outwash, and fluvial deposits. The glacial deposits do not prove to be as extensive as mapped by Professor Stewart. No evidence was found of fluvio-glacial material in the area of East Hill as mapped by Stewart. Many of the kame terraces mapped by Stewart prove to be ledge outcrops; this applies specifically to the area west of Vermont Route 14 opposite Cutler Pond and west of Limehurst Pond.

It is possible that additional sources of acceptable material may be found other than those tested by the survey.

Summary of Rock Formations In Williamstown

Barre Granite - a light to medium gray, even-textured medium grained quartz-monzonite.

Gile Mountain Formation - Gray quartz-muscovite phyllite or schist, interbedded and intergradational with gray micaceous quartzite. The phyllite and schist commonly contain porphyroblasts of biotite, garnet, or staurolite, and locally kyanite, and alusite, or sillimanite.

Waits River Formation - Gray quartzose and micaceous crystalline limestone weathered to distinctive brown earthy crust; interbedded and intergradational with gray quartz-muscovite phyllite or schist. Where more metamorphosed the limestone contains actinolite, hornblende, zoisite, diopside, wollastonite, and garnet, and the phyllite and schist, biotite, garnet, and locally andalusite, kyanite or sillimanite.

Waits River Formation, Barton River Member - Interbedded thick and thin bands of blue-gray recrystallized impure siliceous limestone, fine grained black phyllites or schists, and minor impure quartzites.

Glossary of Selected Geologic Terms

Fluvial - Pertaining to streams or stream action.

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 - of or pertaining to lakes.

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.

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

Till - That part of glacial drift deposited directly by ice, without transportation or sorting by water, consisting generally of an unstratified, unsorted, unconsolidated to moderately consolidated, heterogeneous mixture of clay, sand, gravel, and boulders. The wide range in grain size is typical, although the dominant size and mineralogic and lithologic composition is determined in large part by the rocks from which the till was derived.

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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 Vermont Department of Highways).

Item 102A, Granular Borrow.

"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 per cent (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 the A.A.S.H.O. 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 201A, Sub-base of Gravel.

"The gravel shall consist of material free from silt, loam, or clay. It shall be obtained from approved sources and meet the following requirements:

"Not less than forty (40) per cent 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 A.A.S.H.O. T-4.

"The stone portion of the gravel shall be uniformly graded from coarse to fine and the maximum size particles shall not exceed six (6) inches in diameter.

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

Minimum Per Cent of stone	Per Cent Passing Square Openings No. 100	Per Cent Passing Square Openings No. 270
40%	0-15	0-3
50%	0-15	0-4
60%	0-15	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 A.A.S.H.O. Method of test, Designation T-21."

Item 202 Mod., Sub-base of Sand.

"The sand shall consist of material 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 A.A.S.H.O. T-27, shall meet the grading requirements set up in the following table:

Square Openings	Per Cent Passing
1 $\frac{1}{2}$ "	95-100
5/8"	85-100
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 A.A.S.H.O. Method of test, Designation T-21."

Item 204, Sub-base of Crushed Rock.

"The percent of wear shall not be more than eight (8) when tested by laboratory methods, using Method A.A.S.H.O. T-3."

WILLIAMSTOWN GRANULAR DATA SHEET NO. 1

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				
1	1	1963	1-5	0-1	No	-	-	45.9	22.0	7.5	2	-	Gran. Bor. (Grav.)	Owner: Dr. Raymond Martin. A fairly level meadow at an elevation similar to that of Lotus Lake. Test #1 100' west of private drive, 95' south of town road. Dirty till with flat stones. Fails for Item 201-A, sub-base of gravel. Has 22% passing #100 mesh; maximum allowed 15%. Has 7.5% passing #270 mesh; maximum allowed 3%. Insufficient stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
2	1	1963	1-5	0-1	No	-	-	47.9	19.0	7.0	2	33.8%	Gran. Bor. (Grav.)	Owner: Dr. Raymond Martin. A rolling meadow. Test #1 30' west of lake, 210' south of farm lane. Dirty gravel, ledge bottom. Fails for Item 201-A, sub-base of gravel. Has 19% passing #100 mesh; maximum allowed 15%. Has 7% passing #270 mesh; maximum allowed 3%. Has wear of 33.8%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
3	1	1963	0-5	-	Yes	-	-	65.8	8.0	3.8	2	-	Gran. Bor.	Owner: Dr. Raymond Martin. A pit now used as play-

WILLIAMSTOWN GRANULAR DATA SHEET NO. 2

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
						1 1/2"	5/8"	#4	#100	#270				
													(Grav.)	ground by Lotus Lake Camp. Pit in southern end of knoll. Extension to north 100' from pit to end of knoll was inaccessible for testing. Dimensions of pit 210' east and west, 155' north and south. Test #1 in floor. Sandy gravel with gravel and water in bottom. Fails for Item 201-A, sub-base of gravel. Has 65.8% passing #4 mesh; maximum allowed 60%. Insufficient stone in sample for wear test. Acceptable for Item 102-A, granular borrow.
	2	1963	12-17	-	Yes	-	-	29.2	7.0	2.0	1	25.4%	Gran. Bor. (Grav.)	Test #2 in lower section of face. Gravel with many soft stones of schist. Cementation. Some stones over 6". Fails for Item 201-A, sub-base of gravel. Has wear of 25.4%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	3	1963	1-12	0-1	Yes	-	-	32.4	11.0	3.75	1 1/2	25.4%	Gran. Bor. (Grav.)	Test #3 in upper section of face. Gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 25.4%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 3

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Overburden (FT)	Existing Pit	Sieve Analysis					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						% Passing								
						1 1/2"	5/8"	#4	#100	#270				
4	1	1963	1-9.5	0-1	No	-	-	54.3	13.0	5.0	1 1/2	-	Gran. Bor. (Grav.)	Owner: Dr. Raymond Martin. A series of small knolls north of camp and adjacent to Vt. Route 14. Test #1 on top of knoll. Angular and sub-angular stones with dirty matrix. Many stones over 6". Many soft stones. Poorly sorted-poor stratification. Fails for Item 201-A, sub-base of gravel. Has 5% passing #270 mesh; maximum allowed 3%. Insufficient stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
5	1	1963	0.5-9	0-0.5	No	-	-	48.1	8.0	3.0	1	29.4%	Gran. Bor. (Grav.)	Owner: Carl Barteau. A series of knolls of granular material. Test #1 on ridge adjacent to pond. Gravel generally fine with a few soft stones. Gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 29.4%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	2	1963	0-10	-	Yes	100	100	87.4	19.0	8.0	1	-	Gran. Bor. (Sand)	Test #2 in floor of small pit. Pit limited by ledge in face. Dimensions of pit 100' east-west, 70' north-

