

SECTION 11155 – TRUCK WEIGH SCALE ASSEMBLY




PART 1 - GENERAL

1.01 SUMMARY



The work of this Section consists of furnishing and installing a complete and functional heavy-duty motoring truck weigh scale system and associated electronic control and driver signaling systems. A shallow pit foundation system, as shown in the contract drawings, will be constructed to support the new scale system as a part of this contract.

1.02 GENERAL PROVISIONS


- A. Furnish and install a three (3) platform motor truck scale system with associated electronic controls and signaling devices.
- A. The multi-platform scale assembly shall have a clear and unobstructed weighing surface consisting of three (3) platforms, each approximately 12'-0" wide, with the following approximate lengths: 50'-0", 24'-0", and 50'-0". The width of the scale may vary, depending on manufacturer, by up to 2 inches.
-  The scale shall have a nominal profile of 16 inches, which is measured from the top of the scale to the top of the foundation slab or pier at the load cell bearing points.
- C. The scale system shall have a gross weighing capacity of 100 tons. The scale shall be in increments of 20 pounds, The individual module weighing capacities are as follows:
 - 1. 50 feet x 12 feet shall have a 200,000 pound capacity.
 - 2. 24 feet x 12 feet shall have an 80,000 pound capacity.
 - 3. 50 feet x 12 feet shall have a 200,000 pound capacity.
- D. The scale shall be designed to accept vehicles which generate up to 80,000 pounds per tandem axle and have a Concentrated Load Capacity (CLC) rating of 80,000 pounds as defined by the National Institute of Standards and Technology Handbook 44 and certified by National Type Evaluation.
- E. The scales shall be fully electronic in design and shall not incorporate any mechanical weighing elements, check rods, or check stays.
- F. The scales shall be designed to perform as a multi weighing platform and shall be of flat top design. Side rails are not acceptable.
- G. The scales shall be designed to accept an average daily traffic volume of no less than 250 vehicles per day, 365 days a year, for 20 years, with a load equal to 100 percent of specified CLC rating scale.
-  The junction boxes, load cells, load cell mounting hardware, cover bolts, and fasteners shall be constructed of stainless steel. The cables shall be stainless steel sheathed.
- I. The scales shall be supplied with T-scale rubber strips at all edge openings, Dacon Industries or equal.
-  The scales shall meet the requirements set forth by the current edition of the National Institute of Standards and Technology Handbook 44 (NIST H-44), latest edition. The

- scale manufacturer shall provide a Certificate of Conformance (NTEP Certification) to these standards upon request. The scales shall also be certified by the State of Alaska, Division of Measurement Standard and Commercial Vehicle Enforcement.
- K. The design and manufacturing of the scale weighbridges, load cells, and digital instruments shall be of one manufacturer; printer and associated accessories should be multi-manufacturer so as to maximize compatibility and availability of components. Also, the manufacturers of these items shall have a demonstrated quality control program.
 - L. The manufacturers shall provide, with the bid proposal, a listing of major spare parts and their prices including (but not limited to) replacement load cells, digital instrument, printer, junction box, circuit boards, and associated parts.
 - M. The CONTRACTOR shall provide a scale system that meets or exceed all specified minimum requirements listed herein.
 - N.  The basis of the design is Mettler-Toledo, Inc., Model VTC210.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications, standard details, and certified product test results for all components of the weigh scale assemblies to be provided, including NTEP certification.
- B. Shop Drawings: Include plans, elevations, sections, and details of installation, and anchor bolts.
 - 1. Verify that pit design and construction are coordinated with scale assembly to be provided. Submit any proposed changes to those shown on contract drawings to the DEPARTMENT for review and approval. Note that any changes to the structural drawings, as shown in the contract documents, shall be the responsibility of the CONTRACTOR and shall be submitted to the DEPARTMENT for review and approval.
- C. Submit manufacturer's warranty on all components of weigh scale assemblies.
- D. Submit operations and maintenance data, including product data, installation instructions, servicing requirements, and replacement parts list.

1.04 QUALITY ASSURANCE


- A. Codes and Standards:
 - 1. National Institute of Standards and Technology Handbook 44 (NIST H-44).
 - 2. American Welding Society AWS D1.1, latest Edition.
 - 3. Weighbridge structural steel and structural elements shall conform to ASTM A36 or A992.
- B. The scale manufacturer shall have a quality control program that has been registered to the standards of ISO 9001.
- C.  After installation and check-out, the weigh scale assembly shall be certified by the State of Alaska Division of Measurement Standards Commercial Vehicle Enforcement.

