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Sound Transit East Link

A Case Study in Cascading Construction Quality

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Project at a Glance

- **Project:** Sound Transit East Link Extension, branded as the 2 Line, a 14-mile light rail line connecting Seattle, Mercer Island, Bellevue, and Redmond, including the world's first light rail service on a floating bridge (the I-90 Homer M. Hadley Memorial Bridge)
- **Owner:** Sound Transit (Central Puget Sound Regional Transit Authority)
- **Original cost (ST2 baseline):** approximately $3.7 billion for the 14-mile corridor
- **Voter authorization:** Sound Transit 2 (ST2) approved November 2008; Sound Transit 3 (ST3) approved 2016 expanded the broader program
- **Major contractor (I-90 segment):** Kiewit-Hoffman East Link Constructors, a joint venture
- **Original target service date:** Mid-2023 (per ST2 program commitments)
- **Eastside-only starter line opened:** April 2024 (South Bellevue to Redmond Technology, ten stations)
- **Downtown Redmond extension opened:** May 2025
- **Full line opening (Crosslake Connection complete):** March 28, 2026
- **Total schedule slip from original ST2 target:** approximately three years
- **Contractor delay claim (Kiewit-Hoffman):** approximately $184 million for additional work, extended contracts, and related delays
- **Defective concrete plinths replaced:** approximately 5,400 to 6,000 in the I-90 segment, plus 19,500 nylon fastener inserts replaced on the floating bridge segment

Why This Case Matters

The Sound Transit East Link project is a current, fully documented example of how a complex public transit project with apparently sound engineering can lose years to construction quality issues that emerge progressively through inspection cycles, with each repair attempt revealing additional problems. Unlike Bertha (where a single dramatic event drove the schedule story) or the Elliott Bay Seawall (where mid-project means-and-methods decisions drove the cost story), East Link is a case study in cascading construction defects. A specific quality issue was identified in 2019. A repair was

attempted. The repair failed. Further inspection revealed additional issues. A second repair approach was attempted. New issues emerged. Eventually the agency ordered the complete demolition and reconstruction of thousands of plinths, contributing to a multi-year delay across an entire program that had already been promised to voters with specific service dates.

The case is also a study in how truly novel engineering, the world's first light rail line to operate on a floating bridge, intersects with conventional construction practices that did not initially execute to the precision the novel system required. The floating bridge engineering itself (the track bridge system that distributes movement, the special plinth design with drip caps, the Dex-G adhesive, the lightweight concrete blocks) is genuinely innovative and largely held up. The conventional cast-in-place concrete work on the approach spans on either side of the floating bridge is what failed.

For owners, contractors, and schedulers working on transit, on rail, on any project with novel components integrated with conventional construction, East Link illustrates the schedule and cost consequences of insufficient quality control on the conventional work. It also illustrates the political and operational pressure that builds when an agency has made specific opening promises to voters that cannot be kept.

Background and Project Structure

The I-90 floating bridge transit corridor has been studied for light rail since the late 1970s. A 1976 memorandum of agreement between WSDOT, Metro Transit, and local governments designated the center two lanes of the eight-lane bridge for transit use, with possible conversion to a fixed-guideway system in the future. In 2005, WSDOT conducted a live load test using flatbed trucks carrying concrete weights to simulate the weight of light rail trains and confirm the bridge could carry the loads. The technical foundation for light rail across the I-90 floating bridge was therefore decades in the making before construction began.

Voters approved Sound Transit 2 in November 2008, including funds for East Link with light rail trains projected to reach Bellevue by 2020 and Overlake Transit Center by 2021. After several years of route disputes within the City of Bellevue (including debate over the downtown segment's tunnel), the alignment was finalized in 2013. Construction began in 2016, with mid-2023 as the original service date.

The Kiewit-Hoffman East Link Constructors joint venture was awarded the major construction contract for the I-90 segment, including the approach spans, the Mercer Island station, and the connection across the floating bridge. The line was to be branded the 2 Line on transit maps when it entered service.

