SIMPLAR FOUNDATION

Journal of Research and Practice in Projects and Organizations

WHERE DO PRECONSTRUCTION SCHEDULES GO OFF TRACK? AN EVIDENCE-INFORMED INDUSTRY COMMENTARY

[1]Rebecca Kassa, PhD, [2]Brian Lines, PhD, [3]Jake Smithwick, PhD, [4]Kenneth Sullivan, PhD

[1]Simplar Foundation, email: rebecca.kassa@simplar.com

[2]University of Kansas, email: brianlines@ku.edu

[3]University of North Carolina at Charlotte, email: Jake.Smithwick@charlotte.edu

[4]Arizona State University, email: Kenneth.Sullivan@asu.edu

INTRODUCTION

Across sectors, preconstruction duration is becoming less predictable and, for many portfolios, materially longer. The consequences are not limited to missed start dates: they include resequencing, cost escalation, long-lead exposure, and downstream disruption to contractors, owners, and communities.

This commentary translates repeated practitioner patterns into a practical diagnostic framework: eight domains where preconstruction schedules most often go off track, paired with early warning signals and controls that teams can implement.

This commentary is practice-informed and evidence-informed. It synthesizes:

a. 10 semi-structured interviews conducted in 2025 involving 15 participants across owner, construction management, engineering, and utility-facing roles; and
b. A targeted practitioner survey (n=21, 48 fields; item-level response varied by question), triangulated with peer-reviewed literature and industry reports.

All individuals and organizations are anonymized; details that could identify specific projects, jurisdictions, or entities have been generalized.

The intent is not statistical generalization. Instead, the goal is to surface recurring cross-sector patterns, triangulate them across interviews and survey signals, and provide a field-ready set of controls intended to help reduce preconstruction variance.

EVIDENCE CONTEXT

The literature on preconstruction performance spans front-end planning, delay causation taxonomies, environmental review and permitting timelines, utility interconnection and grid capacity, supply-chain risk for long-lead electrical equipment, workforce availability, and stakeholder engagement. This commentary synthesizes findings from peer-reviewed studies, authoritative government/industry reports, and recent datasets to establish a contemporary baseline against which the field evidence summarized here can be interpreted. This review emphasizes post-2020 dynamics (e.g., interconnection queues, transformer shortages) while situating them within pre-existing bodies of research on planning discipline and approval processes. This section also highlights gaps, particularly

the integration of utility/power constraints and vendor-information flow into preconstruction delay models and the under-specification of regional/sectoral differences, that motivate the evidence-informed, practice-oriented framework presented in this commentary.

Front-end planning research consistently links early scope definition and cross-functional alignment to superior cost and schedule outcomes. The Project Definition Rating Index (PDRI) and related toolkits provide structured checklists to verify scope readiness and decision quality at progressive gates, with studies reporting fewer late changes, tighter cost accuracy bands, and reduced schedule slippage when these practices are embedded (CII, 2006.; Fashina et al., 2021). More recent work underscores that the benefits materialize when planning is resourced and integrated across engineering, procurement, construction, commissioning, and operations, rather than treated as a documentation exercise.

The delay literature offers complementary lenses, owner-related, contractor-related, and external/systemic drivers—showing how incomplete design information, slow decision-making, and resource constraints propagate through preconstruction into execution (Fashina et al., 2021; Adepu et. al., 2023). Post-pandemic updates add evidence for supply chain fragility and labor volatility, with ripple effects that appear early as uncertainty in lead times, inspection capacity, and utility coordination (Adepu et. al., 2023). This work motivates viewing preconstruction not as a single permit-driven path but as an interdependent system in which information release, approvals, procurement, and utility readiness interact.

