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Prepared for AROW



Analysis of different types of street rail on bicycling in Portland

Street rails pose threats to bicyclists. The rails are slick and offer little traction, the flangeways are deep enough to swallow a bicycle wheel. Worse yet, a family of ledges and gaps surrounding a flangeway can destabilize a bicycle before it even arrives at the flangeway.

My concern wasn't the presence of the flangeway, but the topography of the flangeway approach, and any elevation difference between the two sides of the flangeway.

I found that the MAX tracks through the Lloyd Center have no ledges, bumps or dips anywhere in the rail crossing, while the streetcar tracks had multiple ridges and dips. And the MAX track cross sections were reliably smooth along the line, while streetcar track cross sections varied widely between sites and within sites.

Why ledges near rails will make bicycles crash

The variation in height creates an unnecessary hazard to bicycling. Bicycles need to continuously make minute adjustments to the steering to keep the bike upright. If the front wheel can't be continuously precisely adjusted, the bike will instantly crash.

Crossing grooves at a right angle does not affect steering, but crossing them at even a few degrees off 90 will cause the front wheel to be bumped to the side, particularly if the ridge is slick (like a steel rail). And while riding on the 4.5" rail and flangeway section the traction can be so poor that the wheel position cannot be corrected by steering.

A series of ridges and grooves, coupled with a steel riding surface make precise steering impossible. While a single ridge or groove can be recovered from fairly easily, a series of them create a more challenging situation, as the length of time without full control is longer. And encountering each additional ridge after you are already destabilized greatly increases the chances of losing control and

crashing.

Thus, when installing street rail, it is of extreme importance to

- 1) Purchase a rail product that is level (no difference in height between the two rails)
- 2) Purchase a gasket product that is has a horizontal surface (no bulges) and is perfectly level with the rails when installed (no ledges)
- 3) Maintain tight quality control of concrete roadway installation to ensure that concrete is level with the gasket, or slightly higher.

Recommendations --

Immediately

- * Provide improved training to concreteworkers to ensure that concrete is laid flush or above the insulating gasket (and never below).
- * Consider revising the concrete laying standard to raise concrete 1/16" above the gasket.

In future projects

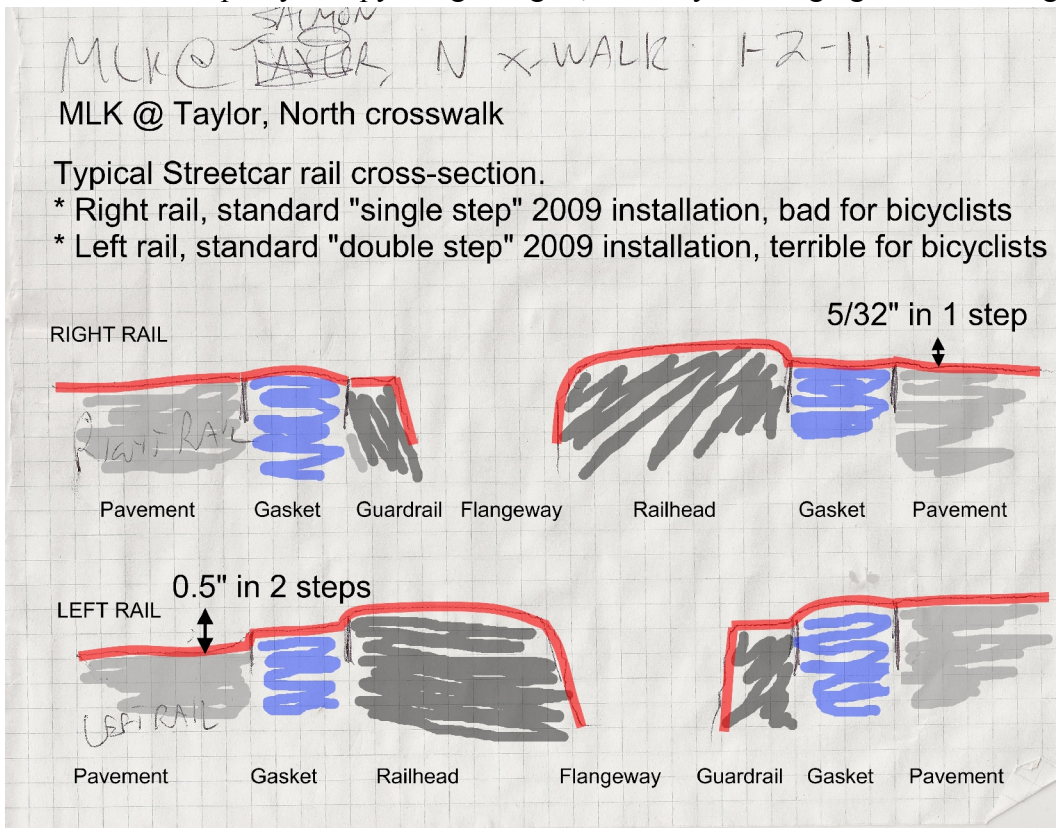
- * purchase rail products that have the guardrail, railhead and gasket all at the same height.

