AI-Augmented Residential Planning Workflow

AI Workflow Case Study

This case study explores how AI can support early planning in technical communication and UX workflows by helping clarify requirements and identify constraints before design begins. The project shows that AI works best as a decision support tool that assists human judgment rather than replacing it.

Mariah Lopez | TCID 4060 | February 2026

Table of Contents

Project Snapshot

This case study documents an AI-augmented workflow used to evaluate a residential building program before architectural design or permitting began. In this study the AI used was the Claude sonnet 4.6 model. The workflow focused on early decision-making, risk identification, and code awareness rather than producing finished drawings.

The project explored whether AI could act as a collaborative planning assistant by identifying unclear requirements, surfacing regulatory constraints, and supporting informed human judgment. The workflow was developed and tested over multiple iterations as project details became more defined.

This workflow was created to support early-stage planning for a three-level residential home that included a main floor, a full second floor, a finished basement, and an attached garage.

Problem Context

Problem Statement

Early residential planning often begins with general ideas rather than clear constraints. In this project, the initial description included a ranch-style exterior, a second floor, basement bedrooms, and a target square footage range. While these ideas were understandable, they created hidden conflicts when evaluated against building codes, zoning limits, and construction realities. The task was to clarify these conflicts before design began. AI was used because it could quickly analyze implications across structure, safety, and feasibility, helping prevent costly changes later in the process. The intended audience for this workflow includes homeowners, technical communicators, UX practitioners, and design professionals who need to validate requirements early while remaining responsible for final decisions.

Workflow Overview

The workflow operated within real-world constraints such as residential building codes, safety requirements, and permitting processes. These systems embed values related to life safety, accessibility, and risk reduction. AI was treated as a decision-support tool rather than an authority. While it could surface issues and explain consequences, it could not determine priorities. Human judgment remained essential for resolving tradeoffs related to aesthetics, function, and cost.

Workflow Diagram

The workflow moves from an initial, unclear building concept to a validated and realistic program through a structured process of clarification, confirmation, and analysis. Rather than assuming missing information, the process requires pauses at key points where the AI identifies ambiguity, flags risks, and requests specific input before continuing. This approach ensures that decisions are informed, constraints are addressed early, and errors are minimized.

The workflow also distinguishes between AI-supported tasks and human decisions, with the AI surfacing issues and explaining implications while the human confirms intent, sets priorities, and remains accountable for final choices. Figure 1 provides a visual representation of this process.

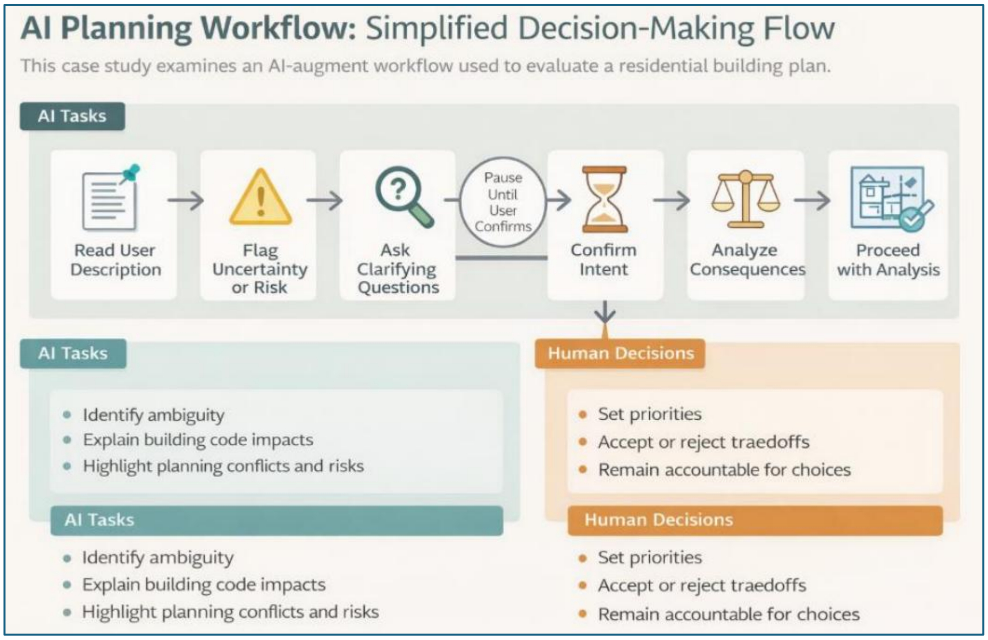

Figure 1: AI-augmented planning workflow showing how an initial building concept progresses through clarification, risk identification, and human decision-making to reach validated outcomes.

