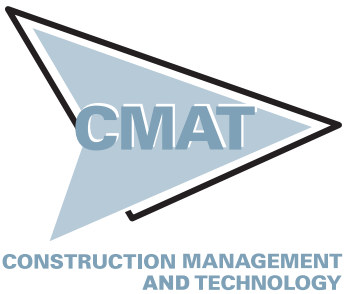
Project Development and Utility Coordination as a Partnership

Final Report
December 2025



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16. Abstract

Utility relocation at the Iowa Department of Transportation (Iowa DOT) is frequently cited as a cause of construction delays and increased highway project costs. This research aimed to enhance alignment between the utility coordination and project development processes by providing recommendations for integrating utility stakeholder partnerships early in project development, with the broader goal of streamlining workflows to reduce utility-related delays and cost overruns. The recommendations presented in this report are designed to improve current utility data collection and utilization procedures and to foster a more cohesive approach that synchronizes project design with utility coordination efforts. To develop these recommendations, the research team collected data on utility coordination best practices from state, national, and international studies, followed by an assessment of the current Iowa DOT utility coordination approach. This assessment involved a content analysis of existing policies, guidance manuals, and technical documents and engagement with key stakeholders, including Iowa DOT staff, consultants, and utility companies. The findings identified areas for improvement that formed the basis for developing the Partnership Approach for utility coordination at the Iowa DOT. This proposed approach offers recommendations to improve the alignment of utility coordination with the project development process and incorporates best practices into the Iowa DOT's utility coordination framework. The approach also proposes revisions to Iowa DOT guidance manuals and policies to incorporate these recommendations. The study findings and deliverables are anticipated to benefit key stakeholders in Iowa's primary and local roadway projects by fostering a more collaborative and efficient process for managing utility impacts.

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EXECUTIVE SUMMARY

Utility conflicts are frequently cited as a significant cause of construction delays and increased highway project costs—issues from which the Iowa Department of Transportation (Iowa DOT) is not exempt. This report presents recommendations to better align utility coordination procedures with the Iowa DOT's project development process and enhance partnerships with utility stakeholders.

To develop these recommendations, the research team first conducted a comprehensive review of state, national, and international studies, along with utility guidance manuals from other US state transportation agencies, to identify best practices that could be implemented at the Iowa DOT to enhance utility coordination and project delivery outcomes. Next, a thorough assessment of the Iowa DOT's current utility coordination approach was performed, mapping its integration within the project development process and evaluating existing practices. Qualitative research methods were employed, including a detailed content review of existing policies and guidance manuals as well as surveys and discussions with key stakeholders such as Iowa DOT internal staff, Iowa DOT consultants, and utility company representatives.

Based on the collected data, the research team identified a range of challenges and opportunities for improvement. This led to the development of a series of recommendations aimed at fostering a more cohesive and collaborative approach and synchronizing project development with utility coordination efforts to facilitate better-informed project decisions. The proposed recommendations—including adjustments to the timing and scope of utility coordination activities and the integration of best practices—were primarily shaped by feedback from key Iowa DOT stakeholders, who possess the deepest understanding of current improvement needs and whose buy-in is essential for successful implementation in the future. These recommendations were consolidated into a proposed Partnership Approach, which seeks to enhance the Iowa DOT's utility coordination process to reduce related delays and cost overruns.

Throughout this study, it became clear that successfully implementing the proposed recommendations and achieving meaningful improvements in utility coordination at the Iowa DOT requires a shift in mindset among key stakeholders. To facilitate this cultural transformation, the Partnership Approach outlines eight core principles that stakeholders should adopt to effectively implement the suggested changes and best practices:

- **P**ositive and Collaborative Relationships
- **A**void, Minimize, and Mitigate Utility Conflicts when Feasible
- **R**eliable Utility Data for Better Project Decisions
- **T**imely and Proactive Engagement of Utility Coordination Stakeholders
- **N**ormalize Treating Utilities as Business Partners
- **E**veryone Knows Where Everyone Goes
- **R**einforce the 3Cs: Communication, Coordination, and Cooperation
- **S**hared Vision and Accountability for Success among Utility Coordination Stakeholders

These core principles reflect the mindset behind all of the recommendations developed in this study, which encompass suggestions for implementation at various stages and during various events of the utility coordination process as well as in procedures from intersecting disciplines. This report provides guidance to support the Iowa DOT in adopting the Partnership Approach and offers proposed revisions to the Iowa DOT's policies and guidance manuals, both of which are designed to improve the effectiveness and outcomes of the Iowa DOT's utility coordination efforts.