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 4

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
						1 1/2"	5/8"	#4	#100	#270				
	3	1963	0-23	-	Yes	-	-	39.5	11.0	4.5	1	28.2%	Gran. Bor. (Grav.)	south. Material in Test #2 pebbly sand with schist particles. Pebbly sand and water in bottom. Fails for Item 202 Mod., sub-base of sand. Has 7% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow. Test #3 in face of pit. Gravel with ledge bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 28.2%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	4	1963	1-10.5	0-1	No	-	-	40.8	8.0	2.3	1	26.6%	Gran. Bor. (Grav.)	Test #4 200' north of pit. Gravel with many soft stones. Gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 26.6%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	5	1963	0-23	-	Yes	-	-	35.5	10.0	3.75	1 1/2	17.6%	Gravel	Test #5 resample of face of face by hand shovel. Acceptable for Item 201-A, sub-base of gravel.
6	1	1963	1-6.5	0-1	No	-	-	63.0	35.0	15.0	3	-	-	Owner: Harold Lawliss. A series of knolls adjacent to Vt. Route 14. Test #1 till-angular and subangular stones, dirty matrix. Un-

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 5

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
						1 1/2"	5/8"	#4	#100	#270				
														sorted, unstratified, soft stones, some over 6". Fails for Item 102-A, granular borrow. Has 15% passing #270 mesh; maximum allowed 10%.
7	1	1963	0-3.5	-	Yes	-	-	50.2	11.0	3.0	1 1/2	23.2%	Gravel	Owner: Harold Lawliss. An extensive pit in several levels. Test #1 in floor of lower level. Dimensions of lower level 200' north-south, 125' east-west. Sandy gravel with sandy gravel and water in bottom. Acceptable for Item 201-A, sub-base of gravel.
	2	1963	0-10	-	Yes	-	-	35.2	6.0	1.3	1 1/2	28.4%	Gran. Bor. (Grav.)	Test #2 in floor of second level, approximately 15' above first level. Dimensions of second level 75' east-west, 100' north-south. Material in Test #2 fine gravel, good stones; gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 28.4%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	3	1963	0-9	-	Yes	-	-	51.4	9.0	3.9	1 1/2	19.2%	Gravel	Test #3 in floor of third level approximately 7' above second level. Gravel coarser than that in tests

WILLIAMSTOWN GRANULAR DATA SHEET NO. 6

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 VIB Spec.	Remarks
						1 1/2"	5/8"	#4	#100	#270				
	4	1963	0-27	-	Yes	100	88.6	75.5	9.0 *6.79	4.0 *3.0	1	-	Sand	#1 & #2. Some stones over 6". Acceptable for Item 201-A, sub-base of gravel. Test #4 in west face of lowest level. By hand shovel. 0-5' fine sand with concretions, 5'-27' pebbly sand, pebbly sand bottom. Acceptable for Item 202 Mod., sub-base of sand.
	5A	1963	0-3	-	Yes	-	-	40.5	11.0	5.0	2	-	Gran. Bor. (Grav.)	Test #5 in face between second and third levels. Gravel with sand bottom. Test #5A fails for Item 201-A, sub-base of gravel. Has 5% passing #270 mesh; maximum allowed 4%. Insufficient proper sized stone in sample for wear test. Acceptable for Item 102-A, granular borrow.
	5B	1963	3-7	-	Yes	100	98.1	97.4	80.0 *77.9	28.0 *27.3	1	-	-	Test #5B sand with gravel bottom. Fails for Item 102-A, granular borrow. Has 28% passing #270 mesh; maximum allowed 10%.
8	1	1963	1-9	0-1	No	100	100	100	19.0	4.0	2 1/2	-	Gran. Bor. (Sand)	Owner: Harold Lawliss. A knoll north of pit. Test #1 in pasture and east of logging road. Medium sand with medium sand bottom. Difficult to obtain clean

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 7

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					
	2	1963	0-5	-	No	-	-	49.5	31.0	9.0	2	-	Gran. Bor. (Grav.)	sample due to dry soil. Fails for Item 202 Mod., sub-base of sand. Has 19% passing #100 mesh; maximum allowed 18%. Acceptable for Item 102-A, granular borrow. It is possible that this material would prove acceptable for Item 202 Mod., sub-base of sand, if sampled under more favorable conditions. Test #2 on top of knoll west of logging road. Till with till bottom. Fails for Item 201-A, sub-base of gravel. Has 31% passing #100 mesh; maximum allowed 15%. Has 9% passing #270 mesh; maximum allowed 5%. Insufficient proper sized stone in sample for wear test. Acceptable for Item 102-A, granular borrow.
9	1	1963	0-8	-	Yes	-	-	21.9	23.0	8.0	1 1/2	49.2%	Gran. Bor. (Grav.)	Owner: Paul Menard. A small pit. Dimensions of pit 125' east-west, 180' north-south. Test #1 in floor of lower level. Angular stones broken ledge. Poorly sorted, unstratified. Till. Fails

WILLIAMSTOWN GRANULAR DATA SHEET NO. 8

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				
	2	1963	3-10	-	Yes	100	100	100	85.0	8.3	1	-	Gran. Bor. (Sand)	for Item 201-A, sub-base of gravel. Has 23% passing #100 mesh; maximum allowed 15%. Has 8% passing #270 mesh; maximum allowed 5%. Has wear 49.2%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow. Test #2 in face between lower and second level. Silt with ledge bottom. 0-3' pebbly sand, probably filled in. Fails for Item 202 Mod., sub-base of sand. Has 85% passing #100 mesh; maximum allowed 18%. Has 8.3% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, sub-base of gravel.
	3	1963	8-18	-	Yes	-	-	30.6	8.0	3.75	1	34.0%	Gran. Bor. (Grav.)	Test #3 in face of upper level. Poorly sorted, unstratified, angular soft stones. Till. Fails for Item 201-A, sub-base of gravel. Has wear of 34%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	4	1963	1-8.5	0-1	No	-	-	46.3	29.0	11.0	2	-	-	Test #4 85' east of pit. Material similar to Test #3. Fails for Item 102-A,

