



Materials sampling and testing methods and documentation procedures prescribed in chapter 8 of the CMM are mobilized into the contract by [standard spec 106.3.4.1](#) and [standard spec 106.3.4.3.1](#).

WisDOT personnel are responsible for checking the accuracy of all scales used on projects under their supervision, both at the time of installation and during use. The following are the current recommended procedures relative to the administration of scale testing and inspection.

The expressions "testing" and "checking" of scales as used here do not imply that the physical work involved in making necessary adjustments or adding or removing standard weights will be done by WisDOT personnel. Actually, the WisDOT personnel will only observe the procedure and work of the contractor's personnel to ensure it is being done in such a way as to provide valid data, take necessary dial or calibration readings, make appropriate notebook notations, and issue the required instructions or orders to obtain the condition for approval. Suggestions or recommendations of technical nature that may be helpful to the contractor in accomplishing the test are considered proper in this function.

Contract items such as asphaltic mixtures, subbase, and base course materials, when measured by the ton, are generally weighed in the delivery vehicle over truck scales; however, asphaltic mixtures also may be weighed over plant or storage hopper scales, and subbase and base course materials also may be weighed over conveyor scales. Each load of asphaltic mixtures must be weighted to the nearest .02 ton. Each load of subbase and base course materials must be weighed to the nearest .04 ton, except when automatic scales are used which record weight to closer tolerances, or except when conveyor scales are used.

The contractor must provide a load ticket for each load, showing, at the minimum:

- Net weight of the load
- Material type
- Date
- Project I.D

Tickets used for automatic digital recordation for asphaltic mixtures delivered over truck scales or weighed on plant or storage hopper scales must conform to the requirements of [standard spec 450.3.1.1.4](#) or [standard spec 450.3.1.1.3](#).

The provisions of [standard spec 109.1.4](#) require that all aggregates and asphaltic mixtures furnished by the ton measurement be weighed on approved scales furnished by and at the expense of the contractor. It is further provided that the scales must be satisfactory to the engineer and must be tested by the engineer or by a testing firm or agency as often as the engineer may deem necessary to ensure their accuracy. Similar requirements are designated in other sections of the standard specs when materials for specific items of work are measured or proportioned by weight.

The engineer must not permit the contractor to use any scale for measuring materials for the work until the scale has been properly checked, inspected, and approved for use.

The Wisconsin Department of Agriculture Trade and Consumer Protection (DATCP) is responsible for checking the accuracy of commercial scales, and so may make random checks during the life of the project if the contractor weighs over commercial scales. DATCP responsibility does not include scales used exclusively for highway construction purposes if the scales are supervised by WisDOT. DATCP follows the specifications and tolerances of Handbook 44 published by the National Institute of Standards and Technology.

### 8-13.1 Truck Scales

#### 8-13.1.1 General

The scale inspector must maintain, as part of the permanent project records, a list of the tare weight of each vehicle and the period for which the list was used. Tare weight must be determined at least once each day and the time of day at which the trucks are tared may vary from day to day. Trucks should be tared at a time when the average conditions for the period prevail, especially regarding fuel levels. The time and frequency of obtaining tare weight will be determined by the engineer, considering the location of the scale with respect to the job or source of material, length of haul, fueling schedules, or other relative circumstances and any apparent changes in the truck.

The scale inspector should observe the tare weighing of the trucks regardless of whether the gross weighing is continuously observed, randomly observed and checked, or printed by truck scale recorders, except that when

recorders are used that record tare weight the tare weighing doesn't need to be directly observed.

Increment weighing of trucks will not be permitted. Truck scales must be sufficient size to weigh the entire truck in one weighing. In the case of a truck and trailer, unless the scales are large enough to completely support both units, the truck and the trailer must be weighed separately. During weighing, the truck and the trailer must be physically disconnected and free from each other, except as follows: Truck and trailer units consisting of a truck and four-wheel trailer equipped with a special jointed tongue need not be disconnected during weighing, provided that test weighing of units on the same scale having the same approach conditions as used in the work indicates no appreciable difference in weights of the units connected or disconnected.

Scales that have had any of their beam extended beyond the scale capacity by filing marks or otherwise can be used to weigh loads only to the rated capacity of the scale. The extension should be reported to the Weights and Measures Technical Section, Wisconsin Department of Agriculture, Trade and Consumer Protection, Madison, WI.

