SURVEY OF HIGHWAY CONSTRUCTION MATERIALS IN THE TOWN OF WATERBURY, WASHINGTON COUNTY, VERMONT

prepared by

Engineering Geology Section, Materials Division
Vermont Department of Highways

in cooperation with

United States Department of Transportation
Federal Highway Administration

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Acknowledgements

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

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

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

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

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

History

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

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

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

Inclosures

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

The granular materials map depicts areas covered by various types of glacial deposits (outwash, moraines, kames, kame terraces, eskers, etc.) by which potential sources of gravel and sand may be recognized. This information was obtained primarily from a survey conducted by Professor D. P. Stewart of Miami University, Oxford, Ohio, who had been mapping the glacial features of Vermont during the summer months since 1956. Further

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

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

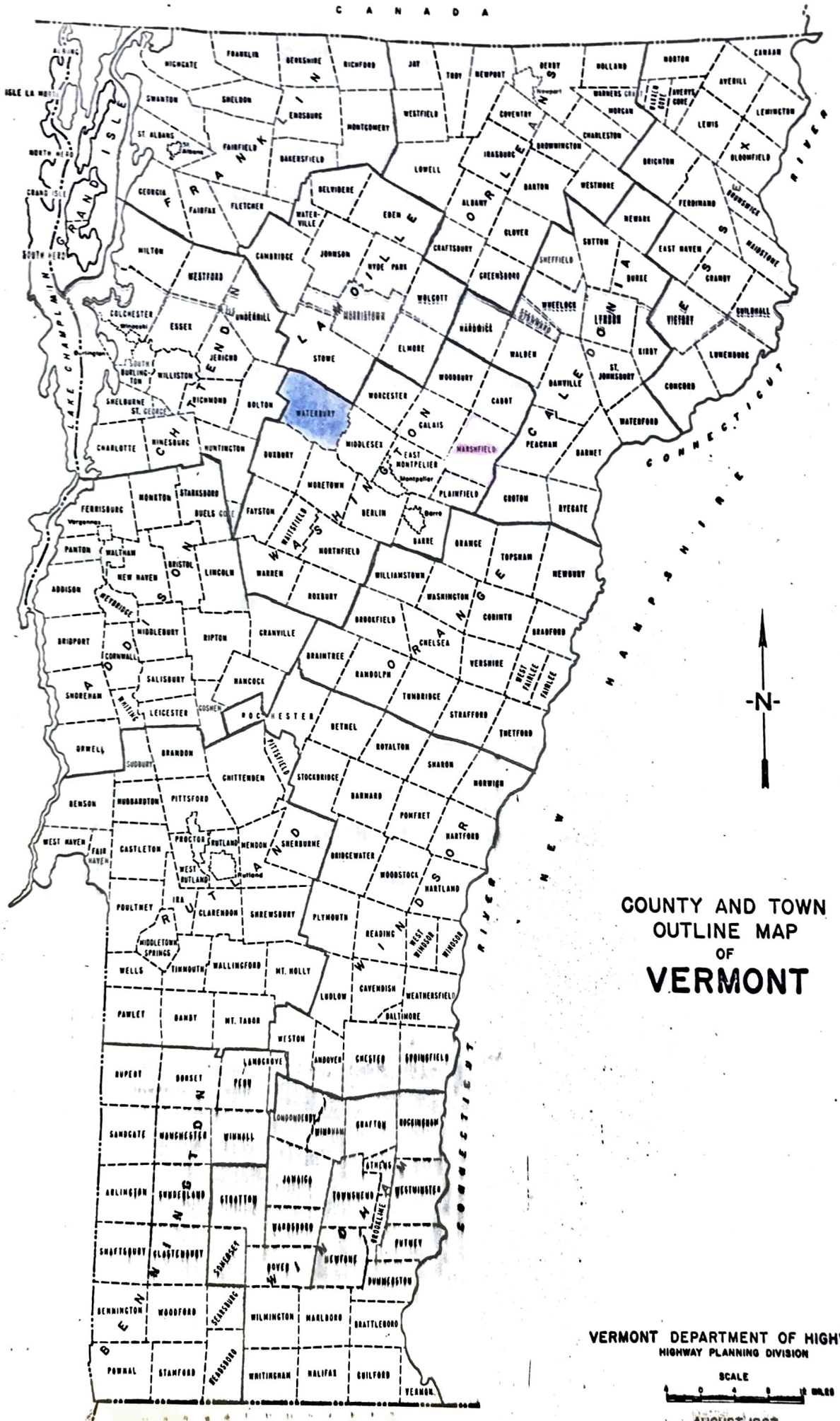
Work sheets contain more detailed information on each test and a detailed sketch of each identification Number Area. The work sheets and laboratory reports are on file in the office headquarters of this Project.

LOCATION

The Town of Waterbury is located in the northwest corner of Washington County in the north-central part of Vermont. It is bounded on the northeast by Stowe, on the southeast by Middlesex, on the southwest by Moretown and Duxbury, and on the northwest by Bolton. (See: County and Town Outline Map of Vermont on the following page).

Waterbury lies within both the Green Mountain and the Vermont Piedmont physiographic sub-divisions of the New England Province. West of Vermont Route 100, the Green Mountain sub-division has typically rugged, steep-sloped topography with sharp-crested hills and mountains having a maximum elevation of just over 3,400 feet at the summit of Ricker Mountain, near the Bolton town line. East of Vermont Route 100, the Vermont Piedmont is a plateau with steep-sided valleys, and is bounded on the east by the Worcester Range which rises to 2,600 feet.

Drainage is southward, via the Little River, and Alder, Bryant, Graves, Thatcher, and several unnamed brooks, into the Winooski River, which forms the town's southwest boundary. The Winooski River occupies a wide, east-west valley and flows westward through the main range of the Green Mountains. The lowest elevation in town is just under 340 feet at the Bolton town line. A large flood-control dam impounds the Little River and forms the Waterbury Reservoir in the north-central part of town.


CANADA
NEW YORK
NEW HAMPSHIRE
CONNECTICUT RIVER
LAKE CHAMPLAIN
GRAND ISLE
FRANKLIN
ORLEANS
LAMOILLE
CHITTENDEN
WASHINGTON
CALEDONIA
ESSEX
ORANGE
ADDISON
RUTLAND
WINDSOR
WINDHAM
BENNINGTON
-N-
COUNTY AND TOWN
OUTLINE MAP
OF
VERMONT
VERMONT DEPARTMENT OF HIGHWAYS
HIGHWAY PLANNING DIVISION
SCALE

SURVEY OF ROCK SOURCES

Procedure for Rock Survey

The routine employed by the project in a survey of possible sources of rock for highway construction is divided into two main stages; office and field investigations.

The office investigation is conducted primarilty during the winter months and comprises the mapping and description of rock types as indicated in various reference sources. Many different sources of information are utilized, as indicated in the bibliography. These references differ considerably in dependability due to new developments and studies that have contributed to the obsolescense of a number of reports. In addition, the results of samples taken by other individuals are analyzed, and the location at which these samples were taken is mapped when possible. 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 field investigation is begun by making a cursory preliminary survey of the entire area. The information obtained in the preliminary survey, together with the information assimilated in the office investigation, is employed to determine the areas where testing and sampling will be concentrated. When a promising source has been determined by rock type, volume of material, accessibility, and adequate exposure and relief, chip samples are taken with a hammer across the strike or trend of the rock. The samples are submitted to the Material Testing Laboratory for abrasion testing both by the Deval Method (AASHO T-3) and the Los Angeles Method (AASHO T-96). It should be kept in mind that the samples taken by the chip method are often within the weathered zone of the outcrop and consequently may give a less satisfactory test result than fresh material deeper in the rock structure. When the material is uniform and acceptable abrasion tests result from the chip samples, the material source is included in this report as being satisfactory.