WILLIAMSTOWN GRANULAR DATA SHEET NO. 9

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
						1 1/2"	5/8"	#4	#100	#270				
	5	1963	1-8	0-1	No	-	-	53.6	27.0	9.75	1 1/2	-	Gran. Bor. (Grav.)	granular borrow. Has 11% passing #270 mesh; maximum allowed 10%. Test #5 85' south of farm lane, 50' west of coniferous trees. Till with till bottom. Fails for Item 201-A, sub-base of gravel. Has 27% passing #100 mesh; maximum allowed 15%. Has 9.75% passing #270 mesh; maximum allowed 3%. Insufficient proper sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
10	1	1963	1-3	0-1	No	-				Not Sampled		-		Owner: Rudolph Young. A series of knolls. Test #1 40' north of cemetery. 90' east of trees. Till with ledge bottom. Not sampled.
11	1	1963	1-3	0-1	No	-				Not Sampled		-		Owner: Carlisle Buzzell. A part of the valley wall. Mapped by Prof. Stewart as glacial deposit. Till with ledge bottom. Not sampled.
12	1	1963	0.5-11	0-0.5	Yes	100	100	94.6	11.0	5.0	1	-	Sand	Owner: Finley McKenzie. A small pit with 40' face. Test #1 in floor 175' west of stream. Uniform coarse sand with sand and water

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 10

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
						1 1/2"	5/8"	#4	#100	#270				
	2	1963	28-40	-	Yes	-	-	41.1	8.0	3.75	1	-	Gran. Bor. (Grav.)	In bottom. Acceptable for Item 202 Mod., sub-base of sand. Test #2 in face. Gravel with gravel bottom. Grading acceptable for Item 201-A, sub-base of gravel. Insufficient proper sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
	3	1963	1-10	0-1	No	100	100	100	84.0	18.0	1	-	-	Test #3 on top of knoll in meadow south of pit. Silt with silt bottom. Fails for Item 102-A, granular borrow. Has 18% passing #270 mesh; maximum allowed 10%.
	4	1963	1-10	0-1	No	100	100	98.8	65.0	21.3	2 1/2	-	-	Test #4 east of Test #3 and at base of knoll. Silt with silt bottom. Fails for Item 102-A, granular borrow. Has 21.3% passing #270 mesh; maximum allowed 10%.
13	1	1963	1-10	0-1	No	100	00	100	48.0	11.3	1 1/2	-	--	Owner: Leland Dailey. A small knoll north of McKenzie pit. Test #1 on top of knoll. Uniform fine sand with sand bottom. Fails for Item 102-A, granular borrow. Has 11.3% passing #270 mesh; maximum allowed 10%.

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 11

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Overburden (FT)	Exist- ing Pit	Sieve Analysis					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						% Passing								
						1 1/2"	5/8"	#4	#100	#270				
14	1	1963	1-7	0-1	No	-	-	66.6	39.0	19.0	1	-	-	Owner: Aldis Fogg. A series of small knolls at high elevation. Test #1 silt with unsorted angular stones, some over 3'. Fails for Item 102-A, granular borrow. Has 19% passing #270 mesh; maximum allowed 10%.
								*25.97	*12.65					
15	1	1963	1-10	0-1	Yes	100	100	85.1	18.0	5.0	1	-	Sand	Owner: Harold Carpenter. A small pit. Test #1 in floor. Sand and silt interbedded. Acceptable for Item 202 Mod., sub-base of sand.
	2	1963	21-30	-	Yes	100	100	81.7	19.0	5.6	1	-	Sand	Test #2 in face. Sand and silt interbedded. Acceptable for Item 202 Mod., sub-base of sand.
	3	1963	1-10	0-1	No	100	95.0	88.7	8.0	3.5	2	-	Sand	Test #3 55' north of pit. Pebbly sand with pebbly sand bottom. Acceptable for Item 202 Mod., sub-base of sand.
	4	1963	1-8	0-1	No	100	100	88.4	56.0	16.0	3	-	-	Test #4 on valley wall. Silt and broken ledge till. Fails for Item 102-A, granular borrow. Has 16% passing #270 mesh; maximum allowed 10%.
								*15.4	*4.3					
								*15.5	*4.6					
								*7.1	*3.1					
								*49.5	*14.14					
16	1	1963	-	-	Yes	-	Not Sampled			-				Owner: George McCarthy. A very small pit, apparent-
						* Percentage of Total Sample.								

WILLIAMSTOWN GRANULAR DATA SHEET NO. 12

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
						1 1/2"	5/8"	#4	#100	#270				
														ly silt. Could not reach pit to sample it as the district was using it to store winter sand. Extension very limited by property lines.
17	1	1963	0-8	-	Yes	100	100	93.7	14.0	3.0	1	-	Sand	Owner: Albert Carrier. A small terrace on valley floor. Test #1 in floor of small pit. Uniform medium sand with concretions, sand and water in bottom. Acceptable for Item 202 Mod., sub-base of sand. Test #2 in face of pit. Very difficult to sample. Medium sand with sand bottom. Fails for Item 202 Mod., sub-base of sand. Has 24.1% passing #100 mesh; maximum allowed 18%. Acceptable for Item 102-A, granular borrow. Test #3 on top of knoll. Dimensions of knoll 150' north-south, 150' east-west. Sand with sand bottom. Acceptable for Item 202 Mod., sub-base of sand.
	2	1963	12-24	-	Yes	100	100	96.5	25.0	4.0	1	-	Gran. Bor. (Sand)	
	3	1963	0-9	-	No	100	94.8	85.7	17.0	5.0	1	-	Sand	

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 13

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Overburden (FT)	Existing Pit	Sieve Analysis					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						% Passing	#4	#100	#270					
18	1	1963	0-10	-	Yes	100	98.3	97.4	13.0	1.5	1	-	Sand	<p>Owner: Town of Williamstown. A large pit. Material very mixed. Silt to gravel layers not continuous-many folds and faults. Pit poorly stripped. Acceptable for Item 202 Mod., sub-base of sand.</p> <p>Test #2 in face. Poor sample due to dry condition of material. Gravel with sand bottom. Fails for Item 201-A, sub-base of gravel. Has 17% passing #100 mesh; maximum allowed 15%. Has 5% passing #270 mesh; maximum allowed 3%. Has wear of 27.8%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.</p> <p>Test #3 in face. Test #3A fails for Item 202 Mod., sub-base of sand. Has 36.23% passing #100 mesh; maximum allowed 18%. Has 6.96% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow. Test #3B acceptable for Item 201-A, sub-base of gravel. Dimensions of</p>
	2	1963	3-20	0-3	Yes	-	-	59.0	17.0	5.0	1½	27.8%	Gran. Bor. (Grav.)	
	3A	1963	1-6	0-1	Yes	100	98.8	92.9	39.0	7.5	1½	-	Gran. Bor. (Sand)	
	3B	1963	6-20	-	Yes	-	-	52.4	14.0	2.5	2½	21.2%	Gravel	

