

[REDACTED]

Bay 3 Crane Rail Measurement

Presented to: [REDACTED]
Presented by: Vanessa Fontaine, P.Eng.
Date of Measurement: June 5, 2019
Date of Report: June 7, 2019
Location: [REDACTED]

[REDACTED] contracted Pine Falls Technical Services (PFTS) to measure the Bay 3 crane rails at the [REDACTED] plant to check the rail alignment, span, and elevation. I, Vanessa Fontaine, with Doug Ursel and Emily Green completed all measurements with a Leica TC15 Robotic Total Station along with PFTS's crane rail robot. A 360 degree mini prism is fixed to the top of the robot and the robot is fixed to the rail picking up the side and top of the rail's top flange. The robot is remotely driven by PFTS using software accessed by an iPad or similar; PFTS drove the robot to each building column and also between each building column taking a measurement at each stop.

I constructed the coordinate system as follows:

- X Axis: Best Fit line of the West Rail
- XY Plane: Level Plane
- Origin: Center of the West rail at the north end of the building

Rail Straightness and Span (Figures 1&2):

Crane Span (Figure 1)

Based on Table 1.4.2-1 included on the last page of this report the overall tolerance for crane span is $\frac{1}{4}$ " or 6.4mm or 0.006m.

From the graph in Figure 1 the average rail to rail span is 24.617m. PFTS was not provided with the actual design span of the crane wheels.

Using the average rail span of 24.617m both east and west rails are within tolerance with the exception of a small area between columns 4B and 3B. I show a semi-transparent blue over the east rail and a semi-transparent red over the west rail for the allowable span tolerance. Where the rails deviate from these areas is where the rail is out of tolerance.

Straightness (Figure 2):

Based on Table 1.4.2-1 included on the last page of this report the overall tolerance for rail straightness is $\pm 3/8"$ or 10mm and $1/4"$ in 20' or 6mm in 6.1m.

Looking at the graph in Figure 2, both rails are within an acceptable straightness tolerance. I show the acceptable rail straightness with light beige ± 6 mm thick lines.

Rail Elevation (Figure 3):

Elevation

Based on Table 1.4.2-1 included on the last page of this report the overall tolerance for rail elevation is $\pm 3/8"$ or 10mm and $1/4"$ in 20' or 6mm in 6.1m.

From the graph in Figure 3 the rails are just within tolerance.

Rail-to-Rail Elevation

Based on Table 1.4.2-1 included on the last page of this report the overall tolerance for rail elevation is $\pm 1/4"$ or 6mm and $1/4"$ in 20' or 6mm in 6.1m.

From the graph in Figure 3, the rail to rail elevation out of tolerance on the north end.

Bay 3 Overhead Crane Rail - Plan View Deviation (Rail to Rail Span)