Permitting and environmental review timelines have been a long-standing concern, yet several data series suggest a more nuanced picture. National statistics on Environmental Impact Statements indicate that median durations have shortened in recent years relative to earlier baselines, reflecting statutory and regulatory refinements and targeted resourcing (CEQ, 2025). Sector-specific analyses for clean-energy projects likewise show instances of one- to two-year federal reviews when scopes are standardized and documentation is complete, even as variability remains across agencies and geographies (RFF, 2025). These findings are congruent with field reports from the energy/electrical segment describing improved predictability where e-plan portals and standardized plan sets are in use.

In parallel, the grid-integration literature documents a rapid expansion of transmission interconnection queues, shifting a portion of preconstruction risk from local permitting to regional system studies and upgrades. Annual updates to large interconnection datasets highlight longer study times, higher withdrawal rates, and the growing need for cluster-based approaches and proactive transmission planning to restore predictability (LBNL, 2024, 2025). From a preconstruction standpoint, interconnection milestones and off-site utility scopes function as gating constraints that must be planned as rigorously as building permits.

Supply-chain analyses focused on the electric T&D sector show persistent constraints for large power transformers and major switchgear, driven by limited global manufacturing capacity, long manufacturing cycles, and materials bottlenecks. Government advisory bodies and industry analysts have both warned that these constraints can dominate schedules for power-intensive projects, amplifying the importance of early reservations, expediting, and quality surveillance within preconstruction (NIAC, 2024; Wood Mackenzie, 2025). The elevation of vendor information flow—drawings, certified dimensions, control narratives—to a formal schedule thread is a recurring recommendation in this literature.

Workforce studies add another structural element: uneven regional availability of skilled craft, inspectors, and testing laboratories. Analyses from 2023–2025 document hiring challenges, demographic headwinds, and mismatches between project locations and available labor pools, with direct links to schedule risk and quality outcomes (U.S. construction workforce studies, 2023–2025). For preconstruction, these findings translate into the need to validate crew curves against lodging and travel constraints, schedule inspections and testing to workfronts, and improve site services to retain crews once mobilized.

Finally, the stakeholder engagement literature points to the effectiveness of substantive, early, and transparent engagement—often formalized through community benefits frameworks—in reducing opposition risk and smoothing approvals. Studies describe how visualizing mitigations (traffic, noise, visual) and tracking commitments publicly can shorten hearing cycles and build trust, particularly in dense jurisdictions or where cumulative project impacts are salient (Dolan et. al., 2025). News and policy analyses reinforce that broader grid and permitting reforms continue to evolve, implying that practitioners should pair internal best practices with an external awareness of regulatory change (Reuters, 2024).

Collectively, the literature suggests that contemporary preconstruction success depends on integrating planning discipline with realistic utility timelines, information-centric procurement, early and complete permitting packages, labor-aware execution planning, and credible stakeholder strategies. This integrative perspective motivates the eight-domain framework and informs the practical controls and metrics presented in Section 4.

EVIDENCE BASIS

This commentary is informed by a mixed-methods evidence base:

- Semi-structured interviews with owners, engineers, and constructors (n=10)
- Analysis of a targeted practitioner survey (n=21, 48 fields; item-level response varied by question); and
- Triangulation with peer-reviewed literature and industry reports.

Note: because some survey sections were optional, response counts vary by question; descriptive statistics are reported using available responses.

Interviews followed a common protocol exploring permitting, utilities, supply chain, workforce, planning discipline, community engagement, and contracting strategy. The survey captured perceived bottlenecks, observed lead times, mitigation practices, and open-ended narratives.

Interview transcripts were coded using thematic categories aligned with the eight-domain framework. Survey responses were summarized with descriptive statistics. Sector and region labels are used solely for analytic clarity.

INSIGHTS AND IMPLICATIONS FOR PRACTICE

This section synthesizes evidence from interviews, survey responses, and external sources into a coherent view of preconstruction performance. Survey snapshots are covered first, then define eight domains where delays concentrate are listed, which is followed by examining how patterns vary by region, project size, and industry. The results integrate anonymized examples to ground the findings and conclude with a consolidated set of practices. Together, these results translate qualitative insights and quantitative signals into actionable guidance for owners, contractors, and policymakers.