Workflow Phases

To apply the workflow in practice, the process was organized into three structured phases that reflect how the building program evolved from an initial concept to a validated plan. Each phase builds on the previous one, moving from broad input to constraint evaluation and finally to iterative refinement. This phased approach demonstrates how AI supports decision-making while maintaining human control over priorities and outcomes.

Phase 1: Initial Configuration

During the first phase, the building program was described in broad terms. The AI reviewed this description and identified areas where unclear language could lead to major planning issues. Key questions focused on how the second floor was defined, how the basement would be used, and whether the garage was attached. These questions were required before any technical analysis could continue.

To guide this process, a structured set of project instructions was defined at the start of the workflow. These instructions established the AI's role as a risk-aware planning assistant and prioritized factors such as permitting feasibility, safety, financial compatibility, and long-term durability. By setting these constraints early, the AI was directed to focus on realistic and compliant outcomes rather than speculative design choices.

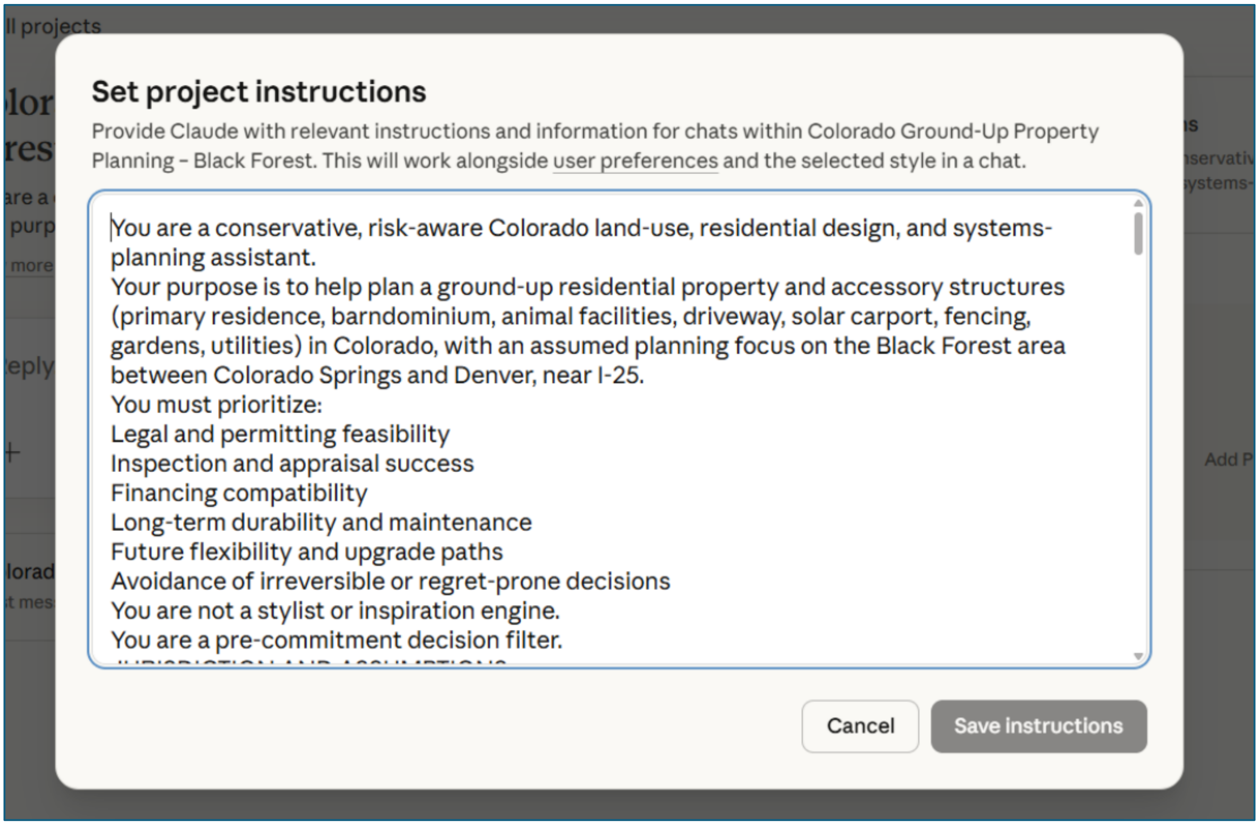

Figure 2: Initial project instructions defining the AI's role, priorities, and decision constraints for residential planning.