Images:

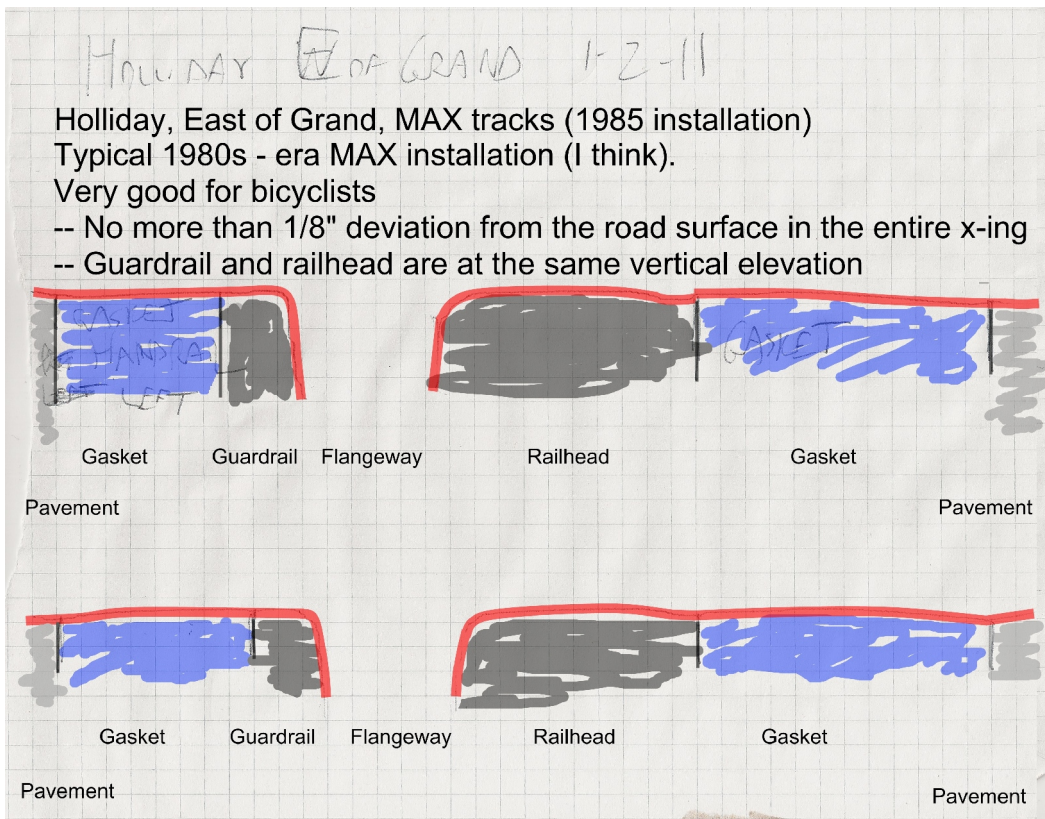
- 1) Photo of partially installed rail at MLK and Salmon