LIST OF ABBREVIATIONS

Abbreviation	Term
AASHTO	American Association of State Highway and Transportation Officials
AGC	Associated General Contractors
ASCE	American Society of Civil Engineers
COC	certificate of completion
DE	district engineer
DelDOT	Delaware Department of Transportation
DOT	department of transportation
DTM	digital terrain model
DUC	district utility coordinator
EA	environmental assessment
EIS	environmental impact statement
EOT	engineering operations technicians
FHWA	Federal Highway Administration
FONSI	finding of no significant impact
GDOT	Georgia Department of Transportation
GPR	ground-penetrating radar
IAC	Iowa Administrative Code
Iowa DOT	Iowa Department of Transportation
INDOT	Indiana Department of Transportation
KYTC	Kentucky Transportation Cabinet
LPA	local public agency
MOU	memorandum of understanding
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NHI	National Highway Institute
NCDOT	North Carolina Department of Transportation
NDOT	Nebraska Department of Transportation
ODOT	Ohio Department of Transportation
OPM	operational planning meeting
PennDOT	Pennsylvania Department of Transportation
PDP	project development process
PM	project manager
PPMS	program and project management system
QL	quality level
RFP	request for proposal
ROD	record of decisions
ROW	right of way
SCDOT	South Carolina Department of Transportation
SHRP2	Strategic Highway Research Program 2
SPR	state planning and research
SUE	subsurface utility engineering
TAC	technical advisory committee
TAC	Transportation Association of Canada
TDOT	Tennessee Department of Transportation
TxDOT	Texas Department of Transportation

Abbreviation	Term
UBA	utility bid attachment
UCM	utility conflict management/matrix
UIA	utility impact analysis
WSDOT	Washington Department of Transportation
VE	value engineering
VDOT	Virginia Department of Transportation

CHAPTER 1. INTRODUCTION

1.1. Problem Statement and Background

As utility facilities, which are essential to the public, are often allowed to occupy the public right of way (ROW), national perceptions of how departments of transportation (DOTs) should interact with these facilities are evolving. Historically viewed as obstructions to roadway improvements, utility companies are now increasingly seen as partners in the highway project development and delivery process, as they provide necessary public services. This shift in perspective is prompting many state DOTs to redefine their relationship with utility companies.

As noted in the request for proposal (RFP) for this project, utility relocation at the Iowa Department of Transportation (Iowa DOT) is frequently cited as a cause for delayed construction and increased highway project costs. Current design and coordination methods tend to prioritize utility relocation rather than fostering early partnerships with utility companies during the design phase to enable more timely and effective resolutions. These issues are not unique to the Iowa DOT. In 2018, the Federal Highway Administration (FHWA) published a program review titled *National Utility Review: Utility Coordination Process* (FHWA 2018), which underscores these concerns on a national scale. The review identified utilities as one of the top three causes of project delays. Similarly, a 2002 Transportation Research Board (TRB) report, *Root Causes of Delays in Highway Construction,* found utility conflicts as the second leading cause of delays according to contractors and the third leading cause according to state DOTs.

In many states, it is a common practice to dictate relocations to utility companies late in the highway design process, which contributes significantly to utility-related delays. Additional factors also contribute to these delays, including inaccurate or unavailable utility location information, insufficient coordination among utility companies, strained relationships with stakeholders, supply chain issues for utility components, and more. These issues can lead to problems such as easement renegotiations, inadequate ROW, improperly designed construction phasing, and delays in the letting or construction schedule. Consequently, these factors introduce inefficiencies into the overall project development process. Research and practice suggest that instituting early coordination and conflict identification, better aligning the project development and utility coordination processes, fostering partnerships, and enhancing communication can help mitigate these delays and inefficiencies (Sturgill et al. 2015).

A successful partnership requires stakeholder buy-in on the importance of accurate and usable utility information for project design, collaborative conflict management, and enhanced coordination methods. Then, improved procedures are essential for acquiring, receiving, and utilizing precise utility location and attribute information, identifying and managing conflicts early, and fostering partnerships with utility companies throughout the project development process.

This research aimed to **enhance alignment between the utility coordination and project development processes at the Iowa DOT**, with the broader goal of streamlining workflows to reduce utility-related delays and cost overruns. A primary focus was the development of

procedures for integrating utility stakeholder partnerships into the early stages of project development. Additionally, this study proposed improved methods for collecting and utilizing utility data in project development decision-making and a more cohesive approach to synchronize project design with utility coordination efforts.

The completed deliverables of this effort will directly benefit project managers (PMs), designers, utility coordinators, and other key players involved in Iowa's primary and local roadway projects. Furthermore, by providing a more collaborative and efficient process for managing potential utility impacts, this initiative will also benefit Iowa utility companies and the public.

1.2. Research Objectives and Tasks

The primary purpose of this research project was to develop and propose procedures for incorporating partnerships with utility stakeholders into the early stages of the project development process at the Iowa DOT. Figure 1-1 presents the specific objectives of this project, along with the corresponding task undertaken to achieve them.