Survey Snapshot: What Practitioners Selected

The survey asked respondents to select common preconstruction challenges across federal permitting, state/local permitting, and site selection. Response counts vary by section because not every respondent answered every question.

Table 1 Summary of the most selected items and their practical interpretation

Survey Section (select all that apply)	**Most Selected Items (count/section n)**	**Interpretation for practice**
Federal Permitting (n=17)	Construction-related environmental permits (76%) Facility operations-related environmental permits (65%) NEPA reviews (35%) Endangered Species Act consultations (35%)	Environmental compliance is a major driver of variance. Teams benefit from early pathway mapping, phased submittals, and defined decision points.
State/Local Permitting (n=16)	Building permits (75%) Coordination with local inspectors (50%) Fire permits (44%) Stormwater permits (44%)	Local throughput and interpretation (inspectors, plan reviewers) often govern cycle time; proactive coordination

		and "first-time-right" packages reduce churn.
Site Selection & Land Acquisition (n=15)	Utility relocation/coordination & approvals (87%) Site plan approval (53%) Zoning/land-use restrictions (47%) Geotechnical testing (47%)	Utility constraints frequently function as a gating prerequisite to site viability; early utility due diligence should be treated as part of site selection.
Prevalence of Challenges (n=16)	25-50% of projects affected (44%) 51-75% affected (25%) <25% affected (19%) >75% affected (12%)	Most respondents report that preconstruction challenges impact a meaningful share of their portfolio, reinforcing the need for repeatable governance rather than ad hoc fixes.

Taken together, the survey emphasizes three practical realities:

(1) Environmental and permitting pathways frequently govern schedule variance,
(2) Local review and inspection throughput can be a controlling factor even when requirements are known, and
(3) Utility coordination often determines site viability and should be treated as part of site selection rather than a downstream task.

What Has Changed: From "Delay Events" to Longer Preconstruction Cycles

Practitioners consistently distinguished between classic "delay events" (unexpected setbacks against a known plan) and a broader shift toward longer, more fragile preconstruction cycles. The most disruptive outcomes were rarely caused by a single issue. They arose from interactions of different causes.

Survey respondents also indicated that preconstruction challenges affect a meaningful portion of their portfolios: among those answering the prevalence question (n=16), 7 reported challenges on roughly 25-50% of projects, and 4 reported challenges on 51-75% of projects (Table 1).

THE EIGHT DOMAINS OF PRECONSTRUCTION CHALLENGES

(1) Equipment & Vendor Information:

Vendor-supplied technical data and long-lead equipment deliveries form a "hidden" critical path behind engineering and site readiness. Late certified drawings stall detail design and procurement sequencing.

Delays mostly arise from small supplier pools, sub-component shortages (e.g., castings, resins, semiconductors), and late or partial submittals that prevent downstream detailing and procurement.

(2) Permitting & Regulatory:

Multi-layered approvals (federal/state/local; air, water, wetlands/404, cultural/106, species/Section 7, stormwater, zoning) can elongate timelines when expectations and completeness are misaligned. Interviewees in energy/electrical noted improved predictability relative to process/industrial peers where standardized submittals and e-plan portals are used.

(3) Utilities/Power Availability:

Interconnection studies and off-site upgrades increasingly gate project energization; electrical gear lead times compound risk.

(4) Site Selection & Environmental Due Diligence:

Deferred wetlands/ESA/106 surveys and logistics constraints (levees, ports, heavy-haul routes, seasonal canals/river stages) drive late redesign and permit rework.

(5) Workforce & Partner Capacity:

Regional labor tightness, inspector/tester availability, and site conditions influence productivity and retention.

(6) Owner Capability & Planning Discipline:

Reduced FEL rigor and late scope freeze correlate with rework, mis-sequenced procurement, and adversarial dynamics.