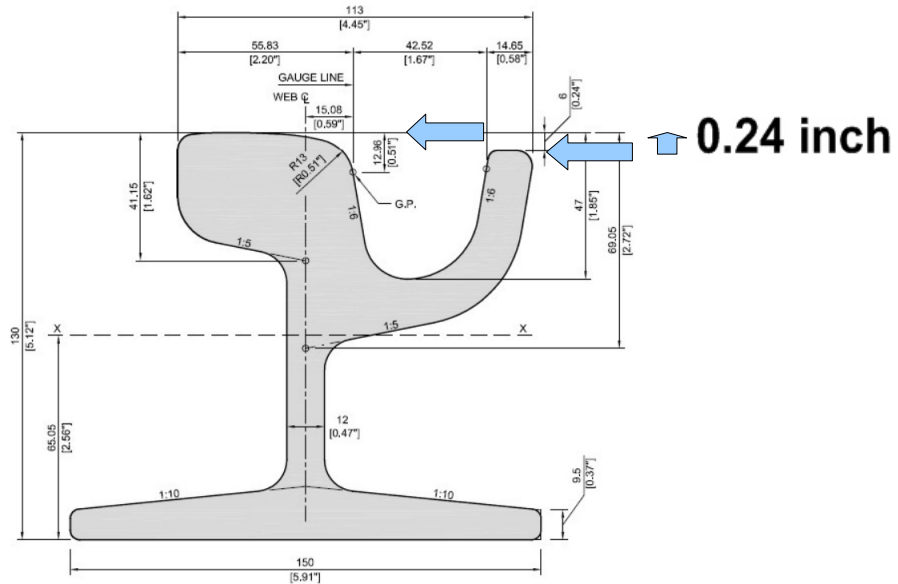
2) Rail cross section, streetcar tracks, MLK and Salmon. Background is a 1/4" grid. Riding across these on a bike is pretty bumpy at right angles, and very challenging at shallow angles.



2) Rail cross section, MAX tracks, Holliday at Grand. Background is a 1/4" grid. Riding across these on a bike is as smooth as butter. Even at an angle.

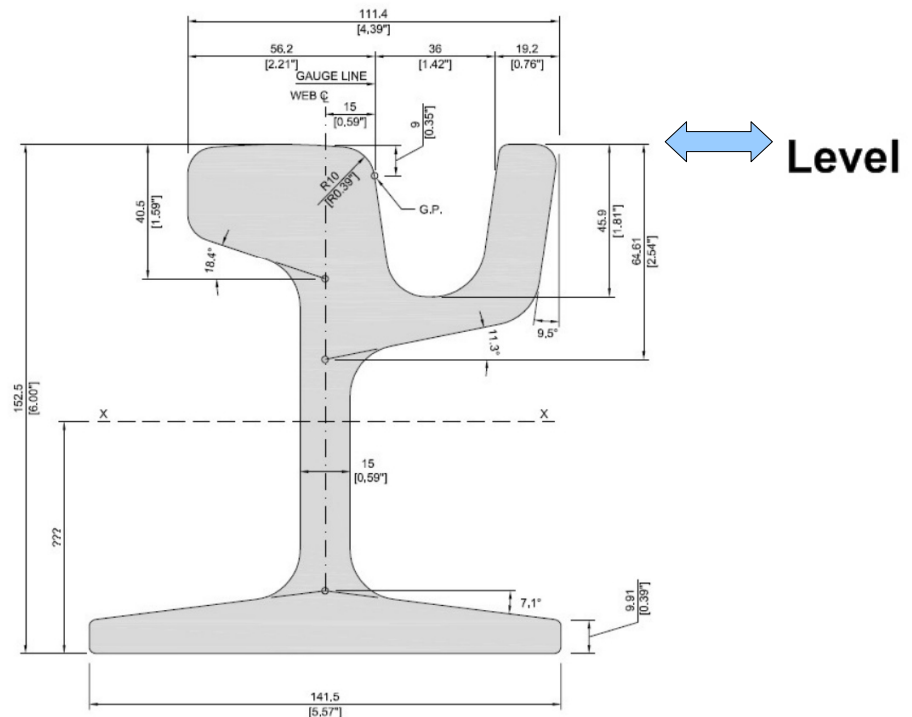


3) 51Ri1 rail, similar to the product used by the streetcar. Note 0.24 inch difference between railhead and guardrail.



