CPM Pros

THE SCHEDULING CONSULTANTS

Elliott Bay Seawall

A Case Study in Marine Civil Schedule Risk

Written by CPM Pros

April 2024

Project at a Glance

- **Project:** Elliott Bay Seawall Replacement (also known as the Alaskan Way Seawall), approximately 7,166 linear feet along Seattle's downtown waterfront
- **Phase 1 scope:** S. Washington Street to Pine Street, approximately 3,400 linear feet
- **Owner:** City of Seattle, through the Seattle Department of Transportation (SDOT) and the Office of the Waterfront
- **Original seawall age:** Built between 1916 and 1934 on approximately 20,000 old-growth timber piles, found post-Nisqually earthquake (2001) to have been substantially consumed by gribbles (marine wood-boring crustaceans)
- **Program management and engineer of record:** Parsons
- **General contractor:** Mortenson-Manson Joint Venture (MMJV)
- **Major specialty subcontractor:** Hayward Baker, Inc. (HBI), responsible for jet grouting
- **Funding:** Seattle Proposition 1 bond measure approved November 2012, $290 million; King County Flood Control District contribution, $32 million; no federal funding
- **Original cost estimate (2013):** $330.8 million for the Phase 1 segment, within an overall waterfront budget of approximately $1.07 billion
- **Final cost (Phase 1):** approximately $410 million, an increase of roughly 21 to 24 percent over the 2013 estimate
- **Construction start:** 2013
- **Practical completion:** 2017, more than a year late against the original schedule
- **Key technical decision:** Mid-project switch from dewatering to ground freezing (frozen soil wall) for excavation support
- **Subcontractor litigation:** $7.3 million breach-of-contract lawsuit filed by Hayward Baker against MMJV in 2016

Why This Case Matters

The Elliott Bay Seawall Replacement is a near-perfect case study in three things that show up on most complex public infrastructure projects: the cost and schedule consequences of mid-project means-and-methods changes, the scheduling implications of differing site conditions in marine and reclaimed-fill ground, and the cascading effect when a critical specialty subcontractor's work is disrupted by ground conditions outside the original sequencing plan.

Unlike the SR 99 Tunnel project (where the dramatic Bertha TBM stoppage drove the schedule story) or Sound Transit's East Link (where a specific engineering defect drove rework), the Seawall is the kind of project where the schedule and budget slipped from a thousand smaller cuts. Harder ground than expected. More material being dislodged by jet grouting than the contingency anticipated. A containment wall that moved during construction. Sequencing changes imposed on a subcontractor mid-execution. A contract structure that placed substantial cost risk on the City. None of these failures was catastrophic in isolation. Together they produced a 21 percent budget increase, a year-plus schedule slip, and a multi-million-dollar subcontractor lawsuit.

For owners, contractors, and schedulers working on marine civil work, urban infrastructure adjacent to operating facilities, or any project on reclaimed fill ground with sensitive neighbors (in this case, the Alaskan Way Viaduct), the Seawall illustrates how schedule risk in marine and ground-stabilization work routinely exceeds what is captured in the original CPM schedule.

Background and Project Structure

The original Alaskan Way Seawall was built between 1916 and 1934 to support Alaskan Way and the Alaskan Way Viaduct above it, and to protect upland infrastructure from Elliott Bay. The 2001 Nisqually earthquake exposed the structure's seismic vulnerability. Subsequent SDOT investigations found that gribbles had consumed substantial portions of the original timber pile supports. WSDOT later assessed a 1-in-20 chance that the seawall could be shut down by an earthquake within the next decade, making replacement a public safety priority.

The project was packaged in two phases:

- **Phase 1:** Washington Street to Pine Street, the priority section supporting the most heavily used downtown waterfront corridor
- **Phase 2:** Pine Street to Virginia Street, deferred and originally not yet funded
- **Northern extension** (Virginia to Broad Street): never under the original Phase 1 or Phase 2 contract, eventually unfunded

The City selected Parsons as the prime consultant and engineer of record, providing program management, environmental clearances, and permits for the full 6,800 linear feet of replacement, plus full design and construction support services for the 3,400 linear feet of Phase 1.

The Mortenson-Manson Joint Venture was awarded the general contractor and construction management contract under what was reported as a contract structure that placed significant cost risks on the City of Seattle. The contract was signed in November 2013 under Mayor Mike McGinn's administration. Cost overruns subsequently emerged under Mayor Ed Murray's administration, leading to public attribution of contract risk allocation as a factor in the eventual budget increase. Mayor Murray publicly characterized the contract as having "placed significant cost risks on the city" and as the source of the City's exposure to overruns.

