



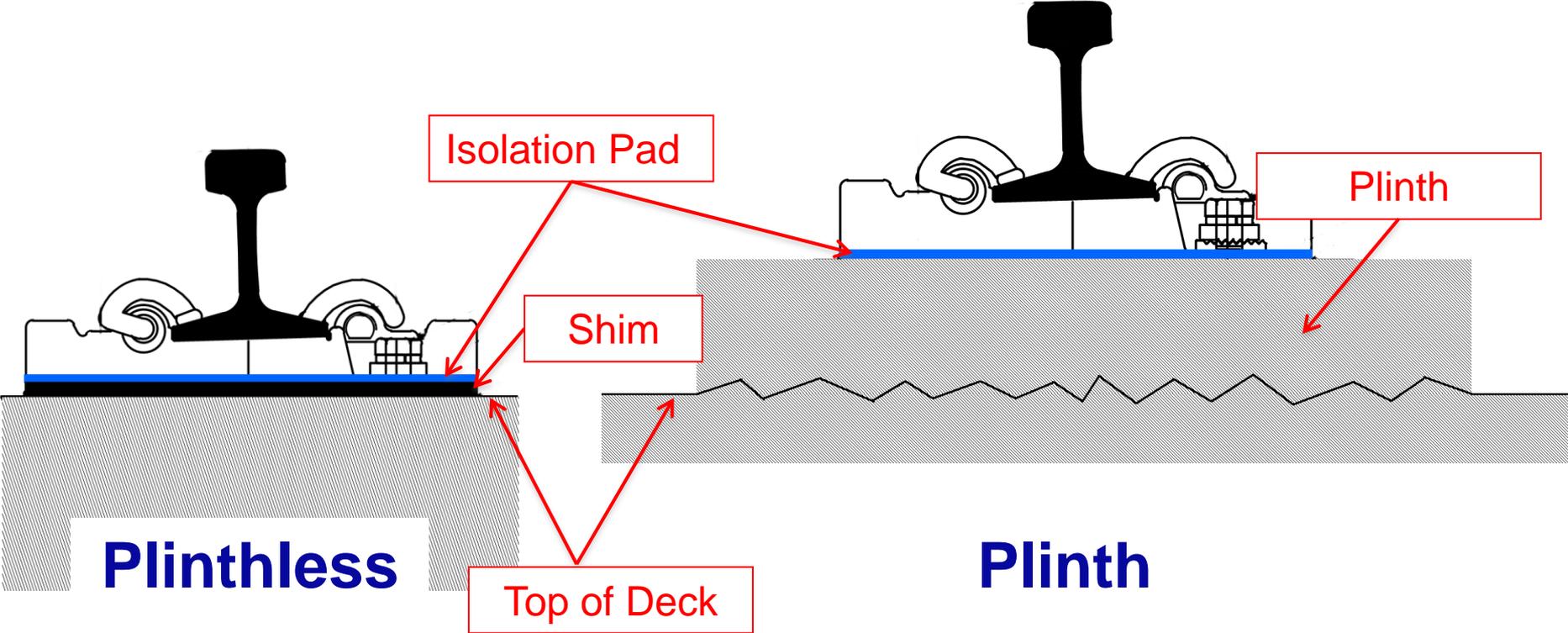
# WOFH and KHG Guideway Trackwork Shims

# Plinths, Shims, and Isolation Pads

## What are they?

- Plinths – Typically provided on guideways and bridges to adjust for final rail tolerances since guideway and bridge tolerances are not as stringent.
- Shims – Provided for final vertical adjustment to meet rail tolerances. Made of High-Density Polyethylene (HDPE).
- Isolation Pads – Provide electrical insulation between the rail and the guideway as part of stray current protection. Made of High-Density Polyethylene (HDPE).

