May 23rd, 1913, information supplied Geographer's Branch re Lat. and Long. of points between Vankleek Hill and Quebec, for control of their maps.

June 8th, 1915, information supplied Geographer's Branch re Lat. and Long. of a large number of points in Ontario and Quebec, for control of their maps.

June 15th, 1915, information supplied Geographer's Branch re Description re location of Royal, Covey Hill, St. Armand, Newton, Rigaud, East and West Base (Coteau), Huntingdon, Buckingham and Stratford, for control of their maps.

August 27th, 1912, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of Scarboro and points along the shore of Lake Ontario for control of Lake Ontario Survey.

October 23rd, 1912, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of Point Petre and West Point, for control of Lake Ontario Survey.

January 2nd, 1913, information supplied Hydrographic Survey, Naval Department, re Azimuth of Scarboro—Clarke; Azimuth of Scarboro—Uxbridge, for control of Lake Ontario Survey.

January 14th, 1913, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of Haldimand, Clarke N. and Uxbridge and Directions on North Shore of Lake Ontario, for control of Lake Ontario Survey.

March 3rd, 1913, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of points between Toronto and Niagara Falls, for control of Lake Ontario Survey.

December 3rd, 1913, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of Gibraltar Lighthouse, for control of Lake Ontario Survey.

December 9th, 1914, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of points around Scarboro, for control of Lake Ontario Survey.

May 14th, 1915, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of points near Coteau, for control of St. Lawrence Survey.

May 27th, 1915, information supplied Hydrographic Survey, Naval Department, re Lat. and Long. of Valleyfield, Coteau du Lac and St. Zotique, for control of St. Lawrence Survey.

June 10th, 1915, information supplied Hydrographic Survey, Naval Department, re inverse data of line, Lat. 50, Long. 60—Lat. 46, Long. 70.

May 9th, 1913, information supplied Geological Survey, re Elevation of Hefty and Canada, for control of topographical work.

November 3rd, 1913, information supplied Geological Survey re Lat. and Long. of points in Gatineau Region and descriptions of numerous points in Quebec and Ontario, for control of geological survey mapping.

January 20th, 1914, information supplied Geological Survey re Lat. and Long. of points in Quebec and Ontario.

November 13th, 1914, information supplied Geological Survey re Azimuth and Distance, Observatory—King; Azimuth and Distance, Observatory—Buckingham; Azimuth and Distance, Navan—King, for control of geological survey mapping.

April 25th, 1915, information supplied Geological Survey re Lat. and Long., Observatory, King Mountain, Hull, Wakefield, Buckingham, for control of geological survey mapping.

November 3rd, 1915, information supplied Geological Survey re Lat. and Long. of points beginning at Buckingham and Observatory and extending into the Gatineau Region, also descriptions of same, for control of geological survey mapping.

September 29th, 1914, information supplied U.S. Coast and Geodetic re Lat. and Long. of Hereford.

June 1st, 1915, information supplied U.S. Coast and Geodetic re descriptions of numerous stations in Quebec and Ontario and Lat. and Long. of same, for control of international boundary survey.

June 30th, 1914, information supplied Quebec Streams Commission re Lat. and Long. of points around Lake St. Francis, for control of their survey.

July 28th, 1914, information supplied Quebec Streams Commission re Lat. and Long. of Theford, Ham, Stratford, for control of their survey.

Janaury 15th, 1915, information supplied Toronto Harbor Commission re Lat. and Long. of Gibraltar Lighthouse, Upper Canada College or any prominent spire or tower, to adjust harbor triangulation.

February 15th, 1916, information supplied City Surveyor of Toronto re Lat. and Long. of points within or on the outskirts of the city, for control.

The writer would also mention the great amount of secondary and tertiary triangulation along the international boundary from the Arctic Ocean to the Atlantic which has been checked up at certain points by the results of our Geodetic Survey and the U.S. Coast and Geodetic Survey. This work has been done under the direction of the boundary commissioners of Canada and the United States, both of whom were until two years ago the superintendents of the geodetic surveys of their respective countries, so that it is not surprising that the importance of triangulation control was recognized by them and formed a vital part of these surveys.

Nor must we forget that important branch of the Geodetic Survey of Canada, the precise levelling branch, the work of which bears the same relation to ordinary levelling with respect to accuracy which a geodetic survey bears to ordinary surveying. This branch establishes the elevation above mean sea level of thousands of points scattered over our Dominion and gives the data whereby all elevations on subsequent surveys may be reduced to the same datum.

(Concluded in the next issue.)

REPORT OF THE ROAD MATERIALS COMMITTEE OF THE AMERICAN SOCIETY FOR TESTING MATERIALS

THE report of Committee D-4, on Road Materials, presented at the last annual meeting of the American Society for Testing Materials, included a number of proposed tentative tests and four new definitions.

The first tentative test proposed was one for the toughness of rock. According to the report, over nine years' experience in routine testing laboratories and a considerable amount of investigation resulted in the conclusion that it was desirable to revise the existing standard test for toughness of macadam rock as printed in the 1916 Book of A.S.T.M. Standards, "giving more complete and specific directions in connection therewith, and at the same time making the test more serviceable for ascertaining the relative toughness of different rocks. The following test was recommended by the committee for publication as tentative for one year before referring it to a letter ballot of the society for adoption as a standard:

1. Definition.—Toughness as applied to rock, is the resistance offered to fracture under impact, expressed as the final height of blow required of a standard hammer to cause fracture of a cylindrical test specimen of given dimensions.

2. Sampling.—Quarry samples of rock from which test specimens are to be prepared shall measure at least 6 ins. on a side and at least 4 ins. in thickness, and when possible shall have the plane of structural weakness of the rock plainly marked thereon. Samples should be taken from freshly quarried material, and only from pieces which show no evidences of incipient fracture due to blasting or other causes. The samples should preferably be split from large pieces by the use of plugs and feathers and not by sledging. Commercial stone block samples from which test specimens are to be prepared shall measure at least 3 ins. on each edge.

3. Size and Form of Test Specimen.—Specimens for test shall be cylinders prepared as described in Section 4, 25 mm. in height and from 24 to 25 mm. in diameter. Three test specimens shall constitute a test set. The ends of the specimens shall be plane surfaces at right angles to the axis of the cylinder.

4. Preparation of Test Specimens.—One set of specimens shall be drilled perpendicular and another parallel to the plane of structural weakness of the rock, if such plane is apparent. If a plane of structural weakness is not apparent, one set of specimens shall be drilled at random. Specimens shall be drilled in a manner which will not subject the material to undue stresses and which will insure the specified dimensions. The ends of the cylinders may be sawed by means of a band or diamond saw, or in any other way which will not induce incipient fracture, but shall not be chipped or broken off with a hammer. After sawing, the ends of the specimens shall be ground plane with corborundum or emery on a cast-iron lap until the cylinders are 24 mm. in length.

5. Impact Machine.—Any form of impact machine which will comply with the following essentials may be used in making the test:

(*a*) A cast-iron anvil weighing not less than 50 kg., firmly fixed upon a solid foundation;

(*b*) A hammer weighing 2 kg., arranged so as to fall freely between suitable guides;

(*c*) A plunger made of hardened steel and weighing 1 kg., arranged to slide freely in a vertical direction in a

(Concluded on page 44, Construction News Section.)