AI-Augmented Plan Review: Practical Lessons from the Field [1]

Kyle Rossignol

Tri-Lakes Contracting and foremanai.co
Palmer Lake, Colorado, USA

Abstract

The accelerating adoption of artificial intelligence (AI) across the construction and project management sectors has generated both optimism and skepticism, especially among practitioners responsible for risk management, scope definition, and preconstruction planning. While headlines often focus on large-scale automation, predictive scheduling, or digital twins, one of the most practical and immediately valuable applications of AI lies in a much simpler but universally relevant domain: augmenting the plan review process before mobilization. Construction documents—regardless of project size, location, or industry—remain one of the single greatest sources of hidden risk. Conflicting dimensions, incomplete details, uncoordinated notes, ambiguous callouts, and cross-discipline inconsistencies frequently lead to RFIs, change orders, rework, and schedule delays once work begins. This challenge is amplified on complex or remote sites, where terrain, logistics, regulatory requirements, and environmental factors interact in nonlinear ways, increasing the consequences of minor oversights.

This article examines how AI-assisted plan review can materially reduce that risk by serving as an additional analytical layer—one capable of rapidly reading entire multi-disciplinary plan sets, identifying patterns that human reviewers may overlook, and surfacing inconsistencies that would otherwise remain invisible until construction is underway. Drawing on real-world examples from residential, civil, and specialty projects in the mountainous regions of Colorado—including engineered onsite wastewater treatment systems (OWTS), custom home builds, and a 4,000-square-foot monolithic dome structure—this article explores the specific categories of design and coordination issues that AI consistently uncovers. These range from missing sheet references and structural callouts that point to nonexistent details, to elevation discrepancies between civil and architectural drawings, to ambiguous mechanical or electrical specifications that require clarification before procurement or mobilization.

While the article references the author's practical workflow using modern AI tools, the objective is not to promote any specific product or company, but to present a balanced, evidence-based

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assessment of how AI can function as a meaningful partner in professional judgment rather than a replacement for it. Emphasis is placed on the role of AI as "augmented intelligence"—a tool that enhances human capability by enabling broader, deeper, and faster cross-sheet analysis, while leaving interpretation, decision-making, constructability assessment, and regulatory understanding firmly in the hands of experienced practitioners.

The findings demonstrate that AI-assisted document review improves the clarity and completeness of RFIs, enhances communication between contractors, designers, and owners, and supports better preconstruction alignment—leading to fewer surprises during execution. In remote or high-risk environments, where field adjustments may carry significant logistical and financial consequences, the value of uncovering hidden inconsistencies early becomes even more pronounced. This article concludes that as project complexity increases and industry expectations for speed and accuracy continue to grow, AI-supported plan review is poised to become an integral component of modern project management practice. Far from reducing the role of the expert, it strengthens it by providing the analytical breadth required to make better-informed decisions upstream, ultimately contributing to higher quality outcomes, stronger partnering relationships, and more stable project execution.

Keywords: *Project Management; Artificial Intelligence; Plan Review; Preconstruction; Risk Management; Construction Documents; Coordination; Quality Management; Augmented Intelligence; Multi-Discipline Analysis; Residential Construction; Infrastructure; Digital Tools; Field Execution; Lessons Learned.*

1. Introduction

Construction projects, regardless of type, size, or geographic context, succeed or fail based on the clarity, completeness, and coordination of their underlying documents. The preconstruction phase—often compressed, often under-resourced, and frequently treated as a procedural gateway rather than a disciplined analytical stage—remains the period in which the majority of project risk is quietly encoded. Conflicts, missing information, ambiguous details, and uncoordinated assumptions within the drawings and specifications become latent conditions that later manifest as RFIs, scope gaps, delays, rework, and cost escalation once mobilization has begun. While experienced project managers and estimators have developed strong practices for reviewing drawings, the modern construction environment introduces constraints that challenge even the most capable teams: project timelines are shorter, plan sets are larger, disciplines are more interconnected, and the pace of design iteration has accelerated.