The technical innovation on the floating bridge segment is genuinely first-of-kind. Light rail trains weigh substantially less than vehicular traffic but produce continuous, repetitive loading at specific points where wheels meet rail. The bridge is also moving constantly, rotating, flexing, and rising and falling slightly with water levels and wind loads. To accommodate this, the project incorporated:

- A custom track bridge system that distributes the bridge's continuous motion over a 43-foot transition zone, preventing rail breakage at the join between stable ground and the moving bridge deck
- Lightweight concrete plinth blocks bonded to the bridge deck with Dex-G adhesive (rather than being bolted, which would have required drilling into the bridge deck and compromised structural integrity)
- A drip cap system to prevent water from creating continuous electrical paths between the rails and the bridge structure (since stray current from the electric Link trains would otherwise corrode the bridge)
- Approximately 9,000 plinths total along the floating bridge segment, with approximately 19,500 nylon fastener inserts holding the rail attachment bolts

The track bridge system was tested at the Transportation Technology Center in Pueblo, Colorado, and validated at three times the expected bridge movement and at the full 55 mph train speed. The system worked as designed.

The problems were not on the floating bridge itself.

What Actually Went Wrong

The Initial Discovery (2019)

In 2019, Sound Transit identified quality issues with track construction on both sides of the I-90 bridge, in the conventional cast-in-place concrete plinth segments on the approach spans through Mercer Island and Seattle. The plinths, the raised concrete blocks that support the rails, were constructed of poorly consolidated concrete that led to gaps under

the rail fasteners. The top surface of some plinths did not connect with the rails they were supposed to be supporting.

This is an important detail. The defective plinths were on the conventional approach spans, not on the floating bridge itself, and not on the novel track bridge transition system. The first-of-kind engineering held up. The conventional cast-in-place work did not.

The First Repair Attempt (2019-2020)

Sound Transit's contractor, the Kiewit-Hoffman joint venture, installed mortar between the blocks and the rails to close the gaps. This was a conventional and reasonable repair approach. The agency believed it would fix the problem.

The mortar started failing in Fall 2020.

Further Discovery (2021)

When the failed mortar was investigated, additional problems came to light: concrete placements that were too low, too high, constructed to the wrong geometry, or resulting in voids under rail fasteners. As the inspection scope widened, more issues kept appearing. Sound Transit and its contractors worked through 2021 to develop solutions for the faulty plinths.

By the end of 2021, Sound Transit projected a 42-day delay to the East Link project. That estimate was about to look very optimistic.

The November 2021 Concrete Strike

In November 2021, approximately 300 concrete workers in the Seattle region went on strike against six cement suppliers. The strike lasted four months. The timing was particularly damaging for East Link because the project was already trying to execute extensive plinth repairs, and ready-mix concrete supply for the Seattle area effectively stopped during the strike.

The strike alone, by Sound Transit's later estimate, contributed four to six months of delay to multiple ongoing extensions including East Link, Lynnwood Link, and Downtown Redmond Link.

The 2022 Demolition Order

In early 2022, as crews removed enough concrete from the existing plinths to expose internal rebar, Sound Transit identified further structural integrity and durability issues. In

some cases, the plinths had been built with improperly installed or missing rebar, the structural reinforcement that provides tensile strength and resistance to cracking. Many of the original plinths had additional issues such as poor concrete consolidation that could not be repaired.

The decision was made to demolish and reconstruct approximately 5,400 to 6,000 plinths along the four-mile I-90 segment on both sides of Lake Washington. Demolition began in September 2022 after repairs were deemed infeasible.

March 2022 Discovery on the Floating Bridge

On top of the cast-in-place plinth issues on the approach spans, in March 2022 Sound Transit also uncovered quality issues with the precast plinths on the floating bridge segment itself. Inspectors observed cracking, flaking, or spalling in approximately 1 percent of examined blocks (9 of 900 inspected blocks at that point, with more than 7,000 still to be evaluated). Additional issues with the nylon rail fastener bolt inserts were observed; the threads on the inserts were stripping when exposed to water. Sound Transit decided to replace all 19,500 inserts on the floating bridge segment.