June 5, 2019

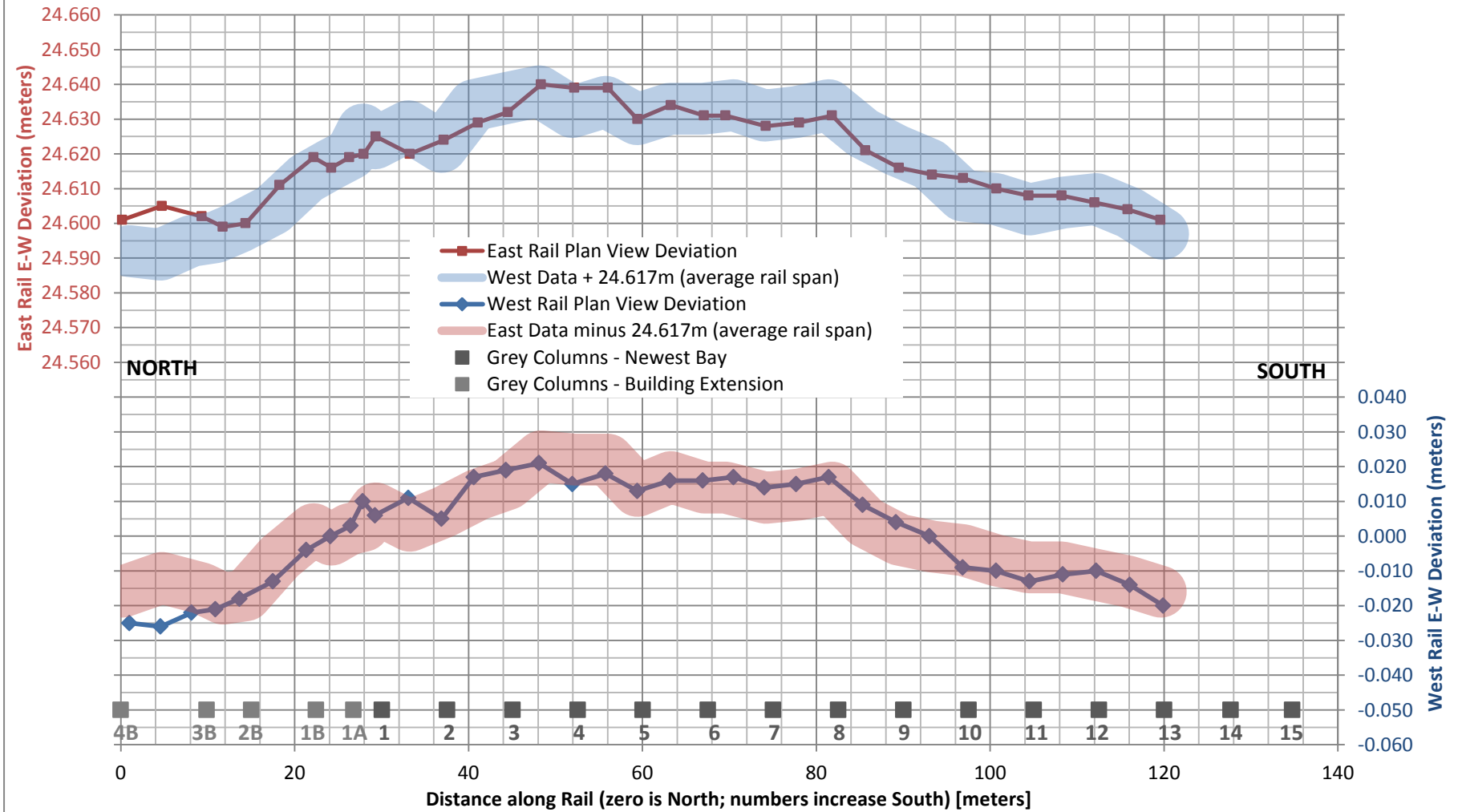


Figure 1: Plan View graph showing rail span.

Bay 3 Overhead Crane Rail - Plan View Deviation (Rail Straightness)