As a result, the traditional manual review of drawings—page by page, discipline by discipline, relying heavily on memory, experience, and organizational heuristics—struggles to scale. Even well-staffed teams face cognitive overload when navigating hundreds of sheets across architectural, structural, civil, mechanical, electrical, plumbing, and specialty disciplines. The more complex the site or building system, the more opportunities emerge for small misalignments to compound into significant field consequences. In mountainous or remote environments, where terrain, access, environmental conditions, and regulatory constraints expand the number of variables a project manager must anticipate, the cost of overlooked inconsistencies increases dramatically.

It is within this gap—between the demands of modern project complexity and the capacity of traditional preconstruction workflows—that artificial intelligence (AI) has begun to provide meaningful value. While much public discourse around AI centers on automation, forecasting, or large-scale data analytics, one of the most immediately impactful applications is more focused: augmenting the plan review process. Unlike theoretical or model-driven uses of AI, plan review is grounded in a simple premise: construction documents contain patterns, relationships, and contradictions that can be systematically analyzed. AI can read an entire plan set quickly, compare details across sheets, identify conflicts, and surface ambiguities that warrant clarification—actions that directly support risk reduction, scope definition, and quality outcomes.

Importantly, AI is not a replacement for professional judgment. It does not interpret design intent, certify engineering decisions, or understand constructability the way an experienced practitioner does. Instead, it acts as a layer of augmented intelligence—extending analytical reach, improving consistency, and revealing hidden issues early enough for teams to address them without disrupting downstream activities. This article explores the practical application of AI-assisted plan review in real construction environments, discusses the categories of issues most commonly identified, and distills lessons learned from projects in mountainous regions of Colorado where terrain, access, and environmental constraints amplify the need for clear and coordinated documents.

The goal is straightforward: to provide project management professionals with a grounded, non-commercial, experience-based perspective on how AI can strengthen the preconstruction phase by improving the accuracy, completeness, and confidence of plan understanding before mobilization. By doing so, AI supports more predictable execution, reduces avoidable field risk, and aligns closely with established principles of quality management and systems thinking.

2. Background: The Preconstruction Risk Problem

Across industries and project types, the consistent pattern in construction management is that the seeds of future problems are almost always planted during preconstruction. This phase, though often compressed by external pressures such as financing, procurement timelines, entitlement schedules, and seasonal constraints, is the period in which project assumptions are formed, constraints are interpreted, and risk is either surfaced—or silently embedded—into the execution plan. The quality of decisions made during preconstruction is directly correlated with the clarity and coordination of the construction documents, which serve as the authoritative baseline for scope, cost, schedule, and quality expectations.

Despite technological advances in design software, BIM coordination, and digital workflows, the industry still relies heavily on PDF plan sets as the primary vehicle for communication between designers, contractors, and owners. These documents frequently span hundreds of pages across multiple disciplines, each prepared by different professionals working under varying timelines, standards, and levels of completeness. While design teams strive for accuracy and coordination, the realities of iterative design, consultant handoffs, evolving owner expectations, and late-stage revisions create inherent opportunities for misalignment. As a result, even well-produced drawing sets often contain inconsistencies, missing references, unclear terminology, or discipline-specific assumptions that are not fully reconciled elsewhere in the documents.

These issues range widely in impact and visibility. Some are obvious—an elevation missing from a civil sheet, a detail callout pointing to a nonexistent section, or a structural note referencing an incorrect sheet number. Others are subtle but more consequential: architectural dimensions that do not match structural clear spans, civil grading information that does not align with foundation step locations, HVAC equipment clearances that conflict with framing layouts, or electrical panel schedules that contradict mechanical power requirements. These discrepancies often remain hidden until discovered by subcontractors, inspectors, or field crews, at which point the cost of clarification or rework increases dramatically. Each unresolved ambiguity becomes a potential RFI, a schedule impact, or a scope dispute.