# Shims



# Plinthless Proposal

- KIWC's proposed to eliminate the concrete plinths during the proposal phase of the project.
  - \$4.8 million estimated cost savings on WOFH
  - \$2.75 million estimated cost savings on KHG
- City and County of Honolulu accepted the proposal on WOFH 6/19/2009 and on KHG 6/4/2010 with conditions:
  - Drainage maintained
  - Vertical rail profile maintained with 9/16" max shim

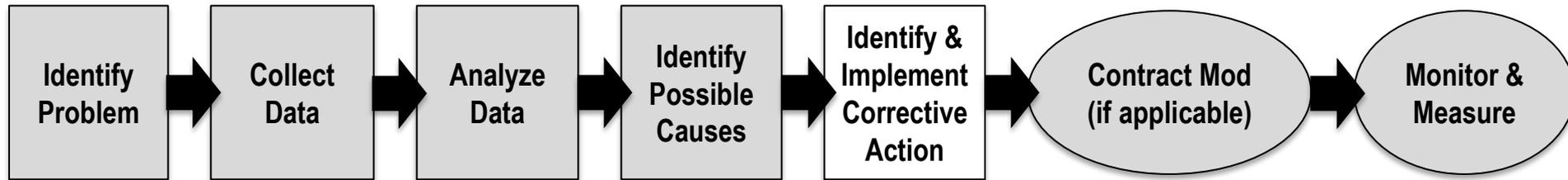
# Procurement and Specification

- Shims were provided by:
  - KKJV supplied the isolation pads from the MSF Contract that included rail procurement for the entire alignment
  - KIWC provided shims for WOFH and KHG
- KIWC's Original specifications for WOFH and KHG specified the following tolerances:
  - 9/16" maximum height for shims
  - 3/16" for isolation pads (HDPE, same material as shims)

# What are the issues? Vertical Profile

- KIWC was unable to meet its vertical profile for guideway construction. Adjustments were required to meet trackwork tolerances for top of rail.
- KIWC proposed:
  - Shims for up to 2" of adjustment (plus the 3/16" isolation pad) about 7/15
  - Mini plinth design for > 2" of adjustment in 3/16
- National peer review of industry experts conducted in 12/15.
- HART acknowledged KIWC's proposed technical corrective action. Cost and warranty issue are being evaluated.

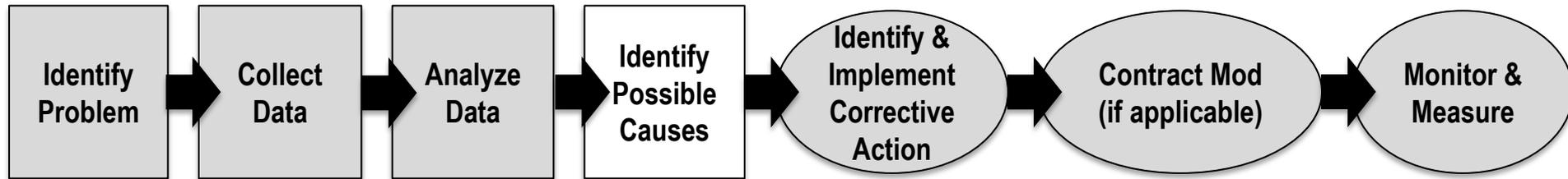
# Vertical Profile Root Cause Analysis



# What are the issues? Shim Material

- Early this summer, cracks were observed in the HDPE shims provided by KIWC and HDPE isolation pads provided by KKJV.
- Material that showed cracking:
  - Blue shims and blue isolation pads
    - ✓ Approximately 2,104 of 110,000 showed evidence of cracking
  - Black shims
    - ✓ Show no evidence of cracking

# Shim Material Root Cause Analysis



# Shim Material Issue Timeline

- Cracked shims & isolation pads observed – 6/28/16
- KIWC letter acknowledges cracks – 7/21/16
- HART notifies KKJV of cracked isolation pads (shims) provided by KKJV through the MSF Contract – July 21, 2016
- NCRs Issued – 7/28/16, 9/12/16
- KKJV acknowledges isolation pads may not conform with their specifications – 9/2/16
  - Carbon content requirement for UV protection may not have been met
  - KKJV will provide replacements for 165,000 isolation pads at no cost to HART
- HART requested that KIWC verify that shims comply with their specifications for WOFH and KHG

# Next Steps

- Finalize determination of root cause for shim material issue
  - HART and KIWC have sent blue and black shims to independent testing labs – Results expected in late September
  - KKJV, before shipment of replacement shims, will also perform verification testing. Results expected in late September
  - Obtain KIWC's response to NCR
- Determine cost or warranty resolution (if applicable) for both shim issues

# *Mahalo!*