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 14

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	
						1 1/2"	5/8" #4	#100	#270					
													pit 100' north-south, 175' east-west. Extension is to north. Permission was not granted to test extension.	
19	1	1963	1-6	0-1	No	100	100	82.7	67.0	32.0	1 1/2	-	-	Owner: Dr. Joseph Mark. A medium-sized terrace of high elevation. Test #1 broken ledge, till, silt. Ledge bottom. Fails for Item 102-A, granular borrow. Has 32% passing #270 mesh; maximum allowed 10%.
									*55.4	*26.5				
20	1	1963	0-9	-	Yes	-	-	41.6	12.0	5.5	1	21.2%	Gran. Bor. (Grav.)	Owner: William Mowatt. A small pit adjacent to road with 25 foot face. Test #1 in floor. Fine gravel with till bottom. Fails for Item 201-A, sub-base of gravel. Has 5.5% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow.
	2	1963	19-26	-	Yes	-	-	64.0	6.0	3.0	1	-	Gran. Bor. (Grav.)	Test #2 in face. Gravel with till bottom. Fails for Item 201-A, sub-base of gravel. Has 64% passing #4 mesh; maximum allowed 60%. Insufficient proper-sized stones in

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 15

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								
						1 1/2"	5/8"	#4	#100	#270				
	3	1963	0-8	-	Yes	100	100	96.8	27.0	5.0	1	-	Gran. Bor. (Sand)	sample for wear test. Acceptable for Item 102-A, granular borrow. Test #3 in floor of upper pit. Sand with sand bottom. Fails for Item 202 Mod., sub-base of sand. Has 26.4% passing #100 mesh; maximum allowed 18%. Acceptable for Item 102-A, granular borrow. Test #4 in face of upper pit. Could not sample 13'-19' due to slouching caused by extremely dry conditions. Test #4A fine gravel with pebbly sand bottom. Grading acceptable for Item 201-A, sub-base of gravel. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow. Test #4B acceptable for Item 202-Mod., sub-base of sand.
	4A	1963	2-13	0-2	Yes	-	-	48.2	6.0	2.5	2 1/2	-	Gran. Bor. (Grav.)	
	4B	1963	19-28	-	Yes	100	92.6	80.0	8.0	3.0	1	-	Sand	
21	1	1963	0-8	-	Yes	-	-	22.6	19.0	4.8	1	24.8%	Gran. Bor. (Grav.)	Owner: Town of Barre. A very extensive pit with high face. Numerous levels. Test #1 in floor of small shelf at southeast end of

* Percentage of Total Sample

WILLIAMSTOWN GRANULAR DATA SHEET NO. 16

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" #4	5/8" #100	#270				
2	1963	0-30	-	Yes	-	48.9	7.9	3.0	1	22.2%	Gravel	pit. Coarse gravel with some stones over 6". Coarse gravel bottom. Fails for Item 201-A, s sub-base of gravel. Has 19% passing #100 mesh; maximum allowed 15%. Acceptable for Item 102-A, granular borrow. Test #2 in face. Sandy gravel with sandy gravel bottom. Acceptable for Item 201-A, sub-base of gravel.
3	1963	0-9	-	Yes	-	33.3	26.0	11.0	1	-	-	Test #3 in floor of 2nd level, gravel with gravel and water in bottom. Fails for Item 102-A, granular borrow. Has 11% passing #270 mesh; maximum allowed 10%. Water standing on floor in other portion of 2nd level.
4	1963	60-75	-	Yes	-	Report Missing			-	-	-	Test #4 in face. Gravel with gravel bottom. Lab report missing.
5	1963	0-75	-	Yes	-	29.2	19.0	7.0	1	28.4%	Gran. Bor. (Grav.)	Test #5 full face sample. Gravel in upper portion very silty. A few bands of sand in lower portion. Fails for Item 201-A, sub-base of gravel. Has 19% passing #100 mesh; maximum allowed 15%.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 17

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" #4	5/8" #100	#270					
												Has 7% passing #270 mesh; maximum allowed 5%. Has wear of 28.4%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.	
22	1A	1963	0-4	-	Yes	-	-	18.7	17.0	7.0	1 1/2	-	Gran. Bor. (Grav.) Owner: Burton Bailey. A large pit. Test #1 in ; floor. Test #1A gravel with sand bottom. Iron stain, some stones over 6". Fails for Item 201-A, sub-base of gravel. Has 17% passing #100 mesh; maximum allowed 15%. Has 7% passing #270 mesh; maximum allowed 5%. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
	1B	1963	4-10	-	Yes	100	100	97.0	21.0	3.3	2	-	Gran. Bor. (Sand) Test #1B sand with sand bottom. Fails for Item 202 Mod., sub-base of sand. Has 20.4% passing #100 mesh; maximum allowed 18%. Acceptable for Item 102-A, granular borrow.
	2	1963	15-25	-	Yes	-	-	47.5	10.0	4.0	1	-	Gran. Bor. (Grav.) Test #2 in face. Sandy gravel with sandy gravel bottom. Grading acceptable for Item 201-A, sub-base

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 18

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
						1 1/2"	5/8"	#4	#100	#270				
	3	1963	1-5	0-1	No	100	100	77.6	31.0	10.8	2	-	-	of gravel. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow. Test #3 in meadow 75' north of pit. Till with ledge bottom. Pit limited by ledge as indicated by Test #3. Fails for Item 102-A, granular borrow. Has 10.8% passing #270 mesh; maximum allowed 10%.
23	1	1963	1-9	0-1	Yes	100	100	97.7	49.0	15.8	1	-	-	Owner: Frank Brockway. A small pit containing sections of coarse gravel with some stones over 6". Dimensions of pit 25' north-south, 85' east-west. Test #1 in floor. Silt with silt bottom. Fails for Item 102-A, granular borrow. Has 15.8% passing #270 mesh maximum allowed 10%.
	2	1963	35-50	-	Yes	-	-	42.9	16.0	6.25	1	23.4%	Gran. Bor. (Grav.)	Test #2 in face. Gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 16% passing #100 mesh; maximum allowed 15%. Has 6.25% passing #270 mesh; maximum allowed 4%. Acceptable for Item 102-A, granular borrow.