Discussion of Rock and Rock Sources

It should be noted that information on the Rock Materials Map is somewhat simplified. (For a more detailed description of the respective rock formations, see the Summary of Rock Formations included in this report). Complex metamorphic rocks comprise most of the lithology within Waterbury.

Rocks belonging to the same formation and exhibiting similar characteristics (i.e., color, texture, etc.) may yield different abrasion test results owing to physical and chemical properties. Therefore, in no case should satisfactory test results of an area be construed to mean that the same formation, even in the same area, will not later produce unsatisfactory material. This is especially true of metamorphic rocks.

Dense woods, glacial drift and inaccessible areas cover much of the more sparsely populated sections of town. Eight rock areas were sampled; six in 1957, and two in 1959. Several of these areas are now within the Interstate Right-of-Way.

The western one-tenth of town is underlain by schist and phyllite of the Underhill formation. Map Identification No. 1 yielded satisfactory abrasion test results in 1957, however it is located on the U. S. Route 2 Relocation right-of-way (opposite the Bolton Falls Dam), and is unavailable. Just east of the Underhill formation, about 40% of the town is underlain by the schist, quartzite, and gneiss of the Hazens Notch formation. In 1957, four samples were taken at Map Identification No. 2 (located about 1/4 mile east of Map Identification No. 1) and only one passed. This rock cut is also on the north side of U. S. Route 2 Relocation right-of-way and would be unavailable.

Just east of the Hazens Notch formation, about one-tenth of the town is underlain by the phyllite, schist, and quartzite of the Ottauquechee formation. In 1957, this formation yielded a satisfactory abrasion test result at Map Identification No. 6 from an outcrop south of East Street in Waterbury Village.

This outcrop is now a rock cut along the Waterbury-Stowe exit ramp of the northbound lane of I-89, and is not available. East of Map Identification No. 6 several narrow bands of calcareous greenstone of the Ottauquechee formation trend nearly north-south. This formation, mapped as a greenstone, was sampled at Map Identification No. 5 and yielded only a failing abrasion test result from a quartzose schist. A thin band of schist of the Stowe formation lies just east of the Ottauquechee formation, but was not sampled because the Stowe schist has not yielded acceptable construction material in other towns.

Just east of the schist, a band of calcareous greenstone of the Stowe formation, yielded satisfactory abrasion test results at Map Identification No. 7. This area is now within the I-89 right-of-way, and thus material is not available. The schist of the Stowe formation alternates with the calcareous greenstone of the Stowe formation, and both are mapped as continuing eastward beyond the Middlesex town line. Map Identification No. 8, in the Stowe schist, lies about three-tenths of a mile east of Map Identification No. 7. This area is in a railroad cut adjacent to the I-89 right-of-way, and yielded unsatisfactory abrasion test results. The calcareous greenstone of the Stowe formation yielded satisfactory abrasion test results at Map Identification No. 3 and No. 4. Both areas are in the northeast corner of town; No. 3 was an inactive quarry from which material for use on part of I-89 was obtained. Map Identification No. 4 was a very small outcrop in dense woods near several dwellings. There was very little relief in the vicinity, so developing this site as a rock source would be difficult and impractical. Map Identification No. 3 would be very easy to reactivate and has a good, readily available reserve of rock. This survey believes it to be the best source of rock for construction purposes in Waterbury.

SURVEY OF SAND AND GRAVEL SOURCES

Procedure for Sand and Gravel Survey

The survey of possible sources of sand and gravel for highway construction is divided into office and field investigations.

The office investigation is conducted primarily during the winter months and uses various sources of information to map potentially productive granular areas. Of these, the survey of glacial deposits mapped by Professor Stewart, soil-type maps, aerial photographs and United States Geological Survey Quadrangles are valuable sources; the last two are used in the recognition and location of physiographic features indicating glacial deposits and in the study of drainage patterns. The locations in which samples were taken by other individuals are noted and mapped, as well as the sites of existing pits.

The field investigation is begun by making a cursory survey of the entire town. All pits and areas that show evidence of glacial or fluvial deposition are noted and later investigated by obtaining samples of pit faces and other exposed materials. Test holes are dug in pit floors and extensions, with a backhoe, to a depth of approximately 11 feet. All samples are submitted to the Materials Division where they are sieved for gradation and tested for stone abrasion by the AASHTO T-4 method.

Discussion of Sand and Gravel Deposits

Granular materials in Waterbury suitable for highway and related construction purposes were deposited by both glaciofluvial and glaciolacustrine processes. One area north of I-89, in the south corner of town, is mapped as a Kame terrace, but was inaccessible to the survey so was not sampled; however, it may be promising for future investigation. Another area mapped as a Kame terrace is in the north-central part of town. It is inaccessible because most of it lies beneath the waters of the Waterbury Reservoir, and because there are no roads to the area; however, it is mapped as extending northward into Stowe. The remaining granular deposits in town are mapped as pebbly sands or lake sediments. The deposits in the western half of town were inaccessible to the survey, for the above-mentioned reasons, and were not sampled. A long strip of granular material lies along the west flank of Waterbury Reservoir, but this area is occupied by a large, active state campground. Other granular areas in the south and central sections of town were not sampled because they are within the village residential limits, and thus are subject to the control of zoning ordinances.

Only Map Identification No. 6, a large field southeast of Town Highway No. 6 (Kneeland Flats Road), yielded specification gravel.

Specification sand was sampled from pits at Map Identification Nos. 4, 5, 8, and 13; and from a large field northwest of Town Highway No. 6 (Kneeland Flats Road), Map Identification No. 7. Sand sources are listed most favorable first: Map Identification Nos. 7, 13, 4, and 8.

Acceptable granular materials in Waterbury are only found between the 500-foot and the 1,000-foot contours.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF WATERBURY

Hazens Notch formation: Interbedded carbonaceous and non-carbonaceous quartz-sericite-albite-chlorite schist; grades to quartzite and gneiss.

Ottauquechee formation: Black carbonaceous phyllite or schist containing interbeds of massive quartzite commonly criss-crossed by veins of white quartz; quartzite is dark gray and carbonaceous, light gray, or white; also includes light green quartz-sericite-chlorite phyllite or schist and sericitic quartzite.

Ottauquechee formation greenstone and amphibolite

Stowe formation: Quartz-sericite (muscovite-paragonite)-chlorite phyllite and schist; porphyroblasts of albite, garnet, chloritoid or kyanite are common locally. Schist contains abundant segregations of granular white quartz.

Stowe formation greenstone and amphibolite: Epidote-albite-chlorite rocks contain actinolite and hornblende where more metamorphosed.

Underhill formation: Silvery, gray-green, quartz-sericite-albite-chlorite-biotite schist containing abundant lenticular segregations of granular white quartz; locally quartz-sericite-albite-chlorite phyllite; porphyroblasts of albite, garnet, and magnetite are common and locally very abundant in gneissic facies in axial anticlines of the Green Mountain anticlinorium.

Ultramafics: Serpentinite, talc-carbonate rock, steatite.

GLOSSARY OF SELECTED GEOLOGIC TERMS

Actinolite: A variety of amphibole, occurring in greenish bladed crystals or in masses.

Albite: The sodium end member of the plagioclase feldspar group, light-colored and found in alkali rocks.

Beach: As used here the term applies to material of shoreline deposits which may consist of any grain size and gradation of sediment, but is usually well-sorted sand and pebbles.

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

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

Biotite: The silicate mineral commonly known as black mica.

Block: A large angular rock fragment showing little or no modification by transporting agencies. May be nearly in place or transported superglacially or by gravity or other agencies.

Calcareous: Pertaining to or containing calcium carbonate.