The technical scope was substantial. The team replaced original seawall structures ranging in width from 15 to 60 feet, refurbished the historic Washington Street Boat Landing structure, and constructed a new earthquake-resistant system that supports the street and right-of-way, provides access to the waterfront piers, improves marine habitat, and supports upland uses.

The project also incorporated significant fish habitat enhancement: the seawall was relocated 10 to 15 feet landward, restoring approximately 1.8 acres of seabed, including intertidal benches for juvenile salmonids, textured concrete face panels to encourage aquatic vegetation, and a cantilevered sidewalk with a light-penetrating surface to allow sunshine to reach the water below. These features were not optional add-ons. They were required elements of the environmental approvals that allowed the project to proceed under federal habitat protection requirements, and they added complexity to the construction sequence.

What Actually Went Wrong

The Soil Stabilization Decision

The most consequential schedule and cost driver was the mid-project switch from dewatering to ground freezing. The original 2013 estimate assumed workers would use dewatering, a relatively conventional technique that lowers groundwater locally during excavation by pumping. In early 2015, officials decided to instead use a more expensive process to protect against delays and against the Alaskan Way Viaduct sinking. They chose to freeze soil at the edge of the site to keep water out.

The choice was driven by a real engineering concern. Dewatering near reclaimed fill adjacent to the Alaskan Way Viaduct, itself already seismically vulnerable and slated for demolition, carried the risk of consolidation settlement that could damage the Viaduct or upland buildings. Ground freezing avoids drawing down water levels and therefore avoids the settlement risk. It is also significantly more expensive, takes longer to install, and creates its own logistical and sequencing demands.

This is a classic owner-side risk management decision: trading a known higher cost (frozen soil wall) for the avoidance of a potentially much larger cost (Viaduct damage, third-party building damage, project shutdown). The decision was probably the right one in isolation. But it was made well after the contract was signed and the original schedule was set, which meant the cost and schedule consequences had to be absorbed by a project already in execution. That absorption is what hurt.

Jet Grouting and the Ground That Was There

The jet grouting work, the primary technical operation for stabilizing the marine and fill soils, was performed by Hayward Baker under subcontract to MMJV. Jet grouting injects high-pressure liquid concrete into the soil to create stabilized columns. SDOT Director Scott Kubly told the public, “There’s not another project that we can find that has the volume of jet grouting that we’re doing.” The technique was central to the project’s structural strategy. Two compounding problems emerged on the jet grouting work.

More material than expected. When the work finally got up to speed in late spring 2015, the City discovered that carting away the material being dislodged from the ground, a mix of historic timber, soil, and harbor fill, cost much more than expected. It tore through the City’s $30 million contingency fund. The original estimate did not adequately anticipate the volume of historic marine sediment, decayed timber pile remnants, and harbor fill that would be displaced by the grouting operation. The waterfront had been built up over more than a century of incremental fill, including bulk materials from the regrading of Denny Hill in the early 1900s, and the actual character of the subsurface was not fully understood until the grouting exposed it.

A containment wall that moved. In January 2015, HBI workers observed unstable ground while performing jet grouting. MMJV determined that the containment wall, the structural barrier separating the construction site from Elliott Bay, was moving in a westerly direction toward the Bay, which caused the unstable ground conditions. The wall movement was a fundamental disruption to the assumptions on which HBI had bid the work, because jet grouting requires predictable ground conditions to control column placement, mix, and curing.

The Subcontractor Sequencing Dispute

When the containment wall moved and ground conditions became unpredictable, MMJV's response had cascading consequences for HBI. According to HBI's subsequent lawsuit, after the containment wall moved, MMJV directed haphazard sequencing, contrary to the terms of the subcontract, and demanded HBI stop-and-start jet grouting work on a moment's notice.

HBI had bid the work on a specific sequencing plan. Its approximately $40 million bid was based on contiguous, predictable execution of jet grouting columns. Stop-and-start work on a specialty operation like jet grouting is significantly more expensive than continuous work because of mobilization of crews and equipment, curing window management, and the risk of incomplete columns or columns whose strength does not develop properly. HBI filed a $7.3 million breach-of-contract lawsuit against MMJV in 2016, claiming that the sequencing changes imposed on it after the containment wall movement were outside the scope of its subcontract and that it had not been adequately compensated for the resulting cost and schedule impact.

For schedulers, the HBI dispute is a case study in how a specialty subcontractor's productivity assumptions can be invalidated mid-project by ground conditions outside its control, and how the resulting cost and schedule impact has to be allocated between the prime contractor and the owner, often with a lawsuit determining the final allocation.

