

8765 SERIES

Rocker Column Railroad Scale



8765 Series Rocker Column Railroad Scale

Installation Manual 51493

Manufactured by **Thurman Scale**
4025 Lakewood Crossing
Groveport, Ohio, 43125

Amendment Record

Created	04/2020	
Revision 1	04/2020	Released manual

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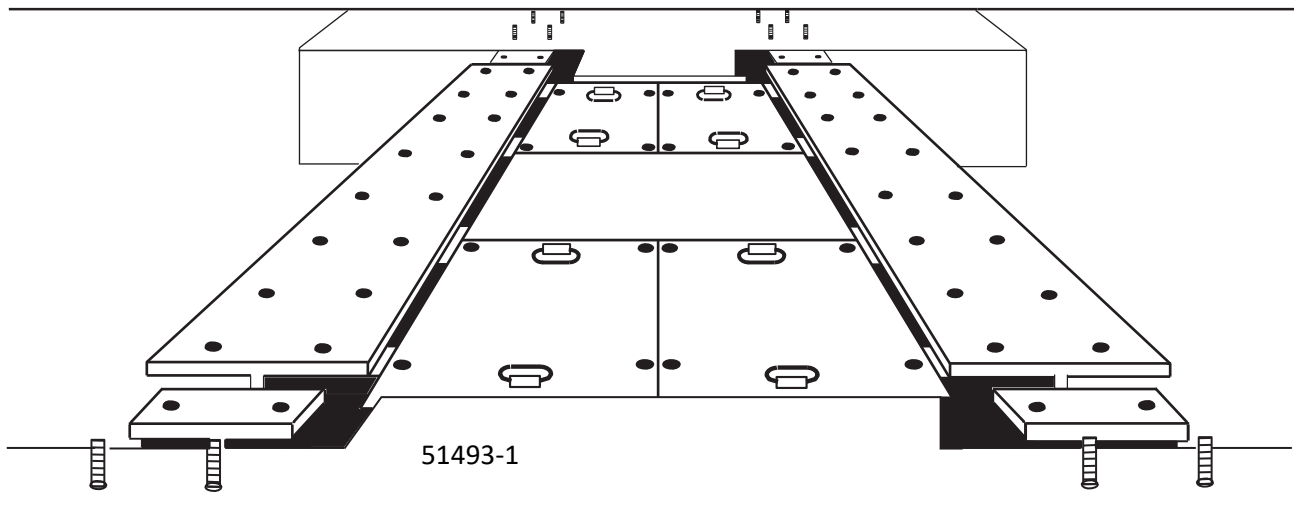
Section 1: INTRODUCTION

A.A.R. Combination Railroad Track / MTS Scale

This manual is intended to compliment and be used in conjunction with the Certified Prints provided by Thurman Scale. Installation should be attempted ONLY with the presence and guidance of experienced personnel who are fully familiar with the assembly of these scales. **Please read this manual in its entirety BEFORE setting scale hardware.**

1.1. Introduction & General Description:

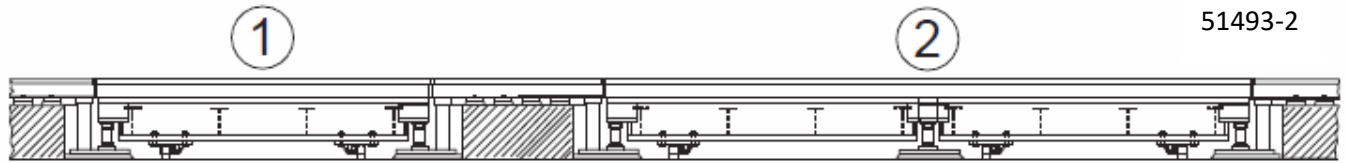
The 2000 Series Rocker Column Railroad Track Scale is a factory assembled, fully electronic scale available in single 12' 6" long, and double 25' long welded steel modules. The 2000 Series is designed for above ground or shallow pit installation and is configured to accept a 115# ARR rail. The scale can be configured to accept other sizes of rail as a special order.



The design of the 2000 Series Railroad Track Scale incorporates hermetically-sealed, stainless steel rocker column load cells, each with a capacity of 110,000 lbs. The combination of a level approach, rocker column load cells, and checking system permits the scale slight movement to mitigate the forces applied to it.

Each module features four removable panels for service access. Interface to a Thurman 2500 Series Digital Weight Indicator with INTALOGIX technology is standard. The purchased scale will include the modules, anchor bolts, loadcells, checking system, smart sectional controllers, power supply, and ground rods.

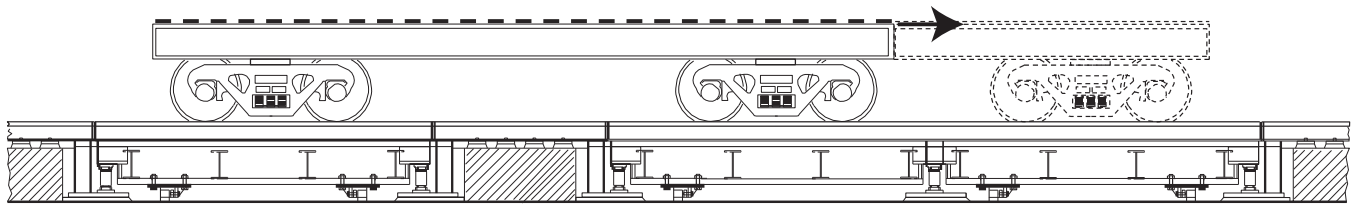
Single and Double Scale Modules



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1: A single consists of one 12' 6" long pre-assembled module.

2: A double consists of two 12' 6" long modules that are configured to assemble together. The double is supported by three sections and is 25' long.

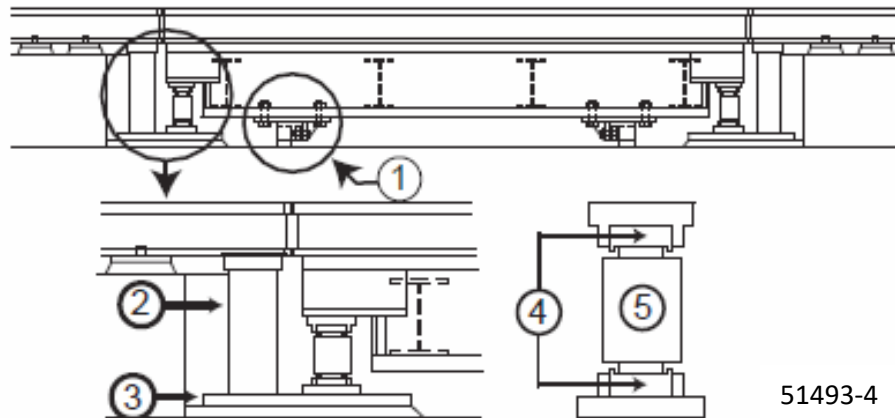


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Both the combination and placement of the scale modules will accommodate rail cars with different wheelbase lengths. A single 12' 6" Module weighs 5000 lbs. and has a Sectional Capacity of 85 Tons.

1.2. Specifications:

Product # & Type	Length(s)	Nominal Capacity	No of Sections	# Load Cells	# Ground Rods
91651 Single	12'6"	170,000 lbs	2	4	3
91652 Double	25'	340,000 lbs	3	6	3
91653 Single/Single	12'6" +	340,000 lbs	4	8	5
91654 Single/double	12'6" +	340,000 lbs	5	10	5
91655 Double/double	25' + 25'	340,000 lbs	6	12	5

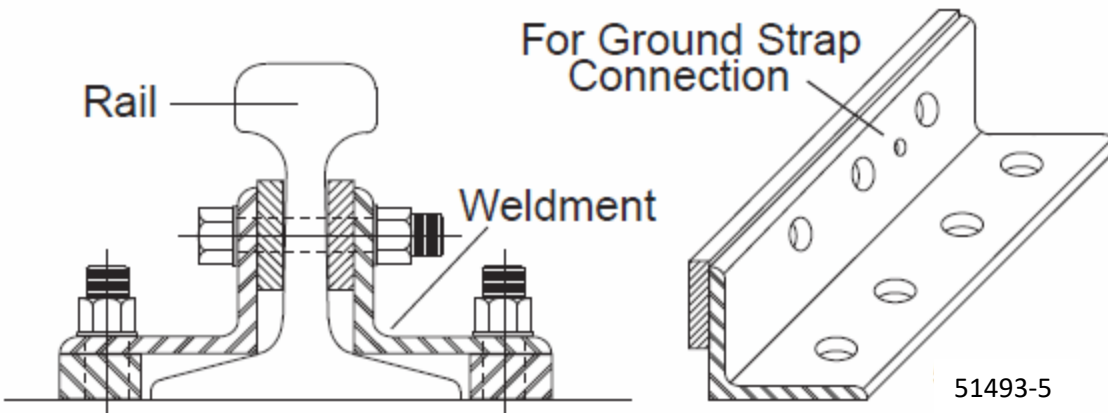


1. Check Brackets limit the platform movement, and the Check Posts serve as safety piers.
2. The Approach column secures the approach rail. It is bolted to the grout plate.
3. Grout plate.
4. Upper & lower bearings are 1" thick, and hardened to Rockwell 50 - 55 C.
5. Stainless Steel, hermetically sealed Rocker Column Load cell.

1.3. Rails & Anti-Creep Devices

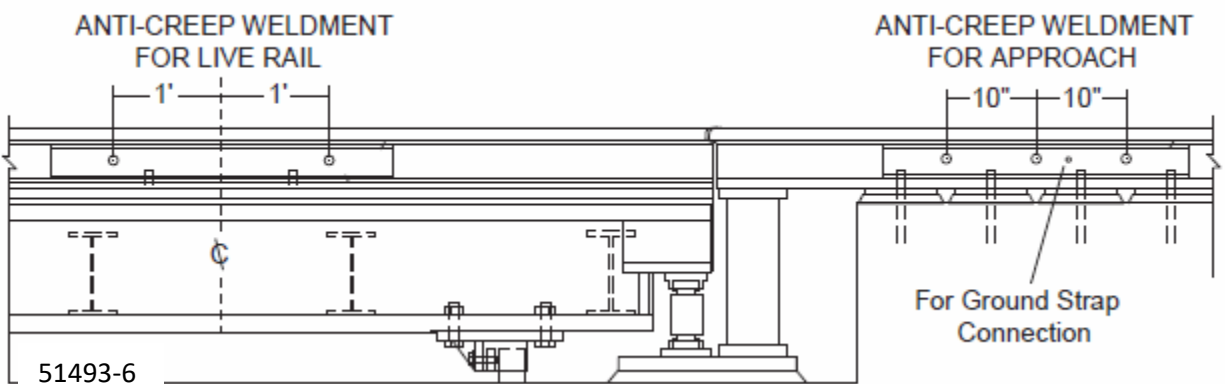
The Scale is designed to accept a 115 lb. rail with Foster #62 rail clip. The approach rails and Scale Weigh Rail should be the same weight. The approach anchor bolts, approach rail plates, rails, rail clips, and anti-creep devices are all optional items. They can be supplied by Thurman Scale when ordered as accessories, otherwise they are not supplied.

Positive means must be provided to prevent the creeping of the approach rails and to maintain a clearance which shall be not less than 1/8 inches or more than 5/8 inches between the approach rails and the weigh rails. Switch points are highly recommended for the purpose. A minimum of seventy-five (75) feet of tangent track at each approach is required by the A.A.R. (Association of American Railroads).

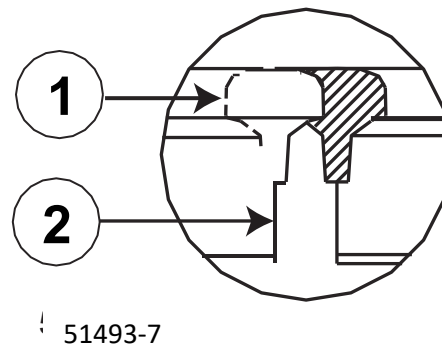
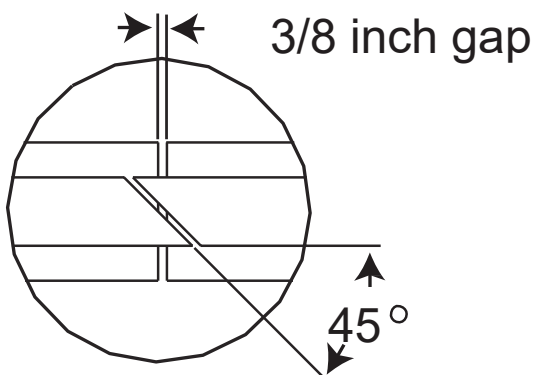


Anti-creep devices are constructed of angle iron with a flat iron weldment to fit to the rail as shown above, the rail is side drilled through its web and bolted to the anti-creep device, effectively securing it from any movement.

