

INSTALLATION  
&  
ASSEMBLY INSTRUCTIONS FOR  
  
CAT-350



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# INSTALLATION INSTRUCTIONS FOR CAT-350

Be sure adequate time is allowed for 'Same Day' complete installation.

## MATERIALS

As packaged, your CAT-350 system includes all materials needed for the installation from Post #1 up to and including Post #6.

A tail-end section is included in a second package of material needed to attach the CAT-350 to the existing barrier or fixed object.

If the system is to be attached to a double or single-faced W-beam guardrail, the tail end stops at Post #8, where the standard highway guardrail begins.

With each CAT-350 shipment is a can containing bags of attachment hardware. These bags are individually tagged showing the location of the posts where the hardware in that bag is to be used.

## SITE PREPARATION

Site preparation requires the layout of a line establishing post locations. The CAT-350 system is installed in a straight line. Posts are spaced 1905mm centers. No concrete footings or foundations are required.

## TOOLS REQUIRED

Tools required are those ordinarily used to install standard highway guardrail (HGR). They include 9/16", 15/16", 1-1/4" and 1-1/2" sockets, wrenches, and such other equipment as augers and post pounders commonly used in driving posts.

## INSTALLATION

### Placing Foundation Tubes

- Install the foundation tubes at locations 1 & 2.

## DO NOT DRIVE TUBES WITH WOOD POST INSERTED

Installation options (best preference listed first):

- A) If the soil is permeable, water will drain from the tubes. The tubes may be driven with an approved driving head.
- B) For non-permeable soil, drill a 305mm pilot hole approximately 1450mm deep and force the soil tube to the appropriate depth by impact or vibratory means with an approved driving head.

If rock excavation is encountered (as defined by the governing specifications):

- The tubes may be cut off to a minimum length of 510mm. A 305mm diameter hole will be drilled 510mm deep. Prior to installing the tubes, approximately 65mm of granular material shall be placed in the hole to provide drainage. The steel tubes shall be placed in the holes and backfilled with adequately compacted material excavated from the hole.



Optional Installation as defined by the Governing Specifications:

- The installer may elect place the tubes in an 460mm hole, approximately 1450mm deep and backfill with concrete. Prior to installing the tubes, approximately 65mm of granular material shall be placed at the bottom of the hole to prevent the concrete from the sealing the bottom of the tube and prevent it from draining

The finished guardrail height will generally be 706mm above the edge of the shoulder adjacent to the barrier. Site grading may be required to prevent the tubes from projecting more than 100mm (4") above the ground line.

### INSTALLING WOOD POSTS

Insert pipe sleeves (PC-19271G) in notched post (PC-3075B) and install in steel tube at post location 1. The notched side faces post #2

Insert pipe sleeves (PC-705G) in post (PC-3074B), in the top hole in the post, and install in steel tube at location 2.

Install standard length CRT posts at locations 3 through 6.

### INSTALLING THE STRUT

Place the slotted yokes of the ground strut (PC-9852A) over the foundation tubes (PC-736G) at the base of posts #1 and #2. A 16mm x 240mm hex bolt (PC-3497G), a hex nut (PC-3340G), and two round washers (PC-3300G) are used to attach the strut to the foundation tube. Note that the bolt goes through the strut, the foundation tube and the wood post.

DO NOT OVERTIGHTEN AND DEFORM TUBES.

### **Installing Wood Blockouts and Guardrail**

There are no rail-to-post attachments at locations 3, 5 and 6. Attach wood blocks (PC-3101B), two per post, at these locations using two 16mm x 610mm hex bolts (PC-4640G), hex nuts (PC-3340G) and washers (3300G)

Connect the knockout blocks (PC-99 21G) to the upstream side (toward the nose) of posts #4 and #6 with two 10mm X 50mm coach screws (PC-3263G) with flat washers (PC-4257G). Top of knockout blocks should be 100mm down from top of the post.

Attach post plates (PC-19261G) to the top of post #4 with a 16mm X 190mm hex bolt (PC-3478G) and hex nut (PC-3340G)

At this point the posts and guardrail downstream from post #6 should be in place. This is the 'tail-end'.

Start with the two 10 – gauge rails (PC130A) that span from post #4 to #6. These are the slotted rails with plates welded to the backside on one end. The welded plates are placed at post #4.

Each of these rails are lapped to the outside of the rail extending beyond post #6. Each splice at post #6 is made with eight (8) plate washers (PC-19259G) and eight 16mm x 45mm special hex head bolts (PC-3395G) and hex nuts (PC-3350G).



This bolt (PC-3395G) has a portion of its shank purposely unthreaded. For functional reasons, DO NOT substitute with ordinary bolts at risk of changing the design concept. Proper bolts are identified by the CAT symbol on the bolt head.

Connect the welded plates of the 10-gauge slotted rails, along with two wood blocks (PC-3101B), to post #4. Secure this attachment with two 16mm X 610mm hex bolts (PC-4640G), hex nuts (PC-3340G) and washers (PC-3300G). Be sure to tighten the nuts before attaching the 12-gage rail.

The two 12-gage slotted rails (PC-31G) are positioned with the 210mm long slots at post #4. The four 19mm diameter holes are at the post #2 end.