The 2022 inspections triggered a full reassessment of the floating bridge segment construction, even though the overall novel engineering remained sound.

The Causation Question

Sound Transit and outside observers have attributed the plinth quality issues to a combination of factors:

- Poor concrete workmanship on the part of the contractor's subcontractors
- Delayed oversight and inspection by Sound Transit and project contractors
- The COVID-19 pandemic, which Sound Transit Deputy Director Kimberly Farley specifically cited: it was "a struggle to get everybody on site, keep the work going, and keep the protocols in place." Inspectors who would normally have been on site monitoring concrete pours during construction were instead working from home during 2020.

The pandemic explanation is partial but real. Concrete construction quality depends heavily on real-time inspection: was the placement properly consolidated, was vibration applied correctly, was the rebar in the right position, was the formwork true to design, was the curing managed properly. When the inspection function is degraded, particularly for repetitive structural elements being installed rapidly, problems accumulate. Once the

concrete has cured, finding internal voids, missing rebar, or poor consolidation is much harder than catching them at the time of placement.

The Schedule Cascade

The East Link delays did not stay confined to East Link. Because the entire Sound Transit Link system is interconnected, with shared train storage and maintenance facilities, the cascading effect rippled across the program.

The Operations and Maintenance Facility East (OMF East) Problem

A new Operations and Maintenance Facility East (OMF East) was built in Bellevue's Spring District as part of the East Link project. This facility was sized to provide additional train storage and maintenance capacity that the entire Link system needs as it expands. Until the I-90 segment of East Link opens and trains can cross Lake Washington to access OMF East, service on the rest of the system, including the new Lynnwood Link extension, is constrained by the storage capacity of the existing Central OMF in Seattle.
Sound Transit explicitly identified this in 2023: "Until the I-90 segment of East Link opens and 2-Line trains can cross Lake Washington and access our Operations and Maintenance Facility East in Bellevue, service to Lynnwood will be limited by the storage capacity of our Central OMF in Seattle. This remains one of our biggest holistic challenges for near-term service expansion systemwide."

The Phased Opening Strategy

In 2023, Sound Transit pivoted to a phased opening strategy. Rather than wait for the I-90 segment to be ready, the agency planned to open the Eastside-only portion of the 2 Line first, providing service from South Bellevue to Redmond Technology while the cross-lake connection remained under repair. This is unusual for a transit line; ten stations would open with no connection to the broader system.
The Eastside-only starter line opened in April 2024 with ten stations. Ridership was reported to substantially exceed Sound Transit's projections, with daily light rail boardings hovering around 6,000 between May and July 2025. The line was extended to Downtown Redmond in May 2025.

The Schedule Revisions

The full line opening date kept moving:

- **Original ST2 commitment (2008):** Trains to Bellevue by 2020, Overlake Transit Center by 2021
- **ST3 voter approval (2016):** Mid-2023 service for the full corridor
- **August 2022 disclosure:** Late 2024 (at least one year delay)
- **Spring 2023 update:** Pushed to 2025
- **May 2025 update:** Slipped to early 2026; "January 16 grand opening date" floated
- **Final opening:** March 28, 2026

The Contractor's Counter-Position

Kiewit-Hoffman has filed claims seeking approximately $184 million for additional work, extended contracts, and related delays. The contractor's position will likely be that some of the delay was caused by factors outside its control, including the COVID-19 pandemic, the November 2021 concrete strike, and supply chain disruptions during the broader 2020-2022 construction market disruption. As of public reporting, the resolution of those claims is ongoing.

For forensic schedule analysts, this is a fact pattern with substantial concurrency: contractor-caused delays (the original plinth quality issues, the failed mortar repair, the rebar issues, the precast block defects, the nylon insert stripping) and excusable or owner-shared delays (the concrete strike, the pandemic). Allocating responsibility between these categories requires careful application of windows analysis, careful attention to which delays were on the critical path during which periods, and explicit treatment of concurrency under whatever framework the contract specifies.