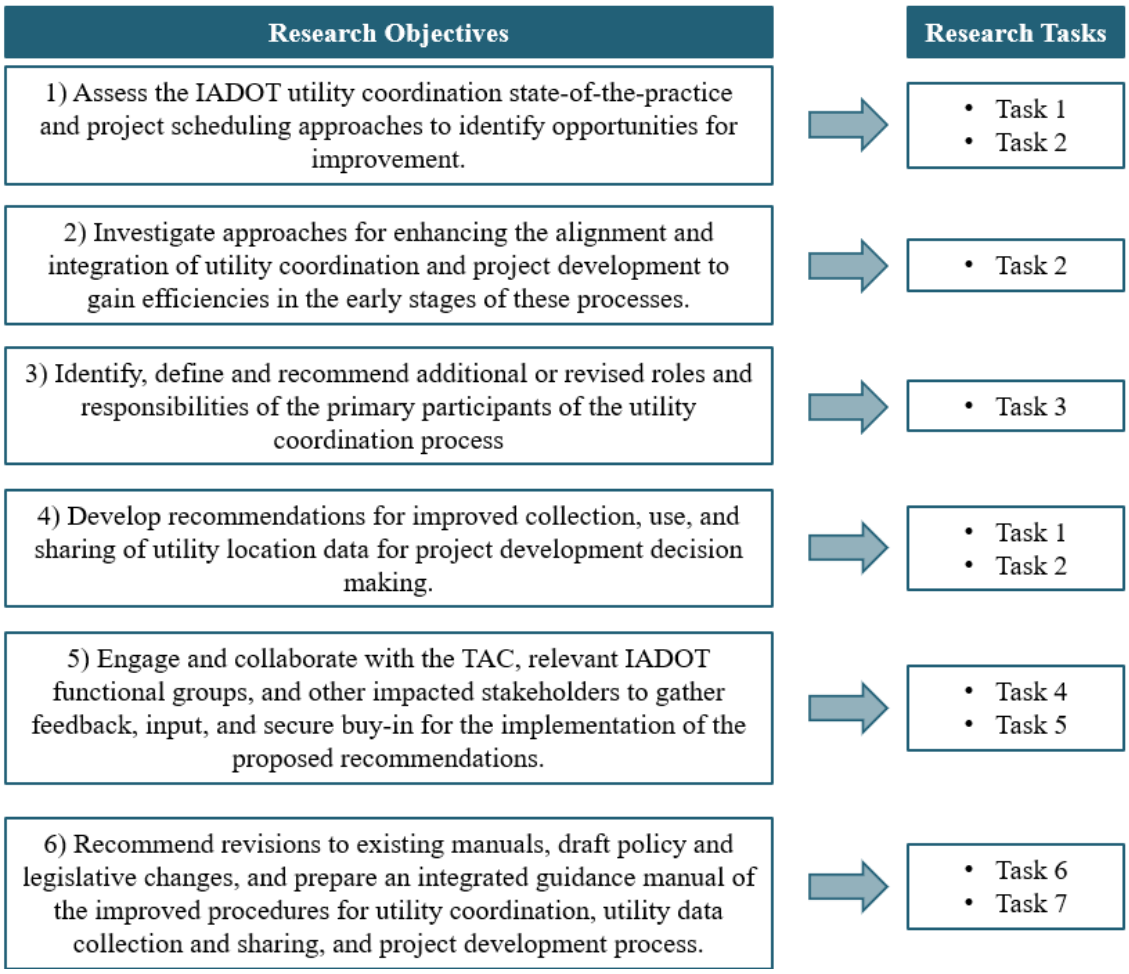


Figure 1-1. Project objectives and tasks

1.2.1. Task 1: Assess Current Utility Data Collection and Sharing Methods Used by the Iowa DOT and Utility Company Stakeholders.

This task involved collecting information and reviewing the Iowa DOT's existing policy, guidance manuals, and technical documentation related to utility coordination. Key documents included the *Policy for Accommodating and Adjustment of Utilities on the Primary Road System* (Iowa DOT 2012), *Policy for Accommodating Utilities on the County and City Non-Primary Federal-Aid Road System* (Iowa DOT 2006), *Instructional Memorandum 3.640 on Utility Accommodation and Coordination from the Local Systems Bureau to Counties and Cities* (Iowa DOT 2008), and *Iowa Guide for Coordinating Utilities on Construction Projects* (Iowa DOT 2004), among other internal documents. This task aimed to gather information on the current methods and procedures used within Iowa DOT highway projects for collecting and sharing utility data among utility coordination stakeholders. Additionally, the research team assessed the current state of the practice for utility coordination within Iowa DOT projects through a survey of Iowa DOT staff, consultants, and utility companies, followed by informal meetings with Iowa DOT staff. This data allowed the researchers to collect empirical information and feedback on current practices and uncover potential best practices for future implementation.

Simultaneously, the research team conducted a literature review of state, national, and international studies to identify recommended best practices for potential implementation in the Iowa DOT procedures. The findings of this comprehensive literature review, along with the data collected from the assessment described above and the research team's experience, allowed the researchers to develop preliminary recommendations for improving the current methods for utility data collection and sharing.