The problem intensifies on projects with elevated complexity. In mountainous regions—where topography, soils, access limitations, groundwater variability, frost depth, and environmental regulations interact in nonlinear ways—the importance of precise and coordinated documentation becomes even more pronounced. Small omissions, such as an unspecified invert elevation or a missing slope percentage, can cascade into significant constructability challenges. On custom or specialized structures, such as monolithic domes, geotechnical variability and structural geometry compound the need for precise cross-disciplinary alignment. When projects involve engineered onsite wastewater treatment systems (OWTS) or other regulated infrastructure, missing details can stall permitting, inspection, or compliance processes.

Traditional plan review workflows are not fully equipped to address this scale of complexity. Project managers and estimators often face considerable cognitive load as they manually compare sheets, recall details, cross-reference annotations, and track subtle variations across disciplines. No matter how experienced or diligent the reviewer, human attention is finite. The larger and more interdependent the plan set, the more difficult it becomes to ensure that no conflicts or gaps remain undetected. The industry has long relied on institutional memory, personal habits, and team-based cross-checking as ways to mitigate this burden, but these methods vary in effectiveness and are often constrained by time.

This gap between document complexity and human review capacity is not a failure of professionals—it is a structural characteristic of modern construction. It is the natural byproduct of increasing specialization, compressed schedules, and the decentralized nature of design coordination. It is also precisely the type of challenge that artificial intelligence is well-suited to augment.

AI systems capable of reading entire plan sets, identifying relationships between sheets, and analyzing cross-discipline consistency can act as an additional layer of review—one that operates at scale, with speed, and without fatigue. AI does not remove the need for expert judgment; instead, it reduces the burden placed on human reviewers by surfacing inconsistencies early enough for project teams to address them proactively. In this context, AI functions not as a disruptive replacement for traditional preconstruction workflows, but as a force multiplier that expands analytical capacity and strengthens upstream decision-making.

The background presented here establishes the foundation for the subsequent sections of this article, which explore how AI can be applied responsibly, what specific issues it identifies in practice, and what lessons project managers and construction professionals can draw from its integration into real-world workflows.

3. What Modern AI Can - and Cannot - Do

Artificial intelligence has entered the project management and construction sectors with extraordinary speed, but its capabilities are often misunderstood. Public narratives tend to overemphasize automation and understate the very real limitations and guardrails that practitioners must understand before integrating AI into preconstruction or field workflows. In reality, the strengths of AI lie not in replacing decision-makers, but in augmenting human analytical capacity—particularly in areas that involve pattern recognition, large-volume document review, and cross-referencing information at a scale beyond what an individual reviewer can reasonably sustain.

Within the context of construction documents, AI's primary value is derived from its ability to treat a complete plan set as a unified data environment rather than a sequence of disconnected pages. Traditional human review, no matter how diligent, is constrained by sequential reading and memory. Reviewers toggle between sheets, flip back and forth to verify callouts, and rely on professional intuition to identify inconsistencies. AI approaches this differently. It ingests every sheet simultaneously, views all annotations and details in relation to one another, and identifies patterns, contradictions, or missing connections that may not be apparent to a human reviewer scanning the set linearly.

3.1 Capabilities: What AI Excels At

(1) Cross-Sheet Consistency Checking

AI is exceptionally effective at identifying when a dimension, note, tag, or specification disagrees with another elsewhere in the drawing set. Examples include:

- Architectural dimensions conflicting with structural requirements
- Grading slopes on civil sheets that do not match foundation steps
- Mechanical equipment clearances not aligning with architectural framing
- Callouts referencing details that do not exist in any sheet
- Elevations that conflict across sections, plans, or schedules
- Inconsistent pipe sizes, material notes, or symbols across disciplines

These issues often form the basis of RFIs, rework, or schedule delays. AI surfaces them early, before procurement or mobilization.

(2) Identification of Missing or Broken References

AI performs extremely well at detecting references that point nowhere: missing section markers, incorrect sheet numbers, incomplete notes, or circular callouts.

These often emerge in progress sets, revised drawings, or large consultant teams where updates are made unevenly across disciplines.