Truck weights can be validated through either continuously observed weighing or randomly checked weighing, which are discussed below.

Normally, testing of truck scales will be accomplished by the engineer. When a truck scale does not check out satisfactorily, proper facilities are not made available for checking, scale performance is erratic, or source of difficulty cannot be determined, the contractor can be required under the specifications to obtain the services of a scale testing firm or agency. The costs of this service are the obligation of the contractor. A report from such an agency indicating conformance will be considered a satisfactory check on the installation of a scale.

When checking truck scales, project personnel are to complete department form [DT1931](#), Inspection and Test Report -- Portable Vehicle Scale, and retain it with project records. An example of a completed form [DT1931](#) is shown in [Figure 1](#).

If a commercial scale is not within reasonable distance from the project to make a comparison test or the contractor refuses to provide the test, the scale must be checked out by a testing agency or firm.

The use of stable concrete foundations and the securing of the scales to the foundation to prevent shifting or movement will be insisted upon before approval for use.

#### **8-13.1.2 Continuously Observed Weighing**

An inspector will observe the weighing and will check the indicated gross and/or net weight of the load, the tare weight of the vehicle, and the settings of the tare weight or counterbalance on scales equipped with a separate tare beam or counterbalance.

The load ticket must indicate the identification of the hauling vehicle. The scale inspector will sign or initial each load ticket after checking that the information on the ticket is accurate and complete.

Figure 1 Inspection and Tests Report for Portable Vehicle Scale

INSPECTION AND TEST REPORT - PORTABLE VEHICLE SCALE				Wisconsin Department of Transportation	
DT1931 2002 (Replaces EC255)					
Project ID	Contractor	Date			
1091-1-70	Ed Kraemer & Sons, Inc	June 10, 2003			
Make	Number	Type	Capacity	Heaviest Load Weighed	lbs. approx.
Winslow	362036	<input checked="" type="checkbox"/> Beam <input type="checkbox"/> Dial	6000 LBS	4600.0	
Scale Location	Scale Owner	Project Engineer			
Jenkins Pit	Ed Kraemer & Sons	T.C. Smith			

<p><b>MINIMUM INSTALLATION REQUIREMENTS</b></p> <p>CHECK AS COMPLETED</p> <p><input checked="" type="checkbox"/> 1. One piece concrete abutments according to drawings.</p> <p><input checked="" type="checkbox"/> 2. Scale bolted to abutments.</p> <p><input checked="" type="checkbox"/> 3. Scale bench mounted on concrete or steel.</p> <p><input checked="" type="checkbox"/> 4. Approaches: Compacted and level (i.e., same plane), with scale platform on each end for a distance equal to the wheelbase of the longest truck weighed.</p> <p><input checked="" type="checkbox"/> 5. Horizontal parts of scale are level; vertical parts are plumb.</p> <p style="text-align: center;"><b>TEST</b></p> <p><input type="checkbox"/> 1. Zero balance.</p> <p><input checked="" type="checkbox"/> 2. Sensitivity with no load (beam scale only). Move smallest poise two graduations or 40 lbs whichever is greater. This must move beam from center of trig loop to bottom and hold it there. This must move the balance indicator when attached to a beam approximately 3/8".</p> <p><input checked="" type="checkbox"/> 3. End test. Place a loaded truck on scale, the weight of which will represent loads to be weighed, keeping rear axle at extreme end of platform. Record: 45690 lbs. weight</p> <p>Reverse position of truck on scale, keeping rear axle at extreme end. Record: 45700 lbs. weight</p> <p>Weight with load centered on platform. Record: 45710 lbs. weight</p> <p>The difference between these weights must not be greater than 2 pounds per thousand pounds of loaded truck weight.</p> <p><input checked="" type="checkbox"/> 4. Sensitivity (beam scale only). With the loaded truck on scale, balance beam in center of trig loop; move smallest poise out two graduations. This must move beam to bottom of trig loop; this must move the balance indicator when attached to a beam approximately 3/8".</p>	<p><b>TEST (Continued)</b></p> <p><input type="checkbox"/> 5. * DIAL SCALE: Using loaded truck.</p> <p>_____ lbs. when splitting dial only; OR</p> <p>_____ lbs. on dial to its capacity.</p> <p>_____ lbs. remaining on beam.</p> <p>_____ TOTAL</p> <p>_____ lbs. when using tare beam only; OR</p> <p>_____ lbs. on beam to its capacity AND</p> <p>_____ lbs. remaining on dial.</p> <p>_____ TOTAL</p> <p>_____ lbs. represented by drop weights(s)</p> <p>_____ lbs. remaining on dial</p> <p>_____ TOTAL</p> <p>* The difference in total weight using any possible combination of reading elements shall not be greater than 2 lbs. per thousand pounds of test load.</p> <p><input checked="" type="checkbox"/> 6. Comparison Test. This is extremely important and valuable and should be performed whenever possible.</p> <p>48700 lbs. weight of loaded truck on project scale.</p> <p>48620 lbs. weight of loaded truck on reference scale.</p> <p>J.C. Jones Operator</p> <p>Lodi, WI Location</p> <p>Reported by</p> <p>x J.A. Johnson</p>
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**8-13.1.3 Randomly Checked Weighing**