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 19

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				
24	1	1963	0-6	-	Yes	100	100	71.6	39.0 *27.9	15.0 *10.7	1	-	-	Owner: Burton Bailey. An extensive pit on several levels. Test #1 in floor of lowest level. Till with ledge bottom. Fails for Item 102-A, granular borrow Has 15% passing #270 mesh; maximum allowed 10%. 15 foot face. Could not sample face- material stripped from next level pushed over face. Hard-packed cobbles in floor of second level-could not penetrate. Test #2 in floor of top level. Coarse gravel with some stones over 6". Acceptable for Item 201-A, sub-base of gravel. Test #3 in face above upper level. Gravel with some soft stones. Fails for Item 201-A, sub-base of gravel. Has wear of 30.8%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow. Test #4 on band of stream at request of property owner. At lower level than pit. Silt, fine sand, angular soft stones. 0-1.5' silt, 1.5'-4.5' gravel,
	2	1963	0-8	-	Yes	-	-	24.9	8.0	4.0	1	20.0%	Gravel	
	3	1963	20-30	-	Yes	-	-	26.9	7.0	2.0	1	30.8%-	Gran. Bor. (Grav.)	
	4	1963	4.5-9.5	-	No	100	100	94.1	39.0 *36.7	13.5 *12.7	1	-	-	

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 20

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
						1 1/2"	5/8"	#4	#100	#270				
5	1963	1-10	0-1	No	100	100	100	88.0	35.0	1 1/2	-	-	4.5'-9.5' silt, fine sand, with silt and fine sand in bottom. Fails for Item 102-A, granular borrow. Has 13.5% passing #270 mesh; maximum allowed 10%. Test #5 on south end of high knoll. Uniform fine sand, silt. Fails for Item 102-A, granular borrow. Has 35% passing #270 mesh; maximum allowed 10%.	
6	1963	1-10	0-1	No	100	100	100	98.0	31.0	1	-	-	Test #6 100' northwest of Test #5. Silt with fine sand bottom. Fails for Item 102-A, granular borrow. Has 31% passing #270 mesh; maximum allowed 10%.	
7	1963	1-10	0-1	No	100	100	100	97.0	45.0	1	-	-	Test #7 200' northeast of Test #6. Fine silt, with fine silt and water in bottom. Fails for Item 102-A, granular borrow. Has 45% passing #270 mesh; maximum allowed 10%.	
8	1963	1-9	0-1	No	100	99.1	94.2	31.0	6.8	1 1/2	-	Gran. Bor. (Sand)	Test #8 150' northeast of pit. Fails for Item 202 Mod., sub-base of sand. Has 29.2% passing #100 mesh; maximum allowed 18%. Has 6.4% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, gran-	

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 21

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
						1 1/2"	5/8"	#4	#100				
	9	1963	0-7	-	Yes	-	-	37.3	14.0	6.0	1	24.0%	Gran. Bor. (Grav.) ular borrow. Test #9 in face of small bench at entrance to second level. Gravel with cementation, gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 6% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow.
	10	1963	0-45	-	Yes	-	-	33.6	19.0	6.0	1 1/2	30.6%	Gran. Bor. (Grav.) Test #10 in face between second and third level. Coarse gravel with coarse gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 19% passing #100 mesh; maximum allowed 15%. Has 6% passing #270 mesh; maximum allowed 5%. Has wear of 30.6%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.
	11	1963	0-45	-	Yes	-	-	31.7	16.0	6.0	1	22.6%	Gran. Bor. (Grav.) Test #11 in same face as Test #10. Finer material. Gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 16% passing #100 mesh; maximum allowed 15%. Has 6% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A granular borrow.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 22

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
						1 1/2"	5/8"	#4	#100	#270				
	12	1963	0-30	-	Yes	-	-	38.6	18.0	7.5	1 1/2.	22.8%	Gran. Bor. (Grav.)	Test #12 in face above third level. Gravel with gravel bottom. Contains bands of fine sand. Fails for Item 201-A, sub-base of gravel. Has 10% passing #100 mesh; maximum allowed 15%. Has 7.5% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow. This pit is poorly stripped, causing silt to contaminate the material. Contains some soft stones.
25	1	1963	1-10	0-1	No	100	100	100	98.0	26.3	2 1/2	-	-	Owner: Frank Brockway. An area of knolls. Test #1 fine sand with fine sand bottom. Fails for Item 102-A, granular borrow. Has 26.3% passing #270 mesh; maximum allowed 10%.
26	1	1963	0-10	-	Yes	100	100	96.6	67.0	14.5	1	-	-	Owner: Burton Bailey. A small pit with 70 foot face. Anticlinal stratification. Calcium carbonate cementation. Dimensions of pit 60' northwest-southeast, 75' northeast-southwest. Test #1 in floor. Sand with sand bottom. Fails for Item

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 23

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
						1 1/2"	5/8"	#4	#100	#270				
	2	1963	0-70	-	Yes	100	100	88.0	44.0	8.5	2	-	Gran. Bor. (Sand)	102-A, granular borrow. Has 14.5% passing #270 mesh; maximum allowed 10%. Test #2 in face. Sand, silt, with small pockets of gravel near top. Fails for Item 202 Mod., sub-base of sand. Has 7.5% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow.
27	1A	1963	1-4	0-1	No	95.7	81.0	66.2	18.0	4.0	1 1/2	-	Gran. Bor. (Sand)	Owner: Emil Osterberg. A series of knolls on sloping valley wall. Test #1 on top of level terrace and in west corner of field. 0-1 foot overburden, 1'-4' pebbly sand, 4'-9' fine sand with fine sand bottom. Test #1A fails for Item 202 Mod., sub-base of sand. Has 81% passing 5/8" mesh; minimum allowed 85%. Has 66.2% passing #4 mesh; minimum allowed 70%. Acceptable for Item 102-A, granular borrow.
	1B	1963	4-9	-	No	100	100	94.9	69.0	13.3	3 1/2	-	-	Test #1B fails for Item 102-A, granular borrow. Has 13.3% passing #270 mesh; maximum allowed 10%.
	2	1963	3-10	0-1	No	-	-	34.1	29.0	9.0	1	-	Gran.	Test #2 in east corner of