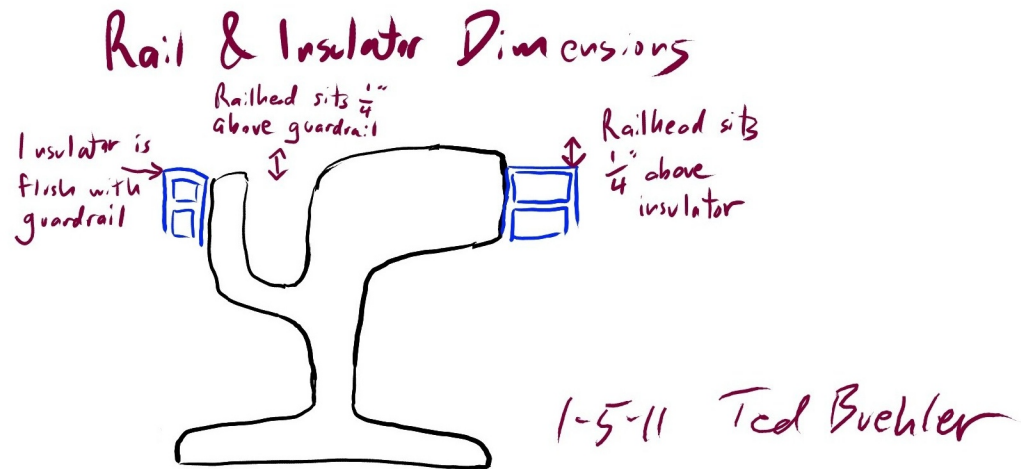
51Ri1 (Ri51)

4) 55G1 rail, similar to the product used on Gresham MAX. Note that both rails are at the same height.

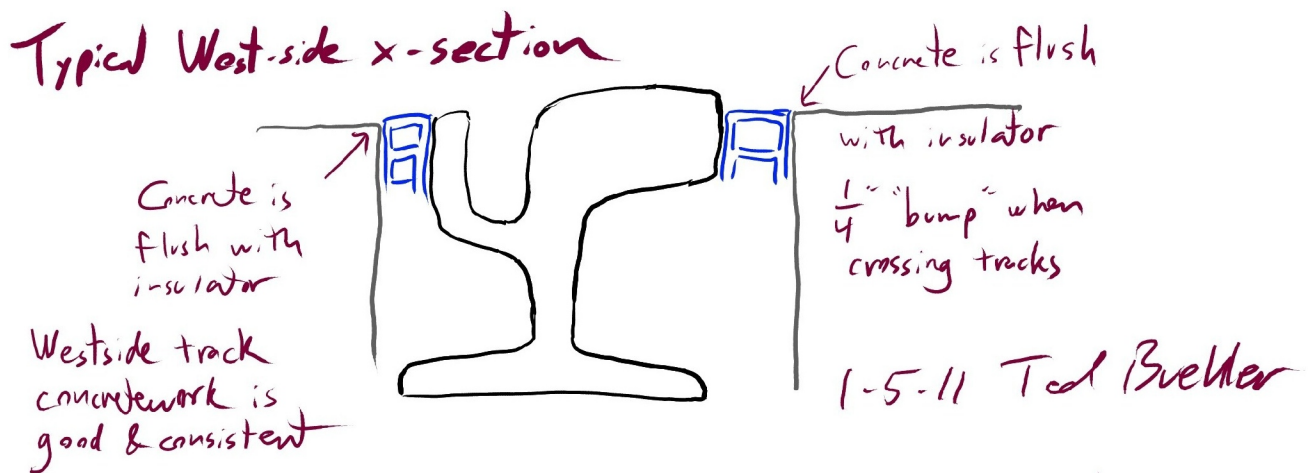


55G1 (35GP)

