

METTLER TOLEDO



SEAPORT

WEIGH IN MOTION

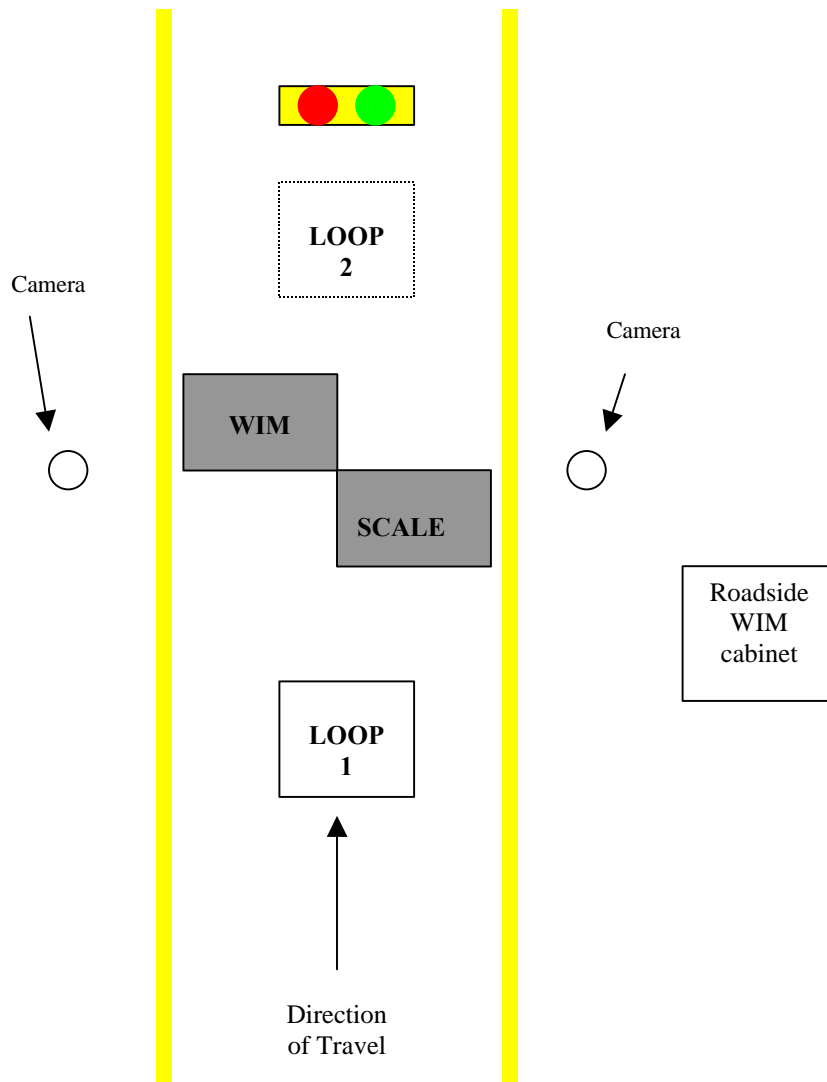
SPECIFICATIONS

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METTLER TOLEDO SEAPORT WIM



Seaport WIM Sequencing

1. Vehicle crosses L1 to initiate WIM System.
2. Vehicle crosses WIM scales and weights (gross, single axle, tandem axle, inner bridge, federal bridge formula speed, and length) are recorded. These weights can be displayed on a CRT, transmitted to main frame system, or be superimposed in a digital image and transmitted if camera(s) are used.
3. Traffic lights or directional signals may be installed downstream to direct or stop vehicle.
4. If required the scales can be used bi-directional, this is accomplished by simply adding a loop on the opposite side of scales. This option could be used to inform vehicles of possible overloads prior to exiting the port.

Basic		KEY	
L1	Scale Loop	Optional	
WIM	WIM Scale Platforms	Not Shown: Wireless Communication	
L2	Scale Loop (bi-directional use only)	Not Shown: Third or Forth camera (close up of tractor door)	
		Traffic Lights or Directional Signals	

WIM SYSTEM ACCURACY

There are many variables that will effect the "real world" WIM system accuracy.

- Pavement Smoothness (maintenance) of Approach / Exit Slabs
- Truck Variable (Truck Type, Drivers, condition of Vehicle)

Pavement Smoothness

The paved approach of the WIM Scale (25ft.) and after the scale (6ft.) needs to meet ASTM Type I specifications and be Portland concrete, and not vary more than 1/8 inch in 20 feet. Pavement smoothness is the user responsibility.

Truck Variables

A WIM System is evaluated only with vehicles with loads over 80% of their rated gross vehicle capacity to assure suspensions are engaged. Truck variables such as type, driver skill, and condition cannot be controlled.

