

**METTLER TOLEDO
WEIGH-IN-MOTION
WEIGH STATION**

**WEIGH-IN-MOTION
(WIM)/STATIC SCALE TRUCK WEIGHT
ENFORCEMENT SYSTEM**

PART 1 - GENERAL

1.1 SUMMARY

- A. This section consists of manufacturing, furnishing, installing, burn-in, and testing a Weigh In Motion (WIM)/Static Scale truck weight enforcement system, hereinafter referred to as SYSTEM, and its accessories and appurtenances.
- B. A SYSTEM to be manufactured, furnished, installed, burn-in, and tested at each Weigh-in-Motion facility as per Contract.
- C. This Technical Special Provision is written for the requirements of one bound (direction). If there are two bounds required in Contract; the Contractor shall provide double of what is stated herein.

1.2 REFERENCES

- A. Applicable Documents
 - 1. Contract Drawings
 - 2. Contract Provisions
- B. Applicable Standards
 - 1. National Institute of Standards and Technology (NIST)
 - a. Handbook 44
 - 2. National Fire Protection Association (NFPA)
 - a. 70 - National Electric Code (NEC)
 - 3. National Electrical Manufacturers Association (NEMA)
 - 4. American Welding Society (AWS)
 - a. D1.5 - Bridge Welding Code
 - 5. Society for Protective Coating (SSPC) Surface Preparation Specifications
 - a. SP 1- Solvent Cleaning: Removal of oil, grease, soil, drawing and cutting compounds, and other soluble contaminants
 - b. SP 6 - Commercial Blast Cleaning

- c. SP 10 - Near-White Blast Cleaning
- 6. American Society of Testing and Materials (ASTM)
 - a. E1318 - 02 - Standard Specification for Highway Weigh-in-Motion (WIM) Systems with User Requirements and Test Methods
 - b. A36 – Structural Steel
 - c. A53 – Black and Hot-Dipped, Zinc Coated, Welded and Seamless
 - d. A123 - Galvanizing
- 7. Current State Standard Specifications

1.3 SYSTEM DESCRIPTION

- A. The objective of the Department is to have a fully operative SYSTEM which shall accurately and automatically pre-select vehicles while in motion, for enforcement weighing and automatically direct the selected vehicles to the enforcement static scales, as set forth in the construction documents.
- B. The SYSTEM is setup so that compliant trucks can pass through with a minimum delay. If a compliant vehicle proceeds to the static scale lane, the SYSTEM shall track and process with potential violators.
- C. The SYSTEM shall automatically provide the following
 - 1. Sort potential violators to the static scale for legal static weighing and/or enforcement
 - a. Potential violators are trucks in violation of any of the following
 - (1) Weight
 - (a) Axle
 - (b) Gross
 - (c) Tandem
 - (d) Bridge formula
 - (2) Exceeding 13'-10" height requirements
 - (3) Exceeding stations posted speed limit
 - (3) Off the WIM scale
 - (5) Over dimension

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- (a) Overall length (75')
 - (b) King pin (rear bridge 46')
 - (6) Random
 - (7) Imbalance
 - (a) Side to side
 - (b) Axle to axle within a tandem axle group
 - (8) Specialized vehicles based on classification
 - b. Compliant trucks not violating any of the preceding
2. SYSTEM shall automatically determine static scale violations.
- a. Axle
 - b. Axle group
 - c. Gross
 - d. Inner bridge
 - (1) Front
 - (2) Rear
3. SYSTEM shall automatically release (all classifications) compliant vehicles from the static scales.
4. Sort up to 15,000 trucks in a 24-hour period
5. Divide commercial vehicles into potential violators or compliant vehicles
6. SYSTEM shall detect the following
- a. WIM weight
 - (1) Wheel
 - (2) Axle
 - (3) Axle groups
 - (4) Gross
 - b. WIM axle spacing

- (1) Axle to axle
- (2) Inner bridge
 - (a) Front
 - (b) Rear
- (3) Overall
- c. WIM axle imbalance
 - (1) Side to side
 - (2) Axle to axle within tandem axle group
- d. Speed
- e. Off WIM scale
- f. Over-Height
- g. Static weight violation
 - (1) Axle
 - (2) Axle group
 - (3) Gross
 - (4) Inner bridge
 - (a) Front
 - (b) Rear
- h. Potential violators in bypass
 - (1) The errant vehicle is tracked in the bypass lane by a system of loop detectors.
 - (2) A stop condition occurs when the truck taking the inappropriate lane approaches the bypass lane CMS signal.
 - (3) The truck is stopped in the by-pass lane by a CMS signal at the weigh station control building. Then, operator instructs the driver via intercom or CMS signal to pull around and proceed to static scale.

- D. The SYSTEM shall allow the following operator control
 - 1. Accumulation of axle on over length vehicle (up to 19 axles)
 - 2. Ability to manually override the SYSTEM and direct
 - a. Individual trucks into the static scale lane
 - b. Select trucks for reporting to the static scale by
 - (1) Programmed weight
 - (2) Programmed axle spacing
 - (3) Random
 - 3. Manual switch or control of the directional signals, traffic lights, and CMS signals

- E. Work for a complete SYSTEM includes, the following package components and accessories constructed as shown on the plans and as described in this Technical Special Provision
 - 1. WIM Subsystem
 - a. Weigh bridges and frames
 - b. Load cells
 - c. Field unit
 - d. Logic controller
 - e. WIM computer
 - f. WIM software
 - g. Printer
 - h. Over-height detector
 - i. Off Scale Sensor
 - 2. Static Scale Subsystem
 - a. Static scale
 - b. Load cells
 - c. Instrument (digital display)

- d. Static scale computer
 - e. Static scale software
 - f. Printer(s)
 - g. Static scale pit
 - h. Approach slabs
 - i. Sump pumps
 - j. Pit lighting and receptacles
 - k. Surge voltage protection
- 3. Overhead lane control signal (Red X and Green arrows)
 - 4. Traffic signals
 - (1) Two section Red/Green traffic lights
 - (2) One section Yellow Wigwag light
 - 5. Changeable Message Signs (CMS)
 - 6. Open/Closed sign (CMS)
 - 7. Loops
 - 8. Fax machine (optional)
 - 9. Photocopy machine (optional)

F. WIM Subsystem

- 1. The WIM computer shall determine whether the truck is a potential violator or compliant vehicle and direct the vehicle which direction to proceed by the overhead signals.
 - a. All over length and over height vehicles shall be directed to static scale.
- 2. The WIM subsystem shall include a function that automatically resets loop queues.
- 3. WIM Subsystem shall determine
 - a. Weight
 - (1) Gross

- (2) Individual axle
 - (3) Individual wheel
 - (4) Tandems
 - (5) Tri-Axle
 - (6) Bridge
 - (a) Front
 - (b) Rear
 - b. Axle imbalance percent difference side to side
 - c. Axle imbalance percent difference axle to axle within tandem axle group
 - d. Speed
 - e. Axle spacing
 - f. Off WIM scales
 - g. Classification of vehicle
 - h. Violation
 - i. Over height
- G. Static scale subsystem shall determine
- 1. Static weights for
 - a. Steer Axle
 - b. Drive Axle(s)
 - c. Trailer Axle(s)
 - d. Gross
 - e. Inner Bridge
 - (1) Front
 - (2) Rear

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2. Determine location of steering axle on platform one to within 2" of the actual
 3. Automatically determine if vehicles are in compliance to State's weight limits including bridge formula
 - a. Front based on axle spacing and weight
 - b. Rear based on axle spacing and weight
 4. Automatically determine if all axles are properly position on static scale, if not alert operator by visual and audio alarms
 5. Determine if vehicle is violator and if so, alert operator by visual and audio alarms, and if not a violator auto release all vehicle classifications
 6. Automatically determine the number of axle(s) on each platform
 7. Record and store static and WIM shift counts
 8. Auto-calibrate the WIM scales
 9. Shall have the capability to perform USDOT number search and if match is found in database alert operator. Database provided by State.
- H. Directional signals shall
1. Direct potential violators to the static scales
 2. Direct compliant vehicles back to the interstate mainline by way of the WIM bypass lane
- I. Traffic signals
1. Red & Green shall sequence vehicles on static scale
 2. Yellow wigwag traffic signal shall alert vehicles of a stop condition in the bypass lane
- J. Changeable Message Signs (CMS) shall
1. Inform the vehicle which is positioned on static scale
 - a. Stop
 - b. Exit
 - c. Pull forward
 - d. Back up