(3) Detection of Ambiguous or Underspecified Details

AI can highlight places where the drawings assume knowledge that is not explicitly documented. For example:

- A required slope is shown but no percentage is provided
- A retaining wall is depicted without reinforcement notes
- A septic or utility line is drawn without invert elevations
- A structural note requires “verify in field” without clear criteria

While ambiguity may not be an error in itself, it is a prompt for clarification.

(4) Pattern Recognition Across Disciplines

AI identifies relationships that humans rarely check side-by-side due to cognitive load. Examples include:

- Mechanical penetrations overlapping structural members
- Civil drainage patterns clashing with architectural egress routes
- Electrical service locations conflicting with site utilities
- Septic or OWTS components misaligned with grading constraints
- Fire protection zones overlapping architectural plan limitations

These patterns often emerge too late in traditional workflows.

(5) Evidence-Backed Summaries and RFI Support

AI can generate structured, evidence-backed statements that identify:

- the problem,
- the affected sheets,
- the location on the drawing,
- and the clarification needed.

This supports clearer communication with design teams and improves RFI response efficiency.

3.2 Limitations: What AI Cannot Do

Just as important as understanding AI's strengths is recognizing what it cannot and should not attempt to do. Responsible integration requires a clear boundary between augmented analysis and professional judgment.

(1) AI Does Not Interpret Design Intent

AI identifies inconsistencies, not the "right answer." It cannot determine which of two conflicting dimensions is correct, or whether a missing detail is intentional or accidental. These judgments belong to licensed professionals.

(2) AI Cannot Replace Engineering or Architectural Decision-Making

AI cannot:

- certify structural integrity,
- design framing solutions,
- determine soil bearing requirements,
- establish code compliance,
- or approve alternate means and methods.

All engineering decisions must remain with qualified practitioners.

(3) AI Cannot Evaluate Constructability the Way a Veteran Builder Can

Constructability depends on experience with:

- local soils,
- trade sequencing,
- weather patterns,
- access logistics,
- equipment limitations,
- and regulatory constraints.

AI can point to a conflict; it cannot determine whether that conflict will delay a concrete pour in a high-elevation environment or create staging challenges on a steep site.

(4) AI May Misinterpret Highly Abstract or Artistic Drawings

Complex architectural representations—particularly conceptual designs—may contain elements that AI cannot easily parse.

(5) AI Relies on Document Quality

If the drawings are incomplete, poorly scanned, artifact-heavy, or inconsistent in formatting, AI performance degrades. It cannot guess missing information.

This is a feature, not a flaw: AI should not hallucinate.

3.3 Augmented Intelligence: The Middle Ground

When viewed realistically and responsibly, AI is not intended to replace designers, engineers, or project managers. Instead, its core contribution is analytical breadth—its ability to:

- review an entire document set instantly,
- cross-reference information with perfect memory,
- flag discrepancies,
- and present structured findings for human evaluation.

This "co-pilot" model aligns with longstanding principles of quality management: problems discovered upstream cost significantly less to resolve than those discovered downstream. In other words, AI strengthens the feedback loop between design intent and field execution by revealing issues while they are still inexpensive to fix.

AI does not eliminate the need for judgment, experience, or leadership. What it does is expand the reviewer's field of vision—making it more likely that critical information is caught early, clarified professionally, and integrated into planning before it can become a source of disruption.

4. Case Examples and Lessons Learned

The practical value of AI-assisted plan review becomes most evident when examined through real project environments where complexity, terrain, regulatory constraints, and architectural ambition intersect. The following case examples are drawn from residential construction, engineered onsite wastewater treatment systems (OWTS), and a highly specialized monolithic dome structure in Colorado's high alpine regions. These projects share a common characteristic: each contained hidden or low-visibility conflicts within the construction documents that, if left undiscovered until later phases, would have introduced significant cost, schedule, or scope consequences. The lessons learned are presented here not as product promotion, but as documentation of how AI-augmented analysis can materially strengthen upstream project decisions.

4.1 Case Example 1: High-Alpine Custom Home Construction

Project Context

This project involved a custom home in a mountainous area with steep grades, challenging access, and strict county requirements for drainage and snow loads. The plan set spanned multiple disciplines—architectural, structural, civil, mechanical, electrical, and septic—and included several revisions issued at different times.