The engineer should select loaded trucks at random for reweighing. [Standard spec 109.1.4](#) provides that vehicle gross and tare weight may be checked as often as the engineer deems necessary. Validation of the weigh ticket is not required by a scale inspector. Loads of asphaltic mixtures, subbase or base materials that, upon reweighing, fall within a tolerance of .05 ton plus or minus of the original weight are acceptable without any need for correction of the original weigh ticket. Sufficient random checks should be made to assure the engineer the contractor's weighing procedures are accurate; at least two of these checks should be performed for each full day of production, if possible.

Should random checking disclose more errors than might occasionally occur, the engineer should review the weighing procedures used by the contractor and require that the scales be tested. Should errors continue to be discovered, it would be necessary to continuously observe the weighing.

**8-13.1.4 Minimum Requirements for Approval**

The minimum requirements for approval of a truck scale installation are:

1. The scale must be supported on concrete abutments or foundations constructed to the minimum dimensions indicated on [Figure 2](#), [Figure 3](#), and [Figure 4](#). The abutments, whether cast-in-place or pre-cast, must be in one piece and founded and laterally supported to prevent settling or shifting. If the abutments are covered with gravel, enough must be removed to reveal clearly whether they are monolithic.
2. Scale pedestals must be bolted or otherwise securely held in place to prevent shifting or wobbling on the abutments.

3. The scale bench (support for the recording dial or the poise beam mechanism) must be mounted on and bolted to a concrete slab or steel beams to offer unyielding support. Wood sleepers may be anchored to the concrete or steel beams to permit lateral adjustment of the scale bench and attachment by means of lag screws.
4. Horizontal scale parts and levers must be level; vertical parts must be plumb. Fulcrums, knife-edges, and clevises must be clean and free.
5. Poise beams, poises, pivots, pivot seats, etc., must be kept clean and free from accumulations of dust. The beams must not be extended beyond scale capacity.
6. Approaches to the scale must be level (in the plane of the scale platform) and firm (no excessive rutting, shoving, and chuck-holing) on either end of the platform for a minimum distance equal to the wheelbase of the longest truck weighed or to the distance between the pintle or hitch of the truck and the rear wheel of the four-wheel trailer when weighing of the units is permitted while connected.