The AAR Scale Specifications state that the rail on the approach and the weighbridge shall be properly anchored to prevent creeping of the rails. This is done in order to maintain the proper gap between the approach rail and the weigh rail.



Rails should be miter cut at the ends of the weigh rails and approach rails to assure a smooth transfer of wheels in order to reduce impact loading to the scale.



1.4. Regulations:

This Scale is designed and manufactured in accordance with regulations established by Handbook 44 as adopted by the National Conference of Weights and Measures (NCWM), the American Association of Railroads (AAR), and the National Institute of Standards and Technology (NIST). If the Scale is intended to provide weights to the serving railroad for revenue, it shall be installed, repaired, tested, and maintained in accordance with the Association of American Railroads Scale Handbook, which contains the rules and specifications for the construction and maintenance of track scales for the weighing of railroad vehicles.

Excerpts from the Association of American Railroads Scale Handbook

Location: Scale shall be so located that an adequate foundation and at least 75 feet of tangent track at each approach to the weigh rails can be provided.

Elevation: In areas with poor drainage, the scale shall be raised to such an elevation that drainage of the surface water shall be away from it. Means shall be provided to prevent accumulation of water at the scale site. Solutions for saturated areas with poor drainage shall be determined by a competent soils engineer.

Drainage: The pit floor shall be pitched to a common point for drainage and shall be smooth and free from pockets in which water may stand. If the pit floor is below substrate water level, the pit shall be drained from its lowest point into a sump adequately equipped with automatic means for removal of water as it collects.

Footings or Piers for loadcells: Concrete footings or piers supporting load cell base plates shall not be less than 18 inches thick. Their tops shall be above the floor a sufficient distance to prevent the accumulation of water around or under the base plates.

Pit floor: The floor of the pit may be a mat of concrete approximately as thick as that required to support the load cell base plates or, if local conditions permit, the thickness may be reduced to no less than 6 inches.

Ventilation: All scale pits shall be ventilated to meet the needs of each particular case to minimize the relative humidity in the pit and to retard corrosion of scale parts and structural steel.

Entrance to the Scale Pit: Suitable access to the Scale pit shall be provided. The entrance shall be closed by a suitable closure fastened to prevent the entry of unauthorized persons.

Bearing Pressures Under Foundations: The bearing areas of the foundation footings shall be such that the pressure under the footings will not exceed:

For fine sand and clay 4,000 lb. per square foot
For coarse sand or hard clay 6,000 LB per square foot
For boulders or solid rock 20,000 LB per square foot

If the soil does not have a bearing capacity of at least 4,000 lb.. Per square foot, and its bearing capacity cannot be increased by drainage, stabilization, or other means, pile foundations shall be provided. Careful soil exploration, including borings, is always desirable.

Leveling: Load cell assemblies shall be raised or lowered, as required, by means of leveling screws, shims, or other methods to bring the weighbridge into level transversely and on grade longitudinally. After leveling the load cell baseplates, to a tolerance of not more than 0.015 inches per foot, they shall be grouted as required.

Scale House Design: Except where the indicating elements are mounted in a separate building, a Scale house large enough to install, observe and service the indicating elements shall be provided. It should have windows of sufficient size and so located as to give the weigher an unobstructed view of the Scale deck and approaching cars or trucks.

Where a special scale house is required, a suitable and substantial building shall be provided. To insure proper operation of the indicator and/or recorder, the house shall be equipped with proper environmental control.

Scale House Location: The lateral clearance between the Scale house and centerline of Scale or any track shall not be less than 8 feet, unless otherwise required by law, or the serving railroad.

Indicator - Recorder Shelf: If a shelf is required for mounting the indicator and/or recorder, it shall be so located as to provide for ease of operation without obscuring the weigher's view of the Scale deck and approaching cars or trucks. The shelf must not limit ready access to the instrument for maintenance purposes.

Power Source The power source of the electronic instrumentation and load cell circuitry shall conform to the following:

Voltage - 115 VAC +/- 10 v
Frequency - 60 Hz, +/- 0.25 Hz

The power source must be reasonably free from harmonics and electrical transients. Fusing shall be provided at 15 amp unless otherwise specified by the manufacturer. The power source shall be a separate circuit back to the distribution transformer. One

side of the 115 V power source shall be at a ground potential.

Power surge protection shall be provided for load cells and instrumentation circuit.

Adequate protection of shielding should be provided to eliminate radio frequency and electro- magnetic interference. The scale must satisfy the tolerance requirements when the scale equipment is subjected to RFI and EMI influences.

Cabling: All cabling between loadcells, junction boxes, and electronic instrumentation shall conform to the following:

All cable shields shall be interconnected and carried to a single ground. This should be a separate ground from the power source ground and be provided for the loadcells and instrumentation circuits only. It should be a copper rod which, when possible, is driven to the depth of the water table.

The connection between the ground rod and the common ground point of the load cell and instrumentation circuits shall be made with copper wire, or the equivalent, of No. 10 gauge or larger.

All cable shields in the load cell circuits shall be grounded at one end only.

Load cell cables shall be physically separate from power cables and never run in the same conduit system.

(NOTE: A 24 inch to 36 inch separation is required by Thurman Scale)

All cable connections, junction boxes, etc., in the load cell circuits shall be properly protected against the effects of moisture.

All multi-conductor cabling shall be color coded or provided with other means of identification of the individual conductors.

Cables from the loadcells to the first junction box shall be in one unspliced length. Junction boxes shall be located near the top of the pit but not on the weighbridge. Cabling from the first junction box to a common master junction box shall be in one length unspliced.

This concludes excerpts from the Association of American Railroads Scale Handbook

1.5. Foundation Construction & Installation

Use only certified prints that are marked for the installation, customer, and scale.

All the dimensions indicated on the certified prints must be rigidly and faithfully followed during all phases of construction. There is very little tolerance for misplacements and mistakes. Pier heights are especially critical as there must be enough space for finishing grout under all stands (per certified drawings) while rails on the scale weighbridge and approach rail must be absolutely level.

Placement of foundation bolts is absolutely critical to the successful installation of the scale. The use of a template or form that matches the design called for can be used. Foundation bolts must NOT be installed at an angle, too deep, or too shallow. Very close tolerances must be met on all aspects of pit construction.

1.6. Grout Plates

The Grout plates are the foundation upon which the scale structure rests, and their level, accurate position is basic to the entire structure. Base plates must be installed at proper height and in the same plane. All grout plates must be level within .015" per foot. All pier bolts must have enough height to allow vertical adjustment of the base plate's, but not so high as to interfere or to have insufficient depth into the pier.

1.7. Rocker Column Loadcells

The 110,000 lb. capacity rocker column loadcells are designed to meet the most stringent accuracy requirements. They offer total stainless steel construction and complete hermetic sealing, making them suitable for use in the toughest of environments. They are rated IP69K.

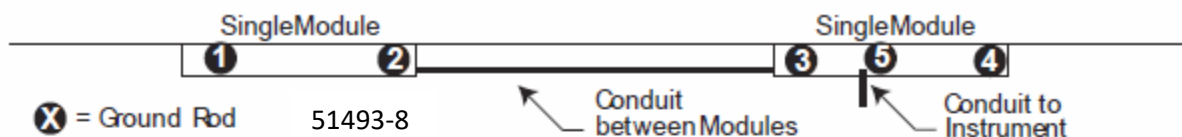
The load cell's Rocker Column design permits it to be self-aligning, always returning to its original plumb, square, and level position after loading and unloading disturbances.

1.8. Ground Rods:

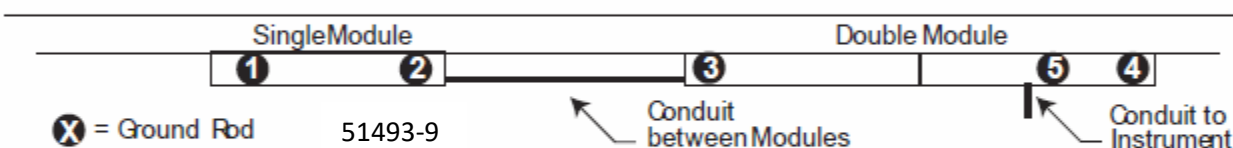
Ground rods are essential in providing protection to the electronic components and loadcells from both lightning surges and static discharges. Pit ground rods shall be tied to the foundations steel reinforcement rod (rebar) prior to pouring and shall protrude 4 inches above the pit floor.

Ground rods for approach rails shall be tied to the rebar assembly. There are five (5) rods with the locations specified as below:

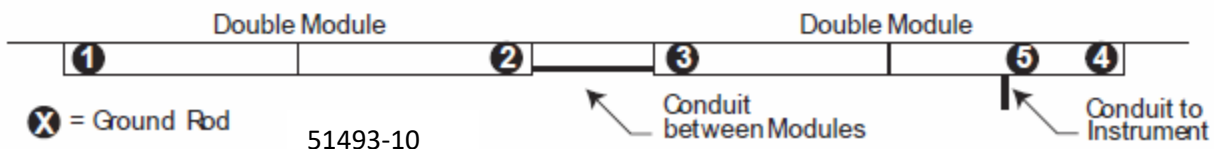
The following drawing shows correct placement of ground rods.



Above example #1: Single / Single



Above example #2: Single / Double



Above example #3: Double / Double

1: Clean all ground rod end(s) with abrasive to assure a good electrical connection. Keep all ground straps untwisted, clear of standing water, with a drip loop, and as short as possible. Secure the strap to the ground rods with the provided clamp and coat with grease.

Cover the connections to protect from condensation.

2: Connections to the weighbridge are installed by bolting to the provided bracket at the end of each Scale Module. Scrape / sand enough paint / coating away to make a good electrical connection, and coat with grease AFTER the connection has been made.

3: Ground rod #5 should be located near the interface conduit. It is used to connect to the isolated ground of the Pit Power Supply (PPS) Acc 2001-1 only.

4: #1, ,2, 3, 4, and 5 Ground Rods are provided. These should be installed and correctly connected with ground braid to the Anti-creep assy's with the provided

hardware. Refer to illustrations 51493_5, 51493_6, and Appendix VII. Ground rod connections 6, 7, and 8 are not shown and are not provided by Thurman. Refer to 2-K: Grounding on page 30 for further details.

Section 2: INSTALLATION

2.1. General Service Policy

Prior to installation, it must be verified that the equipment will satisfy the customer's requirements as supplied, and as described in this manual. If the equipment cannot satisfy the application and the application cannot be modified to meet the design parameters of the equipment, the installation should not be attempted.

Overview:

1. These instructions apply to the Scale Platform only; installation procedures for instrumentation, printers and other peripherals are given in manuals specifically provided for those units. The instructions include a pre-installation checkout, which must be performed before the installation.
2. All electronic and mechanical calibrations and or adjustments required to make this equipment perform to accuracy and operational specifications are considered to be part of the installation and are included in the installation charge. Only those charges which are incurred because of the equipment's inability to be adjusted or calibrated to performance specifications may be charged to warranty.
3. Absolutely no physical or electrical modifications are to be made to this equipment. Electrical connections other than those specified may not be performed, and no physical alterations (mounting holes, etc.) are allowed.
4. The installing technician is responsible to make certain that personnel are fully trained and familiar with the capabilities and limitations of the equipment before the installation is considered complete.

2.2. Pre-Installation Checklist:

The following points should be checked and discussed with the Area Sales Manager and/or customer, if necessary, before the technician goes to the site to install the equipment.

1. Has the customer's application been checked to make certain that it is within the capabilities and design parameters of the equipment?

2. If the installation will disrupt the customer's normal operations, is he aware and has he planned?
3. Is properly-grounded power available at the installation location?
4. Will the equipment operator(s) be available for training?
5. Has the service technician thoroughly reviewed the installation procedures?
6. Has the service technician reviewed the recommended setup with the Area Sales Manager or Area Service Manager, and identified all necessary variations to satisfy the customer's particular application?

2.3. Unpacking:

1. Check that all components and accessories are on hand and agree with the customer's order.
2. Remove all components from their packing material, checking to make certain that all parts are accounted for and no parts are damaged. Advise the shipper immediately, if damage has occurred. Order any parts necessary to replace those which have been damaged. Keep the shipping container and packing material for future use. Check the packing list.
3. Collect all necessary installation manuals and prints, including Certified Prints, for the Scale being installed.

2.4. Safety:

1. As is the case with any material handling equipment, certain safety precautions should be observed during operation:
2. Never load the platform beyond its rated capacity. Refer to the rating on the serial number plate if in doubt.
3. Ensure that any structure which supports the platform is capable of withstanding the weight of the platform plus its rated capacity load.
4. Do not load the platform if there is any evidence of damage to the platform or supporting structure.
5. Use safety chains or other suitable restraining devices if there is any possibility of the load shifting, falling, or rolling from its position on the load receiver.
6. Do not leave the platform unattended when it is loaded.

