SURVEY OF HIGHWAY CONSTRUCTION MATERIALS IN THE TOWN OF RIPTON, ADDISON COUNTY, VERMONT

Prepared by

Engineering Geology Section, Materials Division

Vermont Department of Highways

in cooperation with

United States Department of Transportation

Federal Highway Administration

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

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

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

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

History

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

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

Enclosures

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

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

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

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

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

LOCATION

The town of Ripton is in the east-central portion of Addison County in west-central Vermont. It is bounded on the west by Middlebury, the southwest by Salisbury, the south by Goshen, the southeast by Hancock, the east by Granville, the north by Lincoln, and the northwest by Bristol. (See County and Town Outline Map of Vermont on the following page.)

The town lies entirely in the Green Mountain physiographic sub-division of the New England Upland. Its topography is characterized by steep-sided hills and mountains in the eastern and southwestern part of town, and lower, gentler-sloped hills in the central part. Elevations range from 3,835 feet atop Bread Loaf Mountain in the northeast corner of town, to 827 feet where the Middlebury River crosses the Middlebury town line.

Regional drainage is westward via the Middlebury River and its main tributaries: the North Branch, Middle Branch, South Branch, Sparks Brook, Ander Brook, and Goshen Brook; lesser drainage is via numerous unnamed brooks.

Abbey Pond, in the northwest, and Skylight Pond, in the east, are the only significant bodies of water in Ripton.

SURVEY OF ROCK SOURCES

Procedure for Rock Survey

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

The office investigation is conducted primarily during the winter months and comprises the mapping and description of rock types as indicated in the many reference sources, as indicated in the bibliography. These references differ considerably in dependability due to new developments and studies that have contributed to the obsolescence of a number of reports. In addition, the results of samples taken by other individuals are analyzed, and the location at which these samples were taken, is mapped when possible. As complete a correlation as possible is made of all the available information concerning the geology of the area under consideration.

The field investigation is begun by making a cursory survey of the entire town. The information obtained from this preliminary survey, as well as that assimilated in the office investigation, is used to determine the areas where sampling will be concentrated. When a promising source has been determined by rock type, volume of material, accessibility, and adequate exposure and relief, chip samples are taken with a hammer across the strike or trend of the rock, and are submitted to the Materials Division for abrasion testing by the Deval Method (AASHTO T-3) and the Los Angeles Method (AASHTO T-96). Samples taken by the chip method are often within the weathered zone of the outcrop and consequently may give a less satisfactory test result than fresh material deeper in the rock structure. When the rock is uniform, and the chip samples yield acceptable abrasion test results, the material source is included in this report as being satisfactory.

Discussion of Rock and Rock Sources

The information on the Rock Materials Map (Plate II) is simplified. (For a more detailed description of the respective rock formations, see the Summary of Rock Formations included in this report).

Occasionally, rocks belonging to the same formation and exhibiting similar characteristics (i.e., color and texture) produce different abrasion test results owing to differing physical properties or chemical compositions. Therefore, in no case should satisfactory test results obtained in one area be construed to mean that the same formation, even in the same area, will not later produce unsatisfactory material; this is particularly true of metamorphic rocks.

Complex metamorphic rocks comprise most of the bedrock lithology in the town. The formations mapped as underlying Ripton from west to east are: the Mt. Holly schist and Quartzite which lies at or near the surface of the wooded, steep-sided valley of the Middlebury River; the Mt. Holly gneiss, which underlies a third of the town; the Pinnacle formation graywacke, and the Moosalamoo phyllite which underlie the heavily wooded, inaccessible southwest corner of town; the Forestdale dolomite and limestone which occupies the extreme southwest tip of town; the Hoosac formation schist; the Underhill formation schist and phyllite; the Underhill formation (Batell schist, quartzite, and limestone member) and the Underhill formation (Mt. Abraham schist member); the Pinney Hollow formation phyllite and schist; and a thin band of Hazens Notch formation schist, quartzite and gneiss lies along the Granville town line.

Only the Mt. Holly gneiss was sampled, and yielded material with acceptable abrasion test results at Map Identification No. 1.

SURVEY OF SAND AND GRAVEL SOURCES

Procedure for Sand and Gravel Survey

The method employed by the project in a survey of possible sources of sand and gravel for highway construction is divided into two main stages: office and field investigations.

The office investigation is conducted primarily during the winter months and comprises the mapping of potentially productive areas from various references. Of these references, the survey of glacial deposits mapped by Professor Stewart proves to be particularly helpful when used in conjunction with other references such as soil-type maps, aerial photographs, and United States Geological Survey Quadrangles. The last two are used in the recognition and location of physiographic features indicating glacial deposits, and in the study of drainage patterns. The locations of existing pits are mapped, as are the locations in which samples were taken by other individuals.

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

Discussion of Sand and Gravel Deposits

Results of this survey showed that granular materials suitable for highway and related construction purposes were formed by glaciofluvial and glaciolacustrine processes at elevations from 1,150 to 1,950 feet.

The more easterly deposits, mapped as kame terraces by D. P. Stewart, appear to be kame terraces, outwash, or a transitional phase between the outwash and kame terraces. The westerly deposits are mapped as mostly outwash, but in at least two locations the features are kame terraces. Some of the outwash deposits are very shallow and local in nature. Three previously unmapped areas yielded acceptable granular materials. Some granular areas were not sampled due to inaccessibility, or because permission was denied by the owners.

The most promising sources of Gravel for Sub-base, Item 704.05, are Map Identification Nos. 2, 11, and pits at 10, 19, and 3. The most promising sources of Sand Borrow and Cushion, Item 703.03, are pits at Map Identification Nos. 3 and 15; 3 has a fairly abundant amount, but 15 is quite limited in both amount and quality.

SUMMARY OF ROCK FORMATIONS IN THE TOWN OF RIPTON

Forestdale Marble: Buff-to rusty-weathered white, buff, and pink and white mottled dolomite containing local interbeds of dolomitic sandstone, gray-green phyllitic quartzite, and cross-bedded sandy dolomite.

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

Hoosac Formation: Quartz-sericite-albite-biotite-chlorite schist characterized by albite porphyroblasts—biotite and garnet porphyroblasts common southward; locally carbonaceous.

Hoosalamoo Phyllite: Gray to black sericite-quartz phyllite; sericite-quartz-chlorite phyllite occurs locally.

Mt. Holly Complex Gneiss: Mainly fine-to medium-grained biotitic gneiss, locally muscovitic, and in western areas chloritic; massive and granitoid in some localities, fine-grained or schistose and compositionally layered in others; also abundant amphibolite and hornblende gneiss, and minor beds of mica schist, quartzite and calc-silicate granulite; included numerous small bodies of pegmatite and gneissoid granitic rock.