1.2.2. Task 2: Assess Current Methods for Project Scheduling by the Iowa DOT

This task was conducted concurrently with Task 1 and involved the assessment of the current methods for project scheduling by the Iowa DOT. The primary information source reviewed for this task was the *Project Development Process Manual: Guidelines for Implementing Iowa Department of Transportation's Project Development Process* (Iowa DOT 2013), hereafter referred to as the PDP guidance manual. This document, along with the documentation on the utility coordination process, allowed the research team to build a flowchart illustrating the alignment of both processes. The researchers used this flowchart to identify areas within the Iowa DOT's procedures where best practices could be implemented and highlight where utility-related information might be inserted into project decision-making to improve efficiency in the process.

For this task, the survey data was used to collect information on how project schedules account for utility coordination and relocation activities. Based on the information collected and the research team's experience, the researchers developed preliminary recommendations for improving the Iowa DOT's scheduling approaches.

1.2.3. Task 3: Identify Roles and Responsibilities for Iowa DOT and Utility Stakeholder Personnel to Serve as a Task Force During the Project.

Lessons learned from previous projects showed that an integrated approach to utility coordination and project development requires well-defined roles and responsibilities among the primary participants. Therefore, this task involved the identification of those main roles and responsibilities based on the evaluation of the utility coordination and project development processes conducted in Tasks 1 and 2. Similarly to the previous tasks, the research team developed preliminary recommendations for additional or revised roles and responsibilities for those key stakeholders.

Participation of the researchers in the FHWA's Utility Coordination for Highway Projects certification training offered by the National Highway Institute (NHI) and hosted by the Iowa DOT in January 2023 also benefited this task, as all attendees were Iowa DOT personnel involved in the development and delivery of transportation projects and utility coordination process. During this training, the researchers were able to collect information on current issues and challenges in the utility coordination process, practices that the Iowa DOT is currently using, and feedback on the potential implementation of best practices.

All of the preliminary recommendations developed and compiled to this point—from Tasks 1, 2, and 3—were discussed and reviewed in collaboration with the technical advisory committee (TAC) for this project. This collaborative effort helped streamline the recommendations and get feedback on the feasibility of their implementation for the improvement of the utility coordination and project delivery outcomes within Iowa DOT highway projects.

1.2.4. Task 4: Prepare Presentation Materials for Local Utility Boards and Other Partnership and Outreach Efforts

Considering the importance of marketing and outreach to achieve buy-in and ensure the successful implementation of recommendations, Task 4 involved developing presentation materials to communicate the research recommendations and upcoming changes to the Iowa DOT's utility coordination approach. These materials were shared with key stakeholders in the utility coordination process through various opportunities, such as the Annual Iowa DOT Utility Meeting, allowing them to offer feedback and input. This ensured that they were better prepared to support and effectively implement the recommendations of this study.

1.2.5. Task 5: Coordinate Meetings between Stakeholders to Determine Appropriate Project Development Timeframes and Additional Stages Needed to Accomplish Shared Information

In addition to the feedback gathered from Task 4, this task involved coordinating further collaborations with Iowa DOT stakeholders in a more detail-oriented setting to discuss and finalize specific process recommendations and changes developed through this research. The meetings aimed to refine recommended project development timeframes with integrated utility

coordination best practices and strategies and to identify key stages for implementing the utility data collected.

1.2.6. Task 6: Develop Draft Manuals and Host Discussion Meetings with DOT Stakeholders

Based on the findings from Tasks 1, 2, and 3 and incorporating feedback from Tasks 4 and 5, the research team developed a preliminary report outlining guidance for implementing improvement recommendations related to utility coordination, utility data gathering, utility data sharing procedures, and the integration of these tasks with the project development process. The report also included suggested revisions to existing manuals and policies. After submission, the preliminary report was reviewed by Iowa DOT stakeholders to gather additional feedback.

1.2.7. Task 7: Draft Policy and Legislative Changes or Other Arranged Agreements

Based on the findings from the review of existing Iowa DOT policy and legislation, as well as the recommendations for improving the utility coordination process at the Iowa DOT, the research team collaborated with Iowa DOT stakeholders to determine necessary policy and legislative revisions.

1.2.8. Task 8: Develop the Final Report and Technology Transfer Materials

The final task of this research effort was to prepare a draft project report that compiled all of the previously discussed efforts, which was submitted to the Iowa DOT for review along with all technology transfer material. Once feedback was provided by the Iowa DOT, the research team incorporated the necessary revisions and prepared the final project report presented herein.