### 8-13.1.5 Scale Check Tests

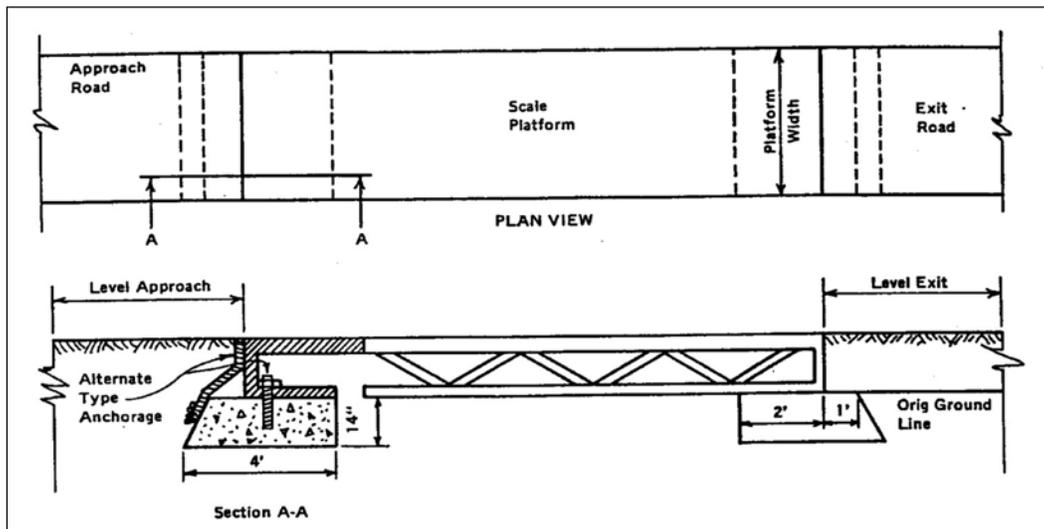
#### 8-13.1.5.1 Zero Balance

The poise must center in the trig loop at no load for beam scales, and must indicate zero for dial scales.

#### 8-13.1.5.2 Sensitivity (Beam Scales Only)

At both "no load" and scale loaded situations, when the smallest poise is moved out two graduations or an amount not to exceed 40 pounds on the balanced beam, the beam end must drop from the center of the trip loop to the bottom and tend to rest there. When a balance indicator is attached to the beam, moving the smallest poise out the above amount should cause the indicator to move from the center approximately 3/8-inch.

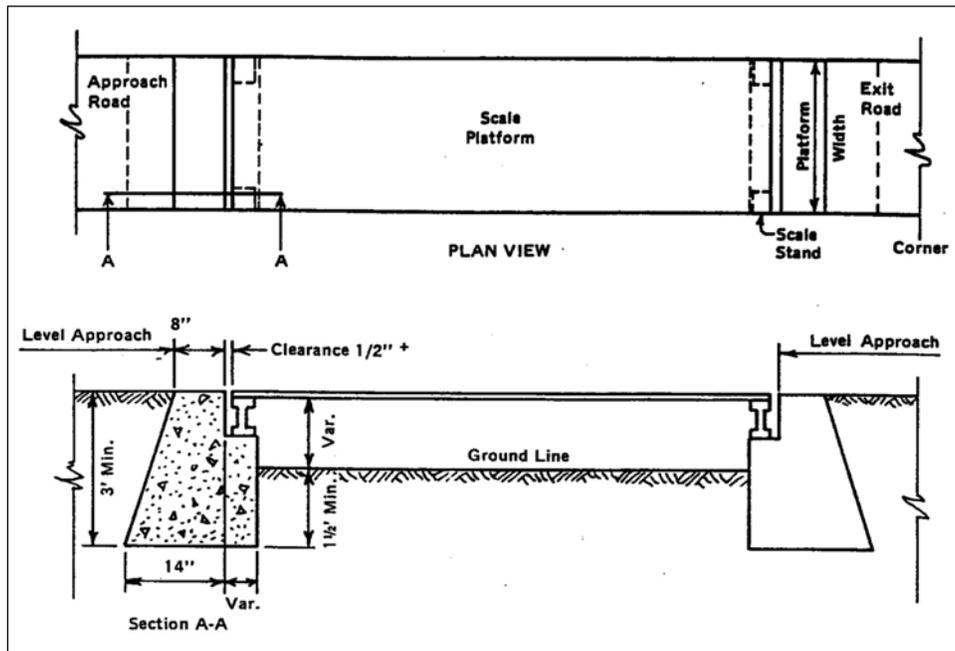
Figure 2 Truck Scale Installation Minimum Requirements, Full Width Bearing Type



Note: Scale box frame must be anchored to concrete foundation by anchor bolts or other means to preclude longitudinal shifting of scales on foundations.

- All indicated dimensions are minimum and may require increase for some scales.
- Abutments and support must be constructed of Portland cement concrete of adequate strength to preclude failure in service.