Calcite: A common rock-formation carbonate mineral having the chemical formula $CaCO_3$. Calcite is distinguished by its softness, perfect rhombohedral cleavage, white or pale color, vitreous luster and its ready effervescence in cold dilute hydrochloric acid. The last named property serves to distinguish it from DOLOMITE with which it is ordinarily confused.

Carbonaceous: Containing carbon.

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

Chlorite: A general designation for a group of hydrous silicates of magnesium and iron, with or without aluminum, so named because of their green color.

Conglomerate: The consolidated equivalent of gravel. The constituent rock and mineral fragments may be of varied composition and of a wide size range. The matrix of finer material between the larger fragments may be sand, silt, or any of the common natural cementing materials such as calcium carbonate, silica, clay, or iron oxide.

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, $CaMg(CO_3)2$: carbon dioxide 47.7, lime 30.4, and magnesia 21.9 percent.

Epidote: A calcium aluminum iron silicate mineral that usually occurs in rocks as formless grains and masses. The color is usually some shade of green, pistachio-green or yellowish-green being the most characterisitc.

Fault: A break in materials of the earth's crust on which there has been movement parallel with the surface along which the break occurs. A fault occurs when rocks are strained past the breaking point and yield along a crack or series of cracks so that corresponding points on the two sides are distinctly offset. A great number of different types of faults have been named.

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

Fluvial: Pertaining to streams.

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

Graywacke: An old rock name loosely applied. Most writers now apply it to a dark-colored, hard sandstone consisting of angular grains of quartz, feldspar, and rock fragments embedded in a fine, compact matrix composed of micas, clay minerals, and chlorite.

Greenstone: A field name for rocks that have been so metamorphosed or otherwise so altered that they have assumed a distinctive color owing to the presence of chlorite, epidote, or actinolite.

Hematite: A common ore mineral of iron, Fe_2O_3, occurring in steel-gray to black crystals, and in red earthy masses.

[illegible] owing to the presence of chlorite, epidote, or actinolite.

Interbeds: occur between or lie adjacent and parallel with other beds usually of a different nature.

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

Klippe: is an eroded remnant of the overthrust sheet of a thrust fault now isolated from the main sheet by errosion. (Plural: Klippen).

Lamina: A thin layer of stratified rock; specifically, 1 cm. or less in thickness. (Plural: Laminae).

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

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

Outcrop: Part of a body of rock that appears, bare and exposed, at the surface of the ground. In a more general sense the term applies also to areas where the rock formation occurs next beneath the soil, even though it is not exposed.

Phyllite: A fine-grained, foliated metamorphic rock intermediate between the mica schists and slates into which it may grade. The foliation is made possible by the development of a large amount of potash mica, sericite, which gives the rock its distinctive silvery appearance.

Physiographic: Pertaining to the physical divisions of the earth.

Pillow Structure: The structure of pillow lavas. Lava, usually basaltic, that has congealed in rounded masses resembling a pile of pillows. The pillows range from a few inches to several feet in diameter and the spaces between may be filled with volcanic ash, clastic sediments, or mineral deposits. Most pillow lavas are thought to have been formed through the chilling of lava flows by water.

Quartzite: A compact metamorphic rock composed of grains so firmly cemented that fracture takes place across the grains and the cementing material with equal ease.

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.

Sericite: A mineral very similar to muscovite mica. It occurs in small flakes and scales in metamorphic rocks such as sericite schists and sericite gneisses.

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

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

Structural: Of, pertaining to, or resulting from, the effects of folding or faulting of the earth's crust; tectonic; as structural ridges, valleys, types.

Synclinorium: A large composite fold of the earth's crust consisting of a series of anticlines and synclines which, taken together, have the general form of a syncline. The term is reserved for folds of relatively large dimension having a width of at least several miles.

Trend: The direction or bearing of the outcrop of a bed, vein, fault, ore body, contact or linear structure. Also the direction or bearing of larger features such as folds, mountains and ridges.

Trough: In general any long, narrow channel or depression, as between hills or waves. the term is used in structural geology to indicate synclines and narrow structural depressions such as grabens.

Undifferentiated: The specific rock types within a formation are not distinguished.

Vesicular: A texture of rocks which are full of air bubbles, which may be almond-shaped, rounded, ellipsoidal, or tubular. They are due to the expansion of the gases of the lava, and their shape is due to movement in the still-liquid lava.

Water Table: The upper limit of the portion of the ground wholly saturated with water.

Weathered: Showing the effects of exposure to the atmosphere.

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PARTIAL SPECIFICATIONS FOR HIGHWAY CONSTRUCTION MATERIALS

Listed below are partial specifications for Highway Construction Materials as they apply to this report at date of publication. For a complete list of specifications see Standard Specifications for Highway and Bridge Construction, approved and adopted by the Vermont Department of Highways in July, 1971.

DIVISION 700 - MATERIALS

Section 703, Soils and Borrow Materials

703.03 Sand Borrow and Cushion

Sand Borrow shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and shall meet the requirements of the following table:

Table 703.03A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Total Sample	Sand Portion
2"	100	
1½"	90-100	
½"	70-100	
No. 4	60-100	
No. 100		100
No. 200		0- 30
		0- 12

703.05 Granular Borrow

Granular Borrow shall be obtained from approved sources, consisting of satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from loam, silt, clay, and organic material.

The Granular Borrow shall meet the requirements of the following table:

Table 703.05A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Total Sample	Sand Portion
No. 4	20-100	
No. 200		100
		0- 15

The maximum size stone particles of the Granular Borrow shall not exceed 2/3 of the thickness of the layer being spread.

Section 704, Aggregate

704.05 Gravel for Sub-base

Gravel for Sub-base shall consist of material reasonably free from silt, loam, clay, or organic matter. It shall be obtained from approved sources and shall meet the following requirements:

(a) Grading
The gravel shall meet the requirements of the following table:

Table 704.05A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves Total Sample	Sand Portion
No. 4	(20-60)	100
No. 100		0-18
No. 200		0- 8

The stone portion of the gravel shall be uniformly graded from coarse to fine, and the maximum size stone particles shall not exceed 2/3 the thickness of the layer being placed.

(b) Percent of Wear
The percent of wear of the gravel shall be not more than 25 when tested in accordance with AASHO T 4, or more than 40 when tested in accordance with AASHO T 96.

704.06 Crushed Stone for Sub-base

Crushed Stone for Sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material, pieces which are structurally weak and shall meet the following requirements:

(a) Source
This material shall be obtained from approved sources and the area from which this material is obtained shall be stripped and cleaned before blasting.

(b) Grading
This material shall meet the requirements of the following table:

Table 704.06A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves Total Sample
4½"	100
4"	90-100
1½"	25- 50
No. 4	0- 15

(c) Percent of Wear
The percent of wear of the parent rock shall be not more than 8 when tested in accordance with AASHO T 3, or the crushed stone a percent of wear of not more than 40 when tested in accordance with AASHO T 96.

(d) Thin and Elongated Pieces
Not more than 30 percent, by weight, of thin and elongated peices will be permitted.
Thin and elongated pieces will be determined on the material coarser than the No. 4 sieve.

(e) Filler

The filler shall be obtained from approved sources and shall meet the requirements as set up for Sand Cushion, Subsection 703.03.

(f) Leveling Material

The leveling material shall be obtained from approved sources and may be either crushed gravel or stone screening produced by the crushing process. The material shall consist of hard durable particles, reasonably free from silt, loam, clay or organic matter.