Accuracy

Accuracy performance is to meet the following criteria for loaded vehicles:

	<u>Accuracy</u>	<u>Conformance</u>
Gross Weight	± 2%	95%
Single Axle Load	± 10%	95%
Tandem Load	± 5%	95%
Axle Spacing	> of ± .5ft. or 5%	95%

WIM Testing Procedure

The following method shall be used to verify the WIM system accuracy:

ACCEPTABLE PERFORMANCE TEST

- A. This section shall apply to all work performed under this contract. Time is of the essence in this contract and the Contractor shall provide the completed system installed and ready for Acceptance Performance Test (APT) after the project completion date. The Contractor shall provide a minimum of **2** weeks advanced notice as to when the APT period will start.
- B. The in-motion calibration tests of the entire WIM system shall be performed by the Contractor after installation is completed and prior to beginning the APT period. The Contractor shall provide the Engineer one weeks notice of the in-motion calibration tests. Calibration weights will be provided by the Contractor.
- C. The APT period shall begin ***two weeks after the completion of the project and calibration of the in motion scales.*** This two week time period will be used as a burn-in and training period, which the system will be functional. The Engineer will assist in this process if requested by the Contractor.
- D. The Contractor shall submit a detailed test plan for approval, no later than 90 days after notice to proceed. During the APT period, the entire **SYSTEM** shall be fully operational under normal traffic conditions and operate trouble free for 24 hours each day for 7 days of each week for 30 consecutive days. The Engineer will check the calibrated performance by obtaining actual truck weight samples. The test for WIM accuracy must be conducted and met BI-weekly during the APT period. The test shall be conducted by comparing actual static weights to WIM weights of class nine vehicles. The Contractor shall provide a WIM scale system specialist to assist in the operation for a period of at least 2 weeks. This specialist shall be made available at additional times during the APT period at the discretion of the Engineer. If problems of any kind are encountered during the APT, at the discretion of the End user, the 30-day APT will start over until 30 continuous days of trouble free operation are experienced. ***This re-start can only occur twice.***

- E. During the two-week burn-in period, the Contractor shall train a minimum of 10 Department staff (to be designated by the End user) in the operation of the **SYSTEM** for a period of 1 week.
- F. The Acceptance Performance Test shall demonstrate to the satisfaction of the end user that the weigh-in-motion system has been constructed and consistently meet the performance requirements of the plans and of these Technical Special Provisions. The APT will be the basis for acceptance or rejection of the **SYSTEM** as a result of demonstrated performance.

The End user will suspend Contract time during the first scheduled Acceptance Performance Test (APT). Contract time will resume if the **SYSTEM** fails during the first, allotted APT time period. When the APT resumes, the entire time period is required as detailed in this section and the End user will suspend the Contract time. The End user will withhold final payment and acceptance of the project until after the successful completion and acceptance of the APT.

At the end of the Acceptance Performance Test period, if the **SYSTEM** performance requirements as described in the plans and these Technical Special Provisions has not been successfully demonstrated to the satisfaction of the End user, the End user shall reserve the right to continue testing or reject the entire **SYSTEM** for a maximum of two, additional Acceptance Performance Tests (APT's). If the **SYSTEM** does not pass the first, scheduled APT or such additional APT as the End user may authorize under this provision, the End user will reject the **SYSTEM** and the Contractor shall replace the **SYSTEM** with one that meets the End users requirements at no additional cost to the End user.

Vehicle Suitability

1. Gross static weight must be a minimum of 80% of GVC (gross vehicle capacity) or 64,000-lb.
2. Liquid tankers, livestock, and car haulers.
3. Vehicles traveling less than 5 mph or more than 30 mph will be excluded.
5. Must be as classified as a class nine vehicle.

GENERAL PROVISIONS WEIGH IN MOTION

- 1.0 The intent of the following provisions is to ensure the WIM system is manufactured to documented quality standards. This is important because the system is subject to highway traffic. Also, these provisions ensure the system will meet documented accuracy requirements for maximum performance, and be supported by local service technicians to minimize down time.
 - 1.1. The scale manufacturer shall have local service.
 - 1.2. The design and manufacture of the WIM scales, load cells, and associated controls shall be of one manufacture to maximize compatibility. This manufacturer shall have a quality system that has been registered to the standards of ISO9001.
 - 1.3. All Welding performed during fabrication of WIM scale platforms and frames must be performed by welders with current AWS D1.1 certification.
 - 1.4. The manufacturer shall provide with the bid proposal a listing of major spare parts and corresponding prices.
 - 1.5. The system shall be a Mettler Toledo type or approved equal.
 - 1.6. The system shall meet ASTM type III or type 1 functional performance requirements, assuming the pavement before and after WIM scales meets ASTM E1318-94 sections 6.1.2, 6.1.3, and 6.1.5 requirements