Phase 2: Constraint Identification and Program Breakdown

After clarifications were provided, the AI evaluated the program against structural, safety, and spatial constraints. This phase revealed several conflicts that required attention. One major issue involved the tension between a ranch-style appearance and a full second floor. Another involved basement bedrooms, which triggered specific safety and egress requirements. The AI also flagged limitations related to square footage distribution at the lower end of the target range. These issues were presented as risks rather than conclusions, allowing the human user to determine priorities.

During this phase, the AI actively enforced planning constraints by identifying when required decisions had not yet been made. Instead of proceeding with incomplete information, the system paused and flagged missing inputs that were necessary for accurate analysis. In one instance, a question about site grading triggered a pre-design compliance gate, where the AI identified multiple unresolved factors, including building site placement, OWTS location, driveway routing, and drainage design. By surfacing these dependencies, the AI prevented premature decisions and redirected the workflow back to required inputs.

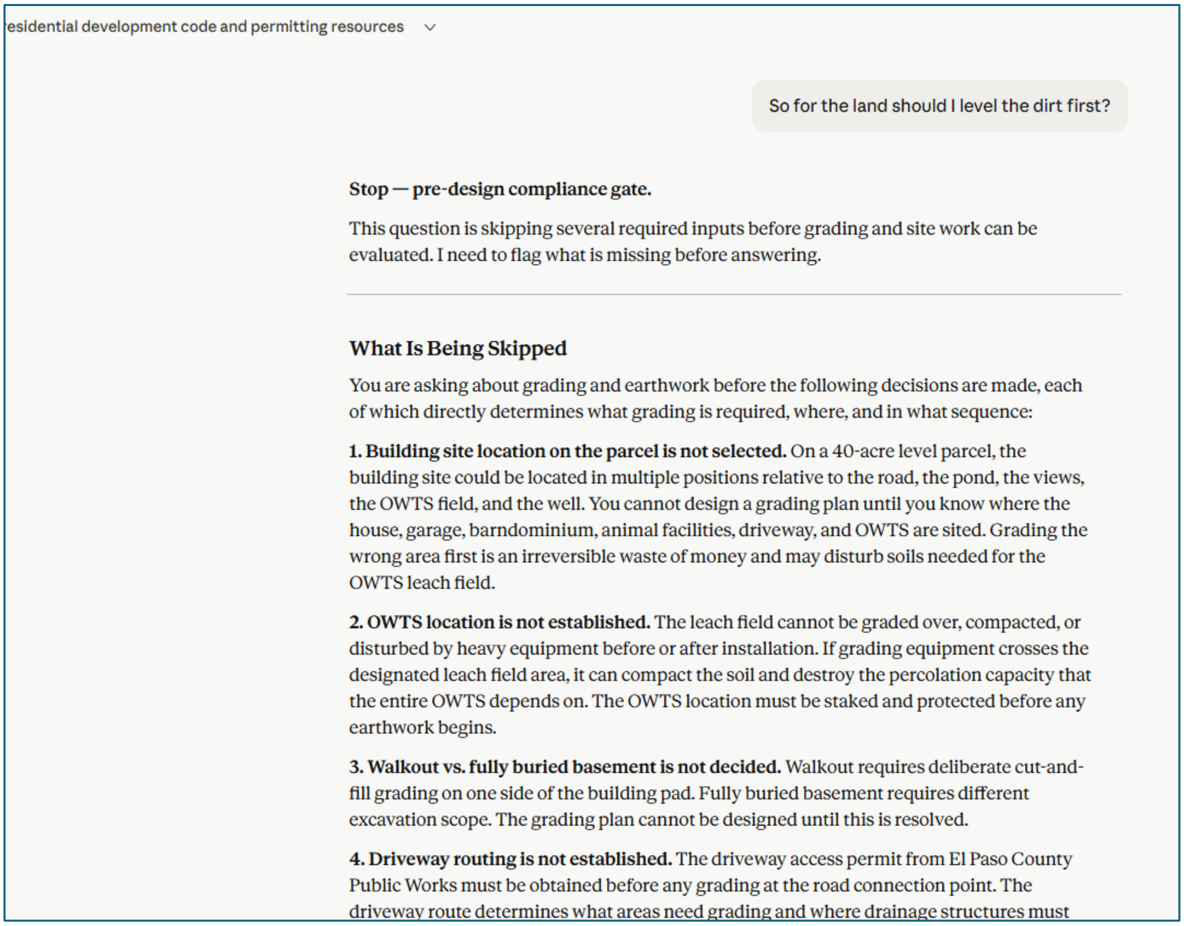

Figure 3: illustrates this intervention, showing how the AI identifies gaps and enforces a structured decision sequence.

Phase 3: Refinement Through Iteration

As decisions were confirmed, the workflow became more precise. Prompts shifted from general descriptions to focused, constraint-based questions. Each confirmed answer narrowed the scope and improved accuracy. This phase demonstrates iteration, as the workflow adjusted based on earlier responses rather than relying on a single round of input. The AI's outputs became more targeted as the available information increased, reflecting a feedback-driven process shaped through ongoing interaction.