1.3. Report Organization

This report outlines the development process, findings, and lessons learned from this study and is organized as follows:

- **Chapter 1** serves as the introductory chapter of the report.
- **Chapter 2** summarizes utility coordination best practices based on a comprehensive review of state, national, and international studies. It also details how the utility coordination process aligns with the project development process in a selected sample of DOTs.
- **Chapter 3** documents the assessment of the current Iowa DOT utility coordination approach, covering its integration with the project development process, utility data collection and sharing procedures, project scheduling methods for utility coordination tasks, and the roles and responsibilities of key stakeholders. The chapter concludes with the identification of opportunities for improvement.
- **Chapter 4** introduces the Partnership Approach for utility coordination at the Iowa DOT, which focuses on improving the alignment between the utility coordination and project development processes and fostering early partnerships with utility stakeholders. It also

provides guidance for implementing best practices and outlines recommended roles and responsibilities for adopting this proposed approach.

- **Chapter 5** presents the proposed revisions to the Iowa DOT's existing manuals and policies, reflecting the recommendations of the proposed approach.
- **Chapter 6** summarizes the main findings and offers overall recommendations.
- Any additional materials referenced in this report that contributed to the completion of the study are included in the appendices.

CHAPTER 2. LITERATURE REVIEW

Chapter 2 presents a comprehensive summary of utility coordination best practices drawn from a comprehensive review of relevant state, national, and international studies, including manuals, reports, peer-reviewed journal articles, and conference publications.

2.1. State-Level Research Review

Despite different initiatives to improve coordination between the Iowa DOT and utility companies, utility-related issues continue to cause significant delays and disruptions in the construction of highway projects in Iowa. Acknowledging this challenge, the Iowa DOT has initiated several research efforts to address and improve these issues. Among these are SPR-RE22(011)-8H-00, Best Practices for Utility Management in the Public ROW, and SPR-RE22(013)-8H-00, Early Identification and Location of Utility Facilities within Iowa DOT Project Footprints. At the time of this project's completion, SPR-RE22(013)-8H-00 had already concluded, and its key findings are summarized below.

While the primary objective of SPR-RE22(013)-8H-00 was to develop a road map for modernizing Iowa DOT business practices and the corresponding technology landscape to acquire and manage utility infrastructure data, it also gathered relevant insights and identified recommended practices that align with the objectives of the project presented herein.

Iowa DOT highway projects face increasing challenges due to advancements aimed at improving infrastructure resilience and addressing environmental, public safety, social, and business concerns. These developments have heightened the demand for public ROW, contributing to congestion and the need for utility adjustments. In response to these challenges, in 2000, the Iowa DOT initiated efforts to enhance coordination between the Iowa DOT and utility companies before the start of construction. These efforts included assigning district utility coordinators (DUCs) to oversee utility coordination, initiating annual meetings with utility representatives across the state, and revising administrative rules regarding utility accommodation on highway ROWs.

This led to the creation of a new policy, referred to as POINT 25, detailed in Iowa Administrative Code (IAC) rule 761—115.25. This policy establishes a time window, where possible, for utility adjustments during the project development process. Although Iowa Code section 306A.3 and the corresponding IAC rules, 761—115.25 through 761—115.30, were first introduced in 2003, it was not until after 2010 that the Iowa DOT began fully implementing the POINT 25 process.

Regarding this process, Meis et al. (2023) highlighted that while POINT 25 effectively addresses administrative activities and timelines for utility coordination/relocation, it lacks detailed guidance on critical engineering activities. This omission has led to missed opportunities to optimize project delivery. The SPR-RE22(013)-8H-00 research team pointed out the need for specific engineering requirements to do the following:

- Thoroughly investigate and accurately depict utilities according to established professional standards
- Systematically identify and evaluate design impacts on utilities and vice versa
- Rigorously analyze resolution options
- Develop and implement a utility plan that mitigates risks and optimizes project outcomes while prioritizing the public interest

The SPR-RE22(013)-8H-00 research team also engaged with Iowa Associated General Contractors (AGC) members, the Iowa DOT, and utility representatives to collect details regarding challenges and potential solutions to utility-related construction delays. Key concerns gathered through this engagement included inaccurate or incomplete utility location data within Iowa DOT plans, particularly missing depth or elevation details, and the frequent noncompliance of utility companies with relocation schedules. Contractors also suggested that penalties might be needed to hold utility companies accountable for delays. During these discussions, the following solutions were proposed:

- **Cultural shift in the utility coordination process**. The adoption of a more collaborative approach was suggested, aiming to foster a partnership between project design teams and utility companies. The approach is for the design team to have access to accurate and thorough utility location data collected through American Society of Civil Engineers (ASCE) 38 investigations or other methods as determined by an early project assessment of utility data needs. The goal is to avoid utility conflicts during design whenever possible and to minimize impacts when avoidance is not feasible. Educating designers on utility avoidance and the impact of design choices on utilities is key to this approach. Furthermore, by treating utilities as partners in the ROW, this collaborative strategy could encourage greater participation and responsiveness from utility companies, ultimately building stronger relationships.

- **Improved adherence to the POINT 25 process**. The construction community emphasized that POINT 25 projects deliver better information and outcomes than most non-POINT 25 projects. They suggested that education on the POINT 25 process is needed within the Iowa DOT and for local agencies and utility companies to ensure better compliance. This community also stressed that projects should not reach the construction letting stage when utility relocations have not been completed.