Mt. Holly Complex Quartzite and Schist: Quartzite, locally in massive beds as much as 30 feet thick, micaceous quartzite, and quartz-mica schist that commonly contains garnet or pseudomorphs (largely chlorite) after garnet; schists are locally rusty weathered and contain conspicuous flakes of graphite; also includes amphibolite and minor hornblende gneiss, biotite gneiss, and pegmatite.

Pinnacle Formation: Schistose graywacke, gray to buff, commonly striped, quartz-albite-sericite-biotite-chlorite rock predominates; quartz-cobble and boulder conglomerate is common, chiefly near base.

Pinney Hollow Formation: Pale green quartz-sericite (muscovite-paragonite)-chlorite phyllite and schist with abundant magnetite, chloritoid phyllite and schist, quartz-sericite-albite-chlorite schist, and rare beds of carbonaceous and schistose quartzite.

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.

Underhill Formation (Battell Member): Carbonaceous sericite-quartz-albite-chlorite schist and schistose quartzite, also carbonaceous and non-carbonaceous limestone; quartz-sericite-chlorite-albite schist.

Underhill Formation (Mt. Abraham Schist Member): Light gray sericite (muscovite-paragonite)-quartz-chloritoid rock with silvery sheen; porphyroblasts of magnetite are common and porphyroblasts of chlorite, chloritoid, garnet, and kyanite occur locally.

GLOSSARY OF SELECTED GEOLOGIC TERMS

ALBITE: The light-colored, sodium end member of the continuous plagioclase feldspar series which is found in alkali rocks. The name is often compounded with the names of rocks containing the mineral.

AMPHIBOLITE: A dark green to black metamorphic rock containing varying amounts of the silicate amphibole, and having a somewhat schistose structure.

ANTICLINORIUM: A large composite fold consisting of a series of anticlines and synclines which, taken as a group, have the general form of an arch or anticline. The term applies only to relatively large features having a width of at least several miles.

BEDROCK: Solid, undisturbed rock in place at, or just below, the surface.

BEDROCK CONTROL: The term used to describe that part of the topography which has bedrock on, or close to, the surface.

BIOTITE: A dark, platy silicate mineral commonly known as black mica.

CALCAREOUS: Pertaining to, or containing from 10- to 50- percent calcium carbonate ($CaCO_3$).

CHLORITE: A term for a group of green hydrous silicates of magnesium and iron, with or without aluminum, which resemble the micas. Chlorites are widely distributed, and often occur as secondary minerals resulting from the alteration of pyroxene, amphibole, biotite, garnet, or olivine.

CHLORITOID: A brittle member of the mica group.

CONCHOIDAL: Shell-shaped; a type of fractured rock survade that resembles half a clam shell. The fracture of glass is typically conchoidal.

DOLOMITE: A term used for both the mineral and rock containing $CaMg(CO_3)_2$. This rock-type is usually considered as favorable for highway construction.

DRAINAGE: The manner by which water moves on or beneath the earth's surface in streams, rivers, brooks, and channels.

DRIFT: A deposit of earth, sand, gravel and boulders, carried by glaciers (glacial drift), or by water flowing from glaciers (fluvioglacial drift). Large areas of North America and Europe are drift-covered in higher latitudes.

FACIES: In general, the term designates the aspect or appearance of a mass of earth material or rock different from the surrounding material or rock.

GARNET: An important group of silicates having the general formula $R_3R_2(SiO_4)_3$, in which the radical R_3 is calcium, magnesium, ferrous iron, or manganese, and R_2 is aluminum, ferric iron, or chromium. Garnets occur as widespread accessory minerals in metamorphic rocks.

GLACIOFLUVIAL: A term used to denote formation by, or relation to, streams within, upon, or emerging from glacial ice.

GLACIOLACUSTRINE: A term used to denote formation by, or pertaining to, deposition in the quiet waters of glacial lakes.

GNEISS: A foliated metamorphic rock with no specific composition implied, but having layers that are mineralogically unlike and consisting of particles visible to the eye. Usually gneiss displays an alternation of granular minerals and schistose minerals, with the rock tending to split along the schistose bands.

GRANITOID: Igneous rocks having the characteristic texture of granite; the mineral grains may be fine or coarse, but are nearly uniform in size.

GRANULITE: A quartz-feldspar rock of high metamorphic grade, poor or lacking in mica, and characterized structurally by a single regular plane of schistosity easily visible to the eye. The schistosity is determined mainly by parallel orientation of flat lenses of coarse-grained quartz set in a quartzose matrix of smaller, equidimensional grains.

GRAYWACKE: Dark, hard sandstone consisting of angular grains of quartz, feldspar, and rock fragments in a fine, compact matrix of micas, clay minerals, and chlorite.

HORNBLENDE: A black, dark green, or brown amphibole which commonly occurs in prismatic masses in metamorphic and igneous rocks.

INTERBEDDED: Occurring between, adjacent and parallel to, other beds of a different nature.

KAME MORAINE: Stratified sands and gravels deposited by melt-water flowing beneath a glacier.

KAME TERRACE: Stratified drift deposited by melt-water flowing between a glacier and an adjacent valley wall.

KYANITE: A blue, thin-bladed aluminum silicate occurring in metamorphic rocks as crystals or crystalline aggregates.

LENTICULAR: The shape of a mass of rock or granular material that thins out in all directions from the center.

LIMESTONE: The most important and wide-spread carbonate sedimentary rock, consisting chiefly of calcium carbonate.

MUSCOVITE: An important member of the mica group, also known as white mica, potash mica, or isinglass.

OUTCROP: A part of a body of rock that lies exposed at or just below the surface.

OUTWASH: Stratified sands and gravels that are stream-built beyond the glacier by melt-water streams issuing from the face of the glacial ice.

PARAGONITE: A mica similar in appearance and composition to muscovite, but containing sodium instead of potassium.

PEGMATITE: A light-colored, coarse-grained, feldspar-rich granite which is characterized by large average grain size, interlocking texture, and an unusually great range in grain size.

PHYLLITE: A fine-grained, foliated metamorphic rock, intermediate and gradational between the mica schists and slates. The foliation is caused by large amounts of potash mica (sericite) which gives the rock its distinctive silvery appearance.

PORPHYROBLASTS: Large crystals which have formed in place within the fine-grained groundmass of a metamorphic rock; they have been formed by the action of heat, pressure, and infiltrating solutions occurring later than the rocks in which they form.

PSEUDOMORPHS: A mineral having the outward form of another species (or of some object, as a shell), as a piece of quartz having the cubic form of fluorspar. Pseudomorphs are formed from the original crystals (whose form alone they retain) by a process of substitution, incrustation, infiltration, or alteration.