2.5. Recommended Installation Sequence:

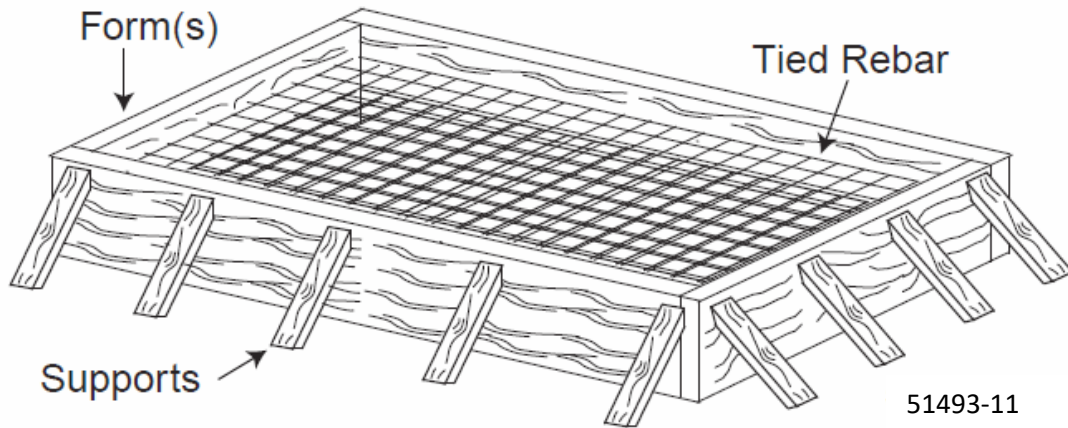
After pit is completed, follow this sequence:

1. Measure pit squareness, depth, width, and length against certified prints.
2. Measure cast-in anchors, pier elevation on all piers against certified prints.
3. Dimensions MUST be correct before installing scale hardware.
4. Using packing list, be sure all scale elements/parts have arrived intact and undamaged.

Then install:

- Grout plates
- Checking brackets
- Scale modules and associated hardware
Loadcells, Bearings, and associated hardware
Adjustments and leveling
- Forming and grouting Grout plates
- Grout Plate Assemblies
- Checking brackets
- Scale modules and associated hardware
Loadcells, Bearings, and associated hardware
Adjustments and leveling
- Forming and grouting Grout plates
Check bracket adjustment
Grounding
- Rail and anti-creep devices
- Complete wiring of load cells
- Instrumentation and any peripheral equipment
- Calibration and testing

2.6. Foundation Construction & Installation



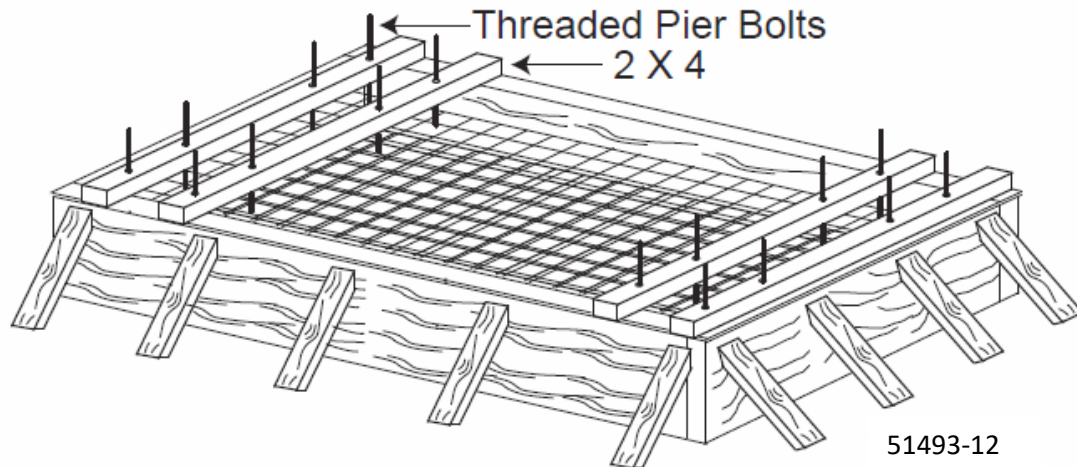
Above: Preparing forms for the slab, upon which the 2000 Series Rail Module(s) will be installed.

Use only certified prints that are marked for the particular installation, customer, and scale. All the dimensions indicated on the certified prints must be rigidly and faithfully followed during all phases of construction. There is very little tolerance for misplacements and mistakes.

Pier heights are especially critical as there must be enough space for finishing grout under all stands (per certified drawings) while rails on the scale weighbridge and approach rail must be absolutely level.

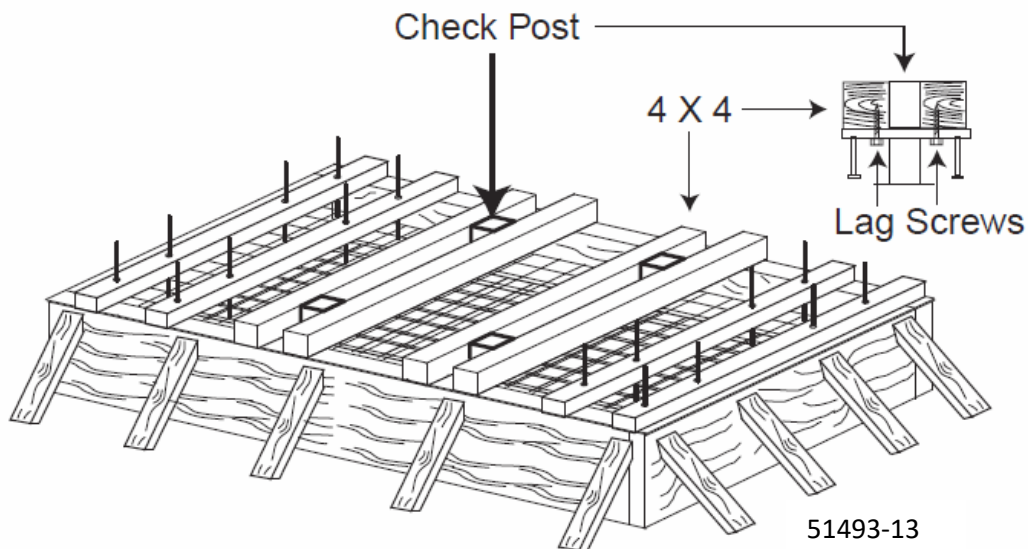
Placement of foundation bolts is absolutely critical to the successful installation of the scale. The use of a template or form that matches the design called for can be used. Foundation bolts must NOT be installed at an angle, too deep, or too shallow. Very close tolerances must be met on all aspects of pit construction.

NOTE: The installation and finishing of poured concrete is best left to trained, well equipped, and experienced personnel.



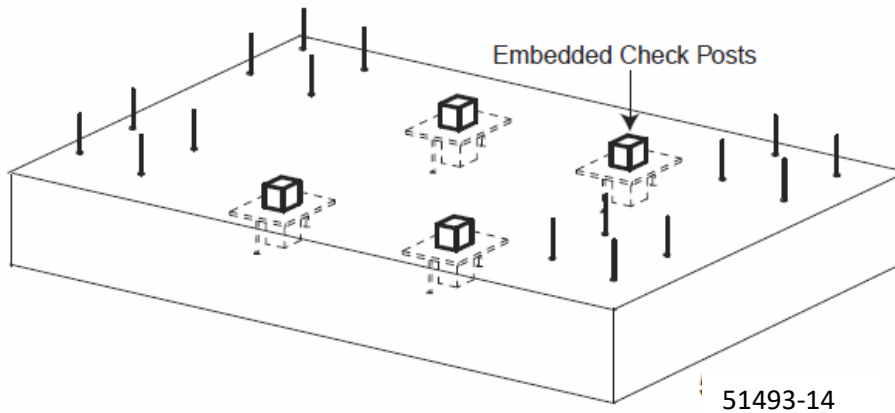
The use of a form to securely hold the threaded pier bolts in the correct position is highly recommended.

For exact dimensions, refer to the CERTIFIED PRINT.



Check Posts limit the platform movement, and also serve as a safety pier. They are designed to be embedded in the poured slab / foundation. Check Posts weigh approximately 70 pounds.

After building, supporting, and securing the main forms, the Check Posts are securely fastened to 4 X 4 with Lag screws. They are then placed and secured into position as shown. For exact dimensions, refer to the CERTIFIED PRINT.

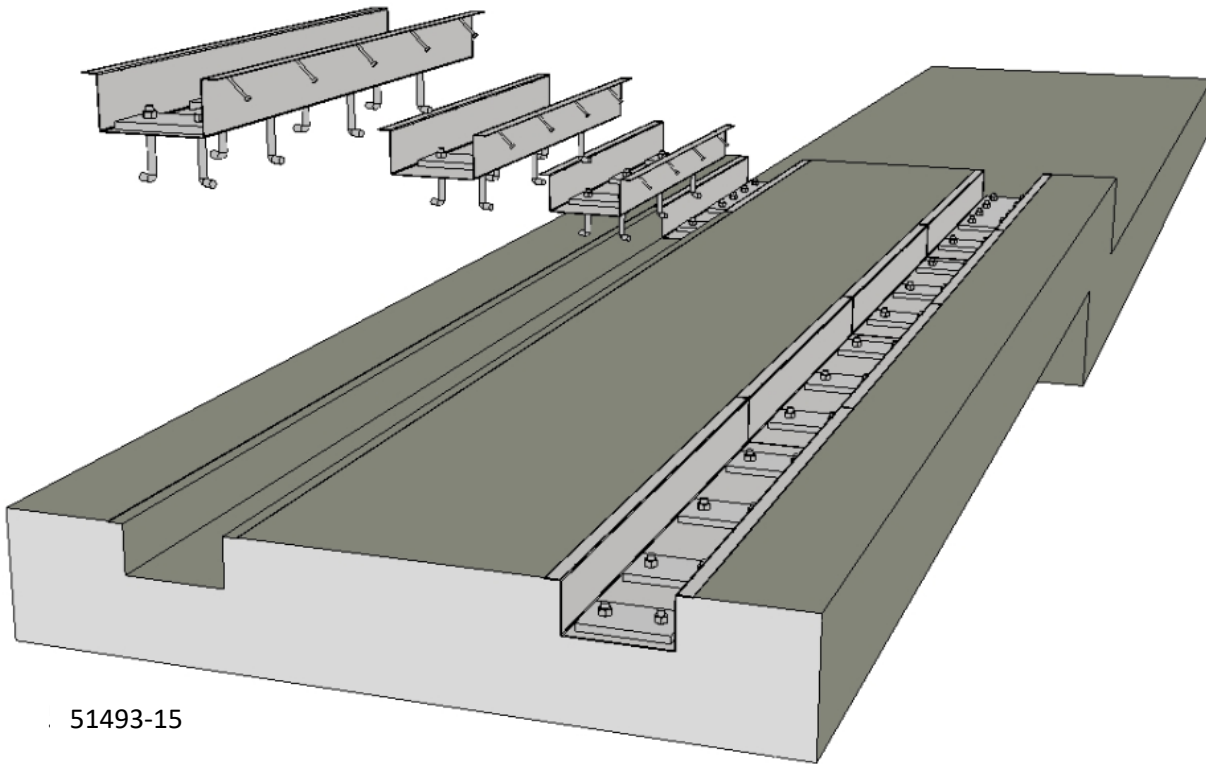


When the poured slab / foundation has been cured, remove 4 X 4's, forms, and lag bolts.

2.7. Rail Troughs

If the optional Rail Trough kits were provided, use them during the forming and pouring of the approaches and dead spans to reduce time and materials required.

Once the outer form for the approaches and/or dead spans are placed, use 4x4 beams to hang the rail troughs in proper place, ensuring the anchors are all aligned correctly. Adjust the alignment as needed to ensure that the troughs are perfectly aligned according to the provided drawings. See the following drawing, 51493-15.



51493-15

Once the foundation is poured and cured, remove the forms and save the anchor nuts for final rail installation.

2.8. Foundation Inspection

Excerpts from Thurman Scale form FF-2267; Foundation Field Check list

A Foundation Inspection should ALWAYS be performed prior to Scale installation, to confirm the Foundation is constructed correctly and is ready for installation. If possible, this should be done prior to the scale shipment.