AI Findings and Observations

(1) Conflicting Dimensions Between Architectural and Structural Sheets

AI identified that the architectural floor plan listed a clear-span living area dimension that was 12 inches longer than the corresponding structural sheet. This discrepancy resulted from a design revision that updated architectural layouts but not the structural framing plan.

- **Risk:** Incorrect beam sizing and load paths.
- **Lesson:** AI is extremely effective at catching dimension mismatches introduced during iterative design updates.

(2) Grade/Foundation Step Misalignment

Civil drawings showed contour lines and foundation wall steps that did not match architectural elevations. A one-foot discrepancy existed between the intended finished floor elevation and the civil grading plan.

- **Risk:** Additional excavation, cold joints, or incorrect stem wall heights.
- **Lesson:** AI cross-referencing between civil and architectural layers is invaluable in terrain-driven projects.

(3) Missing Reference Details

AI surfaced several callouts pointing to detail numbers or sheet references that did not exist in the entire plan set.

- **Risk:** Field improvisation or unnecessary RFIs leading to time delays.
- **Lesson:** AI excels at identifying silent omissions that humans often overlook after reviewing many pages.

4.2 Case Example 2: Engineered Onsite Wastewater Treatment System (OWTS)

Project Context

Multiple projects required septic system design and installation in steep, high-altitude terrain. These systems incorporated advanced treatment units, sand filters, distribution laterals, and uniquely restrictive county regulations. Excavation challenges, groundwater presence, and material staging limitations made design completeness critical.

AI Findings and Observations

(1) Inconsistent Invert Elevations Between Sheets

AI detected variations of up to 6 inches in invert elevations for the effluent line between the septic tank and the treatment unit. The discrepancy occurred because the civil engineer's sheet and the system designer's sheet were developed separately.

- **Risk:** Improper pipe slope, backups, freeze potential, inspection failure.
- **Lesson:** AI identifies elevation conflicts better than manual review, especially in complex nonlinear flows.

(2) Sand Filter Depth Mismatch

On one system, the design narrative specified 24 inches of ASTM C-33 sand, while the cross-section detail incorrectly depicted only 18 inches.

- **Risk:** Non-compliant installation and corrective excavation.
- **Lesson:** AI compares narrative text, detail diagrams, and notes simultaneously—something humans rarely do efficiently.

(3) Violated Setback Distances

AI flagged potential conflicts between the proposed STA and property line, showing a design that was compliant on one sheet but noncompliant when overlaid with another discipline's constraints.

- **Risk:** Permit rejection or site rework requiring heavy equipment.
- **Lesson:** AI demonstrates high value in regulatory compliance cross-checking for rural infrastructure.

4.3 Case Example 3: Monolithic Dome Construction at Elevation 9,400 ft

Project Context

One of the most instructive projects involved the construction of a highly specialized 4,000-square-foot monolithic dome residence with a 2,000-square-foot attached garage. The structure required unique engineering, custom foundations, and integration of multiple systems not found in traditional builds. The site's extreme elevation, steep access, and severe weather risks amplified the importance of clear documentation.

AI Findings and Observations

(1) Conflicts in Mechanical Penetrations Through Curved Surfaces

AI identified several mechanical vent penetrations whose locations, while acceptable in 2D drawings, did not align spatially with the curved geometry of the dome.

- **Risk:** Improper vent angles, insufficient clearance, or water intrusion.
- **Lesson:** Even in unconventional structures, AI's geometric reasoning can flag issues earlier than human reviewers.

(2) Electrical Panel Schedule Mismatch

The electrical panel schedule listed amperage requirements for equipment that differed from the mechanical equipment schedule.

- **Risk:** Incorrect conductor sizing, breaker mismatches, inspection concerns.
- **Lesson:** Cross-discipline schedule comparison is a high-value use case for AI.

(3) Structural Detail References Missing After Revision

A late-stage structural revision removed a detail sheet, but several architectural notes still pointed to it. AI detected the orphaned references instantly.