- **Improved collection and accuracy of utility as-built data within permitting**. Concerns were raised about the accuracy of utility data, particularly in terms of utility elevations. The construction community advocated for more comprehensive utility investigations and better as-built data collection during the permitting process. The discussion also suggested using a decision framework to determine the necessary level of utility investigation for each project. While the Iowa DOT already uses consultants for more in-depth investigations, there was a push to adopt the ASCE 38 standard to improve data accuracy.

- **Application of penalties for utility company delay**. A recurring issue raised by the construction community was the lack of responsiveness from utility companies. They suggested that penalties should be applied for noncompliance, particularly with work plans and schedules. Although it was not a major focus of the discussion, the POINT 25 process does allow for penalties in cases of delay, including withholding future permits from noncompliant utility companies. However, it is important to consider the enforcement of these penalties as a last resort, as it could hinder collaboration and foster adversarial relationships with utility companies.

Based on the proposed solutions outlined above, the SPR-RE22(013)-8H-00 research team developed a roadmap for improving the Iowa DOT's approach to utilities, as presented in Table 2-1.

Table 2-1. Roadmap for improving the Iowa DOT's approach to utilities

Planning Phase	Design Phase
▪ Evaluate existing utility complexities/ project risks through a utility inventory. ▪ Determine the investigation strategy: - ASCE 38-22 QLB - ASCE 38-22 QLC/D - One Call design ticket ▪ Begin utility coordination with a kick-off meeting.	▪ At 0%–10% design, implement a strategy for horizontal and critical vertical location investigations. ▪ Share existing utility data with designers (using the Avoid, Minimize, and Accommodate approach). ▪ Update investigations as necessary. ▪ Use ASCE 75-22 to document all new or relocated utilities. ▪ Keep utility drawings current through letting. ▪ Hold regular utility coordination meetings to assist utility owners.

In addition to these recommendations, the research team proposed further enhancements to the utility accommodation policy, including the following:

- Create a master utility agreement or memorandum of understanding (MOU) to promote cooperation and clarify responsibilities in the DOT/utility relationship during highway projects.
- Include a discussion of various project types and their impacts on utility relocation in the policy.
- Require subsurface utility engineering (SUE) and utility investigations per ASCE/CI/UESI 38-22 and 75-22 to identify conflicts, utilizing a utility conflict matrix (UCM) for highway contractors to minimize risks.
- Implement the Avoid, Minimize, and Accommodate approach in highway project design phases.
- Adopt a value engineering (VE) approach that evaluates the total project cost, including utility relocation expenses, regardless of DOT reimbursement responsibilities.

- Ensure that utility conflict management involves all relevant disciplines, including drainage, traffic, intelligent transportation systems (ITS), construction phasing, bridges, and construction.

2.2. National-Level Research Review

Key findings on best practices for enhancing the utility coordination process within project development, derived from various studies and manuals across the nation, are summarized below.

2.2.1. Utility Coordination Best Practices

2.2.1.1. Effective Partnering and Trust-Based Working Relationships with Utility Companies

Building a professional relationship with utility companies is arguably the most critical factor in effectively resolving utility conflicts and minimizing related delays (Yadollahi and Piratla 2023). While there is no single solution that will instantly enhance the relationship between DOTs and utility companies, various strategies can help cultivate trust-based partnerships (Piratla et al. 2024). For instance, Quiroga et al. (2024) recommend holding annual meetings where utility owners come together to discuss upcoming projects and potential utility conflicts, fostering open dialogue and collaboration with the transportation agency.

The concept of partnering has a longstanding tradition of addressing the complexities and conflicts in transportation projects, which often involve diverse and sometimes conflicting interests (Sweeney 2010). As Ellis et al. (2009) emphasized, DOTs and utility companies must operate as a team, collaborating through trust-based relationships built on partnering principles. These principles include a commitment to shared goals, early and ongoing communication, clearly defined roles and responsibilities, and strong organizational leadership. Such an approach is crucial because the effectiveness of all other utility coordination improvement initiatives relies on establishing this foundational relationship.

2.2.1.2. Early Engagement of Utility Companies

As Ellis et al. (2009) suggest, a proven best practice for improving utility coordination efforts is the early involvement of utility companies in the planning and design processes. While the definition of "early" may differ across states, it is clear that utilities must be notified of potential involvement at the beginning of the planning and design phase to avoid utility-related delays. In their study, Ellis' team observed that most state DOTs consider the 30% design stage to be the point of early notification. However, waiting until the preliminary design phase to initiate utility coordination can be problematic, particularly if environmental agreements or ROW requirements are already in place (Sturgill et al. 2017). Depending on the project, utility coordination could begin as early as the planning phase (Piratla et al. 2024), which allows for the early identification of major issues that may impact the project scope, schedule, and cost.