The Public Communication Problem

A specific moment in the project's history is instructive for owner communication on troubled projects. On July 13, the seawall project manager publicly stated, in response to a reporter's questions:

- Reporter: "How far delayed is the Seawall now?"
- Project manager: "The project's not delayed overall."
- Reporter: "And how's the budget doing? Have you been able to stay relatively on target?"

About one month later, the City announced that the project would take an additional year and cost $71 million more than originally projected, an increase of nearly 21 percent. That gap, between public statement and the actual emerging picture, became a separate political issue. Mayor Murray called for an independent audit. The contracting structure came under public scrutiny. The project's credibility took a real hit during the period when it most needed public support for the additional appropriation.

For owners on troubled public projects, the lesson is straightforward: public communication has to track the internal reality, even when the internal reality is uncomfortable. The cost of an embarrassing public reversal is typically larger than the cost of an honest early acknowledgment.

The Contract Risk Allocation

Mayor Murray's eventual public framing of the cost overruns was that "in November 2013, the city agreed to a contract that placed significant cost risks on the city." Without seeing the full contract, no outside party can verify the precise risk allocation, but the structural point is sound: a public-sector owner bidding a complex marine civil project in reclaimed fill had to either retain ground risk or pay a substantial premium to transfer it to the contractor. The City retained material ground risk. When the ground turned out to be more problematic than expected, the City's exposure was correspondingly larger.

This is not a mistake unique to Seattle. Public sector owners frequently retain ground risk on infrastructure projects because the alternative, paying the contractor's risk premium for guaranteed-price ground work, is typically too expensive to justify when ground conditions are reasonably well understood. On a project with a century of poorly documented harbor fill, the ground was not as well understood as the original risk allocation assumed.

What the Project Got Right

A balanced case study has to acknowledge that the Elliott Bay Seawall Replacement was, in its core mission, successful. The seawall was replaced. The Viaduct was not damaged during construction. The waterfront did not lose its essential infrastructure protection. The fish habitat features were delivered as designed. The replacement structure meets current seismic standards and is rated for a 75-year life. The project finished, on a public site of extraordinary complexity, with no major safety incident.

The technical decision to switch from dewatering to ground freezing, while expensive and disruptive, almost certainly avoided a much larger problem. If the Viaduct had settled significantly during seawall construction, the consequences would have included potential closure of one of Seattle's primary north-south arterials, possible damage to upland buildings, and substantial third-party claims. The 21 percent cost increase, in retrospect, was probably cheap insurance against that scenario.

The project also delivered meaningful public realm and environmental benefits beyond the structural seawall: improved fish habitat, better water quality through stormwater management improvements, and a foundation for the subsequent Waterfront Seattle redevelopment. These benefits are not captured in cost-and-schedule metrics but are part of the project's full value proposition.

Schedule Lessons for Marine Civil and Urban Infrastructure Work

Ground Risk Allocation Drives Cost Outcomes

The single most important contract decision on a project like the Elliott Bay Seawall is who bears ground risk. On reclaimed fill, harbor sediment, and marine soils, the ground is rarely as well understood as the original geotechnical reports suggest. The owner's choice is essentially between paying a contractor's risk premium up front to transfer ground risk, or retaining the risk and absorbing it through changes during construction. There is no third option that costs less than both. Owners who do not face this trade-off honestly tend to be surprised by the cost of changes during construction.

Means-and-Methods Decisions Made During Construction Cascade

The dewatering-to-ground-freezing decision was a single technical choice with cascading consequences: increased cost, extended schedule, changed sequencing for follow-on trades, and altered logistics for material movement. Schedules that cannot absorb mid-project means-and-methods changes are schedules that will fail when the changes happen. Realistic complex-project schedules should include a means-and-methods contingency line, with a budget and duration that the project can draw from when geotechnical or environmental conditions force a change.

Specialty Subcontractor Productivity Is Bid-Specific

Jet grouting, ground freezing, marine pile work, and similar specialty operations are bid against specific sequencing assumptions. When those assumptions are invalidated mid-project, the specialty subcontractor's productivity model breaks. The resulting claims are often legitimate and frequently result in litigation. Schedules that integrate specialty subcontractor sequencing as a flexible afterthought tend to produce these claims. Schedules that treat specialty subcontractor sequencing as a primary constraint tend to avoid them.

Adjacency to Operating Infrastructure Is a Schedule Driver

The proximity of the Alaskan Way Viaduct, itself a vulnerable structure, fundamentally constrained the construction methods available to MMJV. Adjacency to operating infrastructure, particularly infrastructure with its own structural concerns, should be modeled in the schedule as a constraint that affects means and methods, not just as a site condition.