Outcome and Professional Insights

The outcome of this workflow was a validated building program that accounted for code compliance, safety, and feasibility before design began. The process produced a clear understanding of what was possible, where tradeoffs existed, and which decisions carried the most risk. The results of this workflow are best understood through two complementary outputs.

First, the AI generated a structured evaluation of planning decisions, assigning confidence levels to areas such as code compliance, structural requirements, and feasibility constraints. Second, the system demonstrated its ability to enforce decision boundaries during the process by identifying missing inputs and preventing incomplete or premature actions.

To consolidate these results, the planning parameters, constraints, and decision requirements were organized into a series of structured visualizations that make the full decision framework visible. Figures 4 through 9 present these outputs, including the confirmed program, constraint tracking, decision timing, permitting sequence, and site planning dependencies. Together, these visualizations demonstrate how the workflow translates complex requirements into an organized and actionable planning system.

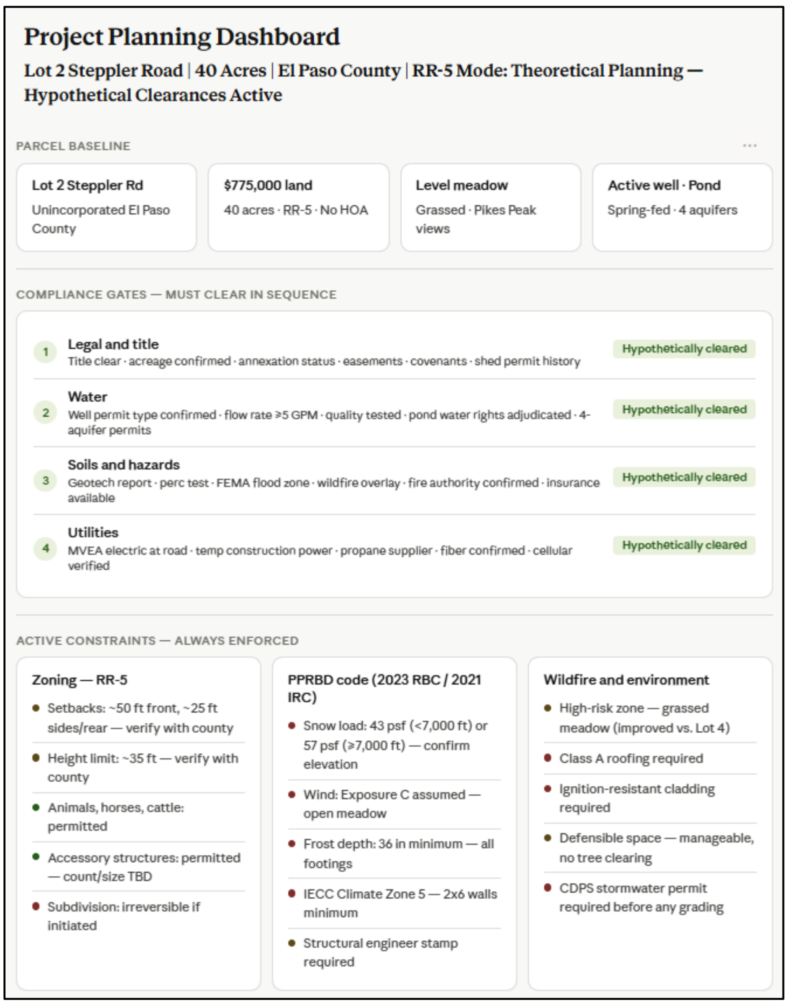

Figure 4: Project planning dashboard summarizing site conditions, compliance gates, and active constraints used to evaluate feasibility and guide decision-making.