- e. Park
- 2. Inform and stop potential violators in the bypass lane
 - a. Stop
 - b. Exit
 - c. Park
- K. Open/Closed (CMS) shall inform mainline commercial vehicles whether the weigh station is opened or closed.
- L. Loops shall
 - 1. Determine back ups in the static scale lane and direct vehicles to bypass lane
 - 2. Determine back ups in the deceleration lane and close weigh station
 - 3. Determine back ups in the bypass lane and close weigh station
 - 4. Determine potential violators in bypass lane
 - a. If the vehicle misses direction, a set of loops just after the nose of the painted gore area tells the SYSTEM operator a vehicle has entered the wrong lane.
 - 5. Reset signals
 - 6. Track vehicle location within weigh station
- M. Fax machine shall be used for administration purposes (optional)
- N. Copy machine shall be used for administration purposes (optional)
- O. Contractor shall provide provisions for routing audio cable for Public Address (PA) speakers at the static scales and bypass lane.

1.4 SIGNS

- A. A "STOP" sign shall be located at the exit end of each static scale. A white painted stop bar shall be painted on the scale or approach, but shall be in line with this "STOP" sign.
- B. A "PERPARE TO STOP" sign shall be located in the bypass lane. The yellow wigwag traffic signal shall be mounted to the top of this sign.
- C. Refer to plans for locations and other sign details

1.5 QUALITY ASSURANCE

- A. Codes and Standards comply with state and federal governing regulations if more stringent than specified herein
- B. SYSTEM vendor must adhere to all sections of this Technical Special Provision in order to meet State requirements, and to ensure the quality of the SYSTEM

1.6 SUBMITTALS

- A. The Contractor shall furnish documentation which demonstrates to the satisfaction of the Engineer that the WIM scale, Static scales, subsystems, and software proposed for use in the SYSTEM is the product of a single (the same) manufacturer and is a complete SYSTEM.
- B. The SYSTEM must be manufactured in the United States and be in use in the United States under conditions similar to those for the intended law enforcement application.
- C. The SYSTEM manufacturer shall demonstrate and submit a SYSTEM successfully installed in the United States that is fully operative, is in use and is meeting the weighing performance requirements of this Technical Special Provision for a minimum of two years.
- D. Prior to the pre-construction conference, the Contractor and the Engineer shall arrange the following
 - 1. The Contractor shall furnish electronically collected accuracy performance data from the pre-existing system to the Engineer. This data shall be in a common database and include WIM records (axle and gross) and static (platforms and gross) weights that have been electronically collected (manually entered data will not be accepted). This report shall contain at least 20,000 vehicle records.
 - 2. The Contractor shall arrange for the demonstration of a pre-existing SYSTEM to the Engineer at least two weeks prior to the pre-construction conference.
 - 3. The Engineer may, at its option and expense, make provision for selected persons to view the demonstration
- E. At the pre-construction conference, the Contractor will furnish
 - 1. The Engineer with written documentation and information of the WIM and static scales
 - a. Manufacturer's name
 - b. Model number, supported by descriptive material for, but not limited to, the standard package system
 - c. All accessories identified

2. Submittals shall be supported by descriptive material such as
 - a. Catalogs
 - b. Cuts
 - c. Diagrams
 - d. Performance curves
 - e. Charts
 - f. Other data published by the manufacturer, to demonstrate to the Engineer the Contractor's intent to comply with the Technical Special Provisions and plan requirements
3. Name a minimum of 10 weigh stations and provide the owner's name, address, person to contact and telephone number of similar enforcement installations in the United States

F. SYSTEM manufacturer shall submit the following

1. Equipment drawings
2. General arrangements
3. Foundation requirements
4. Circuit diagrams
5. Field wiring diagrams
6. Instruction manuals
7. Bill of Materials
8. Spare parts list
9. Samples
10. Manufacturer's product data
11. Certified test reports
12. Material certifications

G. The Contractor shall submit the following equipment documentation for acceptance prior to fabrication

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1. Detailed description of how the SYSTEM requirements are met, including a step- by-step description of how the SYSTEM would function in processing each of the following violations as well as the compliant scenario
 - a. Over weight
 - b. Over height
 - c. Off scale
 - d. Over speed
 - e. Manual override of the system for truck selection either programmed or random
 - f. Compliant
 - g. Over length
 - h. King Pin Violator
 - i. Back parking lot/inspection traffic
 - j. Imbalance
 - (1) Side to side
 - (2) Axle to axle within a tandem
 2. Inductive loops, according to the contract documents
- H. Contractors shall submit six complete sets of full size drawings
1. Showing all field wiring, conduits, pull boxes, transformers, and other pertinent data required to make a complete installation
 2. Drawings are to be approved by the Engineer prior to fabrication
 3. After approval, one complete set of Mylar reproducible is to be submitted certified for construction
- I. The Contractor shall
1. Design all overhead structures and foundation supports
 2. Submit shop drawings along with the supporting calculations to the Engineer for review and approval
 3. Obtain a professional engineer registered in the State to document, sign and seal all structural drawings

- J. Two weeks prior to the acceptance performance test (as described in this section PART 3.5), the Contractor shall supply the following to the Engineer for the maintenance of the SYSTEM
1. Narrative description of system operation in detail
 2. Narrative technical description of the following
 - a. Major system component interaction
 - b. Subsystem component interaction
 3. Drawings
 - a. Major system component operation/interconnection
 - b. Internal Printed Circuit Board (PCB) operation detailing what electronic function and process is being performed on that board
 4. Schematics shall reveal diagrams related to troubleshooting/maintenance including
 - a. Input and output voltage levels on WIM related PCBs
 - b. Voltage test points at various stages on the WIM process
 - c. Data sheets on any specialized proprietary Integrated Circuits (IC's) or boards in the SYSTEM
 - d. Jumper and switch settings on all PCB's for normal operation
 - e. As-built drawings shall show type and location of all conduits, pull boxes, junction boxes, loops, traffic signs, directional signals and PA speakers
 5. Technical documentation on all accessories used in the system (open/close sign, directional signals, over-height detectors, prepare to stop sign, CMS, fax machine, copier)
 6. Training and training materials
 - a. List any preventative maintenance needed on the entire system
 - b. Provide schedule for the list of any preventative maintenance
 - c. The Department personnel as defined by the Engineer shall receive a minimum of (40-hours) of technical training for SYSTEM maintenance by SYSTEM manufacturer
 - d. The training shall consist of

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- (1) Two eight-hour days for the maintenance of the static scale subsystem
 - (2) Two eight-hour days for the WIM scale subsystem
 - (3) One eight-hour day for the WIM to static interface
 - (4) Training to include on site and classroom sessions
 - (5) Training shall cover the above mentioned documentation in line-by-line detail
 - (6) Scale manufacturer shall videotape any on site and classroom training sessions for viewing by future maintenance personnel.
- e. During the burn-in period, refer to Part 3.4 of this section; operators shall receive eighteen hours of training. Two hours each shift over a three day period.
7. Contractor shall provide names and phone numbers of contacts that user may contact for technical help.
 8. Contractor shall provide name and phone number of manufacturer for every replacement part in system.
- K. Acceptance of bid or approval of shop drawings by the Engineer does not relieve the Contractor of the responsibility or the necessity of furnishing material and/or performing work as required by the plans and this Technical Special Provision, nor from the requirements of the Acceptance Performance Test as contained within this Technical Special Provision.
- L. The equipment approved by the Engineer shall be provided and installed according to the plans and this Technical Special Provision. Should the equipment proposed by the Contractor become unavailable, the Engineer may approve in writing alternate equipment proposed by the Contractor due to the unavailability of the originally specified equipment.
- M. Warranty
1. SYSTEM manufacturer shall warrant the SYSTEM's equipment in writing against defective material, lightning, and workmanship.
 2. SYSTEM manufacturer shall warrant the SYSTEM to perform as required by these Technical Special Provisions, giving proper and continuous service under all conditions required and specified.
 3. SYSTEM manufacturer's warranty shall be for a period of five years, but not less than the manufacturer's standard warranty for the products from the date of final acceptance of the project and at which time shall transfer to the Department.