(7) Community & Stakeholder Engagement:

Early, substantive engagement and transparent mitigation (traffic/noise/visual) can accelerate trust and reduce opposition.

(8) Contracting & Execution Strategy Timing:

Late decisions on delivery model, packaging, modularization, and logistics amplify bid volatility and idle time. Scopes must be decided early to avoid bid volatility and idle time.

REGIONAL, SCALE, AND INDUSTRY DIFFERENCES

This section deepens the comparative patterns observed in interviews and the survey, organized by geography, project size, and industry segment.

Regional Differences

In the Southeast and Gulf, projects more frequently interact with wetlands and Waters of the U.S., levee authorities, hurricane-season logistics, and coastal ports. These conditions often add federal coordination under Sections 404, 7, and 106 and create separate clocks

for levee and railroad crossings, with seasonal buffers to protect earthwork and maritime windows. The practical signal for planners is the proportion of permits governed by federal review, the latency of levee/rail decisions, and exposure to weather windows.

In the Midwest, thaw/freeze cycles, river and barge logistics, and legacy brownfields shape preconstruction. Mobilization windows compress around winter, heavy-haul routing ties to barge terminals, and interfaces with railroads are common; useful leading indicators include weather-constrained workdays, barge window alignment, and the number of railroads third-party reviews on the path.

The Mid-Atlantic and Northeast concentrate multi-agency coordination and community/traffic expectations within dense jurisdictions; coordination cycles among city and state entities lengthen, traffic mitigation budgets and staging complexity rise, and public visibility increases. Tracking inter-agency resubmittals, public comments closed per month, and variance against traffic-mitigation budgets helps keep risk visible.

In the West and Southwest, water rights and Endangered Species Act (ESA) species consultations combine with wildfire and grid-hardening programs that compete for crews, while long linear tie-ins extend durations. Water-rights milestones, linear footage cleared versus plan, and conflicts with public programs become salient monitors. Across rural versus urban settings, rural jurisdictions tend to have thinner AHJ and specialty-inspector capacity and limited lodging, while urban projects may benefit from more predictable processes but face higher community/traffic mitigation requirements and complex staging. Inspector/tester response times, lodging capacity versus planned crew curves, and public engagement cadence are useful cross-cutting gauges.

Project Size Differences

Megaprojects (≥ $1B or programmatic) can reserve original equipment manufacturer (OEM) capacity, fund professionalized preconstruction teams, and pursue alliance/integrated project delivery models, but they carry risks tied to transmission upgrades, multi-agency coordination, community benefits negotiations, and workforce housing. Their playbook typically emphasizes portfolio OEM reservations, formal community benefits frameworks, and early modularization/logistics engineering,

Mid-size projects ($50–$500M) gain agility and fewer stakeholders but are most exposed to single long-lead failures and inspector capacity, with limited OEM leverage; they benefit from early vendor data kits, enforceable drawing SLAs, third-party inspection scheduling, and selective modularization/standardization, monitored via on-time submittals, inspector lead times, and bid spreads/interface gaps at award.

Small/fast-track projects (< $50M) often use repeatable designs and can move quickly if relationships are strong, yet they are tempted to skip front end planning and depend overly on preliminary data while contending with constrained AHJ bandwidth; lightweight front end planning toolkits, standard detail libraries, pre-agreed phased approvals, and tight

inspector scheduling help, with gate adherence, rework share from design-at-risk, and AHJ turnaround as practical measures.

Industry Differences

Advanced manufacturing and data-heavy projects are dominated by power availability and transformer/switchgear backlogs, along with heat-rejection and utility corridor constraints; effective responses center on starting the utility track, dual-path interim power, and early reservations, while variance to the energization window and gear status indicate readiness.

Process industries (chemicals, pulp/paper, specialty materials) face bespoke equipment dependencies and broad environmental permit sets that extend timelines; information-centric contracts with expediting and shop surveillance, parallel permit packages, and engineered logistics are the proven moves, with on-time vendor drawings, permit resubmittal counts, and logistics durations as indicators.