TOOLS REQUIRED:

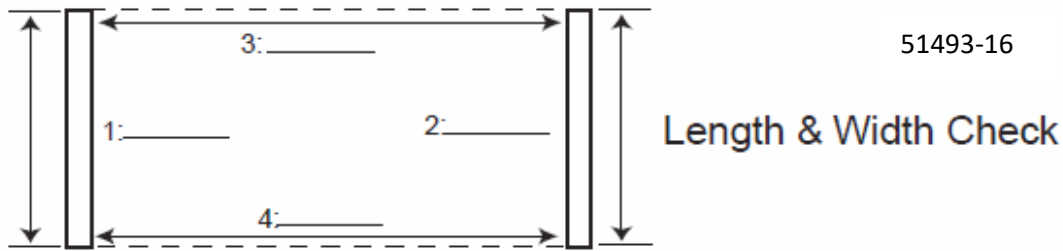
- Certified drawings and site plan
- 25' & 100' steel tape measures
- Hacksaw
- String Line (construction string)
- Construction Spray Paint (upside down type, for marking concrete)
- 2' to 4' level
- Hammer and concrete nails
- Laser or builders level if possible
- Straight edge for pit foundations

Perform the following Foundation checks. It is recommended to keep a copy of the check list with the job file. ALWAYS familiarize yourself with the CERTIFIED FOUNDATION PRINTS for the job you are working on as model numbers and their specifications are subject to change.

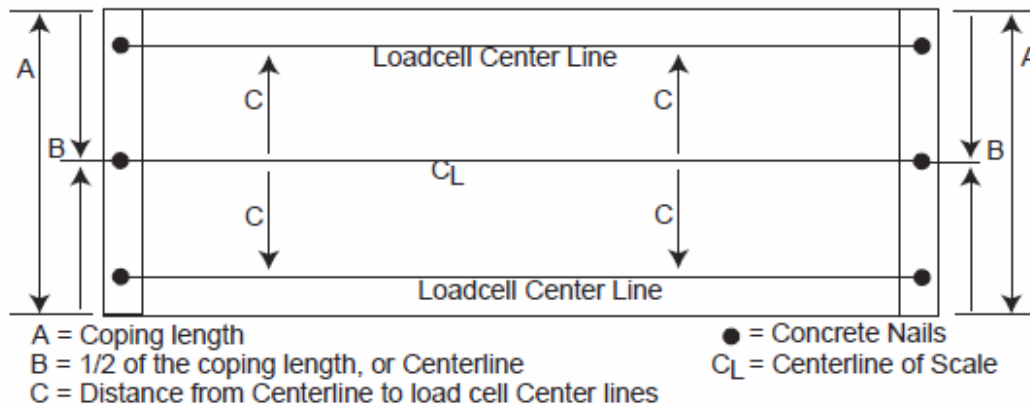
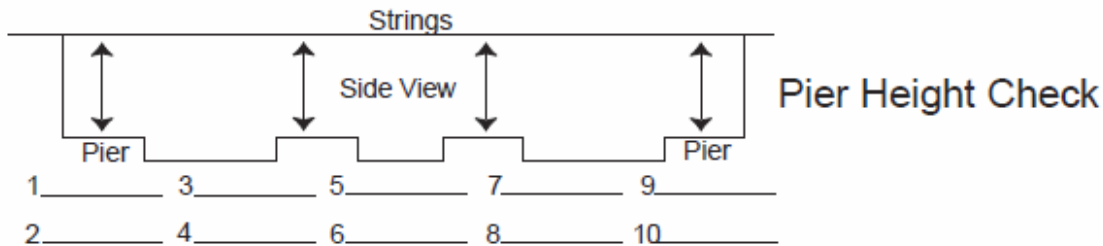
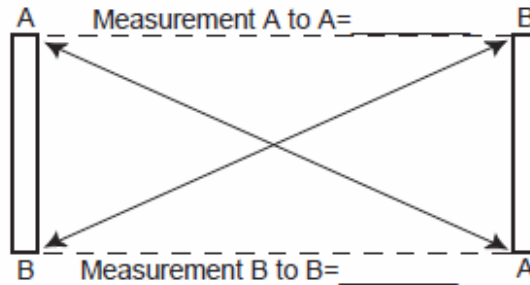
1. Site Plan and Certified Prints should be thoroughly reviewed to confirm accurate locations to the scale and all extra items (scoreboards, lights, poles, etc.) that are included.
2. Check for truck and crane access, overhead wires, fences, green concrete, etc.
3. Dimensional length and width check; check all 4 sides and record on chart.
4. Diagonal measurements check to verify that the Foundation is square and record on chart. These measurements should be equal, or within ½ inch. Greater error could result in the scale not fitting in the Foundation.
5. Check ALL pier heights to make sure they are at the correct elevation and record on chart.
6. Check the pit walls to verify they are straight.
7. Verify Ground Rod locations.
8. Verify conduit locations and pull strings.
9. Verify that drains and sump openings are piped correctly are clear of debris.
10. Check the end coping to ensure they are centerline and that the coping is correct for the scale being installed (10', 11', 12', width, etc.). Check all coping, side and end, for hollow areas.
11. Verify location(s) of any and all required embeds

Record all measurements and observations. Physically mark any discrepancies with the marking paint. Do not proceed with Installation until corrections have been made.

2.9. Foundation Inspection Check List

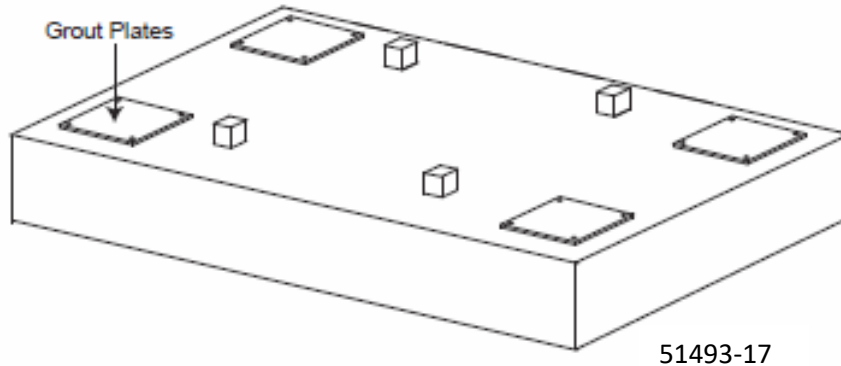


Diagonal Measurements Check



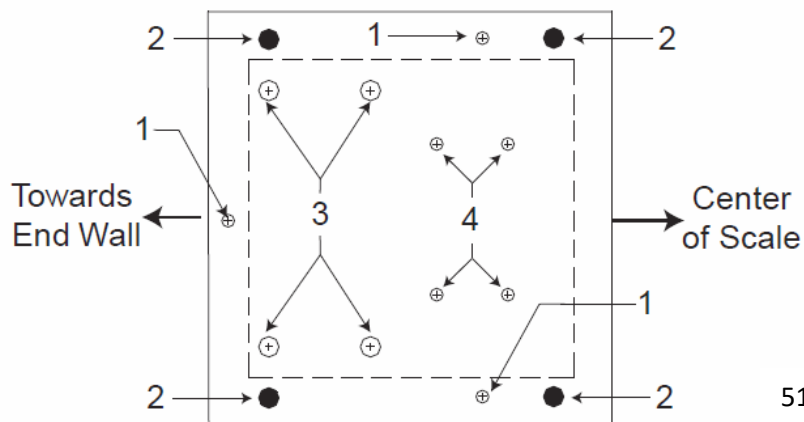
2.10. Grout Plate Assemblies:

CAUTION: Base plates weigh approximately 180 lb. apiece. Work Safely.



51493-17

1. Clean the top of the piers thoroughly, and ensure they are free of any oil or grease deposits. Clean the threads of all base plate pier bolts with a wire brush, using a thread file to restore any damaged threads. Lightly oil the threads, and ensure the threads are clean and in good condition by running a threaded nut down and up the threads of the bolt. Remove all nuts from the pier bolts.
2. Place several short lengths of wooden 2 X 4's or 4 X 4's in the center of the pier bolts.



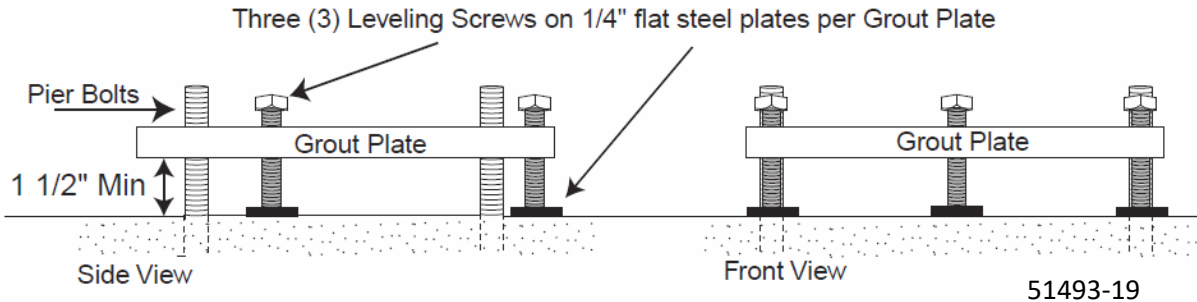
51493-18

ABOVE: End Grout Plate

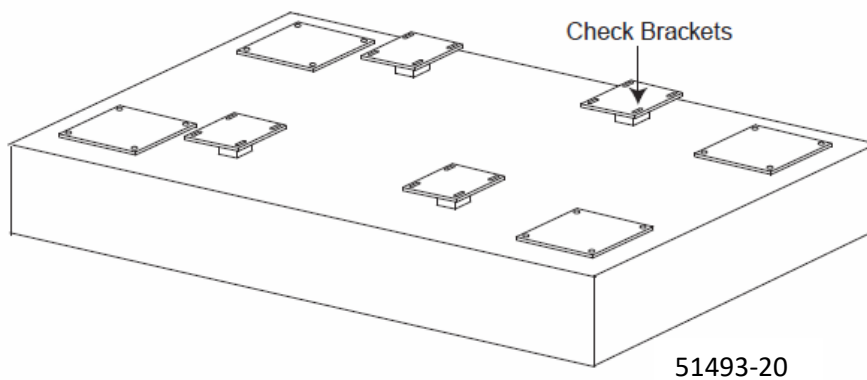
- 1 = Leveling Screws
- 2 = Pier Bolt Mounting Holes
- 3 = Approach Rail Column Bolts (1-8" bolts)
- 4 = Load Cell Base Plate Bolts (3/4-10" bolts)

3. Per the Certified Prints, identify and locate each Grout Plate. Noting the correct orientation, place the Grout Plate onto the wooden blocking on the pier, guiding the 4 pier bolts into the 4 corner holes of the grout plate.

NOTE: Double Module (25') Scales are three (3) Section Scales that use six (6) Grout Plates. The Center Section Grout Plates are arranged differently than the ends. Locate and install these plates per the certified print.

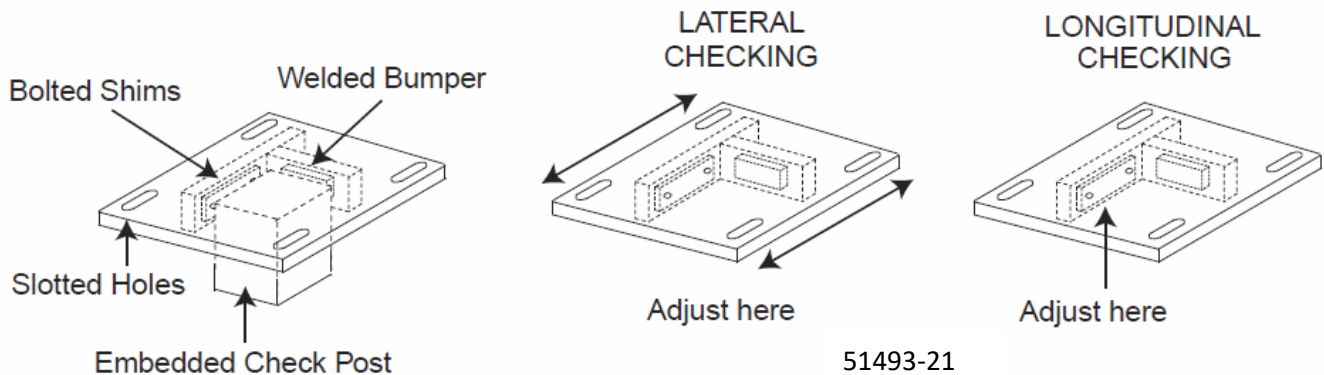


4. Insert greased leveling screws into the provided tapped holes in the Grout Plates, and place a cut piece of 1/4" Flat Steel under each leveling screw. Adjust each screw to raise the plate off of the blocking a minimum of 1 1/2", and to approximately level the plate. Remove the blocking from underneath the Grout Plate.
5. Set all grout plates to the proper height per the Certified Print and level them by turning the leveling screws. Tighten the grout plate anchor bolts tight enough to ensure they do not shift.



6. Set the check brackets over the check posts embedded in the foundation floor. There are two (2) different check brackets, for LEFT and for RIGHT.