- a. SYSTEM manufacturer's routine maintenance procedure must be performed by the manufactures authorized local service provider and shall be paid for under a separate contract
 - b. Contractor shall furnish the written manufacturer's warranty to the Engineer at the time that the equipment performance supporting data is submitted
 - c. The warranties shall state that they are subject to transfer to the Department
4. The SYSTEM manufacturer's written warranty must be acceptable and approved by the Engineer 30 calendar days prior to the anticipated installation of the warranty's subject

1.7 FAILURE OR DELAY IN COMPLETING WORK

- A. Acceptance Performance Test (APT)
1. Department shall suspend Contract time during each scheduled APT.
 2. Contract time shall resume after each APT rejection or acceptance by the Department.
 3. Department shall withhold final acceptance of the project until after the successful completion and acceptance of the APT.
- B. Contractor is allowed three APT to meet the SYSTEM performance requirements as per this Technical Special Provision.
- C. Department reserves the right to continue testing or reject the entire SYSTEM after the third allowable APT.
1. If the SYSTEM is rejected and there have been more than three strikes and re-starts of the APT, the parties will negotiate, in good faith, an acceptable resolution. Following such negotiations, if the same are unsuccessful, the Department may execute the performance bond. Notwithstanding the foregoing, the Contractor will retain/be entitled to receive all amounts paid or payable to the Contractor in accordance with the following payment schedule, agreed-to by the parties:

1.8 PAYMENT

- A. Each SYSTEM will be paid separate as lump sum price
- B. The lump sum compensation includes
1. Materials

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2. Equipment
 3. Labor
 4. Excavation
 5. Tools
 6. Superintendence
 7. Incidentals
 8. Miscellaneous work necessary to complete the SYSTEM
 9. Calibration and testing
 10. Acceptance Performance Testing
 11. Five year warranty
 12. Department personnel training
 13. Traffic control system
 14. Over height detectors
 15. Software
 16. Electrical power supply to all component parts of the SYSTEM
 17. All other items noted within this section
- C. Partial Payments will be made under the basis of the following cost schedule expressed as a percentage of the contract SYSTEM price
- | | |
|--|-----|
| 1. Payment upon safe and secure delivery of all equipment at a storage location approved by the Engineer | 65% |
| 2. Complete installation of the entire SYSTEM | 20% |
| 3. Completion of calibration and burn-in | 5% |
| 4. Completion of the APT | 10% |

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Mettler-Toledo, Inc.

2.2 GENERAL

- A. All materials and equipment shall conform to the plans and this Technical Special Provision.
- B. The SYSTEM manufacturer shall be responsible to the Contractor for meeting all requirements of the SYSTEM.

2.3 WIM SUBSYSTEM

- A. Provide a dynamic weighing and screening system designed to meet all requirements of this Technical Special Provision.
 - 1. Determine possible violators from compliant vehicles
 - 2. Direct possible violators to static scales
- B. The dynamic weighing and screening subsystem shall
 - 1. Have the necessary components for the in motion weighing of trucks
 - 2. Determine if any vehicle exceeds state weight, axle spacing, or over height limits
 - 3. Control overhead signal to direct all over weight, over height, and over dimensional trucks to the static scale for confirmation
 - 4. Direct all compliant vehicles to return to the highway without stopping.
 - 5. Operate accurately at vehicle speeds between 5 to 85 miles per hour
 - 6. Accept individual axle weights up to 50,000 pounds
 - 7. Be capable of accommodating trucks with up to 19 axles
 - 8. Measure speed
 - 9. Indicate over speed violations
 - 10. Indicate off-scale occurrences
 - 11. Indicate king pin violators
 - 12. Indicate imbalances

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- a. Side to side
 - b. Axle to axle within a tandem group
- C. The dynamic weighing subsystem for one direction of traffic shall consist of the following items

| ITEM | QTY. |
|---|-------------------|
| 1. Set of weigh bridges | 1 |
| 2. Off-scale sensors | 2 |
| 3. Support software | 1 |
| 4. Field unit (roadside enclosure) | 1 |
| 5. Logic controller (manual operator enclosure) | 1 |
| 6. Control unit (computer) and software | 1 |
| 7. Printer | 1 |
| 8. Minimum number of Inductive loops | Site Dependant |

- a. SYSTEM manufacturer shall determine size, location, and number of turns in inductive loops for accurate tracking of vehicles.
- D. Weigh bridges and frames
- 1. Locate in the truck exit lane from the interstate
 - 2. Sense the weight of each axle of the truck as it moves in motion over the weigh bridges
 - 3. Determine vehicle speed and axle spacing without the need of other in road devices
 - 4. Sense, with the system software, any axles that fail to go fully over the weigh bridges without the need of other in road devices
 - 5. Provide one weigh bridge per wheel path (i.e., two weigh bridges installed to cover a 12-foot lane)
 - 6. Each is approximately 6 feet wide and 30 inches long (direction of travel)
 - 7. Each has a weighing capacity of 50,000 pounds (single axle) with a 150 percent overload capacity

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8. Design to handle shock loads up to 85 miles per hour
 9. Each is waterproof and coated with a material to resist corrosion
 10. Prepare and galvanize metal to ensure corrosion protection
 - a. Hot dipped galvanize
 - (1) ASTM A123
 11. Each has a static weighing accuracy of 1% or better as demonstrated by apply certified test weights in three places on each platform - each side and center
 - a. 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
 12. Replacement of any load cell shall be accomplished within one (1) hour after certified technician arrives on site.
 13. The WIM scale shall not require calibration after replacement of a load cell.
 14. The design and manufacture of the weigh bridges and load cells shall be of one manufacturer to maximize compatibility.
 15. The manufacture shall have a quality system registered to the standards of ISO 9001.
 16. All welding performed during fabrication must be performed by welders with a current AWS D1.1 certification.
 17. WIM accuracy on all vehicles loaded above 60,000 pounds and traveling between the speeds of 5 to 85 miles per hour shall be as follows
 - a. Axle weights $\pm 10\%$ (95% of trucks)
 - b. Tandem weights $\pm 5\%$ (95% of trucks)
 - c. Gross weights $\pm 4\%$ (95% of trucks)
 - d. Axle spacing ± 6 inches or 5% (68% of axles), whichever is greater
- E. Load Cells
1. Constructed of 17-4 stainless steel construction
 2. Hermetically sealed NEMA 6P IP 67 rated

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3. Have temperature compensation inherent in the load cell design
4. Span temperature coefficient of 100 PPM/degrees Celsius
5. Zero temperature coefficient of 300 PPM/degrees Celsius
6. Loading and unloading time not to exceed 60 seconds each
7. Provide lightning and surge protection

F. Field Unit

1. Shall communicate with the weigh bridges, inductive loops, over height detectors, off scale sensors and control unit
2. Place at least 15 feet from the truck lane, but no more than 80 feet from the weigh bridges
3. Construct in a standard outdoor traffic control cabinet
4. Made capable of supporting an interface for AVI equipment
5. Receive cables from the weigh bridges, loops, off-scale sensors and transmit data to the WIM computer through stainless steel braided serial cable
6. Install on a suitable concrete pad large enough to provide standing area for maintenance staff.
7. Include a module for terminating all in-road items (scales, loops, off scale detectors, over height) and provide necessary communication to WIM computer
 - a. The cabinet shall include power supply, convenience outlet with light, and lightning/electric surge protection.
8. Have the capability of sampling the outputs from the weigh bridges, loops, and off scale detectors over the full range of operating speeds and accurately determine the axle weights and axle spacing
9. Shall provide ground buss for cables and lightning equipment