This material shall meet the requirements of the following table:

Table 704.06B - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves Total Sample
1"	100
3/4"	90-100
1/2"	50- 90
No. 4	30- 70
No. 100	0- 20
No. 200	0- 10

704.07 Grushed Gravel for Sub-base

Crushed Gravel for Sub-base shall consist of material reasonably free from silt, loam, clay or organic matter. It shall be obtained from approved sources and shall meet the following requirements:

(a) Grading

The crushed gravel shall be uniformly graded from coarse to fine and shall meet the requirements of the following table:

Table 704.07A - Gradation Requirements

Grading	Sieve Designation	Percentage by Weight Passing Square Mesh Sieves Total Sample	Sand Portion
	4"	100	
Coarse	No. 4	25- 50	100
	No. 100		0- 20
	No. 200		0- 12
	2"	100	
	1½"	90-100	
Fine	No. 4	30- 60	100
	No. 100		0- 20
	No. 200		0- 12

(b) Percent of Wear

The percent of wear of the parent gravel shall be not more than 20 when tested in accordance with AASHO T 4, or the crushed gravel a percent of wear of not more than 35 when tested in accordance with AASHO T 96.

(c) Fractured Faces

At least 30 percent, by weight, of the stone content shall have at least one fractured face.

Fractured faces will be determined on the material coarser than the No. 4 sieve.

704.09 Dense Graded Crushed Stone for Sub-base

Dense Graded Crushed Stone for Sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material and pieces which are structurally weak, and shall meet the following requirements:

(a) Source

This material shall be obtained from approved sources and the area from which this material is obtained shall be stripped and cleaned before blasting.

(b) Grading

This material shall meet the requirements of the following table:

Table 704.09A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves
	Total Sample
3½"	100
3"	90-100
2"	75-100
1"	50- 80
½"	30- 60
No. 4	15- 40
No. 200	0- 10

(c) Percent of Wear

The percent of wear of the parent rock shall be not more than 8 when tested in accordance with AASHO T 3, or the crushed stone a percent of wear of not more than 40 when tested in accordance with AASHO T 96.

(d) Thin and Elongated Pieces

Not more than 30 percent, by weight, of thin or elongated pieces will be permitted.

Thin and elongated pieces will be determined on the material coarser than the No. 4 sieve.

704.10 Gravel Backfill for Slope Stabilization

Gravel Backfill for Slope Stabilization shall be obtained from approved sources, consisting of satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from loam, silt, clay, and organic material.

The gravel backfill shall meet the requirements of the following table:

Table 704.10A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Total Sample	Sand Portion
No. 4	20-50	100
No. 100		0- 20
No. 200		0- 10

The stone portion of the gravel backfill shall be uniformly graded from coarse to fine, and the maximum size stone particles shall not exceed 2/3 the thickness of the layer being placed.

704.11 Granular Backfill for Structures

Granular Backfill for Structures shall be obtained from approved sources, consisting of satisfactorily graded, free draining granular material reasonably free from loam, silt, clay, and organic material.

The granular backfill shall meet the requirements of the following table:

Table 704.11A - Gradation Requirements

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves	
	Total Sample	Sand Portion
3"	100	
2½"	90-100	
No. 4	50-100	
No. 100		100
No. 200		0- 18
		0- 8

WATERBURY GRANULAR DATA SHEET NO. 1

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
1	1	1973	1-5	0-1	No	--	--	100	93	71	56	---	---	Owner: Joseph Cavallo. Area is large inactive, grass covered field west of Town Highway No. 34 with access about 1.21 miles north of junction with Town Highway No. 6. Test No. 1 was in middle of field about 560' from highway. Material is: 1'-5', gray, silty clay; bottom, same and water table.
2	1	1973	1-13	0-1	Yes	92	86	66	52	42	26	19.2%	---	Owner: Lynwood R. Sweet. Area is a small pit in hayfield west of Town Highway No. 34 with access about 1.08 miles north of junction with Town Highway No. 6. Pit truncates low N-S trending ridge. Test No. 1 was in north face of small diggings in northwest corner of field. Material is: 2'-3', silt; 3'-6', gravelly layer; 6'-9', sand; 9'-13', very hard-packed "tilly gravel" with silt-clay matrix. Floor of pit had standing water.
	2	1973	1-7	0-1	No	--	100	94	86	67	50	---	---	Test No. 2 was atop high point in field east of pit. Material is: 1.5'- 9', silty fine sand; bottom, fine sand.
	3	1973	1-7	0-1	No	--	100	98	82	68	55	---	---	Test No. 3 was in low part of field, 350' southeast of Test No. 2 Material is: 1'- 7', silt and angular boulders up to 2 feet in diameter; bottom, clay.
	4	1974	1.5-8	0-1.5	No	100	83	80	72	70	56	---	---	Test No. 4 was in field, 350' north of Test No. 2. Material is: 1.5'-8', silt to clay with rock fragments; bottom, same.

WATERBURY GRANULAR DATA SHEET NO. 2

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
						2"	1½"	½"	#4	#100	#200			
	5	1973	1-7	0-1	Yes	100	90	85	76	29	17	---	---	Test No. 5 was in low ridge, 50' northeast of Test No. 1. Material is: 1'- 7', stony sand; bottom, silty sand.
3	1	1973	6-18	0-6	Yes	100	94	83	72	26	19	---	---	Owner: Stowe Consortium. Area is an inactive, overgrown pit east of Town Highway No. 6 with access about 0.97 mile south of junction with Town Highway No. 34. Area is site for housing development and materials are not available. Test No. 1 was in northeast face of pit. Material is: 0-6', hard-packed clay (not sampled); 6'- 10', sand, silty sand and pebbles; 10'- 15', clay or silt-clay; 15'- 17', sand and pebbles; 17'- 18', clean gravel.
4	1	1973	5-28	0-2	Yes	95	--	85	74	16	6	---	Sand	Owner: Milton Ernstof. Area is a wooded ridge southeast of Town Highway No. 6 and truncated by a small active pit at the southwest end. Access to pit is 0.48 mile east of junction with Town Highway No. 28. Test No. 1 was in the southeast face of the pit. Material is: 2'- 5', inaccessible; 5'- 28', interbedded silt, sand, pebbly sand and fine gravel lenses; 28'- 35', sloughed material. Floor of pit was soggy and spongy.
	2	1973	1-9	0-1	No	100	96	87	71	18	6	---	Sand	Test No. 2 was atop knoll northeast of pit and north of woods. Material

WATERBURY GRANULAR DATA SHEET NO. 3

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
	3	1973	1-6	0-1	No	100	93	84	69	18	9	---	Sand	is: 1'- 9', sand with silt seams and a few pebble layers. Test No. 3 was in lower corner of field about 150' northeast of Test No. 2. Material is: 1'- 5', sand, pebbly sand and silt; 5' - 6', gravel; bottom, water table.
5	1	1973	2-11	0-2	Yes	100	95	86	76	12	5	---	Sand	Owner: George Izzo. Area is a small pit at the end of Town Highway No. 50 about 80' east of owner's new house. Pit has largely been smoothed over and planted with pines. Test No. 1 was in east face. Material is: 2'- 11', sand with a few pebbly seams. Bedrock shows on upper part of face.
6	1	1973	1-10	0-1	No	82	79	65	50	10	5	23.5%	Gravel	Owner: Milton Ernstof. Area is a large field south of Town Highway No. 6 with access about 0.44 mile east of its junction with State Aid Highway No. 1. Area was used as hayfield at time of survey; however, material would be available. Test No. 1 was in western part of field, about 280' east of property-line fence. Material is: 1'- 10', pebbly fine gravel with small cobbles and silt seams.
	2	1973	1-9	0-1	No	92	87	67	46	13	7	20.6%	Gravel	Test No. 2 was in eastern part of field, 375' east of Test No. 1 and 100' west of small stream that is property line. Material is: 1'- 9',