- **Risk:** Field uncertainty, delays awaiting clarification.
- **Lesson:** Revisions often break references—AI catches this more reliably than traditional review.

4.4 Cross-Project Lessons Learned

Across all project types, several recurring lessons emerged:

Lesson 1: AI Strengthens Early Decision-Making

AI-assisted review accelerates the identification of unclear assumptions, missing details, and design conflicts early—before they become construction-phase disruptions.

Lesson 2: AI Improves RFI Quality and Reduces Friction

RFIs backed by exact sheet references and callout locations are clearer, more professional, and quicker for design teams to respond to.

Lesson 3: AI Identifies Issues That Humans Commonly Miss

Particularly:

- Dimension inconsistencies
- Elevation conflicts
- Missing references
- Schedule mismatches
- Multi-disciplinary coordination issues

These are precisely the categories of risk that often escape early detection in traditional workflows.

Lesson 4: AI Does Not Replace Human Judgment—It Enhances It

Human experience is still necessary to evaluate constructability, sequencing, logistics, and regulatory implications. AI simply expands visibility.

Lesson 5: The More Complex the Conditions, the More Valuable AI Becomes

High-elevation, steep-slope, or specialized projects amplify the consequences of document inconsistencies.

AI becomes a force multiplier in these contexts.

4.5 Summary

These cases demonstrate that AI-assisted plan review is not theoretical; it is a practical, reliable, and replicable tool for reducing preconstruction uncertainty. By rapidly surfacing inconsistencies, omissions, and cross-disciplinary conflicts, AI helps teams ask better questions earlier, communicate more effectively, and build with greater confidence. The result is better risk management, improved coordination, and reduced downstream costs—benefits that align directly with the principles of project management and construction quality systems.

5. Recommendations for Practitioners

The integration of AI-assisted plan review into preconstruction workflows offers meaningful advantages, but its effectiveness depends on thoughtful implementation and clear boundaries. AI is not a substitute for professional judgment, licensure, or field experience; rather, it becomes most valuable when it strengthens established project management disciplines. Based on lessons learned across a wide range of construction projects, the following recommendations outline practical guidance for teams seeking to incorporate AI responsibly and effectively.

5.1 Use AI Early—Before Key Milestones Are Locked In

The greatest value of AI emerges **upstream**, when the cost of corrective action is lowest. Practitioners should run AI-assisted review **before**:

- Finalizing estimates
- Issuing subcontracts
- Locking procurement schedules
- Confirming critical path activities
- Submitting final permit packages
- Mobilizing equipment or crews

AI findings inform assumptions, reveal hidden conflicts, and provide a more stable basis for sequencing and budget clarity.

5.2 Treat AI Findings as a Starting Point, Not a Decision

AI is most effective when used as a **prompt for professional review**, not as a replacement for it. Every AI-generated inconsistency, contradiction, or missing detail should be:

1. Verified by a qualified practitioner
2. Interpreted in the context of constructability
3. Translated into an RFI, design question, or internal action item as needed

This ensures that project decisions remain grounded in licensed expertise and field judgment.

5.3 Require Evidence-Backed Output

To avoid any risk of hallucination or speculative interpretation, practitioners should only rely on AI systems that provide:

- Exact sheet references
- Callout locations
- Quoted text or annotations
- Clear comparisons between conflicting elements

Evidence-backed output not only improves accuracy but strengthens communication with designers, owners, and inspectors.

5.4 Integrate AI Findings into a Structured Preconstruction Workflow

AI-assisted plan review is most effective when integrated into established processes rather than used ad hoc. Recommended workflow steps include:

1. **Upload full construction document set**
2. **Run AI conflict and consistency analysis**
3. **Categorize findings** into:
    - Clarifications (RFIs)
    - Constructibility concerns
    - Coordination issues
    - Regulatory or compliance risks
    - Owner decision points
4. **Assign responsibility** to design teams, engineers, superintendents, or estimators
5. **Incorporate validated findings** into:
    - Schedule logic
    - Procurement needs
    - Material takeoffs
    - Budget contingencies
    - Project risk registers

A structured workflow transforms AI insights into actionable project management outcomes.