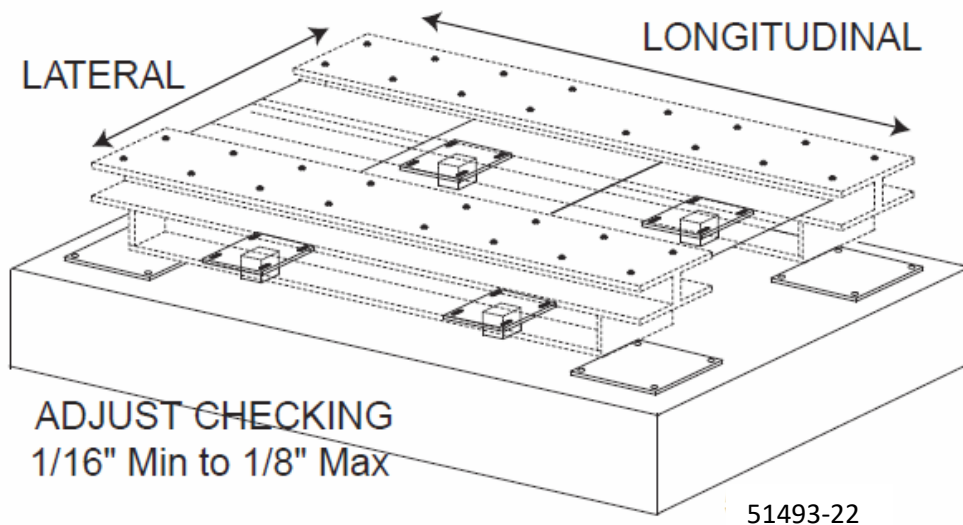
Refer to the **Certified Prints** for proper check bracket placement.



The Check Brackets are designed to limit and restrict the Scale Modules movement for 360 degrees. When they are properly adjusted, they will limit any movement from a minimum of 1/16" to a maximum of 1/8".

Each Check Bracket is provided with slotted mounting holes that are three (3) inches long. To adjust lateral checking (side to side), slide the entire check bracket sideways and retighten.

To adjust longitudinal checking (end to end) install or remove three (3) different sized shims and retighten the two securing bolts.

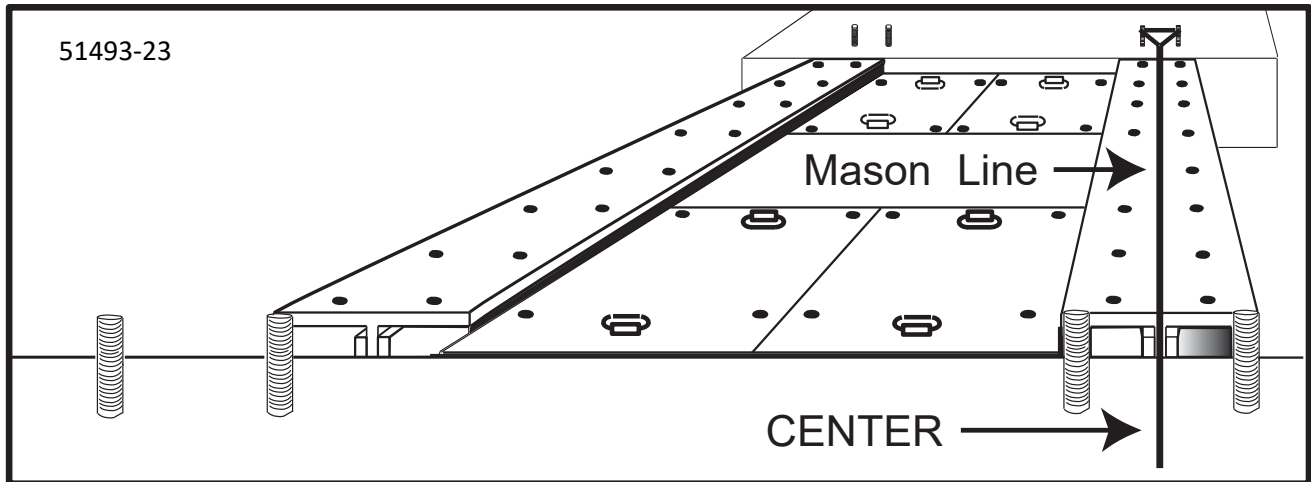


7. Place wooden blocking and cribbing material suitable for supporting each module into position near each pier and grout plate. Each section will require four points of support, therefore arrange the placement of these supports accordingly. It is recommended to set

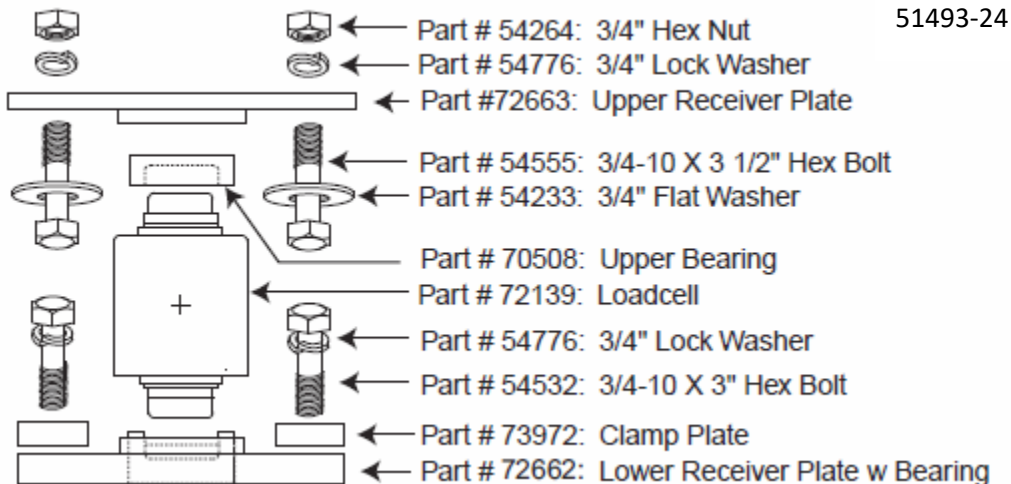
blocking to support the module 1 to 2 inches higher (than the certified prints indicate its final elevation should be) at this time.

8. With a crane and rigging (4 leg drop) of suitable capacity, install each module onto the supporting blocking.

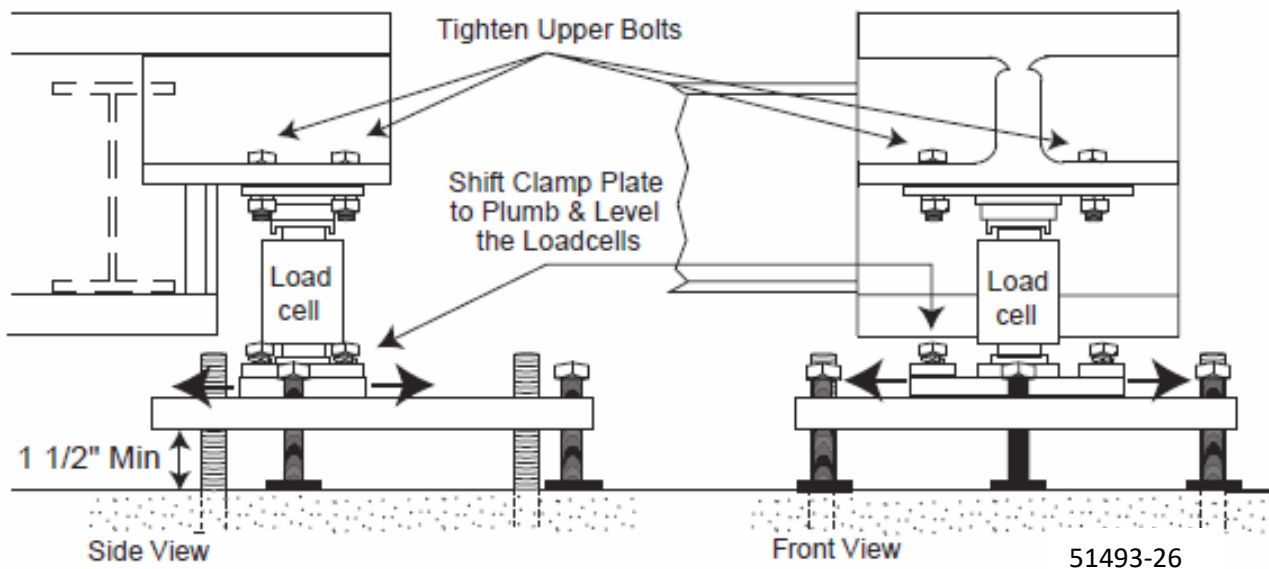
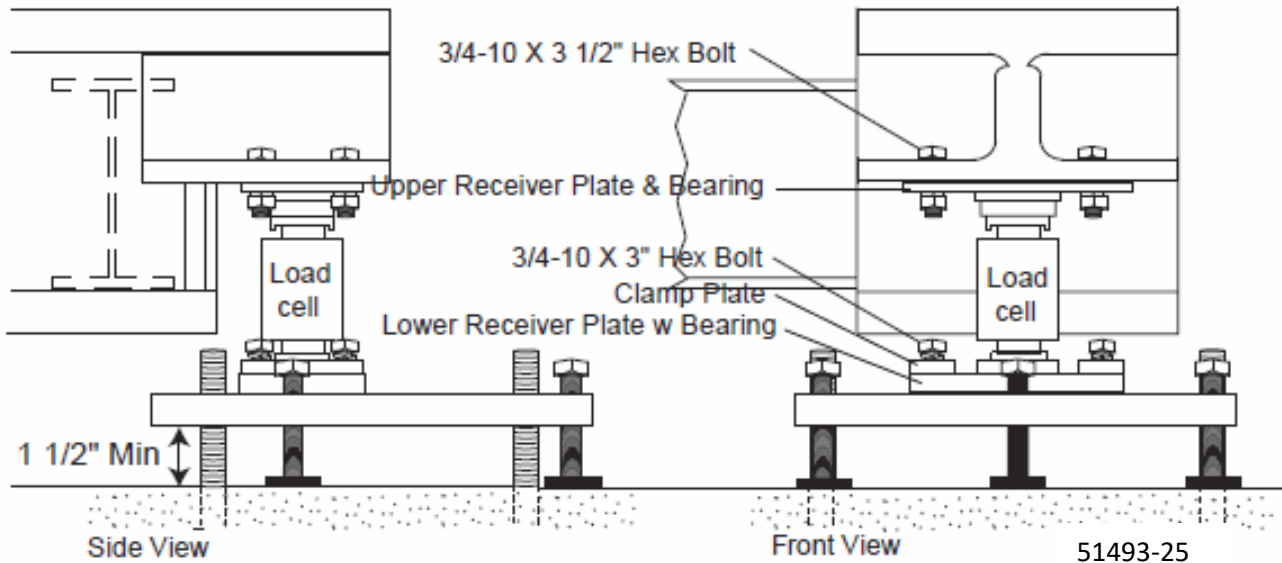
NOTE: On pit installations, remove the access panels on the module(s) before setting.



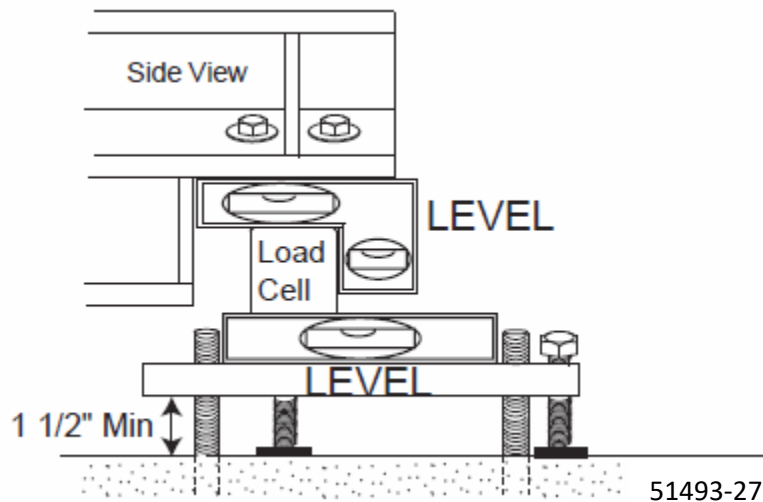
9. Set up a mason line to check and ensure that the centers of the main beams are centered on the approach anchors in the concrete approaches for the entire section. Ensure that the scale module(s) are centered both laterally and longitudinally on the foundation and approaches.
10. When the weighbridge is properly positioned and centered, bolt the check brackets to the Weighbridge. Adjust ALL checking brackets using the provided shims to prevent the scale from moving in any direction.