WATERBURY

GRANULAR DATA SHEET NO. 4

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
	3	1973	1-8	0-1	No	--	100	94	78	53	37	---	---	pebbly fine gravel with silt seams; bottom, spring. Test No. 3 was near southwest corner of field, about 360' S. 65°W. of Test No. 1. Material is: 1'- 3', pebbly fine gravel; 3'- 8', sand and silt seams.
7	1	1973	1-9	0-1	No	--	--	100	97	31	18	---	---	Owner: David Harvey. Area is a large field north of Town Highway No. 6 with access about 0.33 mile east of junction with State Aid Highway No. 1. Field was pasture land at time of survey. Test No. 1 was in southwest corner of field. Material is: 1'- 9', silty sand; bottom silty clay.
	2	1973	1-9	0-1	No	--	100	97	87	19	7	---	Sand	Test No. 2 was 300' north of Test No. 1 and south of wooded gully. Material is: 1'- 8', coarse and pebbly sands; 8'- 9', silty sand with clay seams; bottom, silty clay and water table.
	3	1973	1-7	0-1	No	--	100	92	77	13	6	---	Sand	Test No. 3 was in field about 600' N. 75°E. of Test No. 2. Material is: 1'-4', sand; 4'- 5', silt (with water seep at 4'); 5' 7', sand and silty sand; bottom, silt-clay and water table.
	4	1973	1-4	0-1	No	--	100	95	82	67	55	---	---	Test No. 4 was in field about 800' northeast of Test No.3. Material is: 1'- 4', silt, sand, and stone fragments; bottom, ledge.
8	1	1973	0-12	--	Yes	--	100	81	69	8	2	---	Sand	Owner: Town of Waterbury.

WATERBURY GRANULAR DATA SHEET NO. 5

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
	2	1973	6-16	0-1	Yes	--	100	97	80	10	4	---	Sand	Area is a large, active, five-level pit southeast of State Aid Highway No. 3 about 0.54 mile northeast of its junction with Town Highway No. 5. Test No. 1 was near highway in lowest usable face of pit. Material is 0-3', cobbly sand; 3'- 12', interbedded sand, pebbly sand and silt; bottom, sloughed material. Test No. 2 was in southeast face of level above and east of Test No. 1. Material is: 1'- 6', inaccessible sand and silt seams; 6'- 16', interbedded sand, silt and pebble layers; 16'- 18', sloughed material. Test No. 3 was in upper face at north end of pit. Materials is: 1.5'- 6', silty sand with thin layers of small pebbles; 6'- 13', silt, sand and pebbly sand layers (bottom, sand); 13'- 16', sloughed material.
	3	1973	6-13	0-1.5	yes	--	100	95	90	36	13	---	Gran. Borrow (Sand)	
9	1	1973	1-10	0-1	No	--	--	--	100	59	9	---	Gran. Borrow (Sand)	Owner: Richard Angelino. Area is a large pasture east of Vermont Route 100 behind church about 0.04 mile north of junction with Town Highway No. 38. Test No. 1 was in southwest corner of field behind church. Material is: 1'- 10', sand with traces of silt; bottom, same and water table. Test No. 2 was in northeast corner of field about 900' N. 65°E. of Test No. 1. Material is: 1.5'-4.5', gravel; bottom, silt-clay and water table.
	2	1973	1.5-4.5	0-1.5	No	84	80	49	33	18	14	17.5%	Gran. Borrow (Grav.)	

WATERBURY GRANULAR DATA SHEET NO. 6

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
	3	1973	2-6	0-2	No	88	82	65	50	33	26	24.6%	---	Test No. 3 was near change of slope in field 400' west of Test No. 2. Material is: 2'- 6', gravel; bottom, clay.
10	1	1973	0.5-9	0-0.5	No	100	92	87	75	59	25	---	---	Owner: Harold Wheeler. Area is an emergency airstrip west of Vermont Route 100 about 0.24 mile north of its junction with Town Highway No. 16. Field is grass and moss-covered. Test No. 1 was in north part of field about 350' N. 40° W. of entrance. Material is: 0.5'- 3', sand; 3'- 6', sand, pebbly sand and fine gravel layers; 6'- 9', moist silt and sand; bottom, silt and water table.
	2	1973	1-8	0-1	No	--	100	93	87	73	23	---	---	Test No. 2 was in south part of field about 320' south of Test No. 1. Material is: 1'- 2', "Rusty" silty sand; 2'- 5', silty sand; 5'- 8', sandy silt; bottom, wet silt.
11	1	1973	1-11	0-1	Yes	--	--	--	100	96	60	---	---	Owner: Alfred Kelley. Area is a small active pit northeast of Town Highway No. 4 about 0.61 mile southeast of its junction with State Aid Highway No. 4. Pit truncates a thinly wooded knoll. Test No. 1 was in north face of pit. Material is: 1'- 7', interbedded silt, clay and silty sand; 7'- 11', silty fine sand and silt-clay seams.

WATERBURY GRANULAR DATA SHEET NO. 7

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1½"	½"	#4	#100	#200	Abrasion AASHO T-4-35	Passes VHD Spec.	Remarks
12	--	1973	--	--	Yes	--	N O	T	S A M	P L E	D	---	---	Owner: Robert Pratt. Area is a small pit northeast of U.S. Route 2 about 0.43 mile northwest of its junction with Vermont Route 100. Area was not sampled because ledge rock shows everywhere in depleted pit. Area is now part of rest area on U.S. Route 2.
13	1	1973	5-16	0-2	Yes	--	100	95	90	23	12	---	Sand	Owner: Laird Properties. (Ward Lumber Company). Area is a small, brush-covered pit at the southeast end of Town Highway No. 23. Development is limited by nearness of Winooski River and Interstate Highway 89. Test No. 1 was in northeast face of pit. Material is: 2'- 5', pebbly sand with small cobbles (inaccessible); 5'- 9', clean sharp sand with some pebble layers; 9'- 12', silty fine sand; 12'- 16', coarse sand with pebble layers; 16'- 18', sloughed material.
	2	1973	2-10	0-2	No	93	93	79	64	4	3	---	Sand	Test No. 2 was in field 200' south-southeast of Test No. 1. Material is: 2'- 6', pebbly sand; 6'- 9', coarse sand; 9'-10', fine sand; bottom, fine sand.
	3	1973	1-11	0-1	No	--	--	--	100	70	53	---	---	Test No. 3 was in field 300' northwest of Test No. 1. Material is: 1'- 11', silty fine sand; bottom, silt.

TABLE II
Supplement

WATERBURY PROPERTY OWNERS - GRANULAR	Map Ident. No.
Angelino, Richard	9
Cavallo, Joseph	1
Ernstof, Milton	4, 6
Harvey, David	7
Izzo, George	5
Kelley, Alfred	11
Laird Properties (Ward Lumber Company)	13
Pratt, Robert	12
Stowe Consortium	3
Sweet, Lynwood R.	2
Waterbury, Town of	8
Wheeler, Harold	10