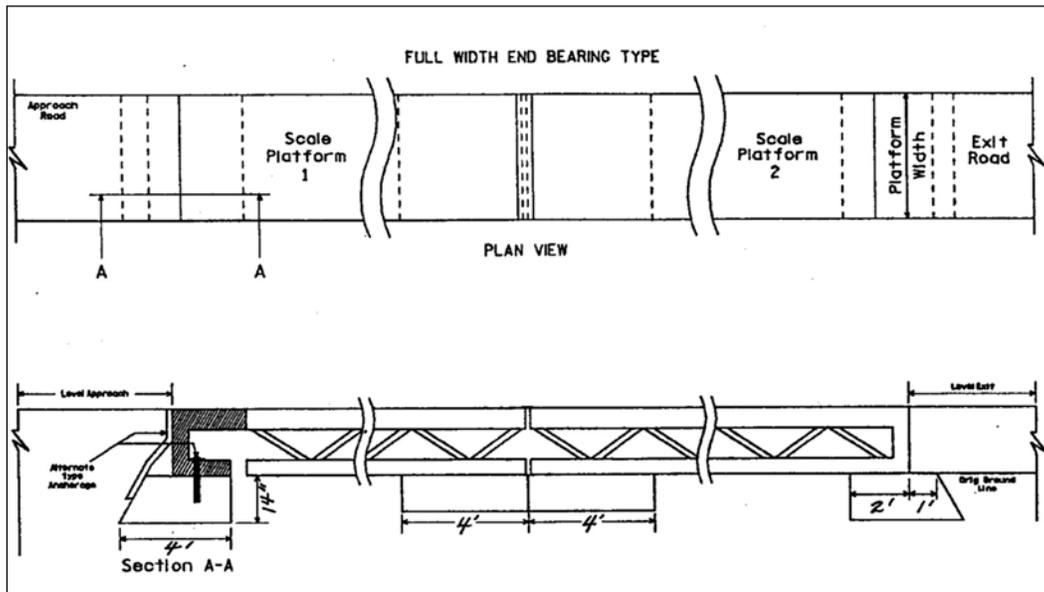
Figure 3 Truck Scale Installation Minimum Requirements, Corner Pedestal Bearing Type



Note: All indicated dimensions are minimum and may require increase for some scales.

- "Variable" dimensions are dependent upon specific scale requirements for bearing areas and level arrangements.
- Abutments and supports for scale corner stands must be constructed of Portland cement concrete of adequate strength to preclude failure in service.

Figure 4 Dual Truck Scale Installation Minimum Requirements



### 8-13.1.5.3 End and Center Test

1. Place a loaded truck, representative of the loads to be weighed, on the scale with the rear wheels at the extreme end of the platform. For a scale having dual platforms, the "extreme ends" must be the approach end of scale platform #1 and the exit end of scale platform #2.
2. Weigh and record the weight.
3. Reverse the position of the truck by placing the rear wheels at the extreme opposite end of the platform.
4. Weigh and record the weight.
5. Place the loaded truck centered on the platform. For a scale having dual platforms, the load when centered must be supported one-half on scale platform #1 and one-half on scale platform #2.

#### 6. Weigh and record the weight.

The difference between any of these weights must not exceed two pounds per thousand pounds of the loaded truck weight.

#### 8-13.1.5.4 Dial Scale Test

The purpose of this test is to check the indicated load using all possible combinations of dial, poise beam, and drop counterweights, which are independently adjustable reading elements.

1. Place a loaded truck, representative of the loads to be weighed, on the scale platform.
2. Record the total indicated weight, based on using the dial to its maximum capacity, and the remaining weight on the beam.
3. Record the total indicated weight, based on using the beam to its maximum capacity, and the remaining weight on the dial.
4. Record the total indicated weight, based on using drop counterweights as required, and the remaining weight on the dial.

The difference in indicated total load when using any possible combination of reading elements must not exceed two pounds per thousand pounds.

#### 8-13.1.5.5 Comparison Test

The contractor's scale must be finally checked for accuracy under a representative truckload against a permanent truck scale. The difference between readings on the two scales (making due allowance for fuel consumed during the trip) must not exceed two pounds per thousand pounds of the loaded truck weight.

#### 8-13.1.6 Frequency of Scale Check Tests

During use, the end and center test and comparison test should be made at least once per week; the zero balance test and sensitivity test (for beam scales only) should be performed several times daily. When scales are being subjected to unusually heavy use or appear to depreciate rapidly in accuracy or sensitivity, more frequent testing may be necessary to ensure adequate control. With record of satisfactory performance, the frequency of check tests may be reduced to two per month for permanent commercial scales; however, at least one comparison test should be made at the beginning of the weighing operations on the project.