QUARTZ: Anhydrous crystalline silica, SiO_2. It is the most common of minerals. It has a hardness of 7, specific gravity of 2.65, color from colorless to white or varicolored depending on impurities, greasy or vitreous luster, conchoidal fracture and forms in hexagonal crystals or amorphous grains. The word quartz is prefixed to the names of many rocks when quartz is not a normal, necessary or essential constituent, as quartz monzonite.

QUARTZITE: A firm, compact rock composed of quartz grains so firmly bonded that fracture occurs across, instead of around, the grains. It is the metamorphic equivalent of sandstone.

ROCK FLOUR: Glacially ground, angular, unweathered, silt and clay size rock material not having the characteristic cohesion of clay minerals.

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

SEDIMENTS: Any material deposited from water (streams, lakes, or seas), wind, or ice.

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

WATER TABLE: The upper surface of a zone of saturation, except where that surface is formed by an impermeable body.

WEATHERED: Showing the effects of exposure to the atmosphere.

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PARTIAL SPECIFICATIONS FOR HIGHWAY CONSTRUCTION MATERIALS

Listed below are partial specifications for Highway Construction Materials as they apply to this report at date of publication. For a complete list of specifications see Standard Specifications for Highway and Bridge Construction, approved and adopted by the Vermont Department of Highways, January, 1972.

DIVISION 700 - MATERIALS

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

TABLE 703.03A - SAND BORROW AND CUSHION

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
2"	100	
1½"	90-100	
½"	70-100	
No. 4	60-100	100
No. 100		0- 30
No. 200		0- 12

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

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

TABLE 703.05A - GRANULAR BORROW

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-100	100
No. 200		0- 15

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

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

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

TABLE 704.05A - GRAVEL FOR SUB-BASE

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-60	100
No. 100		0- 18
No. 200		0- 8

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

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

704.06 CRUSHED STONE FOR SUB-BASE. Crushed stone for sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material, pieces which are structurally weak and shall meet the following requirements:

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

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

TABLE 704.06A - CRUSHED STONE FOR SUB-BASE

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

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

(b) Percent of Wear. The percent of wear of the parent gravel shall be not more than 20 when tested in accordance with AASHTO T-4, or the crushed gravel a percent of wear of not more than 35 when tested in accordance with AASHTO T-96.

(c) Fractured Faces. At least 30 percent, by weight, of the stone content shall have at least one fractured face.

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

704.09 DENSE GRADED CRUSHED STONE FOR SUB-BASE. Dense graded crushed stone for sub-base shall consist of clean, hard, crushed stone, uniformly graded, reasonably free from dirt, deleterious material and pieces which are structurally weak, and shall meet the following requirements:

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

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

TABLE 704.09A - DENSE GRADED CRUSHED STONE FOR SUB-BASE

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

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

(d) Thin and Elongated Pieces. Not more than 30 percent, by weight, of thin or elongated pieces will be permitted.

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

704.10 GRAVEL BACKFILL FOR SLOPE STABILIZATION. Gravel backfill for slope stabilization shall be obtained from approved sources, consisting of satisfactorily graded, free draining, hard, durable stone and coarse sand reasonably free from loam,

(d) Thin and Elongated Pieces. Not more than 30 percent, by weight, of thin and elongated pieces will be permitted.

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

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

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

This material shall meet the requirements of the following table:

TABLE 704.06B - LEVELING MATERIAL

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

704.07 CRUSHED GRAVEL FOR SUB-BASE. Crushed gravel for sub-base shall consist of material reasonably free from silt, loam, clay or organic matter. It shall be obtained from approved sources and shall meet the following requirements:

(a) Grading. The crushed gravel shall be uniformly graded from coarse to fine and shall meet the requirements of the following table:

TABLE 704.07A - CRUSHED GRAVEL FOR SUB-BASE

GRADING	Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
COARSE	4"	100	
	No. 4	25- 50	100
	No. 100		0- 20
	No. 200		0- 12
FINE	2"	100	
	1½"	90-100	
	No. 4	30- 60	100
	No. 100		0- 20
	No. 200		0- 12

silt, clay, and organic material.

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

TABLE 704.10A - GRAVEL BACKFILL FOR SLOPE STABILIZATION

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
No. 4	20-50	100
No. 100		0- 20
No. 200		0- 10

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

704.11 GRANULAR BACKFILL FOR STRUCTURES. Granular backfill for structures shall be obtained from approved sources, consisting of satisfactorily graded, free draining granular material reasonably free from loam, silt, clay, and organic material.

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

TABLE 704.11A - GRANULAR BACKFILL FOR STRUCTURES

Sieve Designation	Percentage by Weight Passing Square Mesh Sieves TOTAL SAMPLE	SAND PORTION
3"	100	
2½"	90-100	
No. 4	50-100	100
No. 100		0- 18
No. 200		0- 8

TABLE I

RIPTON GRANULAR DATA SHEET NO. 1

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
1	1	1976	0.5-16	0-0.5	Yes	100	95	86	76	9	4	--	Sand	Owner: Perry McEdwards. Area is small shallow pit in woods adjacent to eastern side of private drive extension to National Forest Highway No. 233. As of 6/15/76, property was for sale. Good access is 2.7 miles via Forest Highway to the junction of National Forest Highway No. 59 with Town Highway No. 11. Test No. 1 was on southeast face of pit. Material was: 0.5'-2', pebbly gravel; 2'-4', pebbly sand; 4'-5', silty sand layer; 5'-7', sand; 7'-8', layer of 12"-boulders 8'-10', fine gravel with somewhat angular stones; 10'-15', pebbly sand, sand and a few 6"-12" boulders; 15'-16', pebbly fine gravel; bottomed at floor level.
	2	1976	0.5-7	0-0.5	Yes	100	100	86	63	31	20	--	--	Test No. 2 was on the northeast face of pit, 50 feet north of Test No. 1. The material was gap-graded and appeared to be a till. Material was: 0.5'-2', pebbly fine gravel; 2'-5', hard-packed, silty fine sand with angular pebbles; 5'-7', dirty gravel.
	3	1976	0.5-5	0-0.5	Yes	100	98	84	54	9	5	20.2%	Gravel	Test No. 3 was from low face of bank south of small woods road, 0.11 mile south and west of Test #1. Material was: 0.5'-5', pebbly fine gravel which looked clean; however most stones were less than 1" in diameter.