WATERBURY ROCK DATA SHEET NO. 1

Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
1	1	1957	Schist	No		6.2%	Owner: State of Vermont. Area is a cut north of U.S. Route 2 Relocation opposite Bolton Falls Dam on the Winooski River. Power lines cross rock cut and Highway. East end of cut is 0.66 mile west of junction of Town Highway No. 43 with U.S. Route 2. Rock tested was quartz-feldspar-sericite-chlorite schist of the Underhill formation. Seven samples were taken at 20' intervals from northeast to southwest along the cut. Test No. 1 was at northeast end of section.
	2	1957	Schist	No		8.2%	Test No. 2 was 20' southwest of Test No. 1
	3	1957	Schist	No		5.8%	Test No. 3 was 20' southwest of Test No. 2
	4	1957	Schist	No		4.8%	Test No. 4 was 20' southwest of Test No. 3
	5	1957	Schist	No		3.3%	Test No. 5 was 20' southwest of Test No. 4
	6	1957	Schist	No		2.5%	Test No. 6 was 20' southwest of Test No. 5
	7	1957	Schist	No		6.5%	Test No. 7 was 20' southwest of Test No. 6
2	1	1957	Schist	No	Blasting	12.0%	Owner: State of Vermont. Area is a high ledge east of Bolton Falls Dam on the Winooski River and north of U.S. Route 2 Relocation. Center of cut in which ledge occurs is 0.51 mile west of junction of Town Highway No. 43 with U.S. Route 2. Rock tested was quartz-sericite schist of the Hazens Notch formation. Four samples were taken from west to east along the ledge. Test No. 1 was at west end of ledge.
	2	1957	Schist	No	Blasting	10.8%	Test No. 2 was 20' east of Test No. 1.
	3	1957	Schist	No	Blasting	9.9%	Test No. 3 was 15' east of Test No. 2.
	4	1957	Schist	No	Blasting	6.8%	Test No. 4 was 15' east of Test No. 3.
3	1	1959	Greenstone	Yes	Blasting	3.1%	Owner: J. Osborne. Area is an inactive quarry east of Town Highway No. 34 (Loomis Hill Road) about 1.45 miles north of its junction with Town Highway No. 6. Rock tested was greenstone of the Stowe formation and a quarry was developed subsequent to testing. Rock strikes N. 41° E. and 244' section was sampled from northwest to southeast. Area would be easy to reopen, and is probably the best area for crushed rock in town.

WATERBURY ROCK DATA SHEET NO. 2

Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
							Test No. 1 was at northwest end of section.
	2	1959	Green-stone	Yes	Blasting	3.4%	Test No. 2 was 26' southeast of Test No. 1.
	3	1959	Green-stone	Yes	Blasting	4.6%	Test No. 3 was 38' southeast of Test No. 2.
	4	1959	Green-stone	Yes	Blasting	1.8%	Test No. 4 was 25' southeast of Test No. 3.
	5	1959	Green-stone	Yes	Blasting	2.7%	Test No. 5 was 25' southeast of Test No. 4.
	6	1959	Green-stone	Yes	Blasting	2.2%	Test No. 6 was 30' southeast of Test No. 5.
	7	1959	Green-stone	Yes	Blasting	2.6%	Test No. 7 was 25' southeast of Test No. 6.
	8	1959	Green-stone	Yes	Blasting	4.0%	Test No. 8 was 25' southeast of Test No. 7.
	9	1959	Green-stone	Yes	Blasted	4.5%	Test No. 9 was 50' southeast of Test No. 8.
4	1	1959	Green-stone	No	Chip	3.1%	Owner: Donald Thurston. Area is a small exposure in the woods about 0.1 mile west of Town Highway No. 6 at point 0.20 mile south of its junction with Town Highway No. 34. Test No. 1 was sampled from a low ledge only 70' in length.
5	1	1957	Quart-zite	No		9.0%	Owner: Raphael M. Lowe. Area consists of ledges in woodland west of Vermont Route 100 near its junction with State Aid No. 1. Material was a gray quartzite with quartz stringers similar to the Ottauquechee formation. Test No. 1 was sampled from a 15-foot high ledge.
6	1	1957	Quart-zite	No	Blasting	3.4%	Owner: State of Vermont. Area is a cut north of I-89 about 0.1 mile east of the State Aid Highway No. 2 overpass. Material tested was a gray quartzite with quartz stringers of the Ottauquechee formation. Bedding strikes N. 30° E. and sample represents 90' across strike.

WATERBURY ROCK DATA SHEET NO. 3

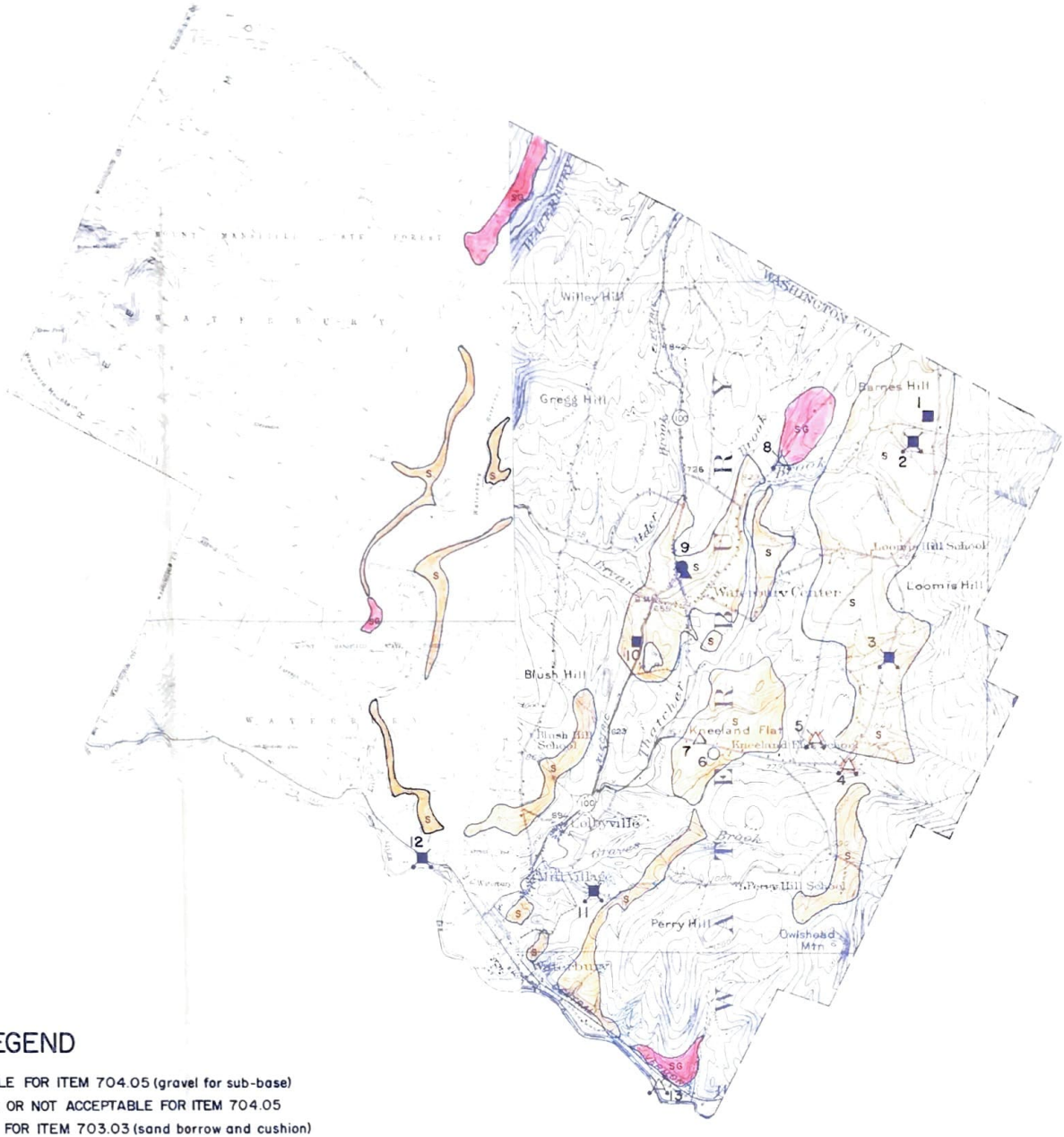
Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
7	1	1957	Green-	No	Blasting	10.6%	Owner: Central Vermont Railway. Area is an old railroad cut south of I-89 and the adjacent portion of the interstate. Cut is located 1.0 mile east of the junction of U.S. Route 2 with Town Highway No. 23. Material tested was massive greenstone of the Stowe formation. Test No. 1 was 20 feet across the strike, in the southbound lane of the interstate.
	2	1957	Green-stone	No	Blasting	10.4%	Test No. 2 was 25 feet across the strike, on the center line between lanes.
	3	1957	Green-stone	No	Blasting	9.4%	Test No. 3 was 20 feet across the strike in the northbound lane.
	4	1957	Green-stone	No	Blasting	18.0%	Test No. 4 was about 60' north-northwest of Test No. 3.
	5	1957	Green-stone	No	Blasting	12.2%	Test No. 5 was about 43' northeast of Test No. 4.
	6	1957	Green-stone	No	Blasting	10.0%	Test No. 6 was about 26' east of Test No. 5.
	7	1957	Green-stone	No	Blasting	18.4%	Test No. 7 was about 18' northeast of Test No. 6.
	RR 1	1957	Green-stone	No	Blasting	6.6%	Test No. RR 1 was in north wall of Railroad cut about 60' from west end.
	RR 2	1957	Green-stone	No	Blasting	16.0%	Test No. RR 2 was in floor of railroad cut about 18' south of Test No. RR 1.
	RR 3	1957	Green-stone	No	Blasting	8.4%	Test No. RR 3 was in north wall of railroad cut about 20' east of Test No. RR 1.
	RR 4	1957	Green-stone	No	Blasting	6.4%	Test No. RR 4 was in north wall of railroad cut about 20' east of Test No. RR 3.
	RR 5	1957	Green-stone	No	Blasting	8.7%	Test No. RR 5 was in north wall of railroad cut about 50' east of Test No. RR 4.
	RR 6	1957	Green-stone	No	Blasting	14.1%	Test No. RR 6 was in north wall of railroad cut about 25' east of Test No. RR 5.
	RR 7	1957	Green-stone	No	Blasting	6.7%	Test No. RR 7 was in north wall of railroad cut about 30' east of Test No. RR 6.
	RR 8	1957	Green-stone	No	Blasting	8.5%	Test No. RR 8 was in north wall of railroad cut about 35' east of Test No. RR 7.

