ITEM 675.5501 23 M Railroad Landis Direct Fixation Fastener – Furnish & Install
ITEM 675.5502 23 M Railroad Landis Direct Fixation Fastener – Pad Retrofit
ITEM 675.5503 23 M Railroad Landis Direct Fixation Fastener - Anchorage Retrofit

DESCRIPTION

This work consists of the installation or retrofit of Landis Series 5500c direct fixation fasteners (DFFs). The work consists of removal and or reinstallation of the DFFs including replacement of the existing plastic concrete anchors, sintered metal cams and associated materials and hardware; and verifying and establishing correct track gage and alignment.

MATERIALS

Provide replacement cams machined from steel stock, as per ASTM Grade A322, to the dimensions indicated on Drawing 1, attached. Use annealed 4140 steel bar stock. As part of the machining process, all corners will be broken so as to avoid sharp edges.

Provide anchor bolts as follows: ASTM Grade A325 22.23mm - 2.82mm pitch x 101.6mm (7/8"-9 x 4") Hex Head Bolts with UNC Thread, Galvanized per ASTM A153 to be used in fastening cams to the concrete anchor system. Provide a minimum of 50% thread length on the bolts.

Provide flat washers and lock washers galvanized per ASTM A153 to install with the 22.23mm (7/8") anchor bolts.

Provide fabricated steel, concrete anchors according to Drawing 2, and as follows: Thread an SAE J429, Grade 5 (A449) bolt into an ASTM A563 coupler for a thread engagement distance of 22.23mm (7/8"). Anchor system bolts are UNC 22.23mm - 2.82mm pitch x 114.3mm (7/8"-9 x 4 ½") and threaded their full shank length. Anchor system couplers are 31.75mm (1 1/4") standard hex-stock UNC 22.23mm - 2.82mm pitch x 76.2mm (7/8"-9 x 3"), with special threading, as follows: Provide a 22.23mm (7/8") full thread insertion followed by a 1 thread gap at the bottom end of the coupler per the diagram, to prevent excessive thread engagement of the anchor system bolt. The top end of the coupler will have approximately 50.8mm (2") of UNC 22.23mm - 2.82mm pitch (7/8"-9) threads for engagement of the topside UNC A325 22.23mm - 2.82mm pitch x 101.6mm (7/8"-9 x 4") cam fastening, anchor bolt which will pass through the washers, cam, shim plate(s) and base plate as shown on Drawing 2. (NOTE: The head size of the bolt and the size of the standard hex stock coupler must fit in a 38.1mm (1 ½") core hole.)

Provide adhesive to affix the steel anchor system into the concrete deck as follows: U.S. Anchor, Ultrabond 1 an epoxy anchoring gel, as supplied by U.S. Anchor Corp.
In house testing of a large variety of adhesive products have not identified a suitable equivalent to Ultrabond 1.

Provide insulating sleeves as follows: Landis glass-filled nylon insulator sleeve, part number RP-0004-24 as supplied by Landis Industries, Inc.
POB 638, Los Altos, CA 94023
650-948-3556

This is a proprietary item.

Provide replacement elastomeric pads 203.2mm x 371.475mm (nominal 8" x 14 5/8" x 11x16") for Landis Model 5500C DFF as follows:
Pandrol Hytrel Double Dipple Pad #USK-1068 as supplied by Pandrol USA
501 Sharptown Road, POB 367
Bridgeport, NJ 08014
856-467-2994 or 800-221-2547, John Hunsburger @ extension 138, reference Quote number Q0506-001B

The above pad has been engineered by Pandrol to meet the loading demands of the situation encountered, resist tearing, be UV stability, and provide a bounce characteristic that is almost identical with the original Landis pads. This design is proprietary to Pandrol. While an equivalent design could be designed and provided by others, those designs will have to be original in nature and be cyclically tested for 2 million cycles of 39K each.

Provide shim plates 9.25mm x 403.23mm (nominal 9 1/4" x 15 7/8") of various thicknesses as needed from 1.59mm to 9.53mm (1/16" to 3/8") sheet HDPE for vertical adjustment. These shims are available from Pandrol or can produced locally by a wide variety of vendors.

Provide lubricant as follows: Automotive Service Grease shall conform to ASTM D4950, category GC.

Provide standard SAE 5 weight motor oil as an anchor bolt lubricant.

GENERAL

Provide solid cams as replacements for hollow cams described in the Materials portion of this specification. Also, provide replacement insulating sleeves; new anchor bolts with flat washers, and split washers; and new fabricated steel concrete
anchors. Provide replacement DFF elastomeric pads. Provide shim plates of various thicknesses as needed. Pandrol clips, solid cams and Landis DFFs will be re-used unless found to be broken. Cost to replace any broken items will be included in this item. Specific quantities will be identified elsewhere in the contract documents.

Where necessary, establish proper gage using temporary or permanent gage rods, grab bars, or other method. Remove clips, bolts, cams, pad and plate and retain. Core new anchor holes at the existing anchor locations, using a ganged core drill. Clean and prepare core holes, making sure to remove all old adhesive. Align and fasten new anchor inserts into concrete deck with adhesive. Allow fastener adhesive to fully cure. Reinstall plate(used), pad(new), shims(used & new), bushings(used & new), cams(solid), bolts(new) Pandrol clips(used). Add/remove shim plates as required to provide a snug load bearing contact between the DFF and deck surface. Reposition DFF over new anchors. Insert cams, insulating sleeves, and hardware. Reinstall Pandrol clips. Adjust for gage and torque bolts. If previously applied, remove temporary gage alignment devices. Any old anchor holes left in deck will be sealed.