Consumer products and light industrial work is sensitive to local reviewer priorities, inspector bandwidth, and short planning windows; standardization/modularization, early inspector scheduling, and relationship-based permitting are decisive, watched through inspector response times, the rate of repeatable design reuse, and comment-cycle durations.

Energy generation and electrical infrastructure shows a distinct pattern: several practitioners describe improving permitting predictability in states with standardized plan sets and e-plan portals, yet schedules still hinge on interconnection studies, off-site upgrades, and specialty electrical gear queues. Programmatic utility governance, portfolio equipment reservations, awareness of cluster-study timing, and phased approvals tied to civil/structural starts are practical differentiators, with interconnection milestone adherence, queue status, and factory dates versus site need as the primary metrics.

COMPOSITE VIGNETTES (anonymized)

The following composite vignettes reflect recurring patterns across interviews. They are not single projects; details have been combined and generalized to preserve anonymity.

Vignette A: Vendor information churn resets external pathways

A project entered detailed design assuming permitting would be the primary gate. Vendor data arrived incomplete and triggered redesign. The redesign drove permit resubmittals, which triggered new comment cycles. The dominant delay driver was not one “slow” agency but repeated resets caused by upstream information churn.

Control: implement vendor data SLAs and submittal readiness gates before external submissions; treat completeness as a schedule control, not an administrative preference.

Vignette B: Utility milestones determine site readiness

A project treated utility coordination as parallel work while advancing civil and site plans. Utility upgrades and coordination extended and assumed power availability became unachievable. Resequencing and cost growth followed.

Control: put utilities on the formal critical path during site selection; track committed dates weekly; and define escalation paths for milestones.

INTEGRATED BEST PRACTICES

- Front-load vendor data: Contractual SLAs for drawings/submittals; expediting/quality assurance with shop visits and witness points; design-at-risk guardrails.
- Permitting playbook: Pre-application summits, complete one-touch packages, decision logs, third-party review (where enabled), phased approvals for foundations/steel.
- Utility track: Launch early; lock energization windows; align long-lead electrical gear with commissioning.
- Site/logistics discipline: Run parallel due diligence on multiple sites; engineer heavy-haul/maritime plans with seasonal constraints; avoid premature land control.
- Workforce strategies: Validate crew curves and lodging; improve on-site conditions; invest in trade pipelines; schedule inspectors/testers to work fronts.
- Owner planning: Restore front end loading; fund owner's project support; decide delivery model and package plan; integrate risk-adjusted schedules.
- Community benefits: Early open houses and visual mitigations; measurable local hiring/training; transparent commitments trackers.
- Commercial alignment: Incentives tied to shared outcomes; early-works packages (utility moves/species mitigation) to de-risk the critical path.

RECOMMENDATIONS TO POLICY MAKERS

1. Resource AHJs and build industrial review capacity. Fund additional reviewers and specialty cadres (industrial/process, electrical, logistics) and provide access to roving experts who can surge into understaffed jurisdictions.
2. Codify phased approvals and model packages. Issue clear guidance and templates for phased permits (e.g., foundations, steel, early utilities) aligned to construction realities to avoid serial redesigns while maintaining safeguards.
3. Pair review clocks with resourcing and accountability. Where statutory timelines exist, tie them to staffing plans and publish cycle-time dashboards (initial review days, resubmittals, repeat-comment rates) to drive predictability.
4. Enable certified third-party plan reviews. Authorize accredited reviewers to augment public capacity for code/plan checks while keeping final public decisions and accountability with the AHJ.