5.5 Combine AI With Human Cross-Discipline Coordination Meetings

AI accelerates document review, but human coordination remains essential. After generating AI findings, teams should conduct:

- Architect–Engineer coordination meetings
- Mechanical–Electrical–Plumbing alignment reviews
- Civil–Structural compatibility sessions
- Contractor–Owner scope definition meetings

AI gives teams a more complete starting point, allowing coordination sessions to focus on decision-making rather than discovery.

5.6 Emphasize Constructibility, Logistics, and Site Conditions

AI is strong in plan analysis but neutral on contextual realities such as:

- Steep grades
- Soil conditions
- Weather impacts
- Equipment access
- Material staging limits
- Inspection sequences

Practitioners should interpret AI findings in light of site-specific constraints. A minor plan inconsistency may have major implications on a remote or high-alpine project.

5.7 Preserve the AI Audit Trail for Documentation and Claims Defense

AI-generated reports serve as excellent documentation of due diligence and risk awareness. Storing these reports provides:

- Transparency in preconstruction decision-making
- Evidence of proactive issue detection
- Support in the event of disputes or scope disagreements
- A record of assumptions at bid time

Well-documented AI findings strengthen partnering relationships and promote accountability.

5.8 Train Project Teams in How to Interpret AI Output

The effectiveness of AI is partly dependent on human understanding. Teams should be trained to:

- Distinguish critical issues from clerical ones
- Validate discrepancies using traditional review methods
- Escalate concerns requiring engineering input
- Translate findings into structured RFIs or clarifications

This ensures that AI enhances, rather than overwhelms, preconstruction workflows.

5.9 Use AI as a Continuous Feedback Loop, Not a One-Time Check

Document sets evolve. Revisions occur. Scope shifts. New sheets are issued.
AI should be re-run:

- When addenda are released
- After major design revisions
- Before major construction phases
- Prior to procurement of long-lead items

AI becomes a means of maintaining document alignment throughout the project lifecycle.

5.10 Preserve the Role of Professional Judgment

Above all, practitioners should maintain a clear boundary: AI is an analytical tool.

It enhances visibility. It accelerates review. It strengthens accuracy.

But it does **not**:

- Replace engineering design
- Determine code compliance
- Define constructability
- Approve alternate means and methods
- Replace the reasoning of experienced professionals

AI increases the *surface area of understanding*, but human expertise makes the decisions.

Summary of Recommendations

To maximize value, practitioners should:

- Use AI early
- Verify findings through human review
- Demand evidence-backed outputs
- Integrate AI into structured workflows
- Combine AI insights with coordination meetings
- Consider site context and constructability
- Document everything
- Train teams to interpret output

- Treat AI as a recurring process
- Maintain human professional authority

When applied this way, AI becomes an enabler of higher-quality outcomes and a stabilizing force in complex project environments.

6. Conclusion

The construction industry is entering a period in which increasing project complexity, compressed timelines, and heightened expectations for accuracy place unprecedented pressure on preconstruction teams. While design technologies have advanced significantly, the fundamental challenge remains unchanged: construction documents are imperfect, often internally inconsistent, and inherently difficult to analyze comprehensively using traditional manual review. As the case examples in this article demonstrate, even highly qualified and experienced practitioners face limitations when navigating multi-disciplinary plan sets that can exceed hundreds of pages and evolve through multiple revision cycles.

Artificial intelligence offers a practical and immediately applicable solution to this challenge—not by replacing human expertise, but by amplifying it. AI's ability to ingest entire drawing sets, cross-reference information across disciplines, detect inconsistencies, and expose missing or ambiguous details provides project managers with an analytical capability that would be impractical to reproduce manually at scale. When combined with disciplined professional judgment, AI-assisted plan review becomes a force multiplier, enabling earlier detection of issues, more precise RFI development, stronger coordination across teams, and more confident decision-making before mobilization.