G. Logic Controller

1. Construct in a metal slope front Nema XII enclosure
2. Include a graphical representation of the weigh station layout with lights to indicate the function of vehicle tracking devices and the status of all signals

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3. Allow for a true manual control of all signals
4. Provide separate devices to audibly and visually alert operator of high water condition in each pit
4. Place a red beacon on the front of the logic controller with an electronic alarm adjustable noise level
 - a. Initial set at 50 db
5. Provide provisions for silencing alarm audible tone while still leaving beacon on red until high water condition is corrected

H. WIM Computer

1. The WIM computer shall be a Pentium microprocessor based computer with Windows XP operating system
2. Acceptable Manufacture
 - a. Dell
 - b. Industrial computer source or approved by Engineer
3. The minimum acceptable configuration shall include
 - a. Microprocessor rated at a minimum of 2.4 GHZ
 - b. Minimum of 512 MB RAM
 - c. Minimum of 80 GB hard drive
 - d. Minimum of 48X CD drive
 - e. 88.9 millimeters 1.44 MB high-density diskette drive
 - f. Minimum of three PC1 and one AGP slots
 - g. Parallel interface for connection to the printer
 - h. 21-inch SVGA 26dp monitor with non-glare screen
 - i. 101 key enhanced keyboard
 - j. Real-time clock/calendar with battery backup
 - k. Power supply as required by system configuration
 - l. System utilities and diagnostic software
 - m. Interface to the WIM electronics enclosure

- n. Interface to digital outputs
- o. High-speed analog to digital converter
- p. Surge protection
- q. Internal modem card compatible with V.32 standards (56k full duplex) or greater
- r. System password protected lock for user access restriction
- s. All access ports, cables and accessories to provide a working system
- t. WIM system computers shall contain diagnostic software to analyze the condition of the weighing and sorting process at various stages of development such as
 - (1) Raw load cell data at output of load cells (analog or digital representation at WIM)
 - (2) Loop closures
 - (3) The ability to simulate automatic computer control of overhead lighting, traffic signals, and loop inputs, etc. from scale house computer

I. WIM Software

- 1. SYSTEM manufacturer is to provide all software necessary for complete and efficient operation of the weigh-in-motion/static weight enforcement scale systems.
- 2. The software must be supplied with the report formats
- 3. Report formats must be supplied as an integral part of the SYSTEM
- 4. Allows the user to dial up and perform diagnostics
- 5. The WIM software must provide the following features
 - a. Perform Multi-lane WIM operation
 - b. Weigh all vehicles entering the weigh station
 - c. Classify all vehicles entering the weigh station
 - d. Perform weight compliance analysis on vehicles in accordance with State regulations

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- e. Insert sequence numbers for vehicle records and tracking purposes
- f. Perform data collection, data storage, file management and report generation functions for collected vehicle information
- g. Direct trucks to the static scale for enforcement weighing if truck exceeds any of the following parameters
 - (1) Gross
 - (2) Axle
 - (3) Tandem
 - (4) Inner bridge weights
 - (a) Front
 - (b) Rear
 - (5) Height
 - (6) Speed
 - (7) Over length
 - (8) Over bridge rear length (king pin)
 - (9) Random
 - (10) Imbalance
 - (a) Side to side
 - (b) Axle to axle within tandem.
- 6. Generate data for the operator display terminals
- 7. Direct non-violators to the bypass lane as determined by design
- 8. Detect and identify violators that have entered the bypass lane
- 9. All vehicle information, including violation information, will be determined in real time and shall be displayed on the scale house display as follows
 - a. Violator's WIM data shall be displayed on static scale computer when vehicle is on static scale
 - b. Compliant vehicles WIM data will be displayed on WIM monitor as vehicle proceeds through bypass lane

10. The system will function under manual or automatic control
 - a. Under automatic control, the compliance system will automatically direct a suspected violator to the static weigh scales and compliant vehicle to the by-pass lane
 - b. In manual mode, directional signals can only be operated or changed by the scale house operator
11. Operate under Windows XP Operating System
12. The Operating System, together with application programs, must support interrupts, context switching, foreground and background programs execution, color graphic and window-based applications.
13. The system shall consist of a computer, color monitor, keyboard, mouse, and interface electronics.
14. The interface electronics shall be a self-contained unit complete with power supply, card cage, chassis assembly and I/O and communication interfaces to satisfy the requirements as specified herein this specification.
15. The system will display errors associated with vehicles missing the in-road scales (off-scale) and inductive tracking loops. Where appropriate, these error messages will be attached to the display of the vehicle record on the scale house terminal.
16. The systems calibration shall be continuously updated based on actual static scale weights.
 - a. System shall accept a minimum of 10 dynamic calibration factors based on speeds
 - b. System shall accept a minimum of 13 dynamic calibration factors based on classification of vehicle
 - c. System shall alert operator if any dynamic calibration factor changes by more than 20% from the nominal value
17. Vehicle records must be displayed on the console monitor in a format similar to the following
 - a. See Exhibit 1 at the end of this Technical Special Provision
18. Transmit WIM shift counts to static scale computer real time
19. Shall sort all over length and over height violators to static scale

- 20. Shall automatically close static scale during high water condition and re-open scale when high water is no longer present.
- 21. Print requirements includes
 - a. Printout the WIM scale axle spacing
 - b. Printout the WIM scale weights
 - (1) Individual wheel
 - (2) Axle
 - (3) Tandem
 - (4) Gross)
 - c. Printout shall indicate pounds and/or kilograms
 - d. Data printed shall match the ticket format presently in use or as selected by the user
 - e. Automatic Print Mode
 - (1) Automatically print violators in the bypass lane
 - f. Manual Print Mode
 - (1) Print only when prompted by weight inspector

J. WIM Printer

- 1. The printer shall be a commercially available laser printer
- 2. Acceptable manufacturers
 - a. Dell
 - b. HP
 - c. Approved equal

K. Over Height Detector

- 1. Provide one over height detector with a photo-eye system
- 2. Input
 - a. 120 VAC \pm 20 percent
 - b. 50/60 Hz

3. Output
 - a. Relay closure
 - b. Rate contact 10 amps, 117 VAC
 - c. Adjustable time from 5 to 30 seconds
 - d. Electronics
 - (1) Solid state
 - (2) Printed circuit boards
4. Effect of Ambient Light
 - a. Eliminated by use of infrared
 - b. Pulsed light emitting diodes and a series of 7 optically flat light traps in eye of the receiver
5. Temperature Range: 40° to 135° Fahrenheit
6. Environmental Control
 - a. Internal temperature, air flow and moisture controls allow continuous operation in fog, ice, snow, dust and heat
 - b. Provide external housing with heavy aluminum castings to minimize potential damage from vandalism
7. Housings
 - a. Made of cast and sheet aluminum
 - b. Minimum 2/16-inch thick
 - c. The pole cap is the mounting bracket and sighting base
8. One piece, seamless, 6 inches minimum diameter round aluminum tube
 - a. Handhole is centered 1.5 inches above the bottom of the shaft
 - b. Secure by stainless steel cover screws
 - c. One-piece base flange cast aluminum socket with 8-17/64 inches bolt center
 - d. No surface preparation or painting is required

- L. Off Scale Sensor
 - 1. Provide sensor to detect off scale
 - 2. Make sensor field replaceable
 - 3. Mount sensor flush to the road surface
 - 4. Couple sensor to amplifiers in the road side cabinet

2.4 STATIC SCALE SUBSYSTEM

- A. Provide multi-platform static scale designed to meet all requirements of this Technical Special Provision
- B. Require HS-20 loading structural requirements as described in the latest edition (at time of letting) of the Standard Specifications for Highway Bridges as adopted by the American Association of State Highway and Transportation Officials
- C. Multi-platform static scale is required for each station for each direction that is designed for highway use in a law enforcement application
- D. The Static scale subsystem is used when a truck is identified by the WIM as a possible violator or random selection
 - 1. The WIM record that is established by the WIM subsystem is transmitted to the static scale computer and display on the Static scale monitor when vehicle is positioned on Static scale.
 - a. This record shall include
 - (1) Speed
 - (2) Axle spacing
 - (3) Inner bridge
 - (a) Front
 - (b) Rear
 - (4) Vehicle length
 - (a) Overall
 - (b) Inner bridge (Front and Rear)
 - (5) Axles weights
 - (6) Individual wheels weights