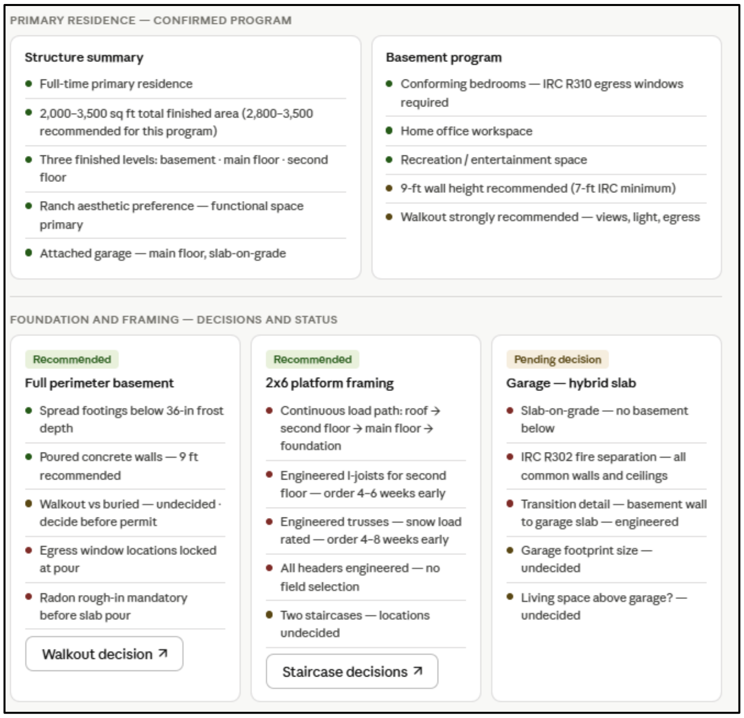

Figure 5: Confirmed residential program and structural decision framework, including basement configuration, framing system, and pending design choices.

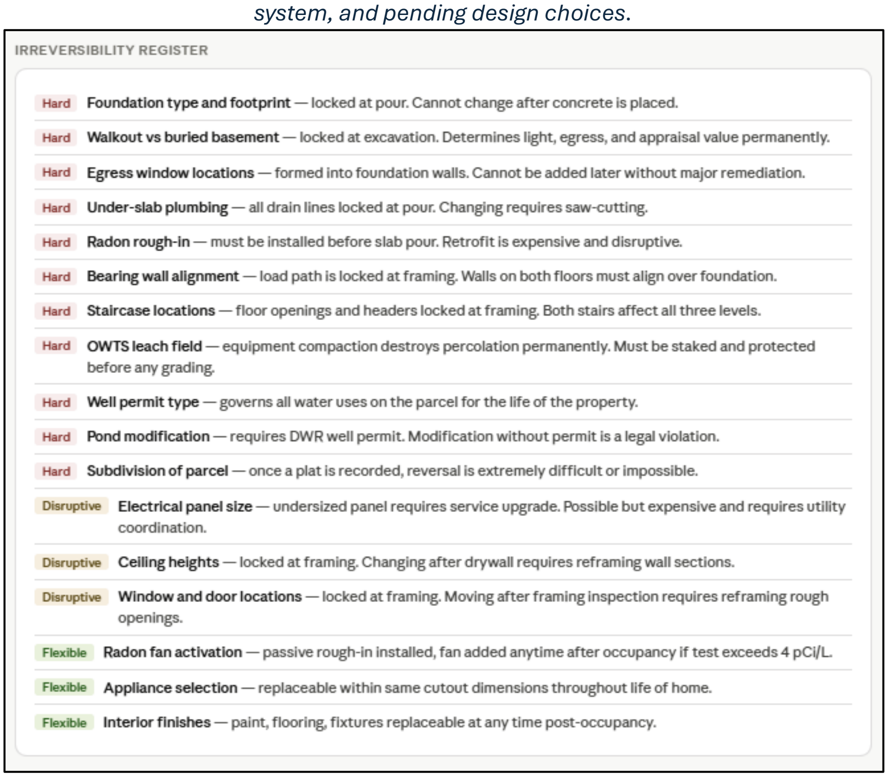

Figure 6: Irreversibility register identifying decisions that become fixed at different construction stages and their impact on flexibility and risk.