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 24

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Overburden (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				
	3	1963	1-10	0-1	No	100	100	100	87.0	33.0	2 1/2	-	-	Bor. (Grav.) field 350' east of Test #1. 0-1' overburden, 1'-3' silt, 3'-10' gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 29% passing #100 mesh; maximum allowed 15%. Has 9% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow. Test #3 north of railroad right-of-way. Fine sand with fine sand bottom. Fails for Item 102-A, granular borrow. Has 33% passing #270 mesh; maximum allowed 10%.
28	1	1963	1-5	0-1	No	-	-	32.8	22.0	7.0	2 1/2	24.0%	Gran. Bor. (Grav.)	Owner: Leo Mayette. Test #1 in garden plot in valley floor. Gravel with gravel and water in bottom. Fails for Item 201-A, sub-base of gravel. Has 22% passing #100 mesh; maximum allowed 15%. Has 7% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow.
29	1	1963	1-9	0-1	No	100	100	100	97.0	37.0	1 1/2	-	-	Owner: Ernest Martell. A small terrace above valley floor, Test #1 silt and

WILLIAMSTOWN GRANULAR DATA SHEET NO. 25

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								
						1 1/2"	5/8"	#4	#100	#270				
	2	1963	1-6	0-1	No	100	100	99.7	93.0	25.0	2	-	-	fine sand. Fails for Item 102-A, granular borrow. Has 37% passing #270 mesh; maximum allowed 10%. Test #2 silt. There is a ledge outcrop within 100' of test. Fails for Item 102-A, granular borrow. Has 25% passing #270 mesh; maximum allowed 10%.
30	1	1963	1-4	0-1	No	-	Not Sampled			-				Owner: Leo Meyette. Test #1 in wall of valley of owner's request. Till with ledge bottom. Not Sampled.
31	1	1963	1-9	0-1	No	100	100	100	90.0	19.0	1 1/2	-	-	Owner: Leo Meyette. A series of knolls on valley floor. Test #1 on top of knoll. Silt with silt bottom. Lake sediments. Fails for Item 102-A, granular borrow. Has 19% passing #270 mesh; maximum allowed 10%.
	2	1963	1-9	0-1	No	100	100	100	74.0	21.0	2 1/2	-	-	Test #2 south of Test #1 and at lower level. Silty sand. Fails for Item 102-A, granular borrow. Has 21% passing #270 mesh; maximum allowed 10%.
32	1	1963	0-9	-	Yes	100	100	88.4	86.0	41.0	1	-	-	Owner: Rouleau Granite Co. Dimensions of pit 75' north.

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 26

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	
						1 1/2"	5/8"	#4	#100					#270
2	1963	1-6	0-1	No	-	-	34.5	10.0	4.0	2	31.2%	Gran. Bor. (Grav.)	south, 55' east-west. Test #1 in floor of small pit. Fine sand with concretions. Fails for Item 102-A, granular borrow. Has 41% passing #270 mesh; maximum allowed 10%. Test #2 in floor of valley below pit. Gravel, with gravel and water in bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 31.2%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.	
3	1963	1-9	0-1	No	100	100	100	80.0	12.5	1 1/2	-	-	Test #3 in valley floor 320' north of Test #2. Fails for Item 102-A, granular borrow. Has 12.5% passing #270 mesh; maximum allowed 10%.	
4	1963	1-15	0-1	Yes	100	100	100	93.0	56.3	3 1/2	-	-	Test #4 in face of pit. Silt with silt bottom. Fails for Item 102-A, granular borrow. Has 56.3% passing #270 mesh; maximum allowed 10%.	
33	1	1963	0-9	-	Yes	100	93.0	82.0	5.0	2.0	1 1/2	-	Sand	Owner: Mrs. Bertha Farnham. A large pit on several levels. Test #1 in floor of second level. Dimensions of this level 35' north-

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 27

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				
	2	1963	0-9	-	Yes	100	100	98.9 *48.5	49.0 *8.9	9.0	1	-	Gran. Bor. (Sand)	<p>south, 90' east-west. Pebbly sand with pebbly sand bottom. Acceptable for Item 202 Mod., sub-base of sand.</p> <p>Test #2 on floor of next level. Dirty pebbly sandy silt. Fails for Item 202 Mod., sub-base of sand. Has 48.5% passing #100 mesh; maximum allowed 18%. Has 8.9% passing #270 mesh; maximum allowed 5%. Acceptable for Item 102-A, granular borrow.</p>
	3	1963	0-9	-	Yes	100	100	89.5 *5.37	6.0 *1.79	2.0	2	-	Sand	<p>Test #3 in floor of upper level. Sand with sand bottom. Acceptable for Item 202 Mod., sub-base of sand.</p>
	4	1963	30-40	-	Yes	-	-	22.3	16.0	4.3	1	26.6%	Gran. Bor. (Grav.)	<p>Test #4 in face above upper level. Could not sample full 60' face. Not stripped. Large hardwoods at top occasionally falling into pit. Water pipe to Mitchell Nursery just behind top of face. Fails for Item 201-A, sub-base of gravel. Has 16% passing #100 mesh; maximum allowed 15%. Has wear of 26.6%; maximum allowed 25%. Acceptable</p>

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 28

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
						1 1/2"	5/8"	#4	#100	#270				
	5	1963	0-50	-	Yes	-	-	50.2	9.0	3.5	1	24.8%	Gravel	for Item 102-A, granular borrow. Test #5 in face between second and third levels. The second level has been severely damaged by dumping trash onto it from above. Very difficult to sample due to pollution of face by foreign material. Acceptable for Item 201-A, sub-base of gravel. Although this pit contains acceptable material, it is poorly maintained.
	6	1961	-	-	Yes	-	-	60.8	4.0	1.75	2	-	Gran. Bor. (Grav.)	Test #6 taken by Barrett Town Manager, F.L. Tucker, in 1961. Location of Test unknown. Fails for Item 201-A, sub-base of gravel. Has 60.8% passing #4 mesh; maximum allowed 60%. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
	7	1962	-	-	Yes	-	-	27.6	17.0	8.5	1 1/2	24.0%	Gran. Bor. (Grav.)	Test #7 taken by Barrett Town Manager, F.L. Tucker, in 1962. Location of test unknown. Fails for Item 201-A, sub-base of gravel. Has 17% passing #100 mesh; maximum allowed 15%. Has 8.5% passing #270 mesh;

WILLIAMSTOWN GRANULAR DATA SHEET NO. 29

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.
						1 1/2"	5/8"	#4	#100	#270				
														maximum allowed 5%. Acceptable for Item 102-A, granular borrow.
34	1	1963	0-9	-	Yes	-	-	68.9	14.0	4.25	1 1/2	-	Gran. Bor. (Grav.)	Owner: Levi Lemieux. A very extensive pit with many levels and sections. Material varies from fine sand to coarse gravel. Test #1 in floor of small bench. Sandy gravel with sandy gravel bottom. Fails for Item 201-A, sub-base of gravel. Has 68.9% passing #4 mesh; maximum allowed 60%. Has 4.25% passing #270 mesh; maximum allowed 3%. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow.
	2	1963	10-20	-	Yes	100	100	94.1	19.0	4.0	1 1/2	-	Sand	Test #2 in face. Sand with concretions. Acceptable for Item 202 Mod., sub-base of sand.
	3	1963	0-9	-	Yes	-	-	50.0	14.0	5.0	1 1/2	-	Gran. Bor. (Grav.)	Test #3 in floor of top level. Silty gravel with soft stones. Fails for Item 201-A, sub-base of gravel. Has 5% passing #270 mesh; maximum allowed 4%. Insufficient proper

* Percentage of Total Sample.