TABLE I

RIPTON 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 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	4	1976	0.5-9	0-0.5	Yes	74	66	62	57	54	29	--	--	Test No. 4 was in floor, 10 feet west of Test No. 1. Material was: 0.5'-7', sand; 7'-9', pebbly fine gravel (caves easily).
2	1	1976	0.5-9	0-0.5	No	78	75	53	36	8	5	23.2%	Gravel	Owner: U.S. Forest Service. Area is a hardwood section known as the Noble Clearing. Its topography is relatively flat but drops steeply down to the northwest and north to Sparks Brook. The area is 310 feet north from National Forest Highway No. 59, at a point 2.7 miles northeast of the junction of Town Highways Number 2, 11, and 12 Test No. 1 was dug in the southwest corner of the largest clearing. Material was: 0.5'-9', well graded gravel with a few random 12"-boulders mixed with the 2"-5" stones which predominate. Hole kept caving at 9'.
	2	1976	1-9	0-1	No	72	59	46	32	9	5	25.8%	Gran. Borrow (Gravel)	Test No. 2 was dug in a small clearing at the east end of the northernmost logging road, 0.25 mile northeast of Test No. 1. Material was: 1'-6', coarse-to-medium gravel with 3"-6" stones; 6'-7', a layer of 6"-12" boulders; 7'-9', gravel; bottomed at 9' in sand layer. Several 12"-24" boulders were noted. Material is similar to that of Test No. 1. Gravel barely fails for abrasion requirements.

TABLE I

RIPTON 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														A steep drop-off is 30 feet north of Test No. 2.
	3	1976	0.5-7	0-0.5	No	86	86	84	80	6	2	---	Gran. Borrow (Sand)	Test No. 3 was dug in a small clearing, 200 feet west of, and 15 feet below Test No. 2. Material was: 0.5'-3', sand; 3'-6', pebbly sand to fine-gravelly sand; 6'-7', cobbly sand; bottomed at 7' on ledge or large boulder, and water.
	4	1976	1.5-7	0-1.5	No	95	83	62	43	18	11	21.8%	Gran. Borrow (Gravel)	Test No. 4 was dug in small clearing, 250 feet west of Test No. 3. Material was: 1.5'-7', bouldery, coarse gravel which would need screening or crushing. 70% of the stones exceeded 4" and were not included in sample. The poorly defined bedding was nearly horizontal.
	5	1976	1-10	0-1	No	84	84	74	67	32	28	--	--	Test No. 5 was dug in a small clearing, 200 feet west of Test No 4. Material was: 1'-4', cobbly gravel; 4'-10', silty fine sand.
	6	1976	1-9	0-1	No	100	96	90	55	25	23	21.8%	--	Test No. 6 was dug in a small clearing, 350 feet S70°W of Test No. 5. Material was: 1'-8', pebbly fine gravel with coarse sand interbeds and an occasional 3"-4" stone; 8', hole kept caving in similar material. The material seemed clean and sharp, but may not be well-graded enough for gravel; most of the stones were 1/2", with a few 1".

TABLE I

RIPTON 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"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	7	1976	0.5-10	0-0.5	No	76	63	46	37	8	4	23.8%	Gravel	Test No. 7 was dug in a small clear ing, 470 feet northeast of the mair clearing. Material was: 0.5'-5', well-nested, but loosely consoli-dated, medium-to-coarse gravel; 5'-7', pebbly fine gravel (or pebbly sand); 7'-10', sand. Good-looking gravel gets finer with depth.
3	1-A	1976	0.5-12	0-0.5	Yes	100	90	76	57	4	2	17.5%	Gravel	Owner: U.S. Forest Service. Area is the large, sprawling Spark pit complex in an unmapped granu-lar area in woods 0.26 mile north of National Forest Highway No. 59. A large portion of the material wa used for the Natural Turnpike (which is National Forest Highway No. 54). Major extension of the pit is northwest and north along the trend of several wooded, slight ly hummocky knolls. Test No. 1-A was on the northwest face of northeast lobe of pit. Material was: 0.5'-3', gravel; 3'-5', gravelly sand and sand; 5'-7', sand; 7'-12', fine gravel and gra-vel. Good-looking material, but present ly sand from lower level may get mixed in when being loaded into trucks.

TABLE I

RIPTON 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	1-B	1976	12-20	0-0.5	Yes	100	100	100	98	26	7	--	Sand	Test No. 1-B was below Test No. 1-A. Material was: 12'-20', sand, with a few thin beds of silty fine sand and a few pebbles.
	2-A	1976	1-10	0-1	Yes	100	100	92	77	7	4	--	Sand	Test No. 2-A was on the southeast face of the northeast lobe of pit, 100 feet S65°E of Test No. 1. Material was: 1'-3', gravel; 3'-7', sand with some gravelly sand; 7'-10', fine gravel and sand layers; bottomed on a silt seam and sloughed material.
	2-B	1976	10-22	0-1	Yes	95	76	65	55	34	29	16.0%	--	Test No. 2-B was below Test No. 2-A Material was: 10'-15', gravelly sand; 15'-17', silt-clay; 17'-22', sand and angular stones.
	3-A	1976	1-14	0-1	Yes	93	88	73	52	4	2	12.0%	Gravel	Test No. 3-A was on east face of small southern pit. Material was: 1'-14', interbedded gravel, gravelly sand, and fine pebbly gravel.
	3-B	1976	14-24	0-1	Yes	87	78	61	42	8	5	22.0%	Gravel	Test No. 3-B was below Test No. 3-A. Material was: 14'-19', pebbly fine gravel; 19'-20', boulders; 20'-21', round 3" cobbles which were silt-clay coated; 21'-24', pebbly gravelly sand. Material sloughs easily.
	4	1976	1-10	0-1	Yes	91	91	91	88	34	24	--	--	Test No. 4 was in floor near north end of larger pit. Material was: 1'-6', sand; 6'-10', silty fine sand.

TABLE I

RIPTON 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	5	1976	0-15	--	Yes	78	72	55	45	6	2	16.0%	Gravel	Test No. 5 was on northeast face of larger pit. Material was: 0'-6', gravel and pebbly gravel; 6'-8', cobbly gravel; 8'-10', seam of silt-clay; 10'-15', gravelly sand; bottomed in slough. Face caved faster than backhoe could dig it out.
	6	1976	0-10	--	Yes	100	100	94	88	36	17	--	--	Test No. 6 was dug in floor of smaller pit, 20 feet southwest of Test No. 3. Material was: 0'-5', silty fine sand; 5'-7', silt layer with angular rock fragments; 7'-10', sand silty sand and stones. An occasional 6"-24" boulder was noted. Pebbly silt-clay coated gravel sloped from 0' at the east end of hole, to 4' at the west end. Overall, material was not very good-looking.
4	1	1976	1-11	0-1	Yes	100	100	100	89	79	67	--	--	Owners: Stanley and Nina James. Area is an overgrown pit adjacent to the east side of a logging road which extends beyond the northeast end of Town Highway No. 10. Pit is 0.43 mile northeast of the junction of State Aid Highway No. 1 and Town Highway No. 10. Test No. 1 was on southeast face of pit. Material was: 1'-11', layers of silt-clay with random angular pebbles and rock fragments. Several large blocks were on surface.