WIM Scales Foundation Requirements

- 2.0 The intent of this section is to ensure the scales maintain elevation and will not settle over time. Changes in elevation or settling of the scales cause inaccuracy in weighing.
 - 2.1 The WIM scales shall have a foundation to support and maintain the scale's elevation.
 - 2.2 The foundation shall meet local requirements and the minimum specifications stated in the section.
 - 2.3 The minimum soil bearing required shall be 1,500 pounds per square foot. The contractor shall be responsible for determining whether or not the soil conditions are adequate.
 - 2.4 The foundation shall be 164-in. wide, 95-in. long, and 10 in. thick.
 - 2.5 The foundation shall be poured and constructed of Portland concrete with a minimum strength of 3,500 PSI.
 - 2.6 The foundation shall be reinforced per manufactures guidelines.
 - 2.7 The foundation shall be constructed to provide adequate drainage.

WIM Scales

- 3.0 The intent of this section is to ensure the WIM scales accurately weigh and measure vehicles at highway speeds, and are field repairable. The following described WIM scales accurately weigh the left and right wheels independently and determine speed, axle spacing, and off scale conditions without the use of other maintenance intensive sensors (axle sensors). These scales are field repairable, because of this and the elimination of axle sensors, maintenance and repairs are accomplished with minimal lane closure time.
- 3.1 The WIM scale consists of two platforms that weigh the left and right wheels independently. The weighing surface of the platforms will measure 6 ft. wide and 30 in. long in the direction of travel, so that together the two platforms will cover a 12-ft. wide lane.
 - 3.2 Each WIM scale platform shall be supported by four (4) bolts on shear beam load cells for quick replacement.
 - 3.3 Each WIM scale platform shall be mounted in separate frames no more than 12 in. deep.
 - 3.4 The platforms are to be installed flush with the road surface and must be able to withstand heavy truck traffic and normal road maintenance devices such as sweepers and snow plows.
 - 3.5 The WIM scales shall be installed in a staggered configuration so that the scales can determine speed and axle spacing without the use of other in road devices.
 - 3.6 The WIM scales staggered configuration and system software shall determine off scale situations without the use of other in road devices.
 - 3.7 The WIM scales shall be capable of weighing a 50,000-pound single axle, and have a minimum of 150% overload capacity.
 - 3.8 Each WIM scale shall have a static weighing accuracy of 1% or better as demonstrated by applying certified test weights in three places on each platform (The center and each side). Furthermore, the linearity of the indicated weight must not deviate by more than 1% from the actual weight as test weights are added or removed over the full range of the scales rated weighing capacity.
 - 3.9 Each WIM scale platform shall be designed to handle speeds up to 90 miles per hour.
 - 3.10 The WIM scales shall be field repairable on site.
 - 3.11 Repair or replacement of any load cell shall be accomplished with no more than a 1-hour lane closure. The WIM scales shall not require calibration after replacing a loadcell.

WIM Scale Platforms and Frames Surface Preparation and Finish

4.0 The intent of this section is to ensure that metal surfaces are prepared properly before painting. The steel preparation and paint procedure can minimize maintenance and provide protection against corrosion.

4.1 Surface Preparation

- 4.1.1 Before abrasive blasting, clean per SSPC-SP1
- 4.1.2 The weldment shall be abrasive blasted with a nine-wheel horizontal wheelabrator descaler per SSPC A SP-10 (near white blast)
- 4.1.3 Travel rate to be 10 ft./min +/- 1 ft./min
- 4.1.4 Abrasive material to be steel grit / shot combination
- 4.1.5 Blat profile to be 1.5 to 2.5 Mils.

4.2 Coating Specification

- 4.2.1 Direct to metal Carboline 890 (Cycloalaphaticamine Epoxy)
- 4.2.2 Color,, State Gray # 1753
- 4.2.3 75% +/- 2% solids by volume minimum
- 4.2.4 Must be suitable for salt solution immersion
- 4.2.5 Temperature resistance to be 200 degrees F continuos
- 4.2.6 Must meet VDC level of 2.0 Lbs/Gal maximum as applied
- 4.2.7 Shall be lead and chromate free
- 4.2.8 Can not contain any substance defined as carcinogenic by the U.S. EPA

4.3 Coating Application Procedure

- 4.3.1 Perform spray applied stripe coat on all edges and other irregular surfaces
- 4.3.2 Spray apply specified coating with 50% overlap for first coat
- 4.3.3 Spray apply second coat with 50% overlap at right angles to first coat
- 4.3.4 Interval between coats to be as specified by coating manufacturer for ambient conditions present
- 4.3.5 Wet millage to be verified and documented at 10 - 12 Mils minimum.

4.4 Curing

- 4.4.1 Each coat to be force cured at 220 degrees F for a minimum of 15 minutes.
- 4.4.2 Coating must cure to 6 - 8 Mils DFT minimum.