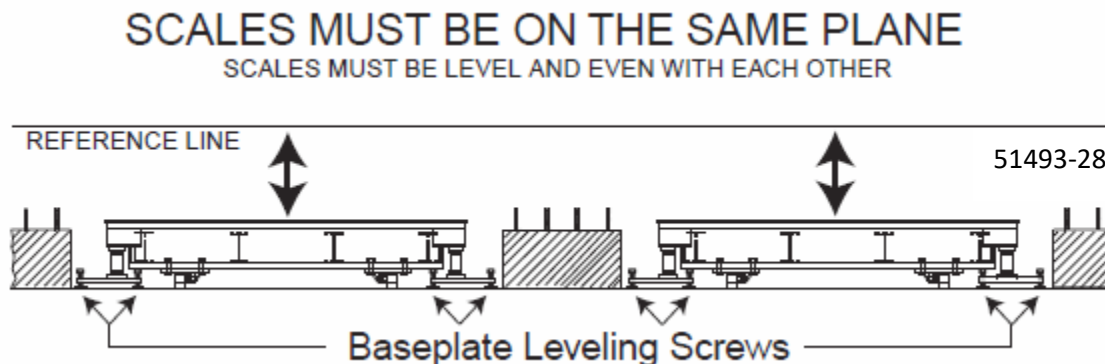
- 11.** Locate the above listed parts and place them at each Grout Plate's location. When assembling, care should be taken to apply grease to the upper and lower cups and bolts to enable future disassembly and to minimize wear.



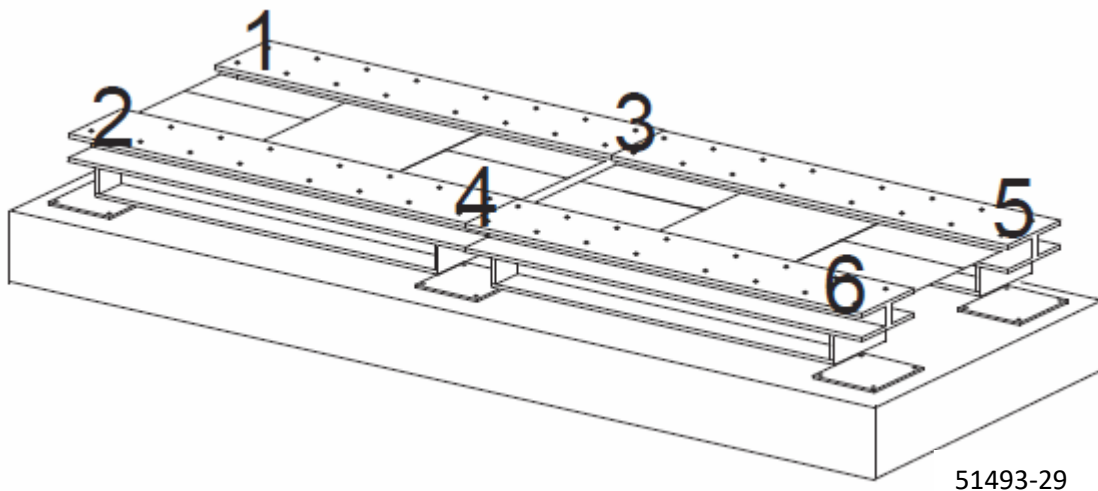
12. Beginning with an end Section, position a suitable capacity jack to raise and lower the module corner as needed. Install and tighten the upper receiver plate to its final torque value. Grease and install the upper bearing, the lower receiver plate, clamp plates, and bolts, leaving the bolts loose. Install the load cell by inserting the top of the load cell in the upper cup, then slowly lowering the module and guiding the bottom of the load cell into the lower cup. Reset the blocking so the load cell supports the corner, but **do not remove the blocking at this time.**



13. Plumb the load cells by lifting the weighbridge up slightly and shifting the load cell base plate on the grout plate. Use a machinist's level to align and ensure a plumb and level condition.
14. When load cell is plumb and level, tighten the lower receiver plate bolts to their final torque value. Repeat for all loadcells in the scale.

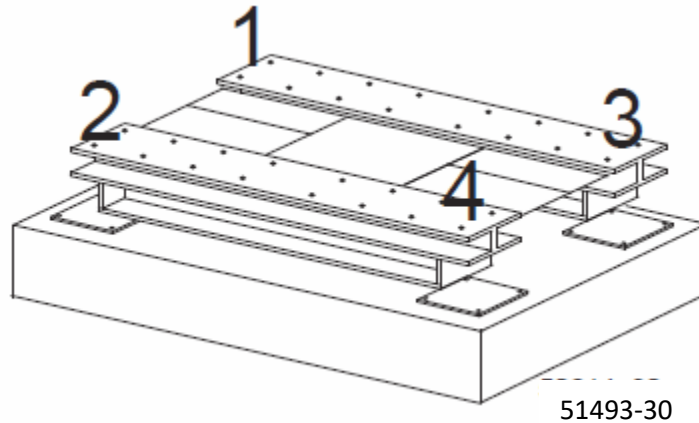


15. When the weighbridge is completely set on plumb load cells, ensure ALL modules are on the same plane. If necessary, loosen the grout plate pier bolts and adjust the three (3) leveling screws in each grout plate. When complete, re-tighten the grout plate anchor bolts tight enough to ensure they do not shift.
16. Double module installations contain a middle section. For the middle sections, the elevation reference is both the absolute level of the main beams with respect to the end sections, and the equal loading of the loadcells that support the middle of the scale. Adjust the grout plate leveling screws to level the modules. Alternately, a transit can be used to compare and maintain elevation, and a tightly stretched mason line.
17. Providing a suitable power supply to connect to the loadcells, measure and record the mV/V output from each load cell in the scale. The resulting readings will indicate the current weight distribution of the scale's deadload among the six (6) points of support. The outputs will be greater for number's 3 and 4 because there is physically more deadload weight upon them.



This final grout plate elevation adjustment should be made to match the mV/V outputs of the load cells to assure correct distribution of the scale's deadload among the six (6) points of support. Adjust the grout plate leveling screws (equally) to match loadcells 1, 2, 5, and 6. Then adjust to match loadcells 3, and 4. When this has been completed, ensure each load-cell grout plate is level to within .015" per foot.

NOTE: The load cell numbering sequence shown is designed for interfacing Thurman INTALOGIX technology instrumentation.



Single modules are supported by two sections, or four load cells. A final grout plate elevation adjustment should be made to match the mV/V outputs of the load cells to assure correct distribution of the scale's deadload among the four (4) points of support. Adjust the grout plate leveling screws (equally) to match loadcells 1, 2, 3, and 4. When this has been completed, ensure each load cell grout plate is level to within .015" per foot.

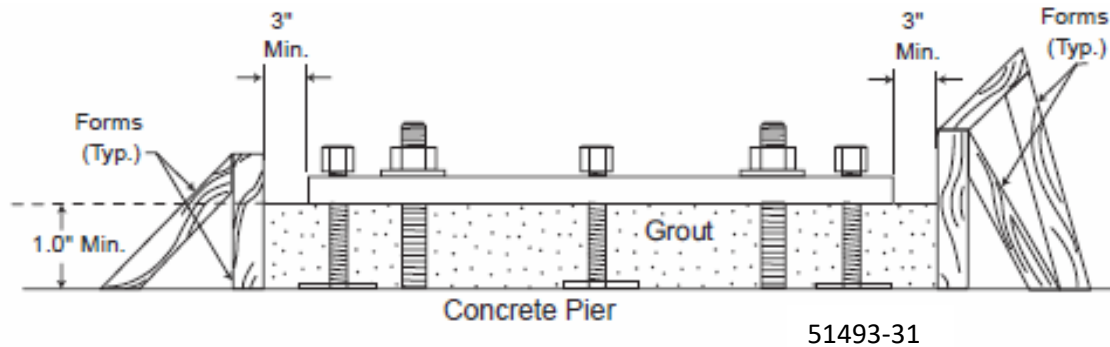
NOTE: The load cell numbering sequence shown is designed for interfacing Thurman INTALOGIX technology instrumentation.

18. Perform a final check to all:

- Load cell grout plates are level to within .015" per foot. All Load cells are vertical and plumb
- Top flanges of the main beams are absolutely level and on the same plane as the end sections.
- There is correct distribution of the scale's deadload among the loadcells. All assembly hardware is secure and tight.
- When complete, recheck to ensure all Grout Plates and Loadcells are plumb, square, and level.

2.11. Grouting the Grout plates:

Grout becomes the base which supports the entire structure. Grout **MUST** be fully supporting the grout plates with NO gaps or spaces. A good method is to build the forms slightly bigger than the plate to permit the pouring and the rising of the grout mixture. The pier should be thoroughly saturated with clean water for a minimum of 4 hours. This will both prevent the dry pier concrete from absorbing water from the mix as it is poured, and greatly enhance the ability for the grout mix to bond with the pier.



1. Grout selection:

- Grout shall be precision, packaged dry, non-metallic, hydraulic, non-shrink, and non- gaseous.
- Grout shall meet or exceed ASTM C-1107 and Corps of Engineers CRD-C621.
- Grout shall be bleed free and attain a minimum of 5000 psi compressive strength in 28 days at flowable consistency.
- Grout **MUST** be mixed to a flowable consistency as specified by the grout manufacturer.
- Do not permit any loads upon the scale until the grout has reached the compressive strength of 2500 psi per the grout manufacturer's instruction.

2. Surface preparation:

- Surfaces to be grouted shall be free of loose debris, grease, oil and other contaminants.
- Contaminant's shall be removed using caustic soda or other approved concrete cleaners.
- All surfaces shall be flushed with clean water.
- Prior to pouring, all surfaces should be saturated with clean water for a minimum of 4 hours.

3. Forming:

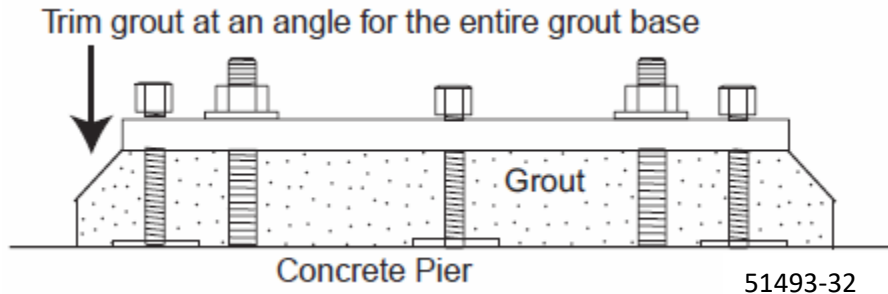
- Forming must be completed and installed before starting to pour grout.
- Forms shall be slightly larger (three to four inches) than the dimension of the grout plates.
- Forms shall be of sufficient strength, anchored properly, and sealed. Seal with caulk and use a form release agent on forms if required. Leave access for pouring grout in a convenient place.

4. Mixing and Pouring:

- Mix grout per instructions on bag until a very smooth, pourable mix is obtained.

Be sure you mix enough quantity for the form you are filling.

- If necessary, use a large funnel or cone to direct mix into form and under stands.
- • Pour the grout mix from one end until it fully reaches the other side and rises to fill the form completely. By using this method, there will be no gaps or air pockets. Vibrators are not recommended due to the danger of disturbing the placement of the load cell base plate(s). Ensure the grout mixture totally fills all voids.

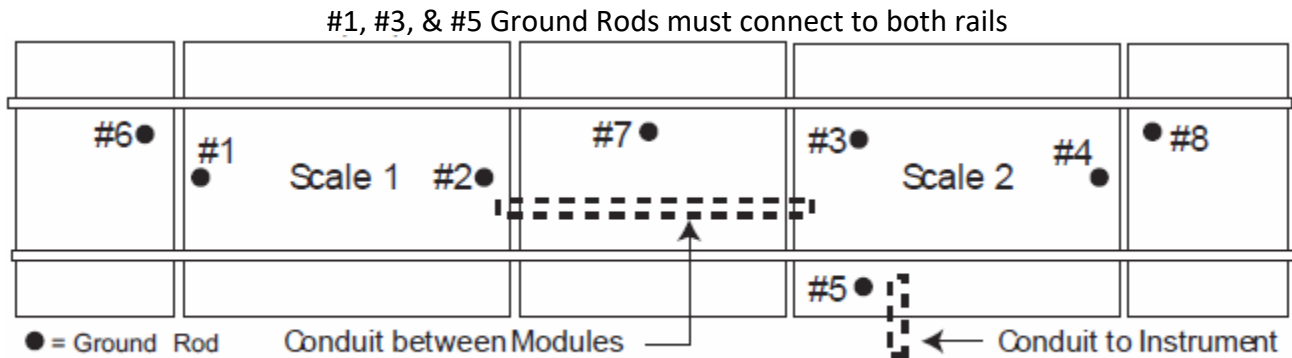


- The A.A.R. requires that IF grout extends beyond the base plate, it be sloped away from the base plates and stands so that water will not pool and saturate the metal, thereby rusting it. The form may be larger than the base or stand by about 3" on all sides. *When grout is firm but can still be shaped, angle all four sides of pour down and away from the base plate or stand.
- Do not allow any movement before grout is completely set. When grout is fully cured, remove forms.
- When forms are removed, remove base plate leveling screws completely and discard them. Fill the empty holes with silicon caulking. Tighten all load cell base plate pier bolt nuts to 250 Ft pounds
- Bolt the approach rail columns to the grout plates
- When the grout has cured per the grout manufacturers instruction, the scale is ready for testing and service.