TABLE I

RIPTON 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						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
5	1	1976	1-20	0-1	Yes	100	100	100	87	35	13	--	Gran. Borrow (Sand)	Owner: Richard Livingston. Ed Wimett has a 15-year lease (1975-1990). Area is a pit southeast of Town Highway No. 3, with access 1.76 miles northeast of the junction of Town Highways No. 3 and 9. The pit floor is quite wet in places. Test No. 1 was on middle of north-west face. Material was: 1'-20', layers of sand, silty fine sand, silt-clay, angular stones and rock fragments.
6	1	1976	1-10	0-1	Yes	100	83	80	80	36	16	--	--	Owner: Harry Johnson. Former Owner: Robert Sherman. Area is an overgrown pit in the woods, 150 feet west of Town Highway No. 3, 1.79 miles northeast of its junction with Town Highway No. 9. Area was being illegally used as a dump. Test No. 1 was on the west side of the north face of pit. Material was: 1'-10', hard-packed silty sand, silt-clay, and angular stone fragments.
7	1-A	1976	1-20	0-1	No	80	75	61	44	22	17	14.1%	--	Owners: David and George Farr. Area is a road cut in a granular feature adjacent to the west side of a discontinued road, 0.30 mile north of Town Highway No. 3., and 0.25

TABLE I

RIPTON GRANULAR DATA SHEET NO. 8

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														mile northwest of its junction with State Aid Highway No. 1. The 80-foot high feature slopes down to the North Branch Brook. The material in the road cut was nearly horizontally bedded, making it possible to sample from top to bottom. Test No. 1-A was the uppermost part of road cut north of brook. Material was: 1'-4', bouldery gravel; 4'-5.5', gravel; 5.5'-8', silty sand; 8'-14', boulders and silty sand; 14'-20', boulders and silt-clay. The material was good in patches or lenses; elsewhere, it was dirty.
	1-B	1976	20-34	0-1	No	96	96	82	65	10	6	19.1%	Gran. Borrow (Sand)	Test No. 1-B was downhill along road cut below Test No. 1-A. Material was: 20'-26', boulders and sand; 26'-29', pebbly sand; 29'-31', gravel; 31'-34', coarse pebbly sand. Interval between 34' and 54' consisted of boulders, sloughed material and vegetation, was not sampled. Overall, material did not look very good.
	1-C	1976	54-78	0-1	No	79	72	58	48	21	11	15.9%	Gran. Borrow (Gravel)	Test No. 1-C was below (downhill from) Test No. 1-B. Material was: 54'-58', gravelly sand; 58'-69', silty fine sand and angular pebbles; 69'-72', sand and boulders; 72'-74', silty sand; 74'-76', sand; 76'-78', silt-clay. Material did not look very good.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 9

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
8	1-A	1976	1-12	0-1	Yes	72	62	49	33	13	9	21.3%	Gran. Borrow (Gravel)	Owners: David and George Farr. Area is a pit adjacent to the east side of a sharp curve on Town Highway No. 3, 0.25 mile northwest of its junction with State Aid No. 1. Pit is on the northwest end of a wooded, steep ridge. Test No. 1-A was on the southeast face of pit. Material was: 1'-8', coarse, silt-clay coated gravel; 8'-12', silt-clay coated, pebbly gravel.
	1-B	1976	12-22	0-1	Yes	82	82	68	57	62	45	--	--	Test No. 1-B was below Test No. 1-A. Material was: 12'-22', bands of silty fine sand and silt-clay with random angular pebbles and stone fragments.
9	1	1976	1-6	0-1	No	100	100	100	92	42	21	--	--	Owner: Matthew T. Lebenbaum. Area is a clearing in woods, 0.05 mile south of Town Highway No. 3, and east of Bridge No. 15. Area was sold by John Waterbury in 1968 and is now being logged. Test No. 1 was at edge of woods at east side of clearing. Material was: 1'-6', sand and silty sand with a few layers of coarse sand and a cobble or two; bottomed at 6' on boulders or ledge, with wate flowing from the southwest.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 10

ap dent. o.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
0	1	1976	1-7	0-1	Yes	82	65	42	32	18	7	13.2%	Gravel	Owner: George Farr. Area is an overgrown, sloughed pit in wooded bank adjacent to the north side of Town Highway No. 3, 0.3 mile east of Town Highway No. 9. Area seems to be part of a kame terrace which rises steeply to a height of 115 feet above the road. The owner was negotiating a lease to re-open the pit at the time of sampling. Only one sample was taken due to extreme caving of material. Test No. 1 was alongside road at east end of pit. Material was: 1'-4', silty gravel with sand similar to well-packed, fine-graded, crushed gravel; 4'-7', clean gravel (looks washed); bottoms at road level.
1	1	1976	1-10	0-1	No	86	77	52	42	7	5	11.6%	Gravel	Owner: U.S. Forest Service. Area is a lobate, flat, granular, possible coalescent kame terrace in woods west-southwest of the junction of Town Highways No. 3 and 9; its access is west of the Gee Cemetery. The clearing is 0.13 mile south of Town Highway No. 9. Test No. 1 was near woods road at southwest end of feature. Material was: 1'-3.5', gravel with boulders, 3.5'-6', well-packed gravel; 6'-10', unconsolidated, fine-to-medium gravel with a few small boulders.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 11

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	2	1976	1-10	0-1	No	88	74	49	35	10	7	13.6%	Gravel	Test No. 2 was in a small clearing, 225 feet N50°E of Test No. 1. Material was: 1'-2', sandy gravel or gravelly sand; 2'-4.5', gravel; 4.5' 6', coarse gravel, with a layer of 6" to 15" boulders at 5'; 6'-8', gravel; 8'-9', coarse gravel; 9'-10' gravel. Material had a higher percentage of 4"-plus stones than Test No. 1.
	3	1976	1-6	0-1	No	76	66	49	37	7	5	16.4%	Gravel	Test No. 3 was in small clearing, 115 feet N10°W of Test No. 2. Material was: 1'-6', coarse gravel; bottomed at 6' on good, clean, coarse, sharp sand.
	4	1976	1-10	0-1	No	87	62	53	48	15	6	11.0%	Gravel	Test No. 4 was in small clearing, 270 feet N15°E of Test No. 3. Material was: 1'-3', fine gravelly sand; 3'-4', sand; 4'-6', coarse gravel; 6'-7', seam of silty fine sand; 7'-10', bouldery gravel (6" t 24"). This material might need crushing. The grading may not be very good because of many large stones and a dearth of 1/2" to 1" stones. Overall, this area looks like a good source of gravel with some sand beneath it.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 12