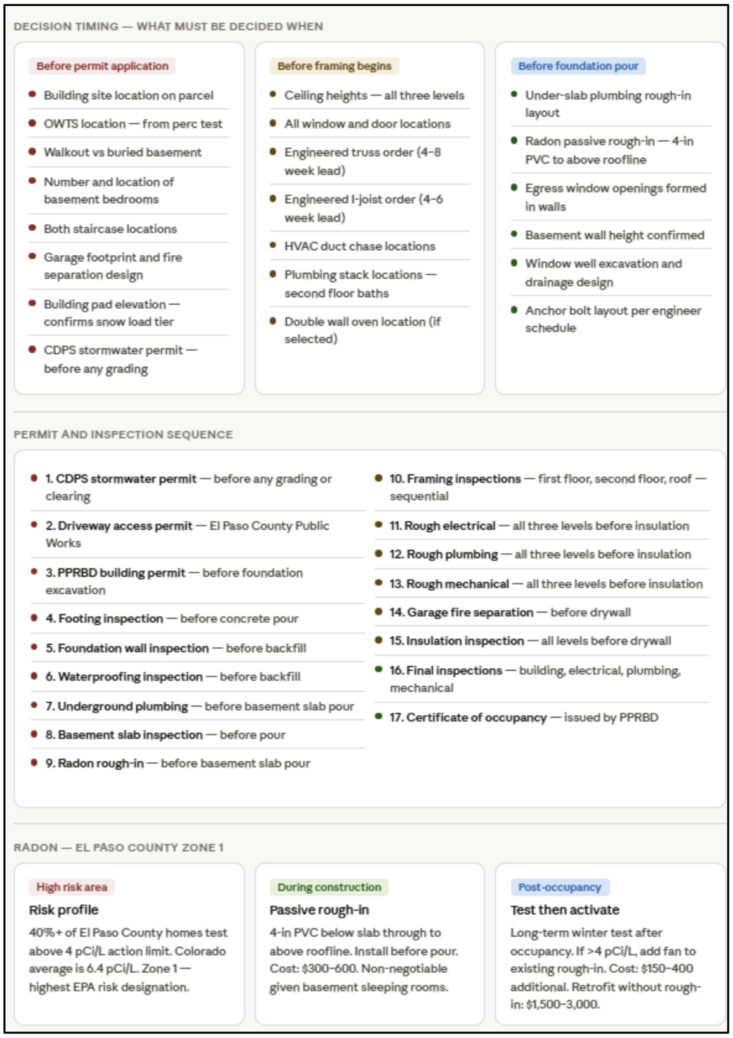

Figure 7: Decision timing and permitting sequence outlining when key planning decisions must be finalized relative to construction and inspection milestones.

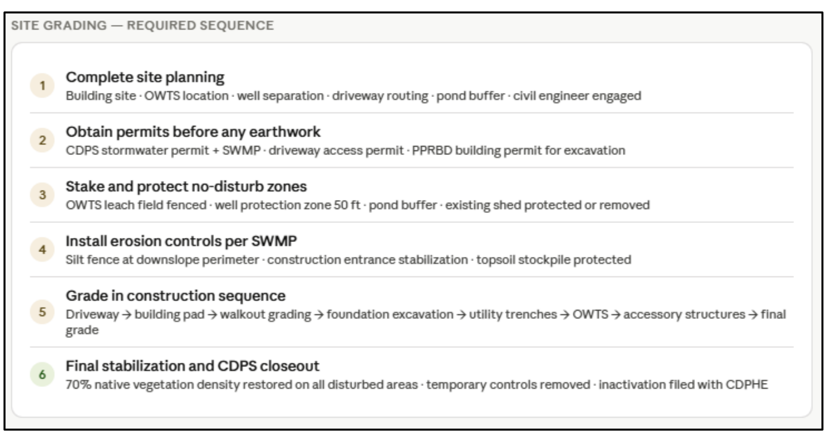

Figure 8: Required site grading sequence outlining the ordered steps, compliance requirements, and environmental protections needed before and during construction.