1. Remove all grout forms.
2. Remove all leveling screws from the base plates. Fill the empty holes with rubber caulking.
3. Tighten all grout plate nuts and bolts
4. Adjust and shim all Check brackets for 1/16" Minimum to 1/8" Maximum clearance. Ensure the scale modules exhibit free movement within the confines of the check brackets, and that when the scale modules are undisturbed, they do not contact the checking posts.

NOTE: If the scale leans to any one side or does NOT return to a centered position, the load cells are NOT plumb. You can ONLY plumb load cells when the scale's checking is touching ALL surfaces and the platform cannot move laterally in any direction.

2.12. Grounding



51493-33

1. Clean all ground rod end(s) with abrasive to assure a good electrical connection. Keep all ground straps untwisted, clear of standing water, with a drip loop, and as short as possible. Secure the strap to the ground rods with the provided clamp and coat with grease.
2. Cover the connections to protect from water and condensation.
3. Connections to the Scale Module are installed by bolting to the weighbridge. Scrape / sand enough paint / coating away to make a good electrical connection and secure with the provided hardware.
4. Connect the strap to the Scale Module using the provided bronze set screw terminals and coat with grease AFTER the connection has been made.
5. Ground rod #6 should be located near the interface conduit. It is used to connect to the isolated ground of the Pit Power Supply (PPS) Acc 2001-1A only. Connect the internal white ground wire from the PPS to that rod.
6. #6, #7, and #8 Ground Rods are intended to ground the approach rails. These should be installed and correctly connected with ground braid to the Anti-creep assy's (*not provided by Thurman*). Refer to illustrations 51493_5, 51493_6, and Appendix VII.

2.13. Post Installation Tasks

- Check for accumulations of solid material under the scale which may affect the accuracy, i.e., ice, frozen mud, debris.
- Check to see that the customer has cleaned under the platform regularly.
- Inspect load cells for damage to the ends/cables, check cups and "O" rings for damage and/or excessive or uneven wear.

- The load cell bearing cups should be inspected, cleaned and greased at least TWICE per year.
- Inspect and adjust all check bolts using anti-seize on the threads.
- Inspect and tighten all connecting and cover plate hardware for proper tightness.

Section 3: MAINTENANCE

Inspect the Scale and its understructure on a regular basis to ensure:

1. The approach rails and Scale rails remain securely in position and are properly fastened in place.
2. The space between the deck edge, pit coping, and rails is clear and free of material which could jam the deck and cause inaccurate weights.
3. The Scale Foundation and understructure is clean and dry. Keep the foundation and the understructure of the Scale as clean and as dry as possible. Any moisture problems should be addressed immediately to prevent steel deterioration. Structural steel should be wire brushed and painted as soon as rust appears.
4. All Load cell's and grout plates are clean and free of debris. All bolts are tight. Load cell is plumb, square, and level.
5. Drains for the foundation are clear and unblocked. Any installed automatic sump pump and discharge piping shall be in good working condition.
6. The Check brackets are in good condition and adjusted properly.
7. All junction box wire gland nuts are securely tightened, and that nylon plugs are in place in any unused gland fittings.
8. Junction box cover screws are properly tightened with a torque wrench to their correct torque specification.
9. All excess cable is neatly coiled and tied up out of any possible accumulations of standing water.
10. All cable entry and exiting points are finished with a drip loop.
11. All ground rod connections are clean, tight, and greased to protect against corrosion.

Mechanical Faults

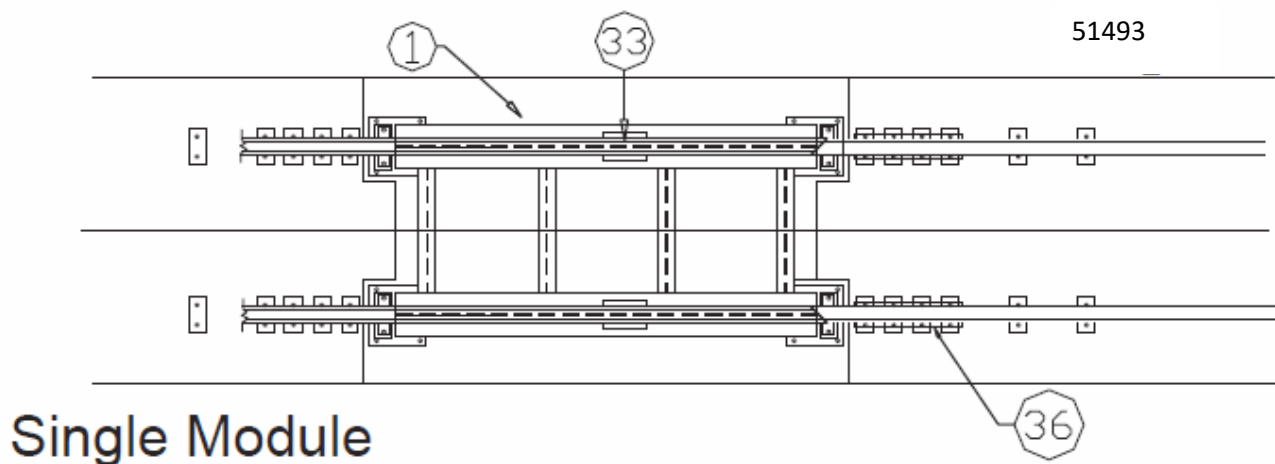
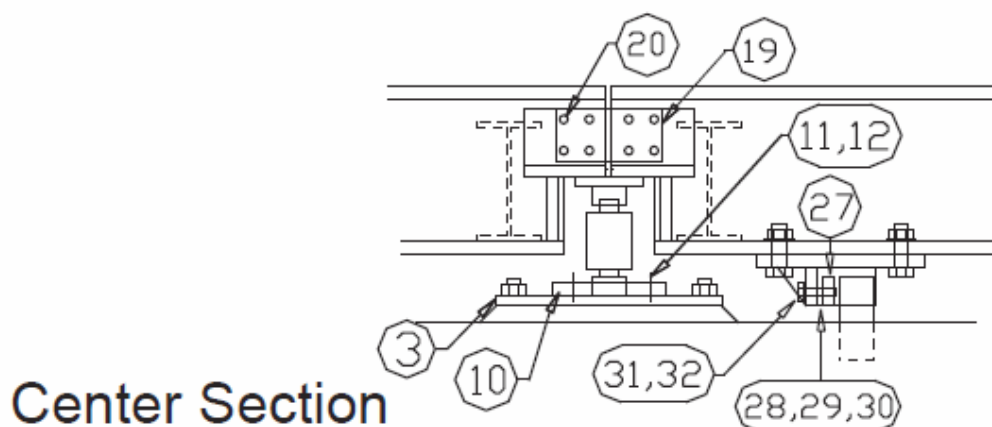
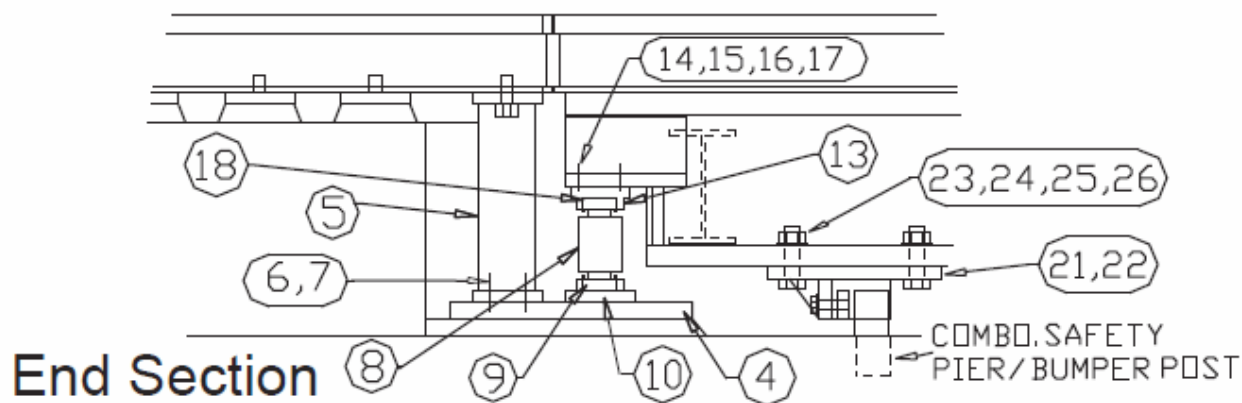
1. Check all clearances around the scale for any obstructions of interference with the free movement of the platform.
2. Check all check bolt clearances both with and without a concentrated load over each section, one at a time.
3. Check all load cells for plumb and level.
4. Inspect the boxes for leaks, the interior should be clean and dry. If there is moisture inside, clean then dry it out thoroughly. Check all connections at the terminal blocks to ensure they are tight.

Load Cell Replacement

1. Remove all power from the instrument.
2. Lift the scale using a proper sized and rated hydraulic jack(s) at the corner(s) closet to the defective load cell location.
3. Check upper and lower receiving cups. Replace as necessary and reapply grease.
4. Insert the new cell into the upper receiving cup and position the anti-rotation pin.
5. Carefully lower the hydraulic jack(s) until the cell is set into the lower cup.
6. Remove the cover of the SSC/Balance box, then loosen the gland bushing to free the cable. Remove the old cell wires and connect new cell wires in the balance Box/SSC.
7. Test and adjust scale as necessary.
8. Secure the cover.

Section 4: PARTS LIST

4.1. Parts Diagram



4.2. Parts List

Item	Part	Description
1	72681	Weighbridge Assembly (single)
2	73784	Weighbridge Assembly (double)
3	74001	Grout Plate 1 1/2" x 20" x 21" (interior)
4	72661	Grout Plate 1 1/2" x 20" x 21" (ends)
5	72689	Approach Column
6	54664	Bolt, Hex 1"-8 x 2 1/2"
7	54782	Washer, Lock 1"
8	72139	Load Cell 110K (50t), LCF-HR4020-15, NTEP CoC
9	72662	Receiver Plate, Lower w/ bearing 1" thk, Hardened RC50-
10	73972	Clamp Plate
11	54532	Bolt, Hex 3/4" - 10 x 3"
12	54776	Washer, Lock 3/4"
13	72663	Receiver Plate, Upper
14	54555	Bolt, Hex 3/4" -10 x3 1/2"
15	54233	Washer, Flat 3/4"
16	54776	Washer, Lock 3/4"
17	54264	Nut, Hex 3/4"
18	70508	Bearing, Upper 1" thk, Hardened RC 50-55
19	73785	Connector Plate, Web 1" x 4 3/4" x 9 1/2"
20	54391	Bolt, Hex 3/4" - 10" x 6" A325 w/nut
21	72674	Check Bracket, RH
22	72673	Check Bracket, LH
23	74023	Bolt, Hex 1 1/8" x 4"
24	54255	Washer, Flat 1 1/8"
25	54788	Washer, Lock 1 1/8"
26	54304	Bolt, Hex 1 1/8"
27	74003	Clamp Plate 3/4"
28	74009	Bumper Shim Plate, 1/16"
29	74007	Bumper Shim Plate, 1/8"
30	74005	Bumper Shim Plate, 1/4"
31	74024	Bolt, Hex 3/4" - 16 x 3"
32	54776	Washer, Lock 3/4"
33	72668	Anti-Creep Weldment for Weighbridge
NS*	84353	Anti-Creep Spacer, 1"
NS*	54435	Bolt, Hex 1" x 4 1/4" w/Nut
36	62145	Anti-Creep Weldment for Approach

* Not shown in the parts diagram

Parts Not Pictured:

Part#	Description Qty
59600	Cut ¼" Steel Plates (2" X 2" Square)
59795	5/8-11 X 4" Chk Stand Leveling Screw
54591	¾-10 X 6" Base Plate Leveling Screw

Weighbridge Assembly Bolts

54532	¾-10 X 3" Hex Bolt
54229	¾-10 X 3 ½" Hex Bolt A325 with Nut
54199	¾ -10 X 2 ¼" Hex Bolt with Nut.
54217	¾-10 X 3" Hex Bolt A325 with Nut
54402	1" X 3 ½" Hex Bolt A325 with Nut

Misc Hardware

54342	1 ½-6 Hex Nut (Check Rods)
54897	1 ½-6 Jam Nut (Check Rods)
58617	1 ½ Spherical Washer Set (Check Rods)
61260	1/8" X 12" X 3' Junction Box Plate
55766	¾" X 1 ¼" X 5" Bar, J Box

Grounding Kit Components

60811	¾" X 8' Ground Rod, Copper Plated,
65061	Clamp, Ground Rod
79385	Set Screw, Ground Braid Clamp
11296	5/8" ID, #8 AWG Braided Ground Strap,
58618	Ground Rod Cap, PVC
79386	5/16-18 X 1 ½" Hex Cap Screw
54224	5/16-18 Hex Nut
54760	5/16" Spring Lock Washer

APPENDIX I: RECOMMENDED TOOLS & EQUIPMENT:

- Local railroad Approval
- Certified Prints
- Service manuals for ALL equipment being installed. Lifting Device capable of safely lifting 5000 lbs or more Laser or Contractor's level (Transit)
- Hand Tools
- Mason Line
- 25 Foot tape measure
- 100 Foot tape measure
- Precision Level (Starrette Model 98 Mechanics Level, 6-inch-long model)
- Torque wrench of suitable capacity
- Thread file; Standard thread sizes of 10, 8, 7, 6. Electric drill / with bits / variable / 1/2" Chuck size Wood hand saw
- Claw hammer
- 5 Gallon buckets, with handles
- Large and small trowels
- 3/4" Socket set
- 36" Crow bar
- 24" Crow bar
- Long handled sledge hammer
- 2 Foot level, general purpose
- 20 Ton Capacity Port a Power Style Jack. Ram no higher than 6". Wire brushes
- 5 pounds of grease NLGI #2, Water resistant, Anti-wear Grease such as CRC Super White. Anti-Seize
- Caulk gun w/caulking

Required at the Jobsite:

- 117 VAC Electric Power (Extension cords as needed) Water
- Suitable crane(s)
- Rigging (I.E. Straps, 4 leg drops, etc.)