WATERBURY ROCK DATA SHEET NO. 4

Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T-3	Remarks
	9	1957	Greenstone	No	Blasting	13.2%	Test No. 9 was near brow of ridge north of Interstate R.O.W. about 29' southwest of Test No. 8.
	10	1957	Greenstone	No	Blasting	12.1%	Test No. 10 was about 22' east of Test No. 9.
	C2	1957	Greenstone	No	Blasting	5.4%	Test No. C2 was resample of Test RR2.
	C3	1957	Greenstone	No	Blasting	11.6%	Test No. C3 was resample of Test RR 6.
	C4	1958	Greenstone	No	Blasting	17.1%	Test No. C4 was resample of Test No. 9.
	C5	1958	Greenstone	No	Blasting	13.3%	Test No. C5 was resample of Test No. 10.
	S1	1958	Greenstone	No	Blasting	12.1%	Test No. S1 was about 80' west of Test No. 4.
	S2	1958	Greenstone	No	Blasting	8.3%	Test No. S2 was about 78' southwest of Test No. S1.
	S3	1958	Greenstone	No	Blasting	8.5%	Test No. S3 was on centerline of Interstate, about 76' west of Test No. S2.
	8	1957	Greenstone	No	Blasting	15.6%	Test No. 8 was about 43' east of Test No.7.
8	1	1957	Schist	No	Blasting	17.2%	Owner: State of Vermont. Area is a cut south of I-89 about 1.3 miles east of the junction of U.S. Route 2 with Town Highway No. 23. Material tested was chlorite-sericite schist of the Stowe formation.

TABLE II
Supplement

WATERBURY PROPERTY OWNERS - ROCK	Map Ident. No.
Interstate 89 Right-Of-Way	6,7,8
Lowe, Raphael	5
Osborne, James	3
Thurston, Donald	4
U. S. Route No. 2 Relocation Right-Of-Way	1,2



LEGEND

- ○ GRAVEL, ACCEPTABLE FOR ITEM 704.05 (gravel for sub-base)
- ● GRAVEL, DEPLETED OR NOT ACCEPTABLE FOR ITEM 704.05
- △ SAND, ACCEPTABLE FOR ITEM 703.03 (sand borrow and cushion)
- ▲ SAND, DEPLETED OR NOT ACCEPTABLE FOR ITEM 703.03
- □ GRANULAR BORROW, ITEM 704.05
- ■ MATERIAL NOT ACCEPTABLE FOR ITEM 704.05
- ✕ EXISTING PIT
- SG SAND & GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

WATERBURY

SCALE 1:31,250

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1974

GRANULAR MATERIALS MAP

BY

VERMONT DEPARTMENT OF HIGHWAYS

IN COOPERATION WITH

U.S. BUREAU OF PUBLIC ROADS

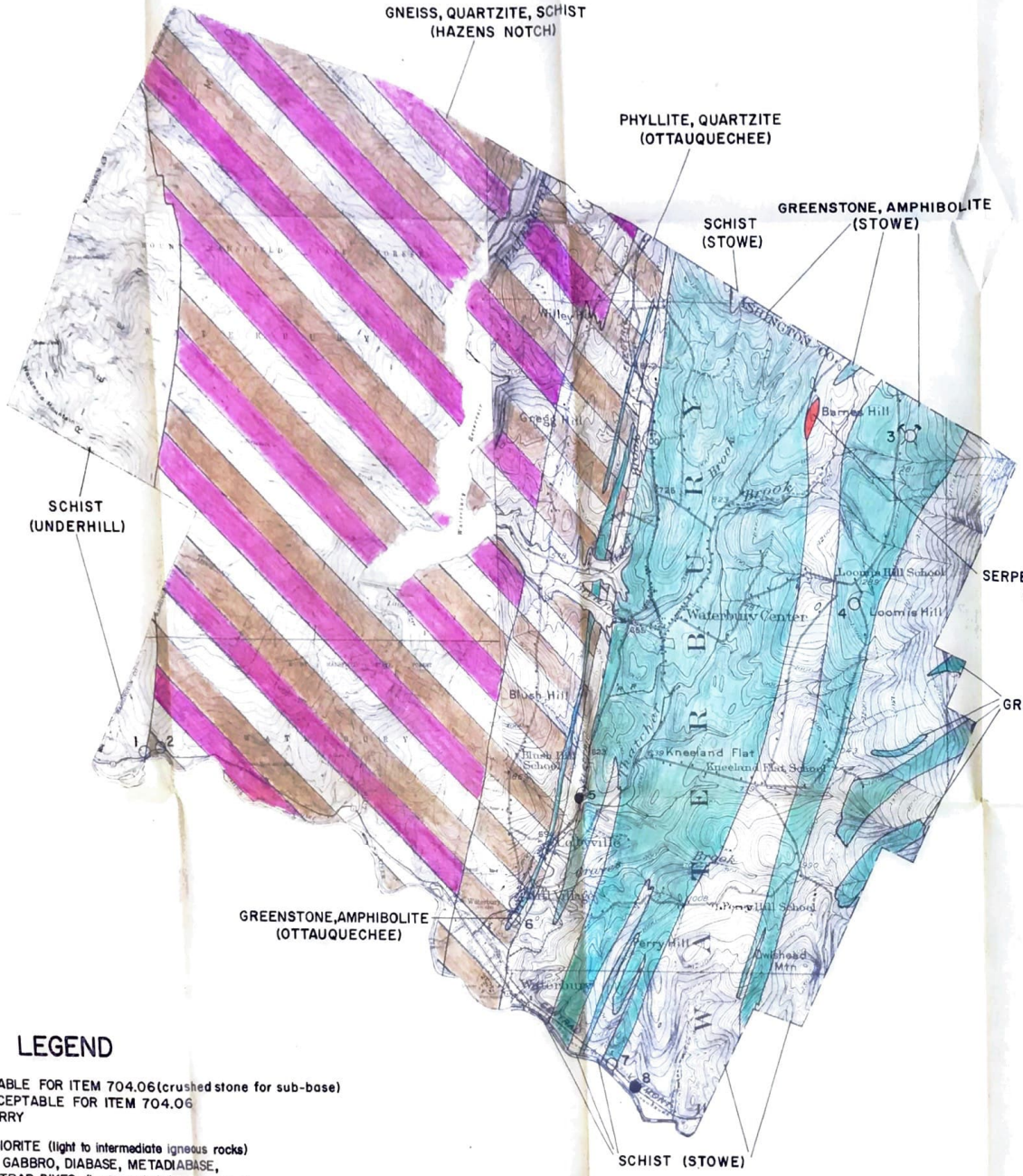
NOTE: BASED ON U.S.G.S. TOPOGRAPHIC MAPS