5. Support state assumption of Section 404 (where capable). Provide federal funding, training, and oversight to states seeking primacy to reduce coordination latency while maintaining environmental rigor.
6. Digitize permitting with common data standards. Expand e-plan portals, structured data submittals, and inter-agency handoffs to reduce rework and comment duplication.
7. Strengthen utility coordination and interconnection reforms. Encourage early load letters, standardized study timelines, cluster studies where appropriate, and cost-recovery mechanisms that accelerate needed upgrades for large loads.
8. Create small-jurisdiction support programs. Stand up state or regional help desks, on-call peer reviewers, and template libraries for rural/local AHJs that rarely see complex industrial projects.
9. Harmonize corridor and logistics permitting. Convene railroads, levee authorities, and transport agencies to establish predictable review windows, standard crossing packages, and single-point coordination where feasible.
10. Invest in workforce pipelines and inspection capacity. Fund regional training/apprenticeships for critical trades and inspectors, enable portable credentials, and support temporary housing in remote builds.
11. Improve supply-chain resilience for critical electrical equipment. Support domestic manufacturing capacity for large power transformers and switchgear, shared inventory strategies, and quality surveillance programs.
12. Increase data transparency. Publish AHJ performance metrics and interconnection queue statistics in accessible dashboards to inform planning and portfolio decisions.
13. Enable risk-appropriate early works. Clarify pathways for limited notices to proceed (e.g., enabling works, utility relocations, species mitigation) with defined environmental preconditions and monitoring.
14. Use programmatic agreements for repetitive project types. Develop standard mitigations and review playbooks for recurring scopes (e.g., similar substations or process units) to shorten learning curves across agencies.

Taken together, these actions can help reduce variance without lowering the bar on environmental protection or public safety. They also align public incentives with private-sector practices that have been reported to provide schedule benefits in the field.

CONCLUSION

Preconstruction delays stem from a system of interdependent risks rather than a single cause. This synthesis suggests that disciplined front-end planning, proactive permitting and utility strategies, vendor-information rigor, and community-forward engagement can help reduce schedule risk and improve predictability. Energy/electrical infrastructure permitting appears to be improving in several states, but interconnection and electrical gear remain on

the critical path. The integrated practices presented here offer a practical blueprint for improving schedule reliability without compromising safety or environmental performance.

Geography tends to drive permit scope and logistics complexity; project size governs leverage, governance, and the need for programmatic approaches; and industry defines which critical path dominates—utility/interconnection, vendor information, or community interfaces. Embedding these differences into early planning checklists and tracking the indicator sets described above enables teams to set realistic buffers, aim incentives at shared outcomes, and select the right early-works to pull schedule forward.

REFERENCES

Construction Industry Institute (CII). (2006) Front End Planning: Break the Rules, Pay the Price.

Adepu, N., Kermanshachi, S., Pamidimukkala, A., & Loganathan, K. (2023). Analyzing the factors affecting construction project schedules amidst COVID-19 pandemic. Project Leadership and Society, 4, 100100.

Council on Environmental Quality (CEQ). (2025). Environmental Impact Statement Timelines (2010–2024).

Dolan, K. J., James, A., & Smith, A. (2025). Stakeholder engagement in large infrastructure projects. Australian Journal of Multi-Disciplinary Engineering, 1-12.

Fashina, A. A., Omar, M. A., Sheikh, A. A., & Fakunle, F. F. (2021). Exploring the significant factors that influence delays in construction projects in Hargeisa. Heliyon, 7(4).

Lawrence Berkeley National Laboratory (LBNL). (2024/2025). Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection.

National Infrastructure Advisory Council (NIAC). (2024). Addressing the Critical Shortage of Power Transformers to Ensure Reliability of the U.S. Grid.

Resources for the Future (RFF). (2025). How Long Does It Take? NEPA Timelines and Outcomes for Clean Energy Projects.

Reuters. (2024). Western U.S. embraces grid reforms but solar queues will linger.

U.S. construction workforce studies (2023–2025) linking labor shortages to schedule and quality impacts.

Wood Mackenzie. (2025). Mind the Gap: Tackling Supply-Chain Challenges in the Electric T&D Sector.