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- (7) Tandem axle weights
- (8) Gross weight
- (9) King pin length
- (10) Imbalance
 - (a) Side to side
 - (b) Axle to axle within a tandem

E. The static scale shall have the following features

1. Scale gross capacity shall be 385,000 pounds gross (105,000 pounds for platform 1 and 2, 175,000 for platform 3)
2. Each scale consists of 3 independent weigh bridge structures
 - a. First weigh bridge is 12 feet long by 12 feet wide
 - b. Second weigh bridge is 24 feet long by 12 feet wide
 - c. Third weigh bridge is 44 feet long by 12 feet
3. Minimum of 10 inch thick concrete deck with double mat reinforced steel
4. Must be NTEP approved
5. Pit construction per approved shop drawings
6. 70,000 pounds tandem axle capacity
7. Handle trucks traveling over the scale at up to 32 miles per hour
8. Provide a fatigue life of a minimum of 20 years
9. All welding during manufacturing shall comply with AWS D1.5 certification
10. Static scale to be of the same manufacturer as the WIM scale
11. Fully electronic load cells shall be used in static scale and shall not incorporate any mechanical weighing elements, check rods, or check stays
12. The scale weigh bridge assemblies shall incorporate no bolt connections or mechanical links between the load cells and weigh bridge assemblies
13. The independent scale weigh bridge platforms shall be coupled together with fixed distance/zero moment transfer links

14. Surface Preparation and Finish
 - a. Shot blast the weigh bridges to a minimum SSPC-B-SP6 specification prior to painting
 - b. Provide a two part epoxy finish of Carboline 15L0, or equal to all exterior surfaces of the scale
 - (1) Provide a total Dry Film Thickness of 6-8 mils
15. Deck channel shall be hot dipped galvanized
 - a. ASTM A123
16. Corrugated deck plate for concrete deck
17. Manholes to access scale pits
 - a. Provide manhole with rings and covers
 - b. Provide three manholes per scale
18. The weigh bridge main girders shall be a minimum of W24 x 68 pounds
19. Each of the weigh bridges is supported by the appropriate number of load cells based on their span
 - a. Minimum fourteen 45 metric ton capacity load cells used per scale
20. Manufacturer or manufacturers authorized representative shall supervise the installation of the static scale
21. The static scale shall be a standard production type that is in use in the United States for weight enforcement.

F. Load Cells

1. Mount 14 load cells in such a manner as to be easily replaced
2. Design mountings to provide for thermal expansion and contraction of weigh bridge steel and for shock loading
3. Meet the latest adopted edition of the NIST Handbook 44 at the time of letting
4. Must be NTEP approved
5. Minimum capacity of 45 Metric tons
6. Construct of 304 stainless steel

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7. Seal hermetically with a minimum NEMA 6P submersible rating
 8. Require a certified technician maximum of 3 minutes to replace one load cell once in position at the load cell with a jack (and blocks if required)
 9. Creep (30 minutes): $\pm 0.017\%$ of applied load
 10. Temperature Range: 14 degrees Fahrenheit to 104 degrees Fahrenheit
 11. Load cell interface cables shall be stainless steel sheathed for environmental and rodent protection
 12. Provide 150 percent safe overload capability
 13. Provide 250 percent ultimate overload capability
- G. Static scale instrument (digital display)
1. Static scale indicator
 2. Microprocessor based item(s) for
 - a. Scale read out
 - b. Control and data handling functions
 3. The scale instrumentation shall be compact and approved by the Engineer.
 4. Manufacturer shall provide proof that the instruments have been in use successfully for at least two years
 5. Provide microprocessor-based digital instrument with Ethernet weight output to the static scale PC and the monitor for totalizing and printer controls
 6. This connection shall provide diagnostics of static scale load cells (load cell raw counts) to the static scale PC or a remote PC
 7. Provide with software diagnostics to facilitate fault finding
 8. Provide a certificate of conformance from the NIST Handbook 44, latest adopted edition
 9. The static scale instruments shall include
 - a. Must be able to power up to 4 scale platforms
 - b. Static Scale Instruments must be of the same manufacturer as the Static scale weigh bridge and WIM weigh bridge

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- c. All instrument setup functions and calibration sequences are programmable through the keyboard/display
 - (1) No at-scale adjustments required for these functions
 - d. Minimum of 15 updates per second
 - e. One display showing individual axle weights and the summation of the individual weights
 - f. Shall be suitable for desktop or set-in mounting, level or at angle
 - g. Display the raw counts of each individual load cell without disconnecting any of the load cells from the system
 - h. Perform all static scale instrument set-up functions via static scale internet explorer web pages
 - (1) Download to instrument via Ethernet connection
 - i. Selectable increments size from 20 to 50,000.
 - j. Display up to 1 part in 10,000
 - k. Internal resolution 1 part in 1,000,000
 - l. Setup functions stored in nonvolatile RAM memory
 - m. Adjustable digital filtering
 - n. Adjustable automatic zero maintenance
 - o. Serial ASCII output port configuration for connection to computer. Baud rate to be selectable from 300 to 9600
 - p. Motion detection should be selectable from ± 0.5 , ± 1.0 , ± 2.0 , ± 3.0 increments
 - q. Display verification test
 - r. Display height at .5 inches with wide angle view
 - s. Static scale instruments shall meet the current specifications of the NIST Handbook 44, current adopted edition
 - t. The instrument shall be UL/CSA listed
 - u. Provide one button printing
- H. Static scale computer shall

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1. Display on the screen the WIM data as depicted in exhibit 1 when vehicle is on static scale.
2. Display on the screen the static weights
 - a. Individual platform weights
 - b. Sum weight
 - c. Inner bridge weights
 - (1) Front
 - (2) Rear
 - d. WIM record
 - e. Static scale shift counts
3. Display on the screen the shift counts, time and date
4. Display or print shift count report for both Static, WIM scales, and average delay for statically weighted vehicle during shift
5. Display or print real time WIM accuracy
6. Write the established data to a database
7. The database shall include
 - a. WIM weight data
 - (1) Steer axle
 - (2) Drive axles
 - (3) Trailer axles
 - (4) Gross
 - b. Static weight data
 - (1) Platform one weight
 - (2) Platform two weight
 - (3) Platform three weight
 - (4) Sum weight
8. The collected data is used to perform

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- a. Continuously and automatically calibrate the WIM scales based on operator selected sample size
 - b. Prove the WIM scale accuracy as defined in this technical section
PART 3.05 ACCEPTABLE PERFORMANCE TEST
 - c. Determine and record delay time for each statically weighted vehicle
9. The database can only be accessed using a password with the highest level of security
 10. Database for the truck weightment records is to be stored in Windows environment
 11. Data retrieval may either be from the site directly or accessed remotely
 12. The computer shall be 100 percent Windows compatible Pentium microprocessor-based computer with Windows XP operating system
 13. Acceptable brands are IBM, Compaq or Dell
 14. The minimum acceptable configuration shall include
 - a. Microprocessor rated at a minimum of 2.4GHz
 - b. Minimum of 512 Mbytes RAM
 - c. Minimum of 80 GB hard drive
 - d. Minimum of 48XCD drive
 - e. 88.9 mm 1.44 MB high-density diskette drive
 - f. Minimum of three PC1 and one AGP slots
 - g. Parallel interface for connection to the printer
 - h. 21-inch SVGA 26 dp monitor with non-glare screen
 - i. 101 key enhanced keyboard
 - j. Real-time clock/calendar with battery backup
 - k. Power supply as required by system configuration
 - l. System utilities and diagnostic software
 - m. Interface to the WIM electronics enclosure.

- n. Interface to digital outputs
- o. High-speed analog to digital converter
- p. Surge protection
- q. Internal modem card compatible with V.32 standards (56 K full duplex) or greater
- r. System password protected lock for user access restriction
- s. All access ports, cables and accessories to provide a working system

I. Static Scale Software

- 1. SYSTEM manufacturer shall provide all software necessary for complete and efficient operation of the weigh-in-motion/static weight enforcement scale systems
- 2. The software must be supplied with the report formats
- 3. Report formats must be supplied as an integral part of the SYSTEM
- 4. Allows the user to dial up and perform remote diagnostics as described below for troubleshooting from a remote location
 - a. Static scale instrument setup
 - b. View individual live raw counts for static scale load cells
- 5. SYSTEM manufacturer shall provide commercially available dial-up software
- 6. The Static Scale software must provide the following features
 - a. Interface with the static scale indicator and the WIM terminal
 - b. Display all static scale weights and the WIM data for the vehicle that is positioned on the static scale
 - c. Display the inner bridge values
 - (1) Front
 - (2) Rear
 - d. Provide adjustable thresholds to each static scale platform weight, gross weight, and inner bridge weights
 - e. Automatically determine the bridge threshold based on axle spacing and platform weights refer to State regulations

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- f. Automatically check weights to thresholds and release vehicle or alert operator of violation
 - (1) Audio and visual alerts
- g. The static scale computer shall be the main operator interface for both the static and WIM scales.
- h. Determine location of steering axle on platform one to within 2" of actual
 - (1) Shall use the WIM data to calculate backwards and determine if all axles are properly positioned on scale.
 - (2) Shall use WIM data to determine axle and/or inner bridge violation per State's weight limits and auto release if compliant or alert (audio and visual) if violator. System shall auto release all compliant classifications of vehicles.
- i. Continuously update WIM calibration based on static weights
 - (1) Perform automatically based on site programmed sample size
 - (2) Shall calibrate the WIM scale based on speed ranges
 - (3) Shall calibrate the WIM scale based on vehicle classification
 - (4) Shall have the capability to determine and update 10 different dynamic calibration factors based on speed and 13 based on classifications
- j. Provide local and remote diagnostics for static scale indicator and load cells
- k. Display static and WIM data in a format similar to the following
 - (1) See Exhibit 2 at the end of this Technical Special Provision
 - (2) Provide within the display the following features
 - (a) Selectable auto release
 - (b) Accumulate axles
 - (c) Display shift counts
 - (d) Violations shall be displayed in red

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- (e) Zero scale
 - (f) Reset scale
- l. Shall allow for USDOT number search via static scale computer and keyboard. Search database shall be supplied by the State.
- m. Print requirements include but not limited to
 - (1) Site identification
 - (2) Gross, all platforms and bridge weights
 - (3) Time and date
 - (4) WIM axle spacing
- J. Static Scale Laser Printer
 - 1. Provide one printer for each station
 - 2. Minimum print speed of 12 pages per minute
 - 3. Minimum print quality of 600 dpi
 - 4. Minimum 8 Mbytes of memory
- K. Static Scale Back-Up Printer (optional)
 - 1. The printer shall be a commercially available 24 pin unit with a printing speed of 200 characters/second and 80 columns
 - 2. Acceptable manufacturers
 - a. Okidata
 - b. Panasonic
 - c. Epson
 - d. Approved equal
 - 3. The paper shall be of a roll type or fan type 215.9 millimeter wide minimum and print the original plus at least one copy
 - 4. The character interface should be ASCII and be compatible with the central processor and software
 - 5. Printer Buffer

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- a. The printer buffer shall be able to allow two microcomputers to share one printer.
 - b. Provide with 256KB buffer size
 - c. Provide cables and ports compatible with the WIM computer, static scale computer and the printer
- L. Static Scale Pit Includes
- 1. Pit per approved shop drawing
 - a. Pit coping angle shall be 6" x 4" x 5/8" hot dipped galvanized
 - (1) ASTM A123
 - b. Contractor shall clean the static scale pit and Engineer will inspect prior to placement and operation of any SYSTEM components
 - c. Contractor shall keep clean the pit and drainage pipes during construction
- M. Approach Slabs
- 1. 10' approaches on both ends of pit shall be per handbook 44 and be part of the static scale pit drawing. The expansion joint between the pit wall and the 10' approaches shall be 1" (25) strip seal expansion joint.
- N. Duplex Sump Pump with In-Building Alarm
- 1. Provide and install duplex sump pumps as indicated in the Contract Documents. Each pump shall be of capacities indicated. The pumps shall be of the automatic, electric motor-driven, submersible type, complete with necessary control equipment. The pumps shall be factory-assembled and tested for operation under water. The pumps shall be furnished complete with cast-iron casing, bronze impeller, stainless steel shaft, sealed heavy-duty ball bearings, water-cooled hermetically-sealed motor, built-in automatic reset thermal protection, float switches, and waterproof three-conductor cables and grounding plugs. Provide high water alarm and check valve as specified herein.
 - 2. Duplex sump pumps shall be equipped with an across-the-line magnetic controller in a NEMA 250, type 4, waterproof enclosure. A float switch assembly, with the switch completely enclosed in a NEMA 250, type 4 enclosures, shall start and stop each motor at predetermined water levels. Duplex pumps shall be equipped with an automatic alternator to change the lead operation from one pump to the other, and for starting the second pump if the flow exceeds the capacity of the first pump. The discharge line from each pump shall be provided with a union or flange, a nonclog swing check valve, and a stop valve in an accessible location near the pump.

3. Sump discharge pipe.
 - a. Supply Sch. 40 PVC from pit wall to discharge site
 - b. Provide one check valve per pump and locate as close to the pump as possible
 - c. Provide a disconnect union per pump to permit pump replacement
 4. Design pump discharge to prevent back flow from ditch or drain into the scale pit
 5. Equip each scale pit with a high water alarm to give early detection of sump failure
 - a. Pit alarm circuit shall be controlled and supplied by the WIM subsystem
 - b. Pit alarm shall be attached to concrete pier and the float shall be located 1" off pit floor
- O. Pit Lighting and Receptacles
1. Provide pit lighting switch inside electrical room of the administration building
 2. Provide dual exterior weather resistant bulb 40-watt fluorescent light fixture
 - a. 12 feet bridge, Three fixtures, 4 feet long with lens cover
 - b. 24 feet bridge, Two fixtures, each 4 feet long with lens cover
 - c. 44 feet bridge, Three fixtures, each 4 feet long with lens cover
 3. Attach (6) fixtures to the side walls and (2) to the end walls of the pit. Lights shall have at least 1" spacing off pit wall
 4. No receptacles in the same current path as the lighting fixtures although the lights may be on the same breaker as receptacles
 5. Lighting and receptacles shall have quick disconnect in pit
 6. Install one weatherproof GFCI receptacle on the concrete pier underneath each weigh bridge not less than 24 inches from the pit floor
 7. Only watertight conduits are to be mounted on the pit wall
 8. Provide waterproof non-metallic type boxes and conduits in the pit

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9. Install one weatherproof GFCI free receptacle for pump power
 - a. Locate receptacle on the concrete pier under the weigh bridge
 - (1) 24 inches from the pit floor
10. Separate and isolate pump circuit
 - a. From lighting, receptacle or any other circuit
11. The current path shall be free of any GFCI devices.

P. Surge Voltage Protection

1. AC Line Voltage Protector: Used "in-line" with external 115 VAC power line to protect equipment from incoming surges
 - a. Clamping Level: 200 Volts
 - b. UL 1449 Surge Protection Rating: 330 Volts
 - c. Protection Modes: Line to Neutral, Line to Ground, Neutral to Ground
 - d. Line Voltage: 120 VAC, 50/60 Hz
 - e. Maximum Current Rating: 15 Amperes (1800 Watts)
 - f. EMI/RFI Noise Filtration: 50 db. (99.7%) from 100 kHz to 1 MHz
 - g. Response Time: <1 Nanosecond
 - h. Energy Dissipation: 30,000 Amperes

2.5 OVERHEAD LANE CONTROL SIGNAL SUBSYSTEM (RED "X" and GREEN Arrow)

- A. Each signal shall have a visibility of 0.25 miles at all times under normal atmospheric conditions.
- B. Provide the control signals with hinged, ventilated protective sun screens to eliminate "phantom" effect from unlit lamps and protect the signal lamps from damage due to thrown objects and flying birds.
- C. Provide UL lamp sockets and lamps for outdoor service
 1. Provide lamps rated at 120 volts with minimum manufacturer's life expectancy of 1,500 hours
- D. Provide 18 inches by 18 inches lens box
- E. Provide clear legible message that attracts attention under any lighting conditions

- F. At full intensity, the signal will be highly visible anywhere within a 20-degree cone centered about the optic axis.
- G. The signal consists, but not limited to
 - 1. Weatherproof housing and door.
 - 2. Fiber optic module
 - 3. Color filters
 - 4. Light source
 - 5. Transformers
- H. SYSTEM controls the signals to provide the truck traffic with a clear and concise signal as to whether to proceed back to the interstate or to the static scales.
- I. Either the WIM computer or the operator manual override can change Bypass lane signal
- J. Signals finish shall be acid etched and painted with two coats of zinc-chromate primer. Door frame, face plate, interior of housing, and visor shall be painted with two coats of high quality flat black enamel. Exterior of housing shall be painted with two coats of high quality semi-gloss black enamel.
- F. Contractor is responsible for the design and construction of the signal pole foundation.
- G. Signal pole design shall be signed and sealed by a Professional Engineer registered in the State.
 - 1. This design shall be submitted with the shop drawings to the Engineer for approval prior to construction.

2.6 TRAFFIC SIGNAL SUBSYSTEM (Red/Green and Yellow)

- A. Red/Green shall be a two section assembly and used to sequence vehicles on static scale
 - 1. Black polycarbonate enclosure
 - 2. 12" Glass lens
 - 3. Post mounted and located at the entrance end of the static scales.
- B. Contractor is responsible for the design and construction of signal pole foundations.

- C. Yellow wigwag shall be a single section assembly and used to inform drivers of a stop condition in bypass
 - 1. Black polycarbonate enclosure
 - 2. 12" Glass lens
 - 3. Post mount and located in the bypass lane
 - D. Contractor is responsible for the design and construction of signal pole foundations.
 - E. All traffic signals shall be 115 VAC
- 2.7 CHANGEABLE MESSAGE SIGNS (forward, back up, park w/arrow, one 8" diameter red, and one 8" diameter green) (park w/arrow, one 8" diameter red, and one 8" diameter green)
- A. The signals that read forward, back up, park w/arrow, one 8" diameter red, and one 8" diameter green shall be used as follows
 - 1. Static scale lane shall have a CMS located over center of lane (160') downstream of scale. This sign will be used to inform drivers positioned on static scale.
 - B. The signals that read park w/arrow, one 8" diameter red, and one 8" diameter green shall be used as follows
 - 1. Bypass lane shall have a CMS located at the stop bar
 - C. Each signal shall have a visibility of 300 feet at all times under normal atmospheric conditions.
 - D. Provide the control signals with hinged, ventilated protective sun screens to eliminate "phantom" effect from unlit lamps and protect the signal lamps from damage due to thrown objects and flying birds
 - E. Provide UL lamp sockets and lamps for outdoor service
 - 1. Provide lamps rated at 120 volts with minimum manufacturer's life expectancy of 1,500 hours
 - F. Provide 35-1/2 inches by 30 inch lens box
 - G. Provide clear legible message that attracts attention under any lighting conditions
 - H. At full intensity, the signal will be highly visible anywhere within a 20-degree cone centered about the optic axis
 - I. The signal consists

1. Weatherproof housing and door
 2. Fiber optic module
 3. Color filters
 4. Light source
 5. Transformers
- J. SYSTEM controls the signals to provide the truck traffic with a clear and concise signal as how to proceed.
- K. Either the WIM computer or the operator manual override can change Bypass lane signal.
- L. Signals finish shall be acid etched and painted with two coats of zinc-chromate primer. Door frame, face plate, interior of housing, and visor shall be painted with two coats of high quality flat black enamel. Exterior of housing shall be painted with two coats of high quality semi-gloss black enamel.
- M. Contractor is responsible for the design and construction of the signal pole foundation.
- N. Signal pole design shall be signed and sealed by a Professional Engineer registered in the State (by Contractor).
1. This design shall be submitted with the shop drawings to the Engineer for approval prior to construction.

2.8 CHANGEABLE MESSAGE SIGN SUBSYSTEM (OPEN / CLOSED)

- A. Make the sign legend as shown in the signing and pavement marking plans
- B. Sign shall be controlled by the SYSTEM software
1. Close the station when vehicles stop on the inductive loop at the entrance gore
 2. Provide a manual override in the administration building
- C. Adjust exact size of opening to meet the sign manufacturer's dimensions
- D. Equip with dimming photometric eye to reduce the illumination during low lighting conditions
1. At full intensity, the sign will be highly visible anywhere within approximately a 60-degree cone centered about the optic axis.
- E. The sign shall completely blank out when not in operation

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- F. No phantom words or legend shall be seen under any ambient light condition
- G. Bundles shall be arranged so that in the event of failure of one light source, the other shall continue to provide a discernible message by providing full power to alternating message points
- H. The sign shall consist
 - 1. Weatherproof aluminum housing and door painted with two coats of high quality semi-gloss black enamel
 - 2. Fiber optic module
 - 3. Light sources
 - 4. Transformers
 - 5. Control module
- I. Use transformers to reduce the incoming 120 volts AC to 10.8 volts AC
- J. Transformers
 - 1. Class A insulation and weatherproofing
 - 2. Rated at 48.5 volt amps
- K. Assemble the fiber optic modules and associated components directly to the sign face
- L. Provide an inside back cover to protect the module
- M. Supply the fiber with fiber optic glass bundles arranged to define the required message
 - 1. Make the fiber optic bundles ground smooth and optically polished at the input and output ends for maximum light transmission
- N. Provide all fasteners and hardware 316 stainless steel
 - 1. Make all components readily accessible for maintenance when the door is open
- O. Provide with standard hardware and locks, no tools are needed for lamp replacement
- P. Mount a disconnect switch on the sign pole eight feet above the ground in order to disconnect all non-grounded conductors
- Q. Signal shall mount to fixed weigh station sign

2.9 LOOPS

- A. Located by SYSTEM manufacturer
- B. Shall be installed per approved shop drawing

2.10 FAX MACHINE (OPTIONAL)

- A. Provide a laser plain paper type
- B. Provide a sheet feed tray that holds 100 sheets or greater of #20 paper
- C. Acceptable manufacturers: Canon, Xerox, and Panasonic

2.11 PHOTOCOPY MACHINE (OPTIONAL)

- A. Provide a high-end commercial grade table top model with tray paper feed
- B. Provide a dry toner imaging process
- C. Provide a dual component and lens/mirror optics
- D. Provide letter paper size, legal paper size, and 11 x 17 inches #20 with 250 sheet tray per each size
- E. Provide fusing with heat and pressure
- F. Provide cold start to warm-up time not greater than 1 minute
- G. Provide reduction settings of 50, 64 and 78 percent
- H. Provide enlargement settings of 121, 129 and 200 percent with variable/zoom from 50 to 200 percent
- I. Acceptable manufacturers: Canon, Xerox, and Mita

2.12 PA SYSTEM PROVISIONS:

- 1. Contractor to provide a 1" empty conduit from the PA System in the control room to the location of the exterior speakers
- 2. Contractor to provide pull strings in the empty conduits

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All electrical shall be tied to a known ground upon installation
- B. Any lightning damage to components or conductors which results from the equipment not being tied to ground upon installation is responsibility of the Contractor.
- C. The Contractor shall replace within one week any damaged components and conductors at their own expense.

3.2 WARRANTY

- A. The Contractor shall warrant the SYSTEM until final acceptance; this includes all equipment furnished, installed and described in this Technical Special Provision.
- B. The warranty shall be in accordance with this Technical Special Provision and suitable to the Department for the purpose intended.
- C. SYSTEM shall function in the manner intended by the Department and be acceptable to the Engineer.
- D. The warranty shall cover materials, equipment, service, all labor, all travel expenses, and all incidentals necessary for warranty service.
- E. This SYSTEM warranty excludes damage caused by flooding, accidents, vandalism or natural disasters.
- F. The Contractor shall commence to provide such warranty service within 24 hours, including weekends and holidays of notice that warranty work is required.
- G. Manufacturer of scales shall have been represented in the local area by complete sales and service organization for 5 years. Local parts and service shall be available on 24-hour, 7-day per week basis. Service list of customers with similar type scales, covering minimum past 2 years, and list of service people and their experience records shall be submitted to ensure that adequate, skilled manpower is available at all times to maintain scale repair service.

3.3 METHODS OF CONSTRUCTION

- A. The SYSTEM shall be installed in strict conformance with the requirements of the manufacturer to provide a complete and fully operable system.
- B. The SYSTEM shall be installed in strict conformance with the Contract.
- C. The SYSTEM shall comply with all applicable codes, state and federal.
- D. Refer to the Contract for other sections that may apply to the installation of the SYSTEM

- E. The WIM control concrete pavement
 - 1. Provide a distance of 200 feet on the approach side
 - 2. Provide a distance of 100 feet beyond the in-motion scale
 - 3. Provide a distance of 40 feet to the scale entrance and exit end of the static scale
 - 4. Provide a smooth and level pavement and in the same plane as the platform
 - 5. See Roadway Plans for location of control pavement
 - 6. The surface of the control pavement must be uniform such that a 6 inches diameter circular plate 0.125 inch thick cannot be passed beneath a 20 feet long straightedge.
 - 7. Grinding of the pavement will be required to meet the above noted tolerances. This shall be done at no additional cost to the Department
 - 8. The pavement shall meet ASTM E1318-02, Section 6.1.1 through 6.1.5
- F. All cables and wires from the weigh bridges and loops shall terminate in the field unit equipment enclosure located adjacent to the roadway as shown on the approved shop drawings.

3.4 BURN-IN PERIOD OR TROUBLESHOOTING SYSTEM FOR APT.

- A. During the two-week burn-in period, the SYSTEM manufacturer shall train operators as specified in Part 1.5.J.6 of this section.
- B. Time shall be used by the SYSTEM manufacturer to tune the system
- C. Contract time shall be suspended during the burn-in
- D. Project must be complete before burn-in can start
- E. Contractor shall provide a minimum 4 week notice to the Engineer as to when the burn-in start date
- F. SYSTEM manufacturer must leave the site on completion of the burn-in and shall not be allowed remote computer connections

3.5 ACCEPTABLE PERFORMANCE TEST

- A. This section applies to all work performed under this Contract
- B. Contractor shall provide a minimum of 2 weeks advanced notice as to when the APT period will start.

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- C. SYSTEM manufacturer shall perform the in-motion calibration tests of WIM subsystem after installation is completed and prior to beginning the burn-in period.
- D. Contractor shall provide the Engineer one week's notice of the in-motion calibration tests.
- E. SYSTEM manufacturer shall provide calibration weights
- F. APT period begins two weeks after the completion of installation and certification of Static scale
- G. APT cannot begin until the static scales have been certified by Department of Agriculture's Weights and Measures Section.
 - 1. Contractor is responsible to request, coordinate and obtain certification from Department of Agriculture
 - 2. The Engineer will assist in this process if requested by the Contractor
- H. Contractor shall submit a detailed test plan to the Department for approval no later than 90 days after notice to proceed.
- I. For the APT period, the SYSTEM shall be fully operational under normal traffic conditions and operate trouble free (defined as any error that will not reset by means of rebooting PC) for 24 hours each day for 7 days of each week for 56 consecutive days.
- J.
 - 1. Only one reboot per shift shall be allowed
- K. The Engineer shall check the accuracy performance by printing an accuracy report from an electronic database which is created and stored on the static scale computer.
- L. The report for WIM accuracy must be printed from the static scale computer by the Engineer and met Bi-weekly during the APT period
 - 1. WIM accuracy on all vehicles loaded above 60,000 pounds and traveling between the speeds of 5 to 85 miles per hour shall be as follows
 - a. Axle weights \pm 10% (95% of trucks)
 - b. Tandem weights \pm 5% (95% of trucks)
 - c. Gross weights \pm 4% (95% of trucks)
 - d. Axle spacing \pm 6 inches (68% of axles), whichever is greater
- M. This database shall be created by continuous electronic recording of vehicles from the vehicle stream, which are loaded to within 75% (60,000 lbs.) of the legal allowable limit.

METTLER TOLEDO SPECIFICATIONS

- N. The actual stable static weights and WIM weights shall be stored in this common database to determine WIM scale accuracy compliance, as opposed to the method described in ASTM E 1318-02.
- O. The SYSTEM manufacturer must leave the site prior to the start of the APT and may only return if a problem is encountered or accompanied by the Engineer.
- P. If problems of any kind are encountered during the APT, the SYSTEM manufacturer will be informed and problem(s) shall be simultaneously witnessed by the Engineer and Contractor.
 - 1. If problem is confirmed by all, a strike will be assessed and problem shall be corrected.
- Q. After confirmation from SYSTEM manufacturer that problems are solved and at the discretion of the Engineer, the 56 day APT will start over until 56 continuous days of trouble free operation are experienced
 - 1. This re-start can only occur three times
- R. The Acceptance Performance Test shall demonstrate to the satisfaction of the Engineer that the weigh-in-motion/static enforcement system has been constructed and consistently meet the performance requirements of the plans and of this Technical Special Provision.
- S. The APT will be the basis for acceptance or rejection of the SYSTEM as a result of demonstrated performance.
 - 1. If the SYSTEM is rejected and there have been more than three strikes and re-starts of the APT, the parties will negotiate, in good faith, an acceptable resolution. Following such negotiations, if the same are unsuccessful, the Department may execute the performance bond. Notwithstanding the foregoing, the Contractor will retain/be entitled to receive all amounts paid or payable to the Contractor in accordance with the following payment schedule, agreed-to by the parties:

END OF SECTION

Exhibit 1

| Real Time View | | 11:23:17 PM | |
|----------------|-----------|----------------|---|
| 02528 | 2:24p | 4-Mar-1992 | Lane:1 Cls:9 ESAL:2.15 Spd:54 Grs:69180 |
| 1..... | 2..... | 3..... | 4.....5 |
| ---12.8--- | -4.4- | -----28.9----- | -4.4- |
| -----17.2----- | | | |
| | | -----37.7----- | |
| | | -----50.5----- | |
| Axle | 1 | 2 | 3 4 5 |
| Rght | 4960 | 8220 | 8580 5300 5360 |
| Left | 5480 | 9580 | 7860 5920 7920 |
| Totl | 10440 | 17800 | 16440 11220 13280 |
| Tandem | | 34240 | 24500 |
| InBr | 1-3 44680 | 2-5 58740 | |

Exhibit 2

METTLER TOLEDO - WIM

Exit Settings DataBase Reports Tools Diagnostics Help

← Home User Help ?

WIM DATA
 001824 04/04/01 14:21 Class: 9 Speed: 44 mph Gross: 74500 lbs

Off Scale Over Gross

| | | | | | |
|-------|-------|-------|-------|-------|-------|
| Right | 1 | 2 | 3 | 4 | 5 |
| LEFT | 5300 | 7600 | 7300 | 7300 | 8300 |
| | 5200 | 8400 | 7600 | 8300 | 7600 |
| TOTL | 10500 | 16000 | 15400 | 16100 | 16500 |
| TNDM | | 31400 | | 32600 | |
| InBr | 1-3 | 41900 | 2-5 | 64000 | |

1: 10800 **Front Bridge** **43080**

2: 32280 **Rear Bridge**

3: 33160 **65440**

S
u
m **76240** **Scale 2**

Vehicle Released

Release - F5 Hold - F6 Print - F7

Shift 1:5 Shift 2:649 Shift 3:14 Logged In as Weight Inspector