WIM Scale Loadcell Specifications

5.0 The intent of this section ensures the WIM load cell is designed to handle the repetitive cycles and extreme weather conditions. The load cells shall be manufactured to tight tolerances to ensure repeatability, accuracy, and serviceability of the WIM scale. Because each load cell is bolted to the platform, and manufactured to the following specifications the load cells are interchangeable to the point that re-calibration is not required. This makes replacement quick, simple, and less costly.

5.1 Each load cell shall have a minimum capacity of 16,000 pounds

5.2 Each load cell shall be of shear beam design with strain gauges

5.3 Each load cell shall be of stainless steel construction

5.4 Each load cell shall be hermetically sealed

5.5 Each load cell shall have temperature compensation inherent in the load cell design

5.6 The load cell specifications

5.6.1 Overload 150% FS (full scale) safe, 300% FS ultimate

5.6.2 Repeatability +/- 0.01% FS

5.6.3 Non-Linearity +/- 0.07% FS

5.6.4 Hysteresis +/- 0.15% FS

5.6.5 Creep 20 sec. - 1 hour(*) +/-0.05% FS

5.6.6 Safe side load +/-100%FS

5.6.7 Span Temp. Coeff 100ppm/deg C

5.6.8 Zero Temp. Coeff 300ppm/deg C

(*) Loading and unloading time not to exceed 60 sec. Each

5.7 The manufacturing tolerance of the load cells must allow them to be interchangeable to the point that no calibration is required after replacing a load cell.

5.8 Each load cell shall have an integral cable with a stainless steel outer shield. This cable shall be of sufficient length to reach the WIM Controller without intermediate connections. No junction boxes shall be placed in the WIM scale pit or below grade.

Roadside WIM Cabinet

6.0 The intent of this section is to ensure the Roadside WIM Cabinet is designed and constructed according to the specifications below.

6.1 Shall be constructed in a standard outdoor traffic control cabinet

6.2 Shall be capable of supporting an interface for AVI equipment

6.3 Shall receive cables from the WeighBridges, loops, traffic signal, Camera(s), and transmit data to the WIM Terminal through standard serial or wireless.

6.4 A suitable concrete pad, shall be installed which will be large enough to support the WIM Controller and provide standing area for maintenance personnel

- 6.5 Shall include a module for terminating all in-road items (scales, loops, camera(s), etc.) and provide necessary communication to WIM Terminal
- 6.6 Shall include power supply, convenience outlet with light, and surge protection for both lightning and electric.
- 6.7 This controller or other equipment in this system shall not require a UPS for adequate operation

WIM Terminal

- 7.0 Shall be a Pentium microprocessor based industrial computer
- 7.1 Shall be 100 percent IBM compatible, acceptable brands are Comark or Industrial computer source
- 7.2 The minimum acceptable configuration shall include
 - 7.2.1 Pentium microprocessor rated at a minimum of 450 MHz
 - 7.2.2 Minimum of 32 Mbytes RAM
 - 7.2.3 Minimum of 5 GB hard drive
 - 7.2.4 (3.5") 1.44 MB high-density diskette drive.
 - 7.2.5 Minimum of five full-sized ISA slots.
 - 7.2.6 Parallel interface for connection to the printer.
 - 7.2.7 Minimum 17" SVGA monitor.
 - 7.2.8 101 key enhanced keyboard.
 - 7.2.9 Real-time clock/calendar with battery backup.
 - 7.2.10 Power supply as required by system configuration
 - 7.2.11 Interface to digital outputs.
 - 7.2.12 High-speed analog to digital converter.
 - 7.2.13 System password protected lock for user access restriction.
 - 7.2.14 PC shall be Y2K compliant
 - 7.2.15 Computer shall contain software that allows the user to dial up and operate remotely.
 - 7.2.16 Copy of original software used in system shall be provided to user.

Lightning Protection

- 8.0 A comprehensive lightning protection system shall be provided with the system and covered by warranty
- 8.1 The system including WIM load cells, WIM scales, Roadside WIM cabinet, and WIM terminal shall be covered by the lightning protection system.

System Warranty

- 9.0 The manufacturer shall warrant the system including all load cells, WIM controller, camera(s) for a period of two years from the date of acceptance from failures due to a defect in manufacturing, workmanship, lightning, or surge voltages.
- 9.1 The written warranty must be acceptable and approved by the user prior to the execution of the construction contract.

- 9.2 The manufacturer shall bear the charges and expenses associated with replacement parts, equipment, (excluding remote laptops) and any associated freight or handling expenses incurred in the repair or replacement of the system due to failed or damaged items under warranty.
- 9.3 This warranty excludes damage caused by flooding, accidents, vandalism or natural disasters. The manufacturer shall commence to provide such warranty service within 24 hours of notice that warranty work is required.