Public Communication Has to Track Reality

The public statement that "the project's not delayed overall," issued one month before a $71 million budget increase was announced, became a separate problem for the project. Owners on troubled public projects have to align public communication with internal reality, even when the internal reality is uncomfortable. Honest early acknowledgment of emerging issues typically costs less, in political capital and public trust, than late acknowledgment forced by financial reality.

Contingency Sized for the Project's Actual Risk Profile

The City's $30 million contingency fund was approximately 9 percent of the original project budget. For a project with this much ground risk, that is on the low end of what was probably defensible. Contingency on complex marine civil work in poorly characterized fill should generally be sized to absorb realistic ranges of differing site conditions. Contingency that is exhausted by the first significant ground surprise is contingency that was not adequately sized in the first place.

Historic Site Conditions Compound Geotechnical Surprise

The waterfront's century of fill, including bulk material from Denny Hill regrades, decommissioned harbor structures, and archaeological deposits, made the actual subsurface conditions less predictable than would be the case in undisturbed ground. Schedulers on projects in historic urban industrial fill should account for this compounding effect. The geotechnical report from a series of borings is an estimate, not a fact, and the variance in poorly documented historic fill is larger than in well-characterized native soils.

The "Last Mile" Funding Problem

The Phase 2 segment (Pine to Virginia Streets) and the northern extension (Virginia to Broad Streets) were never funded under the original program. As of the time of the Phase 1 cost overrun, the Phase 2 estimate had increased from $8.4 million to $38.4 million, a more than fourfold increase, before construction had begun. Public infrastructure projects packaged in segments often see the later segments suffer from compounding cost growth as estimates mature with the experience of the earlier segments. Owners should plan for this and either fund the full program upfront or be transparent with the public about the funding gap that develops.

Closing Observation

The Elliott Bay Seawall Replacement is not a project that failed. It delivered the structural safety, seismic resilience, and habitat improvements it promised. But it cost approximately $71 million more than its original estimate, took more than a year longer than originally planned, and produced a multi-million-dollar subcontractor lawsuit, all primarily because of decisions and discoveries during construction in a marine civil environment with poorly characterized historic fill.

For practitioners working on similar projects, the Seawall illustrates that the scheduling and cost discipline required to deliver complex marine civil work on time and on budget is not primarily about CPM logic, productivity factors, or trade coordination, although all of those matter. It is about correctly identifying the small number of decisions that, if they go a particular way during construction, will reset the project's cost and schedule baseline. On the Seawall, those decisions were the dewatering versus ground freezing choice, the volume and character of material to be removed during jet grouting, the response when the containment wall moved, and the public communication strategy when overruns became visible. Schedules that treated these as low-probability risks underestimated their impact. Schedules that treat them as primary risk drivers, with explicit contingency and management protocols, tend to produce projects that finish closer to their original estimates.

For owners specifically, the Seawall is a reminder that ground risk on marine and reclaimed fill projects is real, difficult to transfer cheaply, and almost impossible to eliminate. The honest approach is to size contingency to the actual risk profile of the work, allocate ground risk explicitly in the contract, and prepare the political and financial framework for the adjustments that will be required. Projects that try to deliver complex marine civil work without that preparation tend to look, in hindsight, a lot like the Elliott Bay Seawall Replacement.

References

- Seattle Department of Transportation, Elliott Bay Seawall Project documentation and public reporting.
- City of Seattle Office of the Waterfront, *Waterfront Seattle* program documentation.
- Parsons Corporation, Elliott Bay Seawall project case documentation.
- Mortenson Construction, Elliott Bay Seawall project case documentation.
- *Seattle Times* coverage of the Seawall project cost increases and contract issues, 2015 and subsequent reporting.
- KUOW reporting on Seattle Seawall project schedule and cost developments.

- KOMO News coverage of the Hayward Baker $7.3 million breach-of-contract lawsuit against Mortenson-Manson Joint Venture, 2016.
- Wikipedia, *Alaskan Way Seawall*, with sources cited therein.
- Puget Sound Innovation Stories, *Seattle Elliott Bay Seawall* program profile.
- Washington State Department of Transportation seismic risk assessments for the Alaskan Way corridor.

Note: Cost figures and schedule durations are drawn from public reporting, City of Seattle documents, and contemporaneous coverage. Practitioners citing this case in formal work should consult the primary sources directly. This article is for informational purposes only and is not intended to provide professional advice.