The frequency of comparison tests may be reduced to twice per month at the discretion of the engineer on work where 10,000 tons or less of material is weighed over the scale weekly.

### 8-13.2 Conveyor Scales

#### 8-13.2.1 Background

Subbase and base course may be weighed over approved conveyor scales and the weight used for pay purposes. Conveyor scales cannot be approved for sporadic or intermittent production, or for commercial sources supplying private and highway needs concurrently, or for similar applications where alternating deliveries could result in unacceptable errors.

If the approved conveyor scales are equipped with an approved printer system, continuous observation by a scale inspector of the weighing will not be required. Validation of the weigh tickets will not be required either.

Conveyor scales may also be used for proportioning purposes, such as for asphaltic and concrete mixtures.

#### 8-13.2.2 Inspection and Approval

Requirements for approval, accuracy, inspection, and testing of conveyor scales must conform to the code for belt conveyor scales in Handbook 44, published by the National Institute of Standards and Technology.

The contractor must furnish all necessary equipment, data, labor, and personnel to accomplish the required testing, unless the contractor prefers to have the testing performed by a scale testing agency. If the conveyor scales do not check out satisfactorily, do not retain their accuracy, or are erratic, and the source of difficulty cannot be determined, the contractor should obtain the services of a scale testing agency familiar with conveyor scales.

The conveyor frame must be equipped with leveling bubbles. The unit must be level when set up for operation. The stability and rigidity of the conveyor in which the scale is installed is of prime importance in all conveyor scale installations, but especially so for portable conveyor scales, since portable conveyor scales are frequently moved from job to job, and from one location to another in a pit.

Truck scales for comparison purposes are not always handy and material tests using truck scales are time consuming. It is, therefore, essential that all portable conveyor scales approved for use must be capable of calibration with simulated tests using a test chain, test weights, or calibrated plates. The unit must be sufficiently

stable and rigid to allow for recalibration after movement of the scale from one location to another without resort to comparison testing with a truck scale.

#### **8-13.2.2.1 Testing for Acceptance**

Unless waived by the engineer, all conveyor scales must be tested initially for acceptance as follows:

1. The conveyor scale must be calibrated with an accurate truck scale by a material comparison test.
2. The leveling jack must be removed and the unit towed about in a typical move, after which the unit should be jacked up and leveled in a different location than that in which it was first calibrated.
3. A zero load test must be run and the scale calibrated by a test chain, test weights, or calibrated plates, and any necessary span adjustments made.
4. A material comparison test must be performed using the truck scale with which the conveyor scale was originally calibrated. No span or zero adjustment must be made during the comparison test.
5. The weights as measured by the conveyor scale must agree with the weights as measured on the truck scale to within 0.5% of the test load.

#### **8-13.2.2.2 Frequency of Testing**

Conveyor scales must be tested and calibrated after each relocation of the scale at the work site as well as after each movement between work sites. Conveyor scales must be tested at least once for each week of continuous use and at any time when accident, settlement, or other causes may have affected their accuracy.

The zero-load test must be performed at least once daily. The contractor may test the scale by either a material test or simulated test, but the contractor should not be required to calibrate or make comparison tests with truck scales when simulated tests provide acceptable results and when the scale was approved as provided above.

#### **8-13.2.2.3 Records**

Several different types of conveyor scales are on the market and these are mounted in conveyors manufactured by a number of companies. The type and manufacturer of the scale and the manufacturer of the conveyor, together with any new or interesting aspects of design should be entered in a field notebook.

All data relative to tests made for acceptance as well as data relative to routine calibration tests should be entered in a field notebook for incorporation in the permanent job records, together with appropriate comments relating to repair, adjustments, problems, and any item of interest relative to the operation of these scales.

#### **8-13.2.3 Scales Used for Proportioning Purposes**

Each conveyor scale must be calibrated and checked for accuracy in accordance with the manufacturer's instructions. A material comparison test with a truck scale of known accuracy should be made before beginning production. The size of material test should be at least the size recommended in the manufacturer's manual. The purpose of the material test is to establish a calibration point to permit routine checking of the scale using its own weights.