This early involvement provides more time for coordination and collaboration between designers and utility companies, enabling them to explore options that could avoid the need for utility relocation altogether. Identifying utility conflicts late in the design phase—such as around 60 % completion—makes design adjustments to avoid these conflicts challenging. The sooner utility companies are notified of a potential conflict, the sooner they can begin planning and incorporating the project into their own schedules (Ellis et al. 2009). Early engagement of utilities can result in conflict avoidance or "negotiated savings" for the utility, where the utility company may contribute to less costly design changes rather than facing the expense and complexity of relocating its infrastructure (Piratla et al. 2024).

One strategy for involving utilities early is to develop a conceptual plan that outlines the project's general goals and objectives. This early notification allows utility companies to organize their resources and plan accordingly for potential relocations. It also fosters a sense of cooperation and shared responsibility, making utilities more responsive and cooperative throughout the utility conflict management process (Yadollahi and Piratla 2023).

Case studies by Sturgill et al. (2017) demonstrated that integrating utility coordination early in the design process significantly benefits utility management. Likewise, Anspach (2010) advises identifying major utility companies early in project development, assessing how proposed designs may impact existing utilities, and estimating mitigation costs for utility conflicts. If significant conflicts arise, utility owners should be engaged to collaborate on alternative design solutions.

2.2.1.3. Consistent and Continuous Engagement of Utility Companies (Communication, Cooperation, and Collaboration [3Cs])

Another influential factor is keeping utility companies involved throughout the project (Yadollahi and Piratla 2023). Consistent meetings with their representatives for updates on resolution, coordination, and relocation processes incentivize the utility companies' participation during the project. These meetings also help keep various project stakeholders, such as the design team, project managers, and utility coordinators, on the same page (Quiroga et al. 2024). Furthermore, maintaining frequent communication promotes a strong and trustworthy working relationship between transportation agencies and utility companies, which ultimately helps to avoid potential conflicts and explore less expensive project design changes rather than utility relations (Yadollahi and Piratla 2023).

Depending on the project development stage, the main objectives of these meetings could be to (1) recognize the shared goals of all parties involved and the steps needed to accomplish these goals, (2) enable early identification of highway projects that affect existing utilities to give engineers adequate time to redesign projects that may originally require major utility relocations, (3) design alternatives to minimize the impact and relocations necessary on highway projects, (4) coordinate the construction schedule with the utility work to reduce disruptions, and (5) refine the coordination process for continued efficient communication (FHWA 2002, El-Rayes et al. 2017).

These coordination meetings can be held at various time intervals and at a project, district, or state level. For instance, higher-level utility coordination meetings at the state or district level may be held quarterly or yearly to discuss long-range projects, policies, incentives, etc. Project-level meetings may be held weekly, biweekly, or monthly, depending on the amount of coordination needed, the highway project's stage, and the status of the utility relocation effort. Additionally, personal-level meetings can be scheduled on a need basis (Yadollahi and Piratla 2023).

In regard to these meetings, Sweeney (2010) recommends holding regular face-to-face meetings with the utility owner's designers, construction superintendents, and coordinators. These meetings should include specific relevant agendas, recorded meeting notes, and follow-up action. Additionally, Sweeney (2010) noted that one-on-one meetings with individual utility owners are sometimes more effective than large meetings where every utility owner attends. Large meetings can be effective occasionally so that everyone can hear each other's concerns, but they are often just opportunities to vent without any real resulting decisions or progress. Ellis et al. (2009) noted that although a face-to-face meeting is preferred, it may not be appropriate for all projects. For simple projects with few utility issues, a formal meeting may not be needed.

Ellis et al. (2009) developed some recommendations, presented in Table 2-2, to support cooperation at different stages of the project development process.

Table 2-2. Actions to support cooperation with utility companies

Project Planning	Project Design
- Host meetings with utility companies to discuss future highway projects. - Recognize the importance of long-range highway/utility coordination. - Provide utility companies with long-range highway construction schedules. - Solicit similar information on utility owners' capital construction programs, particularly where a utility's planned expansion or reconstruction may encroach on and coincide with a planned highway project. Look for opportunities to coordinate overlapping projects so that costs and public impact may be minimized. - Consider using the long-range planning meeting as a convenient forum to discuss other highway/utility issues, such as accommodation policies and reimbursement. - Provide utility companies with a notice of proposed highway improvements and preliminary plans as early in the development of highway projects as possible. - Consider providing earlier preliminary notice to utility companies to allow them to budget for relocations and have sufficient personnel available to do the work.	- Conduct on-site or plan-in-hand meetings with utility companies to determine utility conflicts and appropriate resolutions. - Meet often with utility owners and highway designers throughout the development of projects to coordinate ongoing activities. - Conduct monthly detailed meetings on major projects, at a minimum, for all parties to keep abreast of the project status and changes. - Involve utility companies in the ROW design phase to ensure that utility companies have room between the construction limits and the new ROW where facilities will relocate. - Conduct on-site/plan-in-hand meetings with utility companies to determine utility conflicts and resolve them.