The slotted rails (PC-31G) are lapped to the outside of the 10-gage rails (PC-130A) at post #4. Again, eight (8) plate washers (PC-19259G) and eight (8) 16mm X 45mm hex bolts (PC-3395G) and hex (PC-3350G) are used to make the connection.

Before tightening the rails and blocks to post #2, install the spacer channel (PC-9915A) between the rails, just downstream from post #2. Locate the spacer channel with the 32mm diameter hole facing post #2. Now attach the spacer channel to the rails with eight (8) 16mm x 40mm hex bolts (PC- 3380G) and hex nuts (PC-3340G).

Now attach the rail at post #2 with two wood blocks (PC-3101B), using a 16mm X 635mm post bolt (PC-3650G), two (2) rectangular washers (PC-3320G) and a hex nut (PC-3340G).

### **Assembling the Nose Section**

Bolt the side plates (PC-984G) to the end of each 12-gauge rail (PC-31G), using four (4) 16mm X 32mm splice bolt (PC-3360G) and nut (PC-3340G) .

Bolt the nosepiece (PC-983G) to the side plates, using eight (8) 16mm X 32mm splice bolt (PC-3360G) and hex nuts (PC-3340G). Place the sleeve (9921G) over post #1 and attach narrow wood blocks (PC-3100B), using a 16mm X 635mm post bolt (PC-3650G), two (2) rectangular washers (PC-3320G) and hex nut (PC-3340G). Cut off and peen excess threads.

### **Installing the Cable Anchor Assembly**

Slide one end of the cable (PC-3012G) through the pipe sleeve at the base of post #1. Place the bearing plate (PC-782G) over the cable stud, being sure the 125mm portion is above the stud.

Slide the other end of the cable (PC-3012G) into the pipe sleeve at the top of post #2, then through the 32mm diameter hole in the spacer channel.

Secure both ends of the cable assembly with 25mm washers (PC-3900G) and 25mm hex nuts (PC-3910G) and tighten. Restrain cable with vise grips at the end being tightened to avoid twisting the cable. Make sure the nuts are tight and the cable is taut. A second 25mm nut (PC-3910G) is added to each end of the cable assembly to prevent loosening.

### **Finish the assembly**

After checking alignment of the guardrail and rail height, install the buckling restraint rods (PC-3275G) through the opposing slots in both the 10-gauge and 12-gage rails (behind posts #3 and #5). This 10mm X 620mm rod (PC-3275G) requires a lockwasher (PC-4258G) and double nut (PC-4252G) attachment at each end.

Inspect assembly to ensure all parts are located in proper position and all nuts have been tightened. Your CAT-350 system is now ready to enter service.



## CAT- 350 INSTALLATION CHECK LIST

- Proper and uniform rail height.
- Post #1 notched side faces post #2.
- Proper orientation of bearing plate.
- The steel tubes/posts do not protrude more than 100mm above the ground line (measured by the AASHTO 1.5m cord method, site grading may be necessary to meet this requirement)
- Anchor cable is taut and correctly installed.
- Guardrails spanning from posts #2 to #4 are 12 gauge (PC-31G) and are positioned with the 210mm (8-1/4") long slots at post #4.
- No rail attachment at posts #3, #5 and #6, but a restraint rod attached just downstream of posts #3 and #5.
- Rail splices at posts #4 and #6 permit telescoping.
- Rail splices at posts #4 and #6 include plate washers and PC-3395G special splice bolts.
- Knockout tube in place at posts #4 and #6 with post lates at post.
- Guardrails spanning from post #4 to #6 are 10 gauge (PC-130A) and are positioned with the welded attachment plates at post #4.
- Tail end and / or transition as required have been installed in accordance with contract plans.



## MAINTENANCE INSTRUCTIONS FOR CAT-350

Maintenance for the CAT-350 can be categorized as routine or repair.

Routine maintenance consists of periodically checking the system to see that the cable is taut and the blockouts have not rotated.

Repair maintenance deals with the system after it has been hit.

The CAT-350 designed to collapse in stages when it is impacted on the end. Depending on the severity of the impact, repair may consist of replacing only: stage one, the 1905mm nose section; stages one and two, the nose section and 3810mm set of 12-gauge panels and posts; or all three stages of the above ground parts of the complete CAT-350.

In any event, the CAT-350 replacement parts may be ordered in stages or by the individual parts. A bill of materials for individual parts is included on the SS245 drawing of the CAT-350.

The following steps should be taken in making the repairs:

- (1) Set up the necessary work zone control devices.
- (2) Make note of the broken wood posts and wood blockouts that need to be replaced.
- (3) Inventory and pick up the reusable parts.
- (4) Bring necessary placement parts from the maintenance yard.
- (5) Disconnect and remove the damaged rail and material from the system.
- (6) The broken posts in the steel tubes can be removed using one of the post removal tools recommended that can be assembled from 'off-the-shelf' hardware items. Pound the steel assembly or screw the lag bolts into the top of the broken post and remove the remains of the broken post by pulling on the chain. If necessary, place a steel rock bar in the loop of the chain and use it as a lever arm to remove the post stub.
- (7) After the site has been cleared of damaged material and debris, the system can be reconstructed following the construction installation instructions beginning at the front of this manual.