D. Qualifications:

1. Provide repair and maintenance service within 72 hours of the request.
2. Calibration per NIST H-44 requirements.
3. Meet warranty requirements specified herein.




PART 2 - PRODUCTS




2.01 SCALE WEIGHBRIDGE

- A. The scale weighbridge shall be capable of weighing trucks that have dual tandem axle weights (4 feet minimum between dual axles and at least 10 feet from next axle) of up to 80,000 pounds and shall have a Concentrated Load Capacity (CLC) of 80,000 pounds.
- B. The weighbridges shall consist of partially prefabricated modules and may require special wide load permits for shipping. The Division will issue a special permit for shipping from Port of Anchorage to job site in Alaska as required.
-  C. The weighbridge shall have a cast-in-place deck reinforced by an orthotropic steel understructure. CONTRACTOR is responsible for the coordination of all weigh scale assembly components and dimensions to insure that the scale can be accommodated by the scale pit shown in the contract documents. Verify that the bearing pedestals to support load cells are in the correct location and of the proper dimensions for the weigh scale assembly.
- D. All required junction boxes, load cell cables, and interconnecting cables may be installed and pre-wired prior to shipment by the manufacturer, or can be installed on-site.
- E. All welding shall be completed in accordance with the American Welding Society (AWS) D1.1 Structural Welding Codes.
- F. All welding shall be performed by welding operators who have been certified in the AWS D1.1 Structural Welding Code.
- G. All welding shall be performed in position 1F to ensure maximum weld integrity.
- H. Longitudinal weighbridge members shall be welded continuously, using a high penetration, submerged arc welding process. The use of intermittent welds on longitudinal members is unacceptable.
- I. There shall be no bolted connections between the load cell and weighbridge assemblies.
- J. There shall be no field welding required for the installation of the scales.
- K. The weighbridge modules shall be shot blasted to a minimum SSPC- SP6 specification prior to painting.
- L. All enclosed chambers created by joining two steel members must be hermetically sealed to eliminate internal corrosion.
- M. The deck surface shall be designed and constructed using cast-in-place concrete over a composite acting steel plate with welded studs.

- N. All exterior surfaces of the scale shall have a two-part epoxy finish of Carboline 15LO, or equal, providing a total Dry Film Thickness of 5-7 mils or better.
- O. The finish shall be force cured in order to reduce risk of contamination and ensure durability of the surface.
- P. The weighbridge shall be designed to allow access to the junction boxes, load cell cables base plates, and all foundation anchor bolts from the top of the scale platform.
- Q. The weighbridge and load cell mounting assemblies shall be designed to allow installation or replacement of a load cell with only one additional inch of clearance required between the top of the foundation and the bottom of the weighbridge.

2.02 LOAD CELLS

- A. Each load cell shall have a minimum capacity of 100,000 pounds.
-  B. Load cells shall be certified by NTEP and meet the specifications as set forth by NIST H-44 for Class III L devices, and also be certified by the State of Alaska, Division of Measurement Standards Commercial Vehicle Enforcement. A Certificate of Conformance to these standards shall be provided by the manufacturer upon request.
- C. Load cells shall be supported by 6-inch riser base plates, or by similar means.
- D. Load cells shall be digital, with an integral microprocessor and analog-to-digital conversion function located within the load cell housing.
- E. Load cells shall output only converted digital information to the scale instrument. Analog output of signals from the load cell is not acceptable.
-  F. The load cell assembly shall be constructed so as to perform as a rocker pin and shall have no positive fixed mechanical connectors, such as bolts or links, that are required in mounting the load cell to the weighbridge or foundation base plates.
- G. The load cell shall not require check rods or chain links for stabilization.
- H. The load cell shall be of stainless steel construction and hermetically sealed with a minimum NEMA 6P (submersible) rating or better.
-  I. The load cell shall contain integral Transient Voltage Suppressors (TVS) for all input and communications lines. Each TVS shall contain self-resetting thermal breakers to protect the load cell components from voltage and current surges.
- J. The load cell shall have a chromium nitride coating on all bearing surfaces to reduce load cell wear.
- K. The load cell shall come equipped with a neoprene rubber boot to keep debris from contaminating the lower bearing surface.
- L. The load cell shall have a positive lock quick connector integral to its housing for connecting and disconnecting the load cell interface cable at the load cell. The connector shall be of glass to metal pin type construction to maintain a hermetic seal.

- M. The load cell shall have the following specifications:
1. V_{min} : 3.1 pounds maximum.
 2. Hysteresis: ± 0.025 percent of full scale.
 3. Non-Linearity: ± 0.015 percent of full scale.
 4. Creep (30 minutes): ± 0.017 percent of applied load.
 5. Temperature range: Minus 10 deg C to plus 40 deg C (plus 14 deg F to plus 104 deg F).
- N. The load cell interface cable shall be stainless steel sheathed for environmental and rodent protection. The CONTRACTOR shall mount all cables along pit walls to avoid conflict w/ cleanout/wash down of concrete slab surface below the scale platforms and within the access trenches along each side of the pit.
- O. All load cell gauging areas must be protected by electrochemically polished 316 stainless steel covers, and capable of withstanding MIL SPEC salt spray tests.
- P. The cell design shall permit individual load cells to be electronically matched and the scale sections to be electronically calibrated.
- Q. The scales shall have self-diagnostic capabilities able to identify load cell problems, failure, and predict the failure of a cell before it actually happens to prevent downtime. The diagnostics are to measure load cell counts (not weight) and will also be used to determine reliability of the load cells.
- R. Should a load cell fail, the instrumentation shall identify the specific load cell that has failed. A generic "load cell bad" message without identifying a specific cell is unacceptable. All trouble shooting shall be done from within the scale house.
-  Load cell cables shall be hard wired in both the load cell and the sectional controller. Quick disconnect load cell cables are unacceptable.
-  All electronic hardware in the scale platform shall be housed in stainless steel NEMA 4X junction boxes.
-  Load cells shall meet all of the requirements as stated in this specification or better. Basis of design is Mettler-Toledo, Inc., MTX load cell.

2.03 SCALE INSTRUMENTS

- A. A scale instrument shall be provided for the weigh station.
- B. The scale instrument shall be NTEP approved and meet or exceed the specifications set forth by NIST H-44 for Class II, III, and IIII Devices. The manufacturer upon request shall provide a Certificate of Conformance to these standards.
- C. The scale instruments shall be housed in an enclosure that is suitable for desktop mounting. The instrument housing shall be metal and have a NEMA 4 environmental rating.
- D. The scale instrument shall be capable of performing calibration, span, zero, and shift adjustment through software calculations that require no in scale adjustment.

- E. The scale instruments shall use English language prompts to lead the start-up personnel through all phases of set-up, calibration, and testing. Entry of information shall be accomplished with QWERTY keyboard.
- F. The scale instruments shall be capable of communicating with the digital load cell assemblies, which may be partitioned as one, two, or three.
- G. The scale instrument shall be capable of full digital filtering of the weight information sent from the load cells.
- H. The scale instruments shall be capable of A/D conversion rates of 300 samples per second, for fast response in control applications.
- I. The scale instruments shall only receive digital information from the load cell assemblies. There shall be no analog to digital conversion function in the scale instrument.
- J. The scale instruments shall be capable of assigning each load cell with its own unique identification number and shall be capable of displaying the weight reading of each individual load cell through the instrument without disconnecting any of the load cells from the system.
- K. The scale instruments shall communicate with each individual load cell and shall display an error code immediately in the event of a load cell failure. This error code shall identify the failed load cell and the cause of the failure.
- L. The scale instruments shall have gross/net weight switching and the ability to recall the gross or tare weights in the net mode.
- M. The scale instruments shall be capable of being programmed and calibrated in pounds or kilograms.
- N. The scale instruments shall have a standard communication port configured in bit serial ASCII, bi-directional, RS232C, or 20mA current loop. The port shall be selectable for on demand or continuous communications at up to 9600 baud. The port shall be capable of receiving a remote print command via serial communication or hard wire input.
- O. The scale instruments shall have a standard second data output port for future use that is capable of being configured in a bit serial ASCII, bi-directional, RS232C, 4 wire RS422, or 2 wire RS485 format with up to 9600 baud communication rates.
- P. The scale instruments shall have a standard 10BaseT Ethernet local area network for sharing printers and keyboard/displays between up to 6 scales for communicating to a personal computer.
- Q. The scale instruments shall have a transaction counter to automatically assign a sequential number to each transaction.
- R. The scale instrument shall be capable of outputting all, or a selection of, the following information:
 - 1. Weight.
 - 2. Time and Date.
 - 3. Center of Zero.
 - 4. Mode of Operation (Gross or Net).

5. Weighing Unit (lb or kg).
 6. Selected Scale.
- S. The scale instrument shall be capable of being programmed for sign corrected net weighing so that all net weights are positive.
- T. The scale instrument shall have at least the following keyboard operations:
1. 0-9 Numeric Keys.
 2. Print.
 3. Zero.
 4. Decimal Point.
 5. Clear.
 6. Tare.
 7. Enter.
 8. Select Scale.
 9. Escape.
 10. Space.
 11. Four Application-Specific assignable soft keys.
 12. Five Scale-Function soft keys.
 13. Screen Navigation keys for up, down, left, and right commands.
- U. The scale instruments shall have automatic zero capture on power-up selectable to capture zero at a range of the full-scale capacity.
- V. The scale instruments shall have a programmable power-up time to delay operation until after a warm-up period.
- W. The scale instruments shall have adjustable digital filtering.
- X. The scale instruments shall have adjustable automatic zero maintenance selectable for a range of displayed increments.
- Y. The scale instruments shall have push-button zero selectable for a range of full-scale capacity.
- Z. Tare, Zero, and Print functions shall be selectable while the weight display is changing. Motion detection shall be selectable for a range of increments.
- AA. The scale instruments shall have a weight display that is 0.5 inch high, seven digits, and seven segments, green-blue vacuum fluorescent, or approved substitute.
- BB. The scale instruments shall have a sixteen (16) character operator prompting display that is 0.25 inch high, 5 x 7 dot matrix, green-blue vacuum fluorescent, or approved substitute.
- CC. The scale instruments shall have a "zero" illuminator that indicates the scale is within ± 0.25 of the center of zero increment.
- DD. The scale instruments shall be UL/CSA listed.
- EE. The scale instruments shall have flexible storage capability with a minimum of 4.5 Mbytes of flexible memory in which to store pertinent vehicle, transactional, and commodity information. The scale instrument shall be capable of storing the weight

- information automatically or enable the operator to assign a memory location to the weight automatically.
- FF. The scale instruments shall support upload and download of reports, configurations, and custom programs via the Internet.
 - GG. The scale instruments shall provide a 10BaseT (RJ-45) port as standard, and support the following protocols: TCP/IP, SMTP, HTTP, FTP, PPP.
 - HH. The scale instruments shall provide a true embedded web-based server for configuration and diagnostics.
 - II. The scale instruments configuration, reporting and diagnostics shall be accessible from standard Microsoft Internet Explorer, V5.0 or higher.
 - JJ. The scale instruments shall support automated maintenance planning, condition monitoring, calibration checking, fault recognition and recovery, and ISO compliance functions, including automatic e-mail notification of above problems.
 - KK. The scale instruments shall support up to three scale platforms simultaneously.
 - LL. The scale instruments shall meet or exceed the requirements specified herein. Any deviation from these specified requirements shall be noted as a variance when submitted to the DEPARTMENT for review and approval.

2.04 JUNCTION BOXES AND CABLES




- A. All junction boxes shall be NEMA 4X rated and constructed of stainless steel.
- B. Junction boxes shall be easily accessible from the top of the scale platform for inspection and maintenance.
- C. Load cell cables and scale platform to scale instrument cables shall be stainless steel sheathed for environmental and rodent protection.

2.05 LIGHTNING PROTECTION SPECIFICATIONS

- A. A comprehensive lightning protection system shall be provided with the scale assembly.
- B. The lightning protection systems shall provide optical load cell isolation by providing surge protection (surge stopping barrier) between the scale's load cells and its supporting electronics.
- C. The systems shall not require complicated wiring or devices to provide this protection.
- D. Major scale components including load cells, scale instrument, and printer shall be included in the lightning protection system.
- E. Grounding of all scale components including load cells, scale instrument, printer, and accessories shall be to one common point. Multiple ground point systems are not acceptable. CONTRACTOR to verify that adequate grounding is provided to insure lightning protection.
- F. An AC line surge protector shall conveniently plug into a common electrical outlet and have receptacles for each scale instrument, ticket printer, and other scale accessories.


- G. Each AC line surge protector required shall have one isolated grounding, hospital grade duplex receptacles, and an internal 20 amp circuit breaker.
- H. Verification of lightning protection system performance shall be available in writing from the manufacturer upon request.
- I. The lightning protection system basis for design is Mettler-Toledo, Inc., StrikeShield Lightning Protection System.

2.06 BASIS OF DESIGN

- A  The basis of design for the Truck Weigh Scale Assembly for this project is the Model VTC210 concrete deck weighbridge reinforced by an orthotropic steel understructure configured in a multi-platform scale assembly, manufactured by Mettler-Toledo, Inc.
- B. The CONTRACTOR is not limited to a single scale manufacturer. This is not a sole source contract. It should be noted that this Model VTC210 Mettler-Toledo scale was used as the basis for design for the size, layout, and configuration of the scale foundation pit and that the CONTRACTOR shall be required to provide a weigh scale assembly that will be evaluated by the DEPARTMENT as an equal or better product for this project.

PART 3 - EXECUTION

3.01 PREPARATION

- A  The CONTRACTOR shall demolish and dispose of the existing scale pit. After the new scale pit has been constructed, the CONTRACTOR shall clean out the pit of any dirt and debris. The CONTRACTOR shall also ensure that the elevations and locations of all load cell bearing piers are within acceptable construction tolerances as recommended by the scale manufacturer.

3.02 INSTALLATION

- A. The CONTRACTOR shall be responsible for all aspects of the installation of the complete weigh scale assembly. Coordinate with the DEPARTMENT for any traffic issues during erection. The CONTRACTOR shall provide for traffic control measures as required during construction. Work shall be installed by the CONTRACTOR as indicated and in accordance with the scale manufacturer's diagrams and written instructions. A factory installation specialist shall be at the site to oversee the scale installation process.

3.03 START-UP AND DEMONSTRATION

- A. The CONTRACTOR shall be required to have a manufacturer's representative on site to supervise the start-up, adjusting, testing, and demonstration of the weigh scale systems. The representative shall provide technical direction for start-up and testing of all components and equipment that combine to form the complete weigh scale assembly at the expense of the CONTRACTOR.

3.04 OPERATIONS AND MAINTENANCE TRAINING

- A. The CONTRACTOR shall provide a minimum of up to 6 hours of on-site training for DEPARTMENT-designated operators and maintenance personnel. The training shall be broken into two 3-hour sessions given on two separate days to accommodate DEPARTMENT work schedules. The CONTRACTOR shall coordinate with the DEPARTMENT to establish a training schedule at least 21 days in advance of the first training session.

3.05 CONTRACTOR WARRANTY REQUIREMENTS

- A. The CONTRACTOR shall issue a warranty for all construction work and materials provided under this contract against defects in material or workmanship for a period of one year from the date of completion of all work (beginning at date of beneficial occupancy and/or acceptance by the DEPARTMENT), with the exception of the scale system, which will be under a separate warranty agreement. The CONTRACTOR shall promptly correct any such defect appearing within the warranty period.

3.06 SCALE MANUFACTURER WARRANTY, PM AND CALIBRATION REQUIREMENTS

- A. The manufacturers shall warrant the scale assemblies, including all load cells, scale instruments, printer, junction boxes, cables, and accessories, for the warranty period from the date of installation completion (beginning at date of beneficial occupancy and/or acceptance by the DEPARTMENT) from failures due to a defect in manufacturing, workmanship, lightning, or surge voltages.
- B. The scale manufacturer (or an authorized agent) shall perform all preventative maintenance for the entire duration of the warranty period. The manufacturer's preventive maintenance service agreement, including the costs associated with all parts and labor, shall be included under the terms of the overall warranty requirements.
- C. The scale manufacturer shall bear the charges and expenses associated with replacement parts, equipment, on-site labor, and any associated freight or handling expenses incurred in the repair or replacement of the scale assembly due to failed or damaged items under warranty.
- D. During the warranty period the manufacturer, and/or its authorized representative, shall provide a program of regular maintenance and calibration service including the associated inspection costs. Inspection shall occur at a minimum of once every six months and shall comply with the guidelines set forth by the manufacturer, local regulations, and NIST H-44. The program duration shall extend for the warranty period.
- E. The warranty period is as follows:
 - 1. Base Bid: Five (5) years from Beneficial Occupancy.
- F. The DEPARTMENT (scale DEPARTMENT/operator) shall have the option of renewing the warranty/ preventive maintenance/ calibration agreement for another five years at the end of the warranty period, at a price to be negotiated at that time.

END OF SECTION