2.2.1.4. Integration between Utility Coordination and the ROW Processes

A common cause of delays in utility relocations is the uncertainty surrounding ROW acquisition. This uncertainty arises when it is unclear whether utility facilities can be accommodated within the project's existing ROW or if additional ROW will be required for the relocation (Piratla et al. 2024). To address this, studies have recommended involving utility companies in a timely manner during the ROW design phase to ensure adequate space between the construction limits and the new ROW for relocating utilities (Ellis et al. 2009).

Quiroga et al. (2014), in National Cooperative Highway Research Program (NCHRP) Report 771, noted that ROW acquisition for state DOTs is often treated as a separate process, with limited opportunities for coordination and integration with the broader project delivery process. This separation can result in minimal interaction between ROW agents and other DOT staff despite the importance of involving them in project scoping, cost estimation, and meetings with utility owners. Early collaboration and partnership between these teams are essential for more effective planning and minimizing delays related to ROW acquisition. In line with this approach, Piratla et al. (2024) recommend encouraging utility coordinators to work closely with the ROW office to discuss ROW needs for utility work, identify critical parcels, develop strategies to prioritize ROW acquisition, identify utility property interests or other potential issues early in the process, and track the progress of ROW acquisition.

2.2.1.5. Integration between Utility Coordination and the Environmental Processes

One often overlooked factor is the connection between the utility and environmental review processes (Piratla et al. 2024). As Quiroga et al. (2010) pointed out, the interaction between these two processes has not received proper attention over the years. One of the reasons is that, in many cases, the collection of detailed underground utility-related data starts in the design phase, which typically occurs after the environmental process is complete.

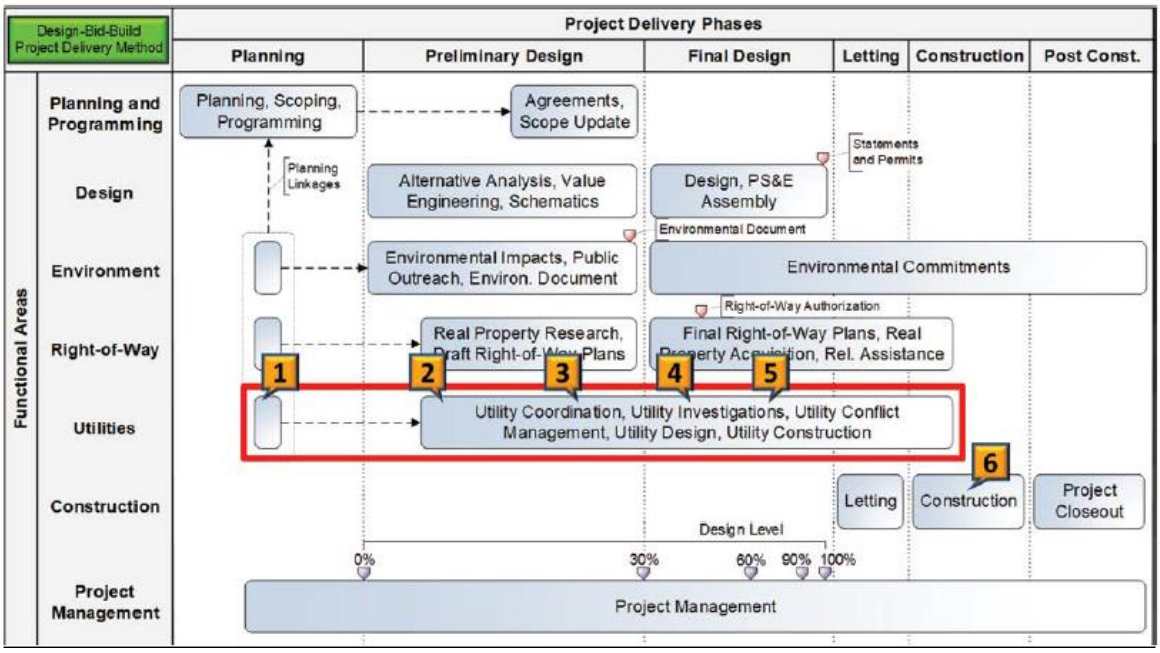
Acknowledging this challenge, Quiroga et al. (2010) conducted a research project for the Texas Department of Transportation (TxDOT) that examined the feasibility of creating synergy and establishing concurrence points between the utility and environmental review processes. Their analysis led to the identification of several optimization strategies to address various environmental and utility-related issues. While some of these strategies are discussed elsewhere in this literature review, the researchers also recommended better coordination between environmental investigations and utility data collection.

Coordinating these activities could facilitate the exchange of critical utility and environmental information. This might involve initiating data collection activities concurrently, sharing partial data during the process, and exchanging the final results of both investigations. Additionally, adