APPENDIX C

MEASUREMENT FOR PAYMENT

C-1. General. Large-stone materials acceptably placed on breakwaters and similar structures are usually measured for payment by the ton as determined by certified scale or by carrier displacement. Partial payment is sometimes made at the time of delivery of stone. Material placed beyond the tolerance limits specified for each zone or stone feature are measured and excluded from payment. The method of determining the quantity of materials placed beyond tolerance limits follows generally that in paragraph 8-2d. on check surveys. This appendix is not intended for application to most rockfill embankments.

C-2. Barge Delivery.

a. Gauges.

(1) The vessel or barge (carrier) for stone delivery is fitted by the contractor at his own expense with gauges or other facilities for accurately determining displacement. Six gauges graduated to 0.1 ft or other suitable units should be placed near the ends and midpoints of both sides.

(2) Gauges are attached solidly to the hull. Gauges located inside need provisions for the free passage of the outside water to a vertical tube and for convenient measurement within the tube. Outside gauges on wooden hulls should be protected by fenders or recessed into the planking. On steel hulls, the gauge marks may be placed directly on the outside plates and identified by punch marks. The zero mark is below water when the carrier lies trim, light, and free from water. The contracting officer should be notified a minimum of 5 days prior to installation and be given the opportunity to be present.

b. Gauging Tables.

(1) A gauging table is prepared by an accredited agent satisfactory to the contracting officer. The table shows the cargo weight in tons for each linear unit of draft. If the lines of the carrier are such that displacement in cubic feet for each measured unit of draft can be accurately calculated, the gauging table is based upon 62.4 lb/cu ft in fresh water and 64 lb/cu ft in salt water.

(2) If the shape of the carrier is such as to render impracticable the preparation of the table according to the method in (1) above, the weight corresponding to each unit of draft is determined by actually loading stone of known weight. All weights thus obtained should be entered in the table for use in subsequent gauging. Alterations made in a carrier which will affect the accuracy of the gauging table necessitate the carrier be remeasured and a new table prepared.

c. Reading Gauges.

(1) Gauges should be read before and after unloading. The difference in tonnage calculated from displacements loaded and empty is the net stone weight. The draft should be determined from the average of all six readings.

The contracting officer should have the opportunity to be present at all draft readings.

(2) All measurements for determining gauging tables and for calculating loads should be made in still water close to the work. The contractor should be required to place the carrier where such measurement can be accurately made.

d. Uniform Loading. The carriers should be so loaded as to cause uniform submergence. The average increase in draft on the middle gauges, as a result of the load, should not differ by more than 0.5 ft, and that between any bow gauge and any stern gauge should not differ by more than 1.5 ft. Otherwise, the contractor should trim the carrier by shifting stone until this limit is reached. If, however, the carriers used by the contractor cannot be loaded as prescribed above, and yet can be calibrated accurately for displacement under varying loads, another method of determining displacement may be used where approved by the contracting officer.

e. Variations. Stone carriers should be free of leaks such as may render accurate gauging difficult. The hold of each carrier should be inspected for leakage and adequate pumping facilities should be provided so that water accumulating in the hold can be removed before each gauging. Lightening by pumping or through transfer of crews or supplies should not be permitted while stone is being discharged. Should any lightening become necessary, the unloading of stone should be suspended and the load marks should be taken in such manner as to ensure the Government against loss from that cause.

C-3. Truck Delivery.

a. Scales.

(1) Stone material delivered by truck should be weighed and certified on weigh bills provided by the contractor at the jobsite. Guidance on scales including tolerances for under-registration and over-registration is found in NBS Handbook 44 (item 30). Load capacity marked on the scale by the manufacturer should be observed. The portion of the load in excess of this nominal scale capacity should not be considered for payment.

(2) The accuracy of the scale should be checked frequently. When a state scale inspector is not immediately available for checking, the contractor, at his own expense, secures a check from a local official sealer of weights and measures, or the contracting officer may allow checking with truckloads weighed on other scales which bear an official seal placed in the current calendar year.

b. Weighing. The total weight of a load should be in a single draft rather than being determined by adding results obtained by separately weighing each end of the truck or trailer except that a coupled combination may be weighed without uncoupling under the following conditions:

(1) Released brakes.

(2) Relaxed drawbar with no tension or compression.

(3) Straight approach in the same level plane as the scale platform.

(4) Paved approaches at least 50 ft in each direction with a seal coat or higher type surfacing.

(5) Large approaches of sufficient width and length to ensure level positioning of vehicles.

c. Documentation. The documentation for platform or surge-bin scale weights includes time and date and truck identification such as license plate number for each truckload. A sequential ticket number is also needed and may conveniently be preprinted on the ticket or weigh bill. Required records of weight are gross weight, tare weight, and net weight. Tare weight should be measured at least twice a day on the same scales. Most scales provide automatic printout of results directly on the ticket or weigh bill. Printout systems should be interlocked to allow printing only when the scale has come to a complete rest. Weigh bills should be certified with signature by the scale operator, attesting to the correctness of weights and other information shown. The Government should reserve the right to inspect periodically the weighing operations at the scales.

d. Onsite Storage. Engineer Regulation 1110-2-1200 describes appropriate provisions in the specifications for safe storage of and partial payment for materials (that is, large stone) delivered on the site. See precautions for handling and stockpiling various classes of stone in Figure B-1.

C-4. Verifying Weight Measurements.

a. Measurements and calculations from which gauging tables, truck weights, and stone tonnages are determined should be open to verification by the contractor and should be subject to the approval of the contracting officer. The contractor should be invited to be present or represented by an authorized agent during the measuring of trucks or carriers. When the empty truck or carrier is measured or remeasured, a record of the allowed measurement should be sent to the contractor. If the contractor protests within 5 days, the carrier or truck should be remeasured with the contractor present or represented by an accredited agent. In this way, an agreement is possible on the contested measurements.

b. The contractor should also be informed of the weight of each load of stone as it is determined. Failure to protest within 5 days is equivalent to expressing satisfaction with the measurements and weights determined by the contracting officer.

C-5. Excess Material. All stone in place permitted by the contracting officer to remain outside the limits and tolerances are normally deducted from the quantity to be paid.

a. Calculation. Volume of excess stone is computed using the average area of excess above or below the tolerance line for two successive cross sections, multiplied by the distance between the cross sections. The volume computed for each type of stone should be converted to weight using the design stone unit weight and percent voids among stones. Stone which has been

delivered to the site but lost or wasted or otherwise not properly incorporated into the final required work must be documented in order to avoid payment or to recover any prior partial payment.

b. Measurement. The contractor should coordinate excess volume surveys with the contracting officer for appropriate timing. The survey work and measurements are done by a joint team of Government and contractor, but volume computations are done by the Government alone. Elevations and soundings are typically taken along sections perpendicular to the axis of the structure and 25 ft apart, with the readings at 10-ft intervals and at breaks in the slope. Other section and reading intervals may be used if deemed appropriate by the contracting officer.