PLATE I GRANULAR

WASHINGTON COUNTY VT. HWY. DISTRICT NO. 6

REVISIONS

DATE					
BY					



LEGEND

- ROCK, ACCEPTABLE FOR ITEM 704.06 (crushed stone for sub-base)
- ROCK, NOT ACCEPTABLE FOR ITEM 704.06
- 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 text)

WATERBURY

SCALE 1:31,250

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1974

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 II

ROCK

WASHINGTON COUNTY VT. HWY. DISTRICT NO. 6

REVISIONS

DATE					
BY					

MATERIALS INVENTORY

TOWN OF

WATERBURY

MAP 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~~ #7	1	1957	Schist	No	Blasted	10.6	0	Waterbury Dump bedrock. Area was sampled from Station 678 + 0 to 681 + 50 along Interstate Project. The rock is Greenstone (massive) to Amphibolite grading locally into Green Schist (Schistose). The strike of the Schistosity is N 19° E. DIP is 86° S.W. Samples 1 thru 10 were taken along the brow of the ridge (see plan) and represent 175' across the strike. (Top section). (R) indicates rock was resampled from same blast hole.
	2	"	"	"	"	10.4	32	
	3	"	"	"	"	9.4	42	
	4	"	"	"	"	18.0	60	
	5	"	"	"	"	12.2	42.5	
	6	"	"	"	"	10.0	25	
	7	"	"	"	"	18.4	18	
	8	"	"	"	"	15.6	43	
	9	"	"	"	"	13.2-17.1 (R)	24	
	10	"	"	"	"	12.1	21	
	1	1957	Schist	No	Blasted	6.6	0	Samples 1 thru 8 were taken along the north wall of old abandoned railroad cut, west of above top section (See plan). The samples in this section represent 185 ft. across the strike. (R) indicates rock was resampled from same blast hole.
	2	"	"	"	"	16.0-5.4 (R)	17	
	3	"	"	"	"	8.4	20	
	4	"	"	"	"	6.4	20	
	5	"	"	"	"	8.7	50	
	6	"	"	"	"	14.1-11.6 (R)	28	
	7	"	"	"	"	6.7	30	
	8	"	"	"	"	8.5	35	
	1	1957	Schist	No	Blasted	12.1	0	Samples 1 thru 4 were taken along the top of the outcrop northeast of the above sections sampled. The samples represent approx. 155' across strike. (See plan). The area is not recommended as a desirable source for Item 204 (sub-base of crushed rock). The completion of the Interstate will render the rock in this area unattainable.
	2	"	"	"	"	8.3	77	
	3	"	"	"	"	8.5	76	
	4	"	"	"	"	6.3	152	

MM Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T - 3	Distance Between Samples (ft.)	Remarks
~~2~~ 8	1	1957	Schist	No	Chip	17.2	0	Bedrock outcrop approx. 1750' east of Location 1 located at Station 664 + 0 of the Interstate Project, adjacent to railroad tracks. The rock is Quartz, Sericite, Chlorite Schist. The strike of the Schistosity is N 19° E. Dip is 86° S.W. The area is not recommended as a desirable source for Item 204 (sub-base of crushed rock).
~~3~~ 6	1	1957	Quartzite	No	Chip	3.4	0	Bedrock outcrop on East St. in the Village of Waterbury at Station 760 + 50 of the Interstate Project Right-of-Way. The rock is a gray Quartzite with Quartz stringers interbedded with Schist. The Schist ranges from a few inches to a foot or better in thickness. The sample was taken in the Quartzite bed. The bedrock is exposed for 90' across strike. The interbedding of the Schist, the proximity of houses and the Interstate make the rock in this area an undesirable source for Item 204 (sub-base of crushed rock).
~~4~~ 5	1	1957	Quartzite	No	Chip	9.0	0	Owner: Raphae Lowe. Bedrock outcrop exposed 1¼ miles north of Village of Waterbury on Vt. Rte. 100, approx. 1000 ft. west of highway. The sample was taken from a Quartzite outcrop exposed in old logging road. Only 15 ft. across strike is exposed. A 100

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								ft. cross section was drilled with a portable diamond drill. The core indicated that the Quartzite was banded and Schistose in nature. Under the present testing methods employed by the Highway Dept. a percentage of wear could not be run satisfactorily on a 7/8" core. Due to the Schistose nature of the Quartzite and the percentage of wear, this area is not recommended as a desirable source for Item 204 (sub-base of crushed rock).
~~5~~ 2	1	1957	Schist	No	Blasted	12.0	0	Bedrock outcrop located east of Bolton Falls dam, on north side of US Rte. 2. Samples taken from Station 965 + 10 to 965 + 60 along the centerline of the Interstate Project. The rock is a Quartz, Sericite Schist. The rock in this Interstate cut area is not recommended as a desirable source for Item 204 (sub-base of crushed rock).
	2	"	"	"	"	10.8	20	
	3	"	"	"	"	9.9	15	
	4	"	"	"	"	6.8	15	
~~6~~ 1	1	1957	Schist	No	Chip	6.2	0	Bedrock outcrop exposed in road cut along side of US Rte. 2 opposite Bolton Falls Dam. The samples taken represent 120 ft. across the strike. The rock is a Quartz, Feldspar, Sericite, Chlorite Schist. The strike of the Schistosity is N 40° W. Dip 76° S.E. The rock in the section sampled will be unattainable due to the relocation of US Rte. 2 and the Interstate Project. The area directly north was
	2	"	"	"	"	8.2	20	
	3	"	"	"	"	5.8	20	
	4	"	"	"	"	4.8	20	
	5	"	"	"	"	3.3	20	
	6	"	"	"	"	2.5	20	
	7	"	"	"	"	6.5	20	

MAP Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHO T - 3	Distance Between Samples (ft.)	Remarks
								field checked. The rock appears to be soft and Schistose in nature. This area is not recommended as a desirable source for Item 204 (sub-base of crushed rock).
~~7~~ 4	1	1959	Greenstone	No	Chip	3.1	0	Owner: Donald Thurston. Bedrock outcrop located S.E. of Loomis Hill School, on the west side of Kneeland Flats Road. The rock is a Greenstone (massive) grading locally into green Schist (Schistose). The area was thoroughly drilled by Lane Construction Co. and was abandoned as a source of Item 204 (sub-base of crushed rock) due to lack of relief and thick overburden.
~~8~~ 3	1	1959	Greenstone	No	Blasted	3.1	0	Owner: James Osburne. Bedrock outcrop located approx. one mile north of Location 7. The rock is a Greenstone (massive) striking N 41° E and dipping S 44° E. The samples taken represent 244 ft. across strike. The area has been stripped and is under lease to Lane Construction Co. This area is recommended as a desirable source for Item 204 (sub-base of crushed rock).
	2	"	"	"	"	3.4	26	
	3	"	"	"	"	4.6	38	
	4	"	"	"	"	1.8	25	
	5	"	"	"	"	2.7	25	
	6	"	"	"	"	2.2	30	
	7	"	"	"	"	2.6	25	
	8	"	"	"	"	4.0	25	
	9	"	"	"	"	4.5	50	