June 5, 2019

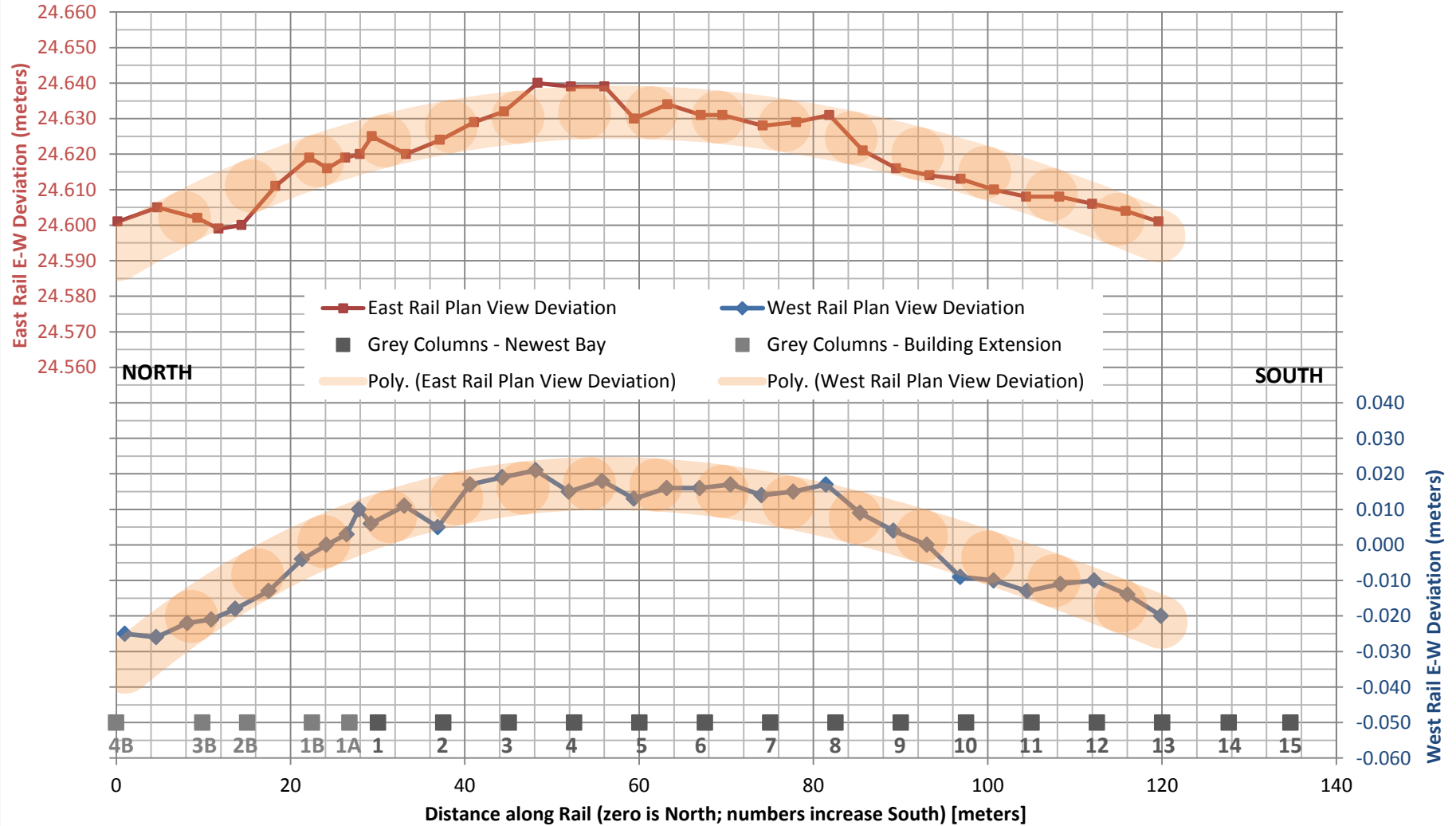


Figure 2: Plan View Graph showing Rail Straightness

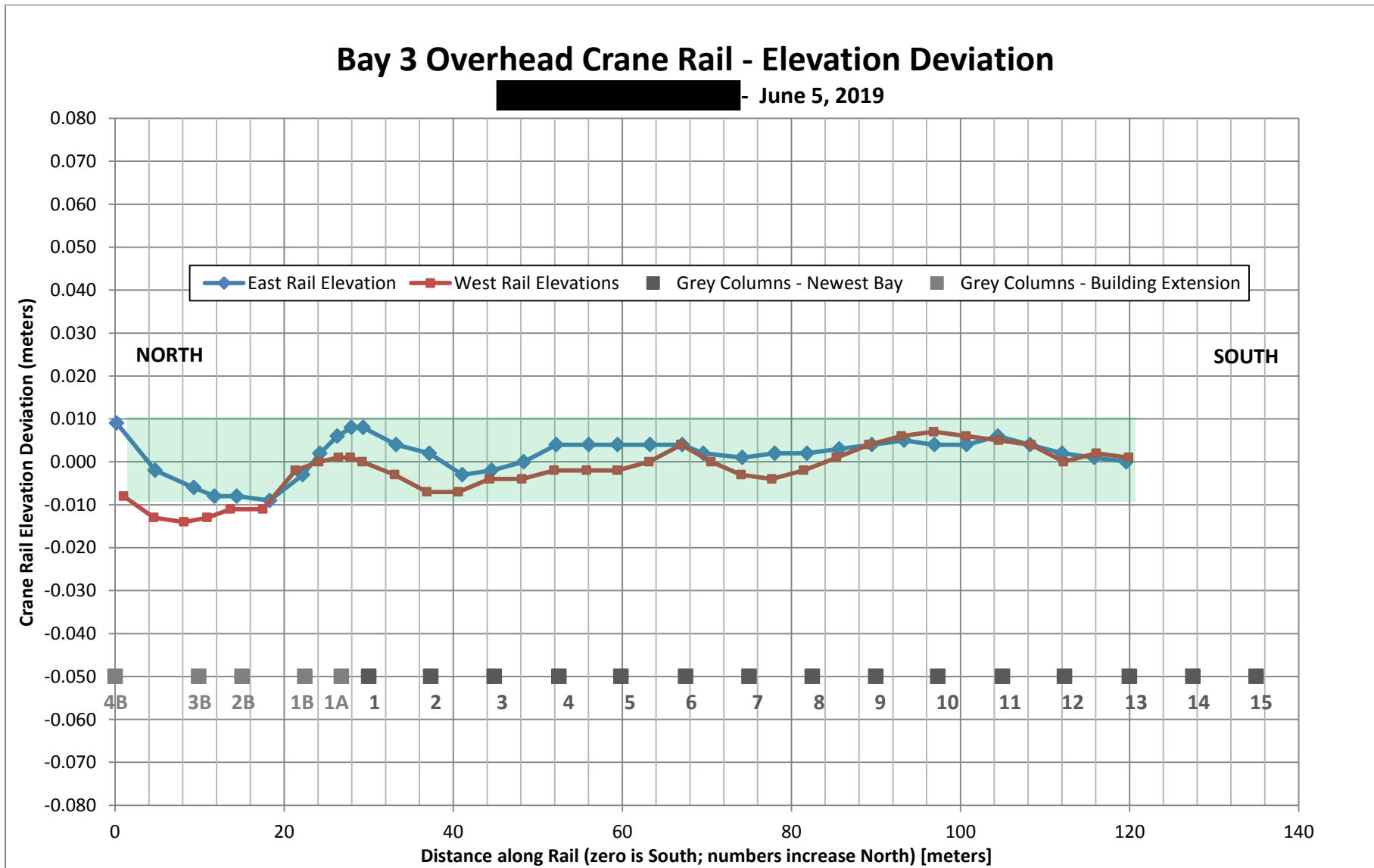


Figure 3: Elevation View graph showing rail elevation and level.

PFTS is committed to safety which is why we have wanted to get a rail robot designed and working. There are many advantages to using the rail robot for measuring but safety is by far the number one advantage. PFTS is extremely proud to be able to provide this service.

Rail Robot Advantages:

- PFTS no longer needs any person walking along the rail,
- The measurements are more consistent as the robot wheels never lose contact with the rail
- Reduced downtime of crane (once started PFTS was able to measure both rails in under 1hr of time)