Importantly, the value of AI is not theoretical or distant. Its benefits appear most clearly in the routine but critical tasks that underpin quality project management: verifying dimensions, ensuring alignment between civil and structural design, identifying missing detail references, validating grading relationships, comparing schedules, or revealing overlooked assumptions. These are the tasks that, when left unaddressed, evolve into delays, cost increases, scope disputes, or field rework. AI simply makes the early discovery of such issues more reliable and more attainable within the time constraints of modern preconstruction windows.

In high-risk or high-constraint environments—such as mountainous terrain, remote job sites, complex foundation systems, or specialized structures—the value of early detection increases dramatically. Projects in these contexts offer little margin for field improvisation. Conditions such as limited access, severe weather patterns, unique geotechnical considerations, and regulatory complexity amplify the consequences of overlooked inconsistencies. AI's ability to surface risks upstream supports safer, more predictable, and more resilient field execution.

Yet, the role of AI must remain properly scoped. It is not responsible for interpreting design intent, validating engineering decisions, or determining constructability. Those responsibilities rightly remain with licensed professionals, seasoned builders, and interdisciplinary project teams whose judgment is shaped by education, experience, and contextual understanding. AI is most effective when deployed as a layer of augmented intelligence that enhances visibility, sharpens cross-disciplinary awareness, and expands the reviewer's field of understanding—without diminishing the role of human expertise.

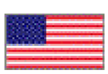
As project managers, engineers, designers, contractors, and owners continue to explore how AI can support their work, a responsible path forward emerges: use AI to strengthen existing workflows, not replace them; use AI to enhance communication, not bypass it; and use AI to reduce uncertainty, not introduce it. With this approach, AI becomes a practical tool aligned with the core tenets of project management: clarity, coordination, risk reduction, and continuous improvement.

In this light, AI-assisted plan review is not merely an emerging technology—it represents the next logical evolution in how professionals manage complexity, protect project outcomes, and deliver higher-quality work. As more organizations adopt these methods, AI will likely become a standard component of preconstruction practice, contributing to more reliable schedules, more accurate budgets, and more collaborative project environments. In doing so, it reinforces the fundamental principle that informed decisions made early in the project lifecycle lead to stronger results in the field.

About the Author

Kyle Rossignol

Colorado, USA



Kyle Rossignol is the Owner and Founder of Tri-Lakes Contracting and Apex Excavation, two Colorado-based firms specializing in civil construction, custom homebuilding, onsite wastewater treatment systems (OWTS), and high-alpine land development. With more than a decade of experience working in Colorado's mountain regions, he has managed projects ranging from remote telecommunications infrastructure and complex site development to ground-up residential and commercial construction.

Kyle began his career in commercial civil construction and later became a Comtrain-certified Radio Frequency Technician, building, upgrading, and troubleshooting communications systems on some of the tallest tower structures in the state. This background strengthened his technical problem-solving abilities and shaped his approach to construction in challenging environments.

Today, Kyle oversees full-service projects from raw land through completion, with specialized experience in soil evaluations, geotechnical coordination, grading, utilities, excavation, septic system installation, and water infrastructure for rural and off-grid properties. He holds multiple professional licenses issued by the Colorado licensing board, including B-1 Commercial General Building Contractor, Class C Residential Home Builder, Licensed OWTS Installer, and Licensed Excavation Contractor.

In addition to general contracting, Kyle develops resilient water-supply solutions for remote mountain properties and leads one of the only construction teams in Colorado specializing in fire-resistant Monolithic Dome construction. He is an active member of several industry organizations, including the Associated General Contractors of Colorado (AGC), the Associated General Contractors of America (AGC of America), Colorado Professionals in Onsite Wastewater (CPOW), and the National Onsite Wastewater Recycling Association (NOWRA).

Across all projects, Kyle focuses on precision, clear communication, and practical risk management. His professional experience with multi-disciplinary plan sets and high-constraint construction environments has informed his interest in AI-supported preconstruction workflows and their potential to improve clarity, coordination, and quality outcomes in the project lifecycle. He can be contacted at Kyle@trilakes.co.