NOTE: The weight capacity of all lifting and rigging equipment must be suitable for their intended use.

APPENDIX II: MATERIALS:

- Grout shall be precision, packaged dry, non-metallic, hydraulic, non-shrink, and non-gaseous. Grout shall meet or exceed ASTM C-1107 and Corps of Engineers CRD-C621.
- Grout shall be bleed free and attain a minimum of 8000 psi compressive strength in 28 days at flowable consistency.
- Grout MUST be mixed to a flowable consistency as specified by the grout manufacturer. "
 - Quantity required will vary according to pier heights. Projected amount is 3 bags per load- cell base plate, and 2 bags per checking stand at 40lb per bag.3
- Materials and equipment for mixing the grout and water to a suitable consistency and delivering it to each grout plate.

NOTE: Pier heights other than those indicated on the certified prints will affect the quantity required.

- Wood for forming base plates and checking stands. Select unfinished pine, 1 1/2" to 2" wide
- X 12 feet long. Project quantity is one stick per base plate, and one stick per check stand. Drywall screws suitable for constructing and securing wood forms.
- Wood blocking and cribbing material, suitable for supporting the weighbridge. Sufficient quantity to provide a safe, stable support from the pit floor to the bottom of the main I-beams. Shipping weights for these scales range from 36,500 lbs to 50,000 lbs.
- Grease: NLGI #2, Water resistant, Anti-wear Grease such as CRC Super White.

APPENDIX III: TORQUE VALUES CHART AND TOLERANCES

A. Torque Values

All Values are Pounds (LB).

SIZE	GRADE 2 LUBED	GRADE 2 DRY	GRADE 5 LUBED	GRADE 5 DRY	GRADE 8 LUBED	GRADE 8 DRY
1/4-20	49 in	65 in	75 in	100 in	107 in	143 in
5/16-18	101 in	134 in	157 in	210 in	220 in	305 in
3/8-16	15 FT	20 FT	23 FT	31 FT	32.5 FT	44 FT
7/16-14	24 FT	30 FT	37 FT	50 FT	53 FT	70 FT
1/2-13	36.5 FT	49 FT	57 FT	75 FT	80 FT	107 FT
9/16-12	53 FT	70 FT	82 FT	109 FT	115 FT	154 FT
5/8-11	73 FT	97 FT	113 FT	151 FT	159 FT	211 FT
3/4-10	129 FT	173 FT	200 FT	266 FT	282 FT	376 FT
7/8-9	125 FT	166 FT	321 FT	430 FT	454 FT	606 FT
1-8	187.5 FT	250 FT	482.5 FT	640 FT	680 FT	900 FT

B. Tolerances:

Load Cell Grout Plates, level within 0.015" per Foot.

APPENDIX IV: LOAD CELL SPECIFICATIONS:

Type:	LCF-HR4020-15
COC	#97078 / Class III L, Single: 10,000 d
Safe Load Limit:	150% of Rated Capacity.
Capacity:	110,000 LB. (50t)
Height:	7 "
Input Resistance:	1150 ohms
Output Resistance:	1000 ohms
Insulation Resistance:	10 giga ohms (1000 meg ohms)
Calibration:	2 mV/V
Cable Length:	15 feet

Wiring:	Excitation (+) =
	Green Excitation (-) =
	Black
	Output (+) = White
	Output (-) = Red

APPENDIX V: GROUND ROD KIT PACKING LIST

ASSY

#	<u>Description</u>
60811	Copper Plated Ground Rod: 3/4" X 8 '
65061	Ground Rod Clamp
79385	Ground Braid Clamp
11296	Braid, Ground Shield, 5/8 ID #8
58618	Ground Rod Cap
79386	Hex Cap Screw 5/16-18 X 1 1/2"
54224	5/16-18 Hex nut
54760	5/16" Spring Lock Washer

APPENDIX VI: CONCRETE & SLUMP TESTING

Concrete is produced from the mixing of sand (fine aggregate), stone (coarse aggregate), cement and water. The water combines with the cement to form a fluid paste often referred to as "plastic". The paste is combined with the sand and stone to make a workable "plastic" concrete that can be poured, shaped, smoothed, and molded. The plastic concrete then hardens around the sand and stone forming a solid mass. Concrete in its plastic state can be formed into structures such as pavements, walls, or footings. When the plastic concrete hardens, the structures formed can then support the anticipated loads.

The reaction of water with cement is called hydration. The water to cement ratio is an important factor in the ultimate strength of the concrete and its subsequent load carrying ability. The lower this ratio is, the tighter the microscopic crystals of concrete, and the stronger the concrete will be. Fewer shrinkage cracks from excess water will also result from this low ratio.

For a given amount of cement, a smaller quantity of water will produce a higher strength concrete. Too small a quantity of water, however, will not allow for adequate mixing of the sand and stone, and will also make the concrete difficult to "work" and to form, which in turn will produce a lower strength concrete.

The amount of water in a particular concrete mixture is thus carefully selected to balance the desired strength of the concrete. Whether a "soupy" mix, or "firm" mix, the ability of the concrete to be shaped, worked, and placed is called fluidity. The slump test is a quality control measure of the fluidity of the concrete mixture.

The procedure for the slump test is covered in ASTM (American Society for Testing & Materials) Document C-143 from a sample of concrete obtained per ASTM C-172. The slump is measured in inches. The measured slump is then compared to the desired specifications.

The equipment for the slump test is usually a metal cone, a metal base plate and a metal rod. The "cone" is 12 inches in height, 4 inches in diameter at the top, and 8 inches in diameter at the bottom. The slump test must be performed within 2 1/2 minutes after obtaining the sample.

1. The cone, base plate, and rod are moistened with water.
2. The cone is placed on the base plate with the 8" opening at the bottom.
3. The cone is filled in three (3) equal layers.
4. Each layer is rodded 25 times to settle the concrete, before the next layer is added.
5. The cone is then pulled straight up and off the sample. The cone must come off within 3-7 seconds for an accurate test, per ASTM standards.

6. When the cone is removed, the concrete mixture "slumps" down. It is then measured to determine how far down it has slumped and compared to specification.

The slump test is a direct measure of the amount of water in the mixture, unless ADMIXTURES are added. Admixtures are liquid chemicals added to concrete to make it easier to place without the reduction in strength adding water would cause. Admixtures of this type are known as "plasticizers" or "water reducers", and adding them to the mixture will either make the concrete mix more "plastic" with the same amount of water, or allow the concrete to have the same "plasticity" with a smaller amount of water (increasing strength). Testing and ensuring the slump specification for concrete is correct will enable the concrete mixture to have the strength and placability the designer requires it to have.

APPENDIX VII: ABOUT THE AAR

The Association of American Railroads (AAR) is one of the nation's oldest and most respected trade associations and represents the major freight railroads in the United States, Canada and Mexico. Amtrak and some commuter railroads are also members of the AAR. In addition, the AAR has two categories of associate members, one for smaller railroads and a second for railway suppliers and others with an interest in railroads. The AAR serves as the joint representative of its individual members in matters requiring cooperative handling to better enable railroads to be an efficient, safe, inter-linked system. It is governed by a board of directors that includes the CEO of each Class I railroad in the United States. Amtrak, smaller railroads, Mexican railroads and the Railway Association of Canada are also represented on the AAR Board. One CEO serves as AAR Chairman for a one-year term which rotates among the Class I railroads.

About AREMA

The American Railway Engineering and Maintenance-of-Way Association (AREMA) was formed on October 1, 1997, as the result of a merger of three engineering support associations, namely the American Railway Bridge and Building Association, the American Railway Engineering Association and the Roadmasters and Maintenance of Way Association, along with functions of the Communications and Signal Division of the Association of American Railroads. The rich history of the predecessor organizations, each having over 100 years of service to the rail industry, is the legacy of AREMA.

About the American Railway Engineering Association

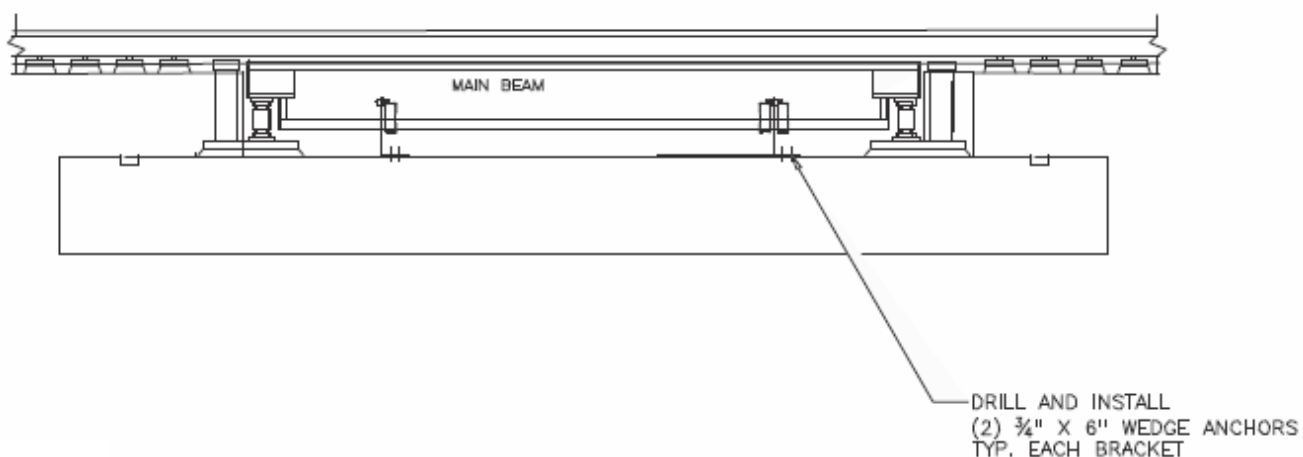
At the suggestion of Railway Age magazine, a meeting was held in Chicago on October 21, 1898, to organize a forum for the development and study of recommended practices for the newly-integrated standard-gauge North American railway network. This led to a meeting in

1899 in Buffalo, New York, to adopt a constitution and establish a permanent organization named the American Railway Engineering Association (AREA). From its inception, the AREA dealt with the many engineering challenges through standing technical committees. Five of those committees; ties, rail, track, buildings and yards & terminals continued intact continuously from 1899 until the merger and still continue under AREMA functional groups. In 1905, AREA issued its first Manual of Recommended Practices. Its name was changed to the Manual of Railway Engineering in 1970 and is updated annually by the technical committees. The manual, which is now also available on CD-ROM, will continue under AREMA.

APPENDIX VIII: 2000 SERIES J-BOX BRACKET ACCESSORY

This accessory provides a means to mount the smart sectional controllers, pit power supplies, and analog junction boxes away from the scale frame. Each bracket can accommodate a maximum of two boxes. The illustration below shows a typical installation of these brackets.

The part number of the bracket is 106314.





Manufactured by Thurman Scale
4025 Lakewood Crossing
Groveport, Ohio, 43215

Thurmanscale.com

8765 SERIES

Rocker Column Railroad Scale

Installation Manual 51493