Weights as recorded by the conveyor scale must agree with the weights as measured on the truck scale to within 1.0% of the test load. Should the conveyors be moved and re-erected, another material test should be performed.

The conveyor's scale must be calibrated and checked for accuracy using its static weights at least once for each week of continuous use and more frequently as necessary or desirable. High-production plants may warrant scale checks more frequently than once a week. Frequency of checks should be determined by the engineer on the basis of the specific plant operation. The zero-load test must be performed at least once daily.

#### **8-13.3 Storage Hopper Scales**

Storage hopper scales must be checked for inspection and testing of batching scales, or by the comparison test. Rather than compare the gross load of the truck at the plant site with the gross load when weighed on a permanent scale, while making due allowance for fuel consumption, a comparison will be made between the net load at the plant site and the net load when weighed on a permanent truck scale. The difference between the two weights must not exceed 0.5% of the net load when weighed by storage hopper scale at the plant site.

The storage hopper should be substantially loaded for at least five hours so that most of the probable settlement will have occurred. An example of the calculations is shown below.

Example 1

Truck tare at plant = 27,700 lbs  
 Fuel consumption; estimated 10 gal. @ 6 lbs./gal. = 60 lbs  
 Recorded weight of mix on storage hopper scale = 21,000 lbs  
 Gross weight on permanent scale = 48,620 lbs  
 $27,700 - 60 = 27,640\#$   
 $48,620 - 27,640 = 20,980\#$   
 $21,000 - 20,980 = 20\#$   
 Allowable difference =  $21,000 \times 0.005 = 105$  lbs  
 Actual difference = 20 lbs, so the storage hopper scale passes the check.

**8-13.4 Plant Scales**

[Standard spec 450.4](#) permits the weighing of minor quantities of asphaltic mixtures over the plant scales in lieu of truck scales when approved by the engineer. This provision applies to asphaltic plants not equipped with printer systems. The size of minor quantities is left to the discretion of the engineer; however, the provision should not be construed to eliminate the need for installation of a truck scale on small tonnage contracts. Plant scales might be used for minor quantities when truck scales are out of order, when automatic printers are malfunctioning and are awaiting repair, and when other similar situations occur. Standard spec 450.4 also permits the measurement of intermittent or minor amounts of asphaltic mixtures by weighing over the plant scale when the measurement of amounts based on net weight would be impractical.

Initial inspection of the scales and subsequent checks by random weighing by a scale inspector will be required. A comparison test should be made in accordance with the frequency. Asphaltic mixtures weighed over automatic plant scales equipped with an approved printer system will not require continuous observation of the weighing or validation of the weigh ticket by a scale inspector.

Requirements for approval, accuracy, inspection, and tests of plant scales used for weighing asphaltic mixtures and materials for pay purposes, including scales used in connection with automatic printer, mixing, and batching systems are in this section.

**8-13.4.1 Storage Hopper Scales**

Asphaltic mixtures may be weighed with storage hopper scales. If the approved storage hopper scales are equipped with an approved printer system, continuous observation by a scale inspector of the weighing will not be required. Validation of the weigh tickets will not be required either.

**8-13.4.2 Commercial Batching Scales**

Permanent commercial ready-mixed concrete or asphaltic batch plants serving the general public must have on hand a report of annual testing of each scale by a scale testing agency. This report should be checked to determine if the scale accuracy meets specification requirements. In general, a report dated before the calendar year in which the scales are used will not be satisfactory. If a current report indicating satisfactory accuracy is available, the engineer need not make any initial check on the scales, but should make periodic checks of proper functioning and sensitivity during the course of normal batching operations.

If satisfactory evidence of scale check by a testing agency is not available, the installation must be checked out by a testing agency before it is approved for use. It is not necessary for WisDOT personnel to observe testing when performed by a testing agency.

The requirements for approval and use of batching scales are covered in [standard spec 450.3.1.1.2](#) (hot mix asphaltic mixtures) and [standard spec 501.3.4.5](#) and [standard spec 501.3.4.6](#) (Portland cement concrete).

**8-13.4.3 Inspection**

Before approval of a scale for use, the installation must be inspected and tested for compliance with the requirements of [standard spec 450.3.1.1.2](#), [standard spec 501.3.4.5](#), and [standard spec 501.3.4.6](#) as applicable.