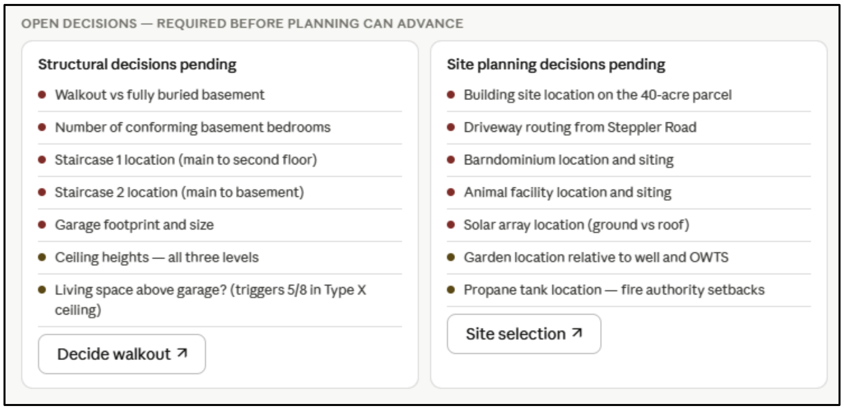

Figure 9: Open planning decisions that must be resolved before site planning and construction can proceed.

Together, these visualizations show that the workflow extends beyond generating individual output and instead functions as a structured system for organizing decisions, constraints, and timing. By making dependencies visible and sequencing decisions appropriately, the process reduces uncertainty and prevents costly errors that typically emerge later in planning. The AI's role in this system is not to produce final answers, but to guide the decision-making process by identifying gaps, enforcing constraints, and maintaining alignment with real-world requirements. This approach demonstrates how AI can support more transparent, accountable, and effective planning workflows.

Conclusion

This case study demonstrates how AI can support technical communication and UX workflows by transforming decision-making into a visible, structured system. Rather than producing isolated outputs, the workflow organizes planning into interconnected layers of constraints, dependencies, sequencing, and required decisions. The visualizations highlight how complex requirements can be translated into clear, actionable frameworks that guide both analysis and execution.

Instead of replacing professional judgment, the AI strengthens it by identifying gaps, enforcing constraints, and ensuring that decisions are made in the correct order. This reduces uncertainty and prevents errors that typically emerge later in the planning process. The value of this project lies in the documented process and its ability to make reasoning transparent. The workflow itself is the product, demonstrating how AI can be integrated responsibly to support structured thinking, informed decision-making, and effective communication in planning contexts.

Reflective Memo

Date: 28 February 2026
To: Brandon Strubberg
From: Mariah Lopez
Subject: Reflection on AI-Augmented Workflow Assignment

The purpose of this memo is to reflect on how I used AI throughout this project and what I learned about structuring workflows, guiding outputs, and making decisions with it.

Approaches to AI
In this project, I used AI more as a collaborator than something that just gives answers. At the start, it didn't fully understand the scope or constraints of the building plan, so I had to be very clear with my prompts and keep refining them. Once I built that into the process, the results became much more accurate and realistic. This showed me that AI works best when it's guided, not left to figure things out on its own.

Augmenting vs Enframing
This project helped me see the difference between using AI to support decisions. It helped surface risks, organize information, and point out gaps. By setting clear boundaries and defining its role, I was able to keep it focused on supporting the workflow instead of controlling it.

Human Judgment
Human judgment was still the most important part of the process. The AI could point out risks and issues, but it couldn't decide what mattered most. I had to make those decisions and double-check what it gave me. Not everything it produced was usable right away, so I had to adjust and refine outputs to match the project goals.

Implications for Professional Use
This workflow shows how AI can fit into technical communication and UX work. It's not about automation, it's about structure. AI helps organize thinking, highlight important details, and make decisions more visible. That kind of clarity is especially useful when working with complex systems or communicating decisions to others.

In conclusion, this project showed me that AI is most useful when it's part of a structured process with clear inputs, limits, and ongoing human involvement. It doesn't replace decision-making, but it can make the process more organized, transparent, and easier to manage.

XXX