What the Project Got Right

The East Link extension is now operational. Despite the delays and cost growth, the underlying engineering achievement is real: the 2 Line is the world's first light rail service on a floating bridge, and the Crosslake Connection has been delivered. The track bridge system that handles the 43-foot transition from stable ground to the moving bridge deck works as designed. The plinth design accommodating the bridge's special requirements

works. The full corridor opened on March 28, 2026, including ten stations on the Eastside that opened progressively starting in April 2024.

Sound Transit's decision to open the Eastside-only starter line in April 2024 was a sophisticated response to a difficult situation. Rather than holding all ten Eastside stations closed while waiting for the cross-lake plinth repairs, the agency used the available infrastructure to provide actual transit service. Ridership on the abridged line exceeded projections. The agency's "no surprises" communication policy, with regular quarterly updates to the Board of Directors and public, also represents reasonably mature crisis management even when the news being delivered was bad.

The agency also retained confidence in the underlying engineering throughout the crisis. Sound Transit's interim CEO Brooke Belman stated explicitly during the 2022 disclosures: "We are 100 percent confident in the design and operability of the segment across the floating bridge and that we will complete the entire alignment." The engineering as designed worked. The construction execution did not initially match the design quality requirements, but the design itself never was the problem.

Schedule Lessons for Transit and Major Public Projects

Quality Problems Cascade

A specific quality issue identified in 2019 (concrete placement gaps under rail fasteners) was followed by a failed repair (mortar that itself failed), which led to wider inspections, which discovered additional issues (rebar problems, geometric issues, void issues, precast block cracking, fastener insert stripping), which together led to a complete demolition and reconstruction order for thousands of plinths. The original problem was relatively contained; the cascading discovery process was what produced the multi-year delay.

For owners, the lesson is that the first quality issue identified is often not the only quality issue present. When a particular failure mode is identified, the inspection scope should expand to assess whether the same construction practices may have produced other failures elsewhere on the project. Contained problems are cheap to fix early. Cascading problems are expensive to fix late.

Pandemic-Era Construction Quality Has a Documented Footprint

Sound Transit explicitly cited the COVID-19 pandemic and its disruption to on-site inspection as a contributing factor to the plinth quality issues. The acknowledgment that inspectors were working from home during 2020 while concrete was being placed is significant. Similar issues on other 2020-era projects may surface in coming years. Any project that performed major concrete placements during 2020 should consider whether its inspection records support the construction quality the design assumes.

Concrete Strikes Are a Real Schedule Risk

The November 2021 concrete strike in the Seattle region lasted four months and contributed four to six months of delay to multiple Sound Transit projects. Construction labor disputes involving critical specialty trades (concrete suppliers, ironworkers, electricians) can effectively halt work that depends on their materials or labor. Schedules for projects in regions with active labor environments should include force majeure or schedule contingency for this category of risk.

Novel Engineering Pairs With Standard Construction

The track bridge system, the special plinth design, and the Dex-G adhesive bonding on the floating bridge segment all represent first-of-kind engineering that worked. The conventional cast-in-place concrete plinths on the approach spans did not. When a project incorporates novel and conventional elements, both demand quality execution. Owners and contractors who concentrate quality assurance attention on the novel elements (where the engineering risk is) and assume the conventional elements (where the construction risk lives) will be executed reliably are at risk of exactly the East Link pattern.

Programmatic Cascading Delays Are Real

The East Link plinth issues did not stay confined to East Link. The OMF East dependency meant that constraints on the I-90 segment also constrained train storage and maintenance for the broader Link system, including the new Lynnwood Link extension. On any major program with shared infrastructure, individual project delays can have programmatic consequences. Schedulers should explicitly map these dependencies during master scheduling rather than discovering them when one project slips.

Phased Opening Strategy Has Real Value

Sound Transit's decision to open ten stations on the Eastside in April 2024 while the cross-lake connection remained under repair, even though those ten stations could not connect to the broader system, was a smart response to a difficult situation. Some operational benefit was delivered. Some political pressure was relieved. Some institutional learning was acquired. Phased opening is rarely the original plan, but it should be in the playbook for major transit projects when one segment slips materially while others are ready.