WILLIAMSTOWN GRANULAR DATA SHEET NO. 30

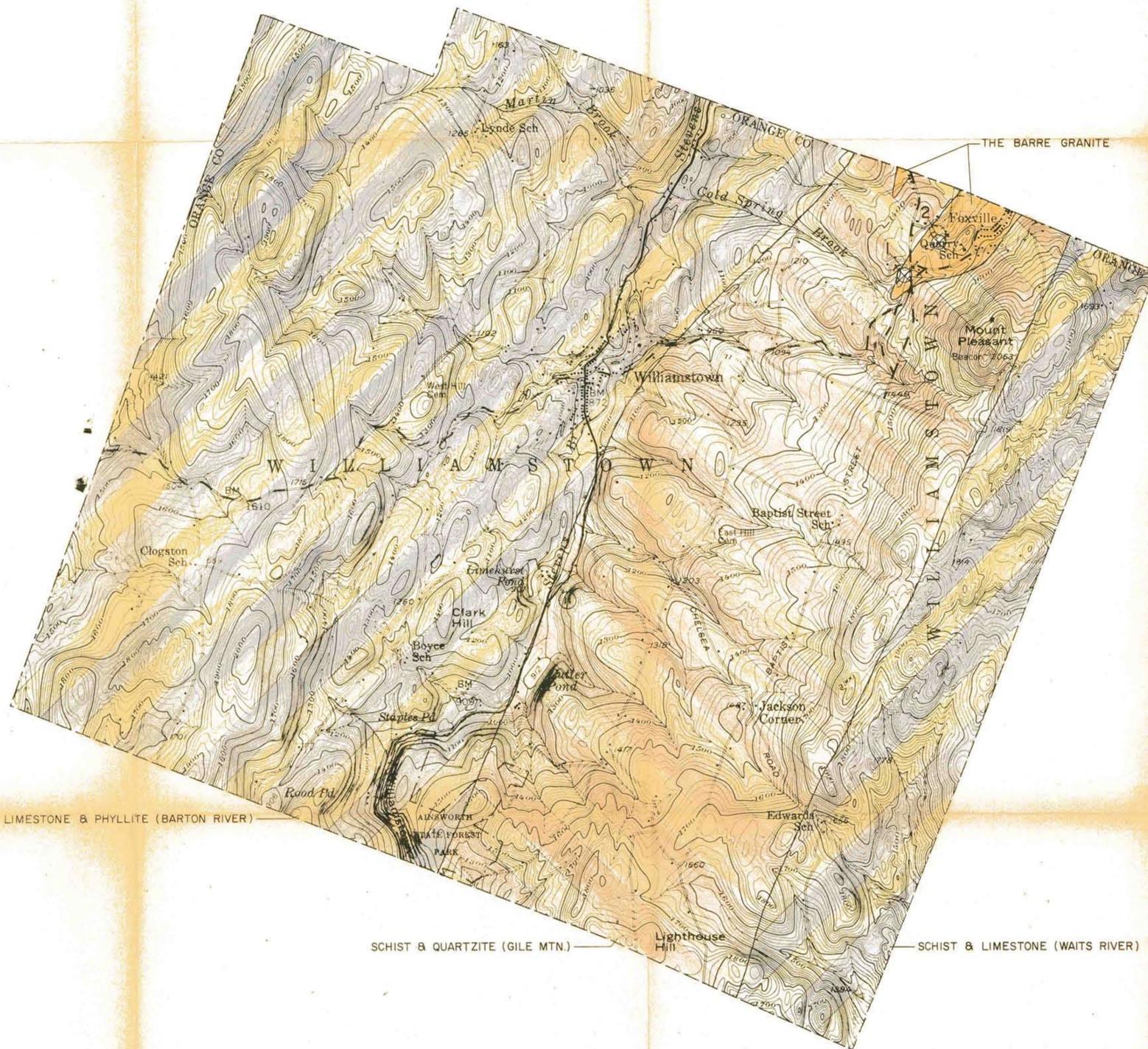
Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Over-burden (FT)	Exist-ing Pit	Sieve Analysis					Color AASHO T-21	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						% Passing								
						1 1/2"	5/8"	#4	#100	#270				
	4	1963	9-18	-	Yes	-	-	35.9	9.0	4.0	2.	25.6%	Gran. Bor. (Grav.)	<p>sized stone in sample for wear test Acceptable for Item 102-A, granular borrow. Test #4 in face of top level. Gravel with calcium carbonate cementation. Gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 25.6%; maximum allowed 25%. Test #5 in floor of north upper level. Sandy gravel with sandy gravel bottom. 0-3' fine sand, 3'-10' gravel, gravel bottom. Fails for Item 201-A, sub-base of gravel. Insufficient proper-sized stones in sample for wear test. Acceptable for Item 102-A, granular borrow. Test #6 in floor of bench on upper level. Uniform gravel. Acceptable for Item 201-A, sub-base of gravel. Test #7 in face of bench. Gravel with gravel bottom. Fails for Item 201-A, sub-base of gravel. Has wear of 32%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow. Test #8 on north side of</p>
	5	1963	0-10	-	Yes	-	-	50.4	9.0	2.0	1 1/2	-	Gran. Bor. (Grav.)	
	6	1963	0-10	-	Yes	-	-	33.2	13.0	4.8	1	17.6%	Gravel	
	7	1963	5-12	-	Yes	-	-	37.7	12.0	4.0	1 1/2	32.0%	Gran. Bor. (Grav.)	
	8	1958	-	-	Yes	-	-	63.5	8.0	3.75	1	33.2%	Gran.	