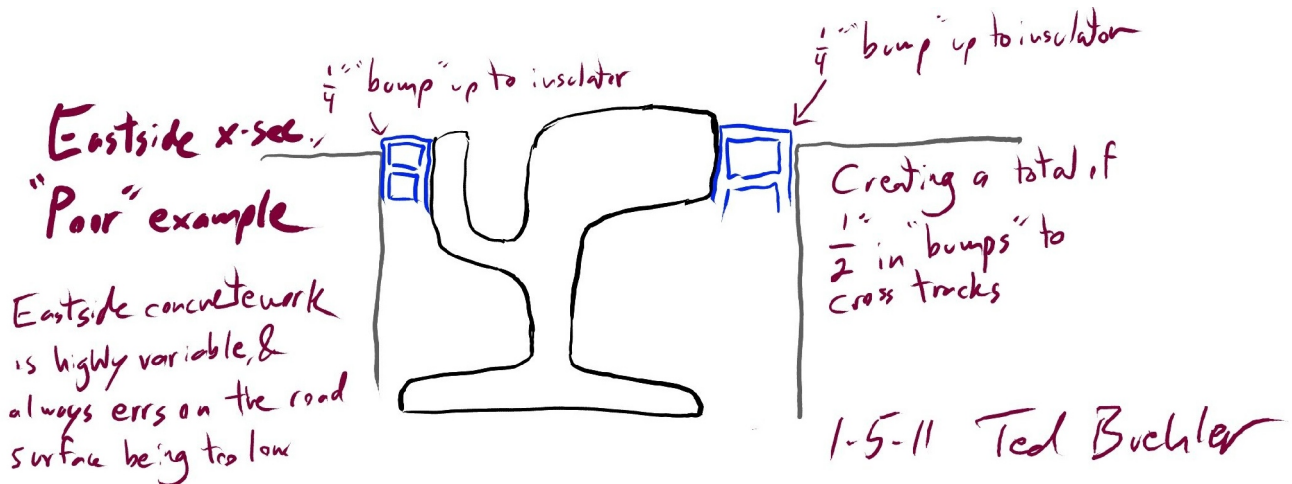
5) Schematic 1 -- streetcar rail and gasket -- dimensions can't be changed after they are purchased.



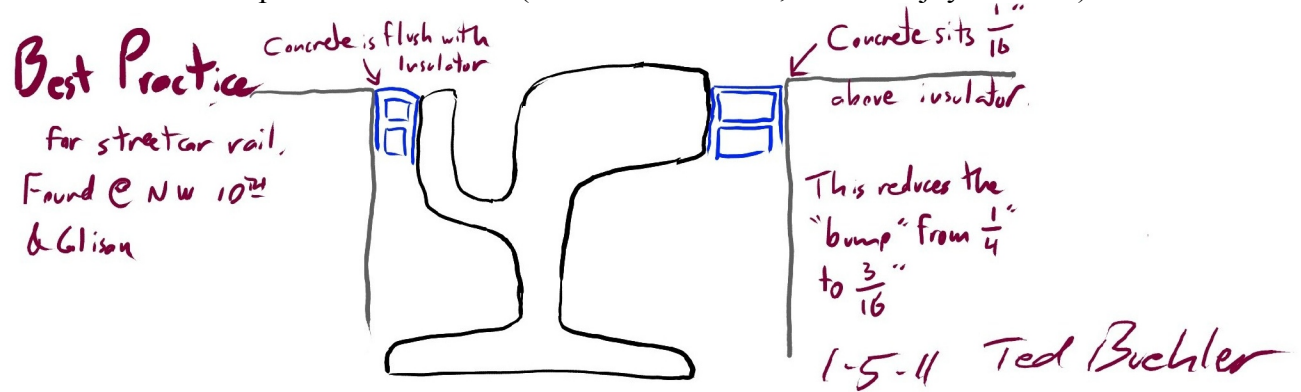
6) Schematic 2 -- streetcar rail, typical westside installation



7) Schematic 3 -- streetcar rail, poor eastside installation



8) Schematic 4 -- best practice installation (NW 10th and Alder, NW Lovejoy and 21st)



9) Contour Gauge. Available for \$20.95 at Woodcrafters (212 NE 6th Ave, Portland OR)