The required number of standard 50-pound testing weights should be available, not only for the initial test, but for rechecking as required to ensure continuously correct weighing. The weights must be kept clean and free from accretions of foreign material. They should be checked for accuracy before initial use and thereafter whenever there is reason to suspect a change in their weight.

Inspections and tests must be made in accordance with the following recommended practices. The inspections and tests should be made preliminary to approval and during routine plant inspection.

#### 8-13.4.4 Requirements for Accuracy

All scales at asphaltic batching plants should be accurate to 0.5% of the maximum load that may be required. Scales at concrete batching plants should be accurate to within a tolerance of 0.4% of the net load in the weigh hopper.

#### 8-13.4.5 Suspended Hopper Scales

Scales must be checked only after the bins have been fully loaded for at least five hours so that most of the probable settlement will have taken place. Horizontal scale parts and levers must be level and vertical parts plumb.

Scales used in weighing aggregates may be checked for accuracy at 500-pound increments of load until near the required net load, when 100-pound increments should be used. The contractor may have, in addition to the required minimum of 10 standard 50-pound weights, standard weights of greater size such as weights of 500 pounds each, accurate to within 0.1%.

When these larger weights are available, increments of up to 2,000 pounds may be used until near the required net load, when 100-pound increments should be used. Cement and asphalt scales must be checked at not more than 500-pound increments of load until the last 500 pounds of required net load, when 50-pound increments should be used. The sensitivity of beam-type scales must be checked at each increment within 200 pounds of the required load.

##### 8-13.4.5.1 Load Tests

The poise beam must be balanced to center in the trig loop with the pointer of the indicator dial (if attached) centered at no load for beam scales or to indicate zero for dial scales. The standard weights must then be placed on the scale in a manner to approximate as closely as possible the conditions of normal load application. When the last weight has been applied for the increment, the actual test load and its comparable indicated load should be recorded on department form [DT1378](#). An example of a completed form [DT1378](#) is shown in [Figure 5](#).

Without changing the scale setting, the standard weights are removed and the beam again brought to accurate balance by placing material into the weigh hopper. The standard weights are applied as before to the new load and the process repeated until the required net load for each beam, dial, or combination of beams and dial is reached. Scales should be checked against standard weights at the start of weighing operations, at least once a week during continuous use and more frequently as necessary or desirable, or at any time that accident or settlement may have affected them. High production plants may warrant scale checks more frequently than once a week. Frequency of checks should be determined by the engineer on the basis of the specific plant operation. Commercial batching scales having a current report indicating satisfactory accuracy need not be checked against standard weights unless deemed necessary by the engineer.

##### 8-13.4.5.2 Sensitivity

A beam scale is acceptably sensitive if, when the smallest poise is moved two graduations, the beam moves at least 1/4 inch from the position of equilibrium in the middle of the trig loop towards the top or bottom of the loop and tends to rest there. Scales not accurate to within specification limits or not sufficiently sensitive must not be used until adjusted or repaired.

The scales should be inspected frequently to detect signs of sluggishness, inaccuracy, or damage. They should be checked for zero balance at no load several times daily and for accuracy and sensitivity at least once a day by applying one standard 50-pound weight to the full load and observing the difference in weight and the sensitivity.

If the scales have long, exposed levers that cause instability in the telltale dial on windy days, the contractor should be required to provide the scales with suitable protection from the wind. When oil is used on scale parts such as knife-edges, pivots, fulcrums, clevises, etc., it has a tendency to collect dust and cause sluggishness. Less trouble will result if brushes and highly volatile cleaners are used instead of oil.

Telltale devices, or over or under indicators, must be checked for compliance with specification requirements whenever the scales are checked for accuracy.

#### 8-13.4.6 Records

A tabulation of data of scale readings versus increments of standard weight must be recorded on department form [DT1378](#), with appropriate comments relating to corrections, repair, approvals, etc., entered on the back of the form.

#### 8-13.4.7 Recordation

The standard specs require that on projects involving 10,000 tons or more of asphaltic mixtures, the contractor must employ recordation of weights. If the contractor does not use recordation on batch plant scales, the contractor must use recordation on a truck or storage hopper scale. Truck and storage hopper scale recordation