WILLIAMSTOWN GRANULAR DATA SHEET NO. 31

Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (FT)	Over-burden (FT)	Exist-ing Pit	Sieve Analysis			Color AASHO	Abrasion AASHO	Passes VHD Spec.	Remarks
						% Passing	#4	#100				
						1 1/2"	5/8"		T-21	T-4-35	Bor. (Grav.)	pit. Taken F.J. Callahan in 1958. Fails for Item 201-A, sub-base of gravel. Has 63.5% passing #4 mesh; maximum allowed 3%. Has wear of 33.2%; maximum allowed 25%. Acceptable for Item 102-A, granular borrow.

WILLIAMSTOWN ROCK DATA SHEET NO. 1

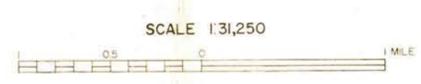
Ident. No.	Field Test No.	Year Field Tested	Rock Type	Exist- ing Quarry	Method of Sampling	Abrasion AASHO T-3	Distance Between Samples (FT)	Remarks
1	1	1963	Granite	Yes	Chip	2.4	-	Owner: Rene Dufresne. A small quarry near the southern end of the Barre Granite. Granite is interfingered with schist or Gile Mountain. Sample was taken to indicate quality (abrasion) of rock here in Williamstown. This is not necessarily a source where rock could be quarried for crushing.
2	1	1963	Granite	Yes	Chip	3.8	-	Owner: J.K. Pirie, Estate. Sample taken was from one of many large grout piles in the area. No attempt was made to ascertain ownership and availability of all the granite. Sampling was done to indicate general quality (abrasion) of the rock. This is not necessarily a source where rock could be quarried for crushing.



LEGEND

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

WILLIAMSTOWN



1964

ROCK MATERIALS MAP

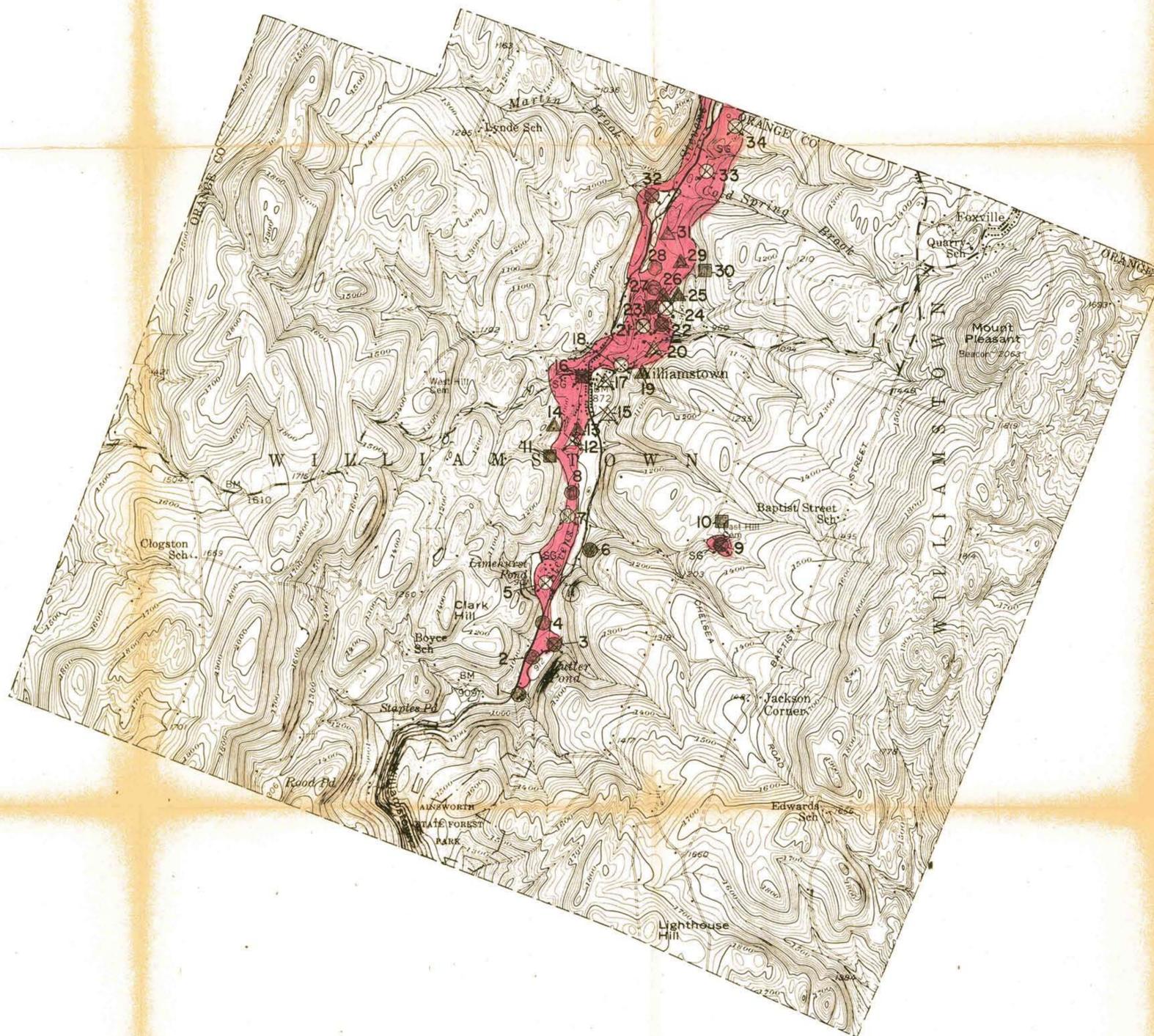
BY
VERMONT DEPARTMENT OF HIGHWAYS
IN COOPERATION WITH
U.S. BUREAU OF PUBLIC ROADS

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

REVISIONS

DATE				
BY				

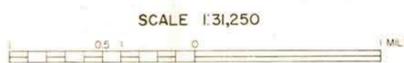
ROCK



LEGEND

- GRAVEL, ACCEPTABLE FOR ITEM 201-A (sub-base of gravel)
- GRAVEL, DEPLETED OR NOT ACCEPTABLE FOR ITEM 201-A
- △ SAND, ACCEPTABLE FOR ITEM 202 (sub-base of sand) Mod.
- ▲ SAND, DEPLETED OR NOT ACCEPTABLE FOR ITEM 202 Mod.
- GRANULAR BORROW, ITEM 102-A
- MATERIAL NOT ACCEPTABLE FOR ITEM 102-A
- ⊗ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

WILLIAMSTOWN



CONTOUR INTERVAL 20 FEET

1964

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					