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
12	1	1976	2-6	0-2	Yes	69	59	57	52	18	11	--	Gran. Borrow (Sand)	Owner: U.S. Forest Service. Area is the smoothed-over, overgrown, North Branch Pit, 0.57 mile west of the junction of Town Highways No. 3 and 9. Test No. 1 was in floor near east end of old pit. Material was: 2'-6', sand; 6'-9', layer of 6" to 24" boulders which were not sampled. This hole showed a very limited amount of material.
	2	1976	5.5-9	0-5.5	Yes	84	77	65	56	63	48	--	--	Test No. 2 was at northeast edge of pit, 120 feet N25°E of, and 11 feet above Test No. 1. Material was: 1'-5.5', silt with random large(24") boulders; 5.5'-7', gravelly layer; 7'-9', silt and boulders. Material is definitely not granular.
13	1	1976	1-10	0-1	No	91	79	57	36	12	8	13.0%	Gravel	Owner: Ray Whitman. Area is a small clearing in woods south of logging road, 0.4 mile west of State Aid Highway No. 1, 0.19 mile north of Vermont Route 125. Test No. 1 was near north end of clearing. Material was: 1'-3.5', fine gravel; 3.5'-5', seam of silty sand; 5'-6', coarse gravel; 6'-7', layer of boulders; 7'-10', fine gravel, looks good.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 13

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	2	1976	1-10	0-1	No	100	75	45	38	30	22	18.5%	--	Test No. 2 was near woods, 130 feet south of Test No. 1, 60 feet north of stone wall. Material was: 1'-4', coarse gravel with 3"-6" stones; 4'-7', fine gravel; 7'-10', cobbles and tan fine sand (still a gravel); bottomed at 10 feet on coarse or bouldery gravel. Material looks siltier than Test No. 1.
	3	1976	2-10	0-2	No	94	85	66	43	34	28	15.5%	--	Test No. 3 was in corner of clearing, 130 feet N80°E of Test No. 2. Material was: 2'-5', fine gravel; 5'-7', coarse gravel; 7'-10', medium-to-fine gravel.
14	1	1976	1-10	0-1	No	100	100	100	97	24	7	--	Sand	Owner: Ray Whitman. Area was excavation for house foundation and was sampled for information about the feature. Area is 0.04 mile west of State Aid Highway No. 1 and 0.19 mile north of its junction with Vermont Route 125. Test No. 1 was on north wall of excavation. Material was: 1'-10', clean, uniform, hard-packed sand.
15	1	1976	0.5-5	0-0.5	Yes	84	61	52	44	9	4	15.8%	Gravel	Owner: Herbert and Antonietta Billings (they are in-laws) Area is a sprawling pit atop a flat granular feature which may be a terrace. Pit is 0.22 mile east of Town Highway No. 11, and 0.11 mile north of its junction with Town Highway No. 14.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 14

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														Test No. 1 was on a low face in the northeast corner of the pit. Material was: 0.5'-2', pebbly fine gravel; 2'-4', hard-packed and somewhat cemented gravel; 4'-5', pebbly sand; bottomed at 5' in silty fine sand. There is a very limited extension in the northeast corner. The material extends eastward in horizontal beds into a tree plantation, whose owner did not allow sampling. Any possible future material would have to be from the floor.
	2	1976	1-7	0-1	Yes	100	100	100	79	13	4	15.8%	Sand	Test No. 2 was south of ramp on eas face, 200 feet south of Test No. 1. Material was: 1'-3', cemented, pebbly, fine gravel; 3'-5', pebbly fine gravel with a few 3" stones; 5'-6', pebbly sand; 6'-7', sand wit a few 3"-4" cobbles.
	3	1976	1-5	0-1	Yes	87	70	54	46	10	3	13.0%	Gravel	Test No. 3 was on face in southeast corner of pit. Material was: 1'-3 cemented gravel; 3'-4', pebbly fine gravel; 4'-5', pebbly sand; bottome at 5' in silty sand.
	4	1976	0-18	--	Yes (Stock-pile)	100	100	100	60	22	12	--	Gran. Borrow (Crush-ed Gra-vel)	Test No. 4 was on a stockpile near center of pit floor. Material was: 0'-18', crushed gravel, fine graded Failed because of excess fines.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 15

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
	5	1976	0-11	--	Yes	100	100	100	100	93	49	--	--	Test No. 5 was in floor of northeast corner of pit. Material was: 0'-11', silty fine sand; bottomed in silty fine sand.
	6	1976	0-11	--	Yes	100	100	100	100	60	36	--	--	Test No. 6 was in southeast floor of pit. Material was: 0'-5', silty fine sand; 5'-8', silt-clay; 8'-11', sand.
	7	1976	0-10	--	Yes	100	100	100	100	86	61	--	--	Test No. 7 was in floor in southwest part of pit. Material was: 0'-1', sand; 1'-2', silt-clay; 2'-6', silty fine sand; 6'-10', fine sand. This pit appeared to be near depletion.
16	1	1976	1-8	0-1	Yes	80	74	71	63	38	14	--	Gran. Borrow (Sand)	Owner: Chester Caliss. Area is pit in woods, 0.04 mile south of Town Highway No. 15, and 0.23 mile east of its junction with Town Highway No. 2. Pit is shallow, sprawling, and nearly depleted. The floor is wet in many places. Test No. 1 was on face, just east of ramp in southeast part of pit. Material was: 1'-3', sand and pebbly sand; 3'-5', gravel; 5'-7', sand; 7'-8', silty fine sand.
	2	1976	1-8	0-1	Yes	100	100	100	92	57	22	--	--	Test No. 2 was on face of bank east of curve in access road, 150 feet N10°E of Test No. 1. Material was: 1'-2', pebbly sand; 2'-4', silty fine sand; 4'-5', pebbly sand;

TABLE I

RIPTON GRANULAR DATA SHEET NO. 16

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														5'-8', layers of sand and fine sand bottomed at 8' in sloughed material.
	3	1976	2-10	0-2	Yes	81	81	81	76	24	9	--	Gran. Borrow (Sand)	Test No. 3 was in logging road, 30 feet west of ramp. Material was: 2'-4', rusty, lumpy sand, and sand with some angular 1" to 2" stones; 4'-10', sand. Overall, this area is nearly depleted.
17	1-A	1976	4-11	0-4	Yes	76	76	54	39	3	1	15.3%	Gravel	Owner: Middlebury College. Area is a pit adjacent to the east side of National Forest Highway No. 59, 0.82 mile east of the junction of Vermont Route 125 and Town Highway No. 20 (National Forest Highway No. 59). Pit is known as the Gilmore Pit and lies just south of a tiny brook that crosses the road. The pit is heavily overgrown and is the northwest end of a wooded, lobate, 200-foot wide granular feature which rises gently S75°E. Test No. 1-A was on the southeast face. Material was: 4'-11', interbeds of fine gravel, gravel, pebbly gravel and pebbly sand.
	1-B	1976	11-15	0-4	Yes	100	100	100	89	27	24	--	--	Test No. 1-B was below Test No. 1-A. Material was: 11'-15', sand and fine silty sand.
	2	1976	0-5	--	Yes	79	68	52	42	20	13	14.7%	Gran. Borrow (Sand)	Test No. 2 was in the floor, 20 feet north of Test No. 1-B. Material was: 0'-2', sand; 2'-5', well-nested gravel; much water flowed in

TABLE I

RIPTON GRANULAR DATA SHEET NO. 17

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing 2"	1-1/2"	1/2"	#4	#100	#200	Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
														at 3'; 5'-8', layers of sand, silt-clay, and boulders (not sampled).
18	1	1976	1-6	0-1	No	64	64	64	57	67	43	--	--	Owner: Middlebury College. Area is clearing in woods 0.25 mile north of Vermont Route 125, access is 0.62 mile east of the junction of Town Highway No. 20 and Vermont Route 125. Test No. 1 was at west corner of small clearing. Material was: 1'-6', silty fine sand with some angular rock fragments. Material is probably till.
	2	1976	1-7	0-1	No	100	87	76	69	62	43	--	--	Test No. 2 was in a larger clearing 0.12 mile south of Test No. 1. Material was: 1'-7', silty sand with angular rock fragments; it bottomed at 7' on large fragments. Material is probably till.
19	1-A	1976	1-15	0-1	Yes	80	69	54	40	10	6	17.3%	Gravel	Owner: Mrs. Dulcie Scott. Area is a sprawling pit with some planted trees in the floor. Major extension is north into the woods; minor extension is northwest and east into the woods. The owner allowed sampling but said explicitl that she does not want this area listed as a materials source. Test No. 1-A was on the southeast face of the southeast lobe of pit.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 18

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
														Material was: 1'-5', dusty gravel; 5'-6', boulders; 6'-10', gravel; 10'-15', sandy gravel (or sand with cobbles).
	1-B	1976	15-22	0-1	Yes	87	69	54	41	12	6	18.3%	Gravel	Test No. 1-B was below Test No. 1-A Material was: 15'-19', fine gravel 19'-22', gravelly sand; 22', (floor level) bottomed on hard-packed, silty fine sand.
	2	1976	1-9	0-1	Yes	94	92	74	60	25	23	19.0%	--	Test No. 2 was on northwest face of pit, 310 feet N60°W of Test No. 1. Material was: 1'-9', gravel with some boulders; bottomed on cobbles and sloughed material.
	3	1976	0.5-10	0-0.5	Yes	100	100	100	100	72	29	--	--	Test No. 3 was in floor, 50 feet northwest of Test No. 1. Material was: 0.5'-6', sand; 6'-10', silty fine sand and silt-clay seams.
	4	1976	1-10	0-1	No	68	64	51	42	9	4	16.0%	Gravel	Test No. 4 was in woods, 250 feet N50°E of ramp at north end of pit. Material was: 1'-3', fine gravel; 3'-5', gravelly sand; 5'-7', bouldery gravel; 7'-8', layer of 6" to 24" boulders; 8'-10', gravel; bottomed in gravel.
	5	1976	1-10	0-1	No	75	70	51	40	5	2	17.7%	Gravel	Test No. 5 was in small clearing, 275 feet S42°E of, and 10 feet above Test No. 4. Material was: 1'-3', gravel; 3'-6', cobbly gravel, 6'-7', layer of boulders; 7'-10', gravel.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 19

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
	6	1976	2-9	0-2	No	68	56	43	34	6	2	17.9%	Gravel	Test No. 6 was dug in clearing, 310 feet S65°E of Test No. 5. No testing was done beyond Test No. 6 due to poor condition of muddy trail. Material was: 2'-5', hard-packed, bouldery gravel; 5'-9', sandy fine gravel; bottomed on bouldery gravel (Very hard digging through boulder layer).
20	1	1976	0.5-5	0-0.5	Yes	89	72	53	40	6	3	21.5%	Gravel	Owner: Harvey Brooks. Area is a tiny pit south of the south branch of the Middlebury River; 0.40 mile east of Town Highway No. 21, 0.53 mile west of the Hancock Town Line, and 0.15 mile south of Vermont Route 125. No backhoe testing was allowed. Material might extend south and east of pit, but survey had no proof. Test No. 1 was on southeast face of small, shallow pit. Material was: 0.5'-5', cobbly gravel with a few small boulders; bottomed on silt-clay at 5'.
	2	1976	1-4	0-1	Yes	94	85	65	49	7	3	20.0%	Gravel	Test No. 2 was on southwest face of pit, 20 feet southwest of Test No. 1. Material was: 1'-4', gravel with small boulders and some sand; bottomed in water on the floor. Material would need screens or a crusher.

TABLE I

RIPTON GRANULAR DATA SHEET NO. 20

Map Ident. No.	Field Test No.	Year Field Tested	Depth of Sample (Ft)	Over-burden (Ft)	Exist-ing Pit	Sieve Analysis % Passing						Abrasion AASHTO T-4-35	Passes VHD Spec.	Remarks
						2"	1-1/2"	1/2"	#4	#100	#200			
21	1	1976	2-13	0-2	Yes	100	100	100	94	20	3	--	Sand	Owner: U.S. Forest Service. Area is a tiny, partly smoothed-over pit in woods, 0.08 mile west of National Forest Highway No. 67 and 1.0 mile south of the junction of Town Highway No. 21 and Vermont Route 125. There were signs that part of the pit had trash and garbage bulldozed under the surface. Only the east face had "in-place" material. Test No. 1 was on east face of pit. Material was: 2'-13', sand with a few pebble seams; bottomed at 13' in silty, fine sand. The sand was firm and did not cave easily. Material is limited in extent by a pine plantation to the south, southwest and west.

TABLE I
SUPPLEMENT

RIPTON PROPERTY OWNERS - GRANULAR	Map Identification No.
Billings, Herbert and Antonietta	15
Brooks, Harvey	20
Caliss, Chester	16
Farr, David and George	7, 8, 10
James, Stanley and Nina	4
Johnson, Harry	6
Lebenbaum, Matthew T.	9
Livingston, Richard	5
McEdwards, Perry	1
Middlebury College	17, 18
Scott, Mrs. Dulcie	19
United States Forest Service	2, 3, 11, 12, 21
Whitman, Ray	13, 14

RIPTON

TABLE II **ROCK DATA SHEET NO. 1**

Map Ident. No.	Field Test No.	Year Field Tested	Rock Type	Existing Quarry	Method of Sampling	Abrasion AASHTO T-3	Abrasion AASHTO T-96	Remarks
1	1-A	1976	Gneiss	No	Chip	4.1%	31.7%	Owner: International Paper Company. Area is an outcrop in a wooded rise just south of logging road, 1.85 miles east of the east end of Town Highway No. 10. The terrain is quite flat and thus any major development would have to be downward. Reserves are estimated to be minor, and with the distance to major roads, it may not be economically feasible to develop. The rock is mapped as the Mount Holly Gneiss. There was some banding (gneissic) structure noted; however, the rock becomes more quartzitic and less gneissic towards the northeast. The rock seems quite hard and tenacious, but there are zones where it shatters quite easily and yielded fragments from blocky to tabular; all pieces were very sharp-edged. A bit of vein quartz was noted; cleavage surfaces were sericitic. Test No. 1-A was taken for 75 feet along the strike of the rock in the more gneissic zone west of skid trail.
	1-B	1976	Gneiss	No	Chip	3.6%	37.8%	Test No. 1-B was taken for 75 feet along the strike of the rock in the more quartzitic zone east of skid trail.

TABLE II
SUPPLEMENT

RIPTON PROPERTY OWNERS - ROCK	Map Identification No.
International Paper Company	1

N

LEGEND

- ○ GRAVEL, ACCEPTABLE FOR SEC. 704.05 (gravel for sub-base)
- ● GRAVEL, DEPLETED OR NOT ACCEPTABLE FOR SEC. 704.05
- △ SAND, ACCEPTABLE FOR SEC. 703.03 (sand borrow and cushion)
- ▲ SAND, DEPLETED OR NOT ACCEPTABLE FOR SEC. 703.03
- □ GRANULAR BORROW, SEC. 703.05
- ■ MATERIAL NOT ACCEPTABLE FOR SEC. 703.05
- ✕ EXISTING PIT
- SG SAND and GRAVEL DEPOSIT
- S SAND DEPOSIT
- 3 IDENTIFICATION NUMBER (refer to data sheets)

RIPTON

SCALE 1:31,250

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1976

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

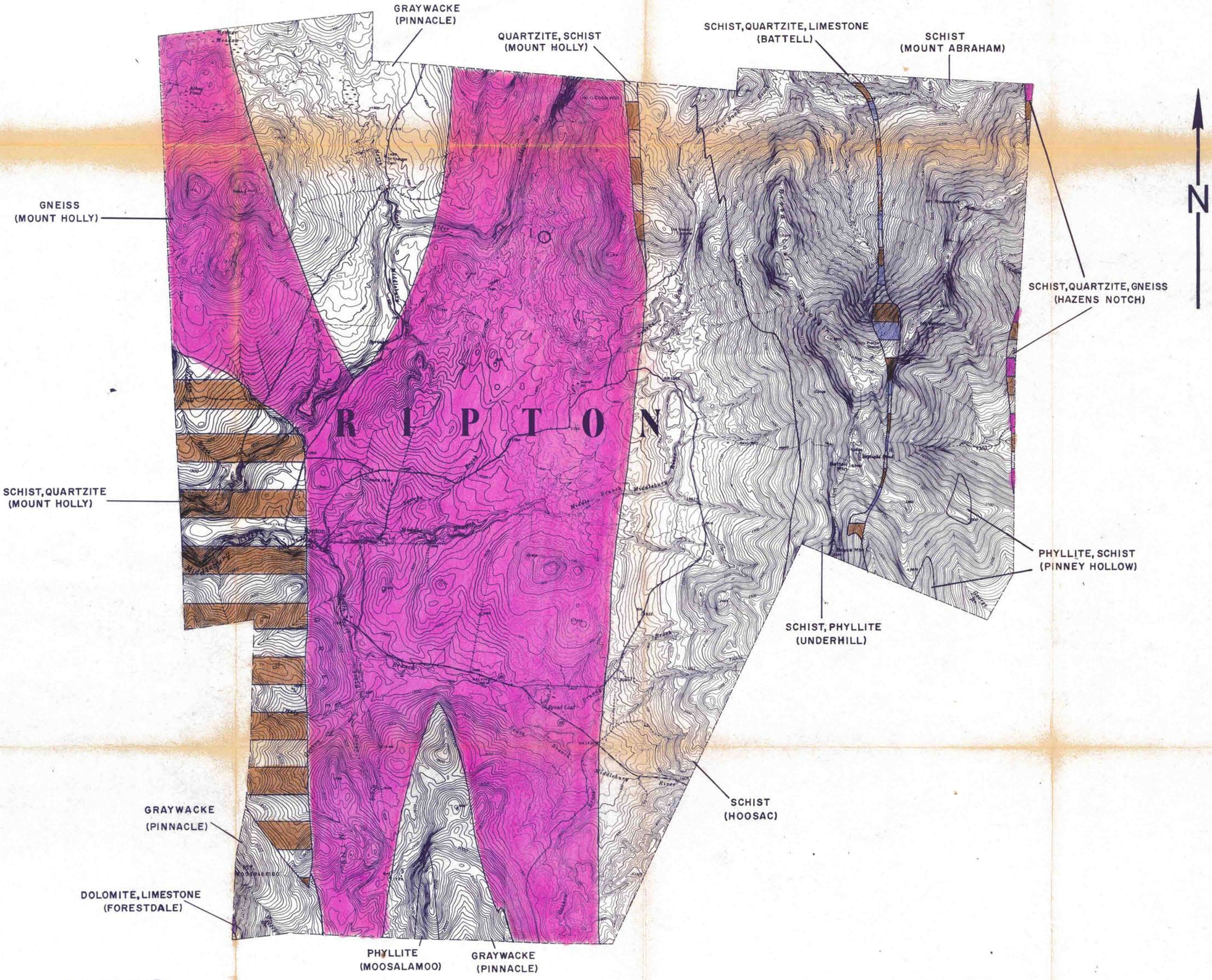
PLATE I GRANULAR

ADDISON COUNTY VT. HWY. DISTRICT NO. 5

REVISIONS

DATE						
BY						

RIPTON



LEGEND

- ROCK, ACCEPTABLE FOR SEC. 704.06 (crushed stone for sub-base)
- ROCK, NOT ACCEPTABLE FOR SEC. 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 data sheets)

RIPTON

SCALE 1:31,250

0.5 0 1 MILE

CONTOUR INTERVAL 20 FEET

1976

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

ADDISON COUNTY VT. HWY. DISTRICT NO. 5

REVISIONS

DATE						
BY						