Public Communication Discipline Pays Off

Sound Transit's "no surprises" communication policy, with regular quarterly Board of Directors updates and public release of construction issue details, generated criticism in real time but appears to have preserved institutional credibility through a difficult period. The contrast with the Elliott Bay Seawall case, where a project manager publicly stated "the project's not delayed overall" approximately one month before a $71 million budget increase was announced, is instructive. Honest early acknowledgment of problems is generally less damaging than late acknowledgment forced by financial reality.

Voter-Approved Schedules Carry Political Risk

Sound Transit 2 was approved in 2008 with specific service dates: Bellevue by 2020, Overlake Transit Center by 2021. The actual service dates have been roughly five years later than those original promises. Voter-approved transit schedules carry political risk that conventional capital project schedules do not. When the schedule slips, it is not just a contractual issue with the contractor; it is a public credibility issue with the funding base. Agencies making voter-approved schedule commitments should plan their internal contingencies accordingly and communicate the actual delivery probability range honestly during the campaign.

Closing Observation

The Sound Transit 2 Line and East Link extension is a project that achieved something genuinely new: the world's first light rail service on a floating bridge. The fact that it opened on March 28, 2026, almost three years later than the ST3 voter-approved 2023 target and approximately five years later than the original ST2 ballot promise, does not negate the

engineering achievement. The track bridge system works. The bridge accommodates the train. The Crosslake Connection has been delivered.

The case is also a study in how a significant capital project can lose years to construction quality issues that emerge cumulatively, even when the underlying design is sound. The plinth issues did not begin as a design problem. They began as a concrete placement problem. The decision to repair with mortar in 2019 looked reasonable at the time. The escalation through 2020, 2021, and 2022 represented the cumulative cost of the original execution failure plus each subsequent repair attempt that did not fully resolve the underlying issue.

For schedulers, the East Link case is a reminder that the most expensive schedule risk is often not the dramatic event (a TBM stoppage, a major design change, a fire) but the subtle quality issue that grows over time as inspections widen and repair attempts fail. Schedule contingency on major construction should include explicit allowance for cascading quality issues. Inspection regimes should be designed to catch problems at the time of placement, not during commissioning. Owner quality assurance staff should be present in real time during major repetitive structural work.

For owners, the lesson is that the contractor's quality program is as important to the schedule as the contractor's productivity. Selecting a contractor based primarily on price and experience, without rigorous evaluation of the contractor's quality control and quality assurance practices, exposes the owner to exactly the kind of cascading quality discovery that drove East Link's schedule. When inspection function is reduced (as during the pandemic), proactive quality assurance becomes more important, not less.

For the public, the East Link story is ultimately a successful one. The trains run. The connection across Lake Washington is open. Riders on the Eastside-only starter line in 2024 and 2025 used the service in higher numbers than the agency projected. The ridership demand was real. The engineering is delivered. And the lessons it produced will shape the next generation of major transit construction in the Puget Sound region and beyond.

References

- Sound Transit, *East Link Extension* program documentation, Board of Directors materials, and quarterly construction updates.

- Wikipedia, *2 Line (Sound Transit)*, with primary sources cited therein.
- *The Seattle Times* coverage of the East Link plinth quality issues, including 2022 reporting on the inspection findings and 2023–2026 reporting on schedule revisions.
- *Seattle Transit Blog*, including the *Crosslake Connection: 50 Years in the Making* retrospective and the 2022 *More Link Delays* analysis.
- *PubliCola* coverage of the cascading construction errors, August 2022.
- *The Urbanist* coverage of Sound Transit construction delays through 2025–2026.
- *Lynnwood Times* coverage of the Sound Transit budget shortfall and 2 Line opening, March 2026.
- King County Council, Sound Transit Board of Directors System Expansion Committee meeting records.
- Kiewit-Hoffman East Link Constructors public project documentation.
- WSDOT historical documentation on the I-90 Homer M. Hadley Memorial Bridge live load testing (2005) and broader corridor planning.

Note: Schedule durations, contractor claim amounts, and final settlement terms continue to evolve as Kiewit-Hoffman's claims are processed. Practitioners citing this case in formal work should verify current status with Sound Transit and primary sources.