Coordinate track access, rail safety, and portions of the retrofit procedure with the rail maintenance contractor, the railroad, and Engineer, as necessary.

Stage operations so that all anchors installed are fully cured and all retrofitted DFFs are reinstalled before the end of the allowed construction time window for any work period.

A separate table is provided that details the location of the full retro-fits and the pad and shim change out only locations.

CONSTRUCTION DETAILS

Retrofit Landis Series 5500c direct fixation fasteners (DFFs) at indicated locations as follows:

1. At the direction of the EIC, select a track work location. The contractor is warned not to disconnect or loosen any rail from more than 3 DFFs in a row. Measure and record gage at each location where a plate is to be loosened or removed. Never remove the DFFs that are directly across from each other.
2. Remove the Pandrol clips, remove the anchor bolts, remove the cams and bushings, remove the shims and old rubber pad, and remove the plate. The rail may need to lifted slightly in order to remove the pad and shim. Retain all parts, except the buttress threaded bolts, old Landis pads and old style hollow cams, which are to be discarded. Brush clean and hand vacuum (with a Shop Vac) the concrete bridge deck in the area of the pad. If steel anchors are already installed at this location, protect these holes from becoming contaminated.
3. Where the plastic anchors will be replaced, determine where the new anchors will be placed. Set up the dual ganged core drill with bits to produce 38.1mm (1 ½") diameter holes. Set bit positions to match those required for the DFFs. Set depth stops to produce a 177.8mm (7") deep hole. Adjust bit angles to be perpendicular to the concrete surface.

4. Using the ganged core drill, core two new anchor holes for each DFF, next to (closest hole approximately 25.4mm (1") from) each existing DFF in the selected work location.

5. Using the gang core drill, core two new anchor holes for each low-side rail DFF, next to (closest hole approximately 25.4mm (1") from) each existing DFF in the selected work location. Place new anchor holes on the high-side and low-side rails at the approximate same distance from the DFFs and in the same compass direction along the rails.

6. Clean/score/prepare the new anchor holes as recommended by the anchor adhesive manufacturer’s instructions. (At a minimum, roughen the hole, flush with clean water and air dry with oil-free air.) Assemble the (lower) 114.3mm (4 ½") bolt and threaded coupler nut to form the concrete anchor as shown in Drawing 2. (Assure that excess cutting oil is removed from the surface of the anchor.)

7. After preparation of holes, fill each anchor hole with sufficient adhesive grout to fill the hole when the anchor is inserted. Insert anchors perpendicular to the concrete surface. Position the top of each anchor coupling flush with the concrete surface, as shown in the anchor system diagram. By means of a plastic plug or other method, prevent adhesive from fouling anchor coupling threads which will receive the 101.6mm(4") top-side anchor bolt. Wipe away excess adhesive from concrete surface.

8. Allow anchors to fully cure. Follow manufacturer’s recommendation for time to full cure, based on installation curing temperature.

9. Inspect all parts prior to re-assembly. Replace those parts that are broken or worn to half of their original thickness. Cost of replacement is included in this item. Re-assemble the Landis DFF assembly. Start by placing the plate and the new pad under the rail. Insert suitable old shims and new HDPE shims as may be necessary to provide a load bearing fit. Slight lifting of the rail may be necessary.

10. Orient the Landis DFF/new pad/shim assembly as to align over the new anchors. Trim shim plates as needed for clearance near the guard-rail fastening system.

11. Apply ASTM D4950 Automotive Service Grease to the outer surface of the solid cam and insert into the Landis insulating sleeve. Then, place the insulating sleeve and cam into DFF insert hole. (Align cam bolt hole with anchor hole.) Place washers on new 22.23mm x 101.6mm (7/8" x 4") anchor bolt, and lubricate anchor bolt with SAE 5 weight motor oil. Apply the Pandrol clips. Thread the anchor bolt into the embedded anchor, adjust the twist of the cams to obtain correct gage (as recorded in step 1) and torque to 406.75 nm (300 ft-lb.)

12. Retorque anchor bolts to 406.75nm (300 ft-lb) after 96 hours.
13. Place a minimum 25.4mm(1 inch) length of foam backer rod into each old bolt hole, approximately 25.4mm (1 inch) below the deck surface. Seal old anchor holes flush with the deck surface with silicone sealant.

NOTES:

a. Depending on the temperature, the contractor will be limited in the number of DFFs he can loosen because of rail expansion/movement considerations.
b. Any removed hardware not sampled and removed by NYSDOT may be retained by CSXT for service maintenance of the un-retrofitted portion of the Oak Point system.

METHOD OF PAYMENT

The work will be measured as the number each of DFF’s installed or retrofitted

675.5501 23 Railroad Landis Direct Fixation Fastener – Furnish and Install one complete DFF
675.5502 23 Railroad Landis Direct Fixation Fastener – Pad Retrofit – Furnish and install one new elastomeric pad, and replace and install and broken or worn items - Include work itemized in steps 1,2,9,10,11 and 12
675.5503 23 Railroad Direct Fixation Fastener – Anchorage Retrofit - Furnish and Install new anchorage system, new cams, new bushings, and washer and bolt assemblies – Includes work itemized in all of the above steps

BASIS OF PAYMENT

The unit price bid shall include the cost of all labor, materials, replacement materials, and equipment necessary to complete the work.

(06/2006)
The above dimensions are in English units
Drawing 2. Concrete Anchor System & Cam to Concrete Anchor System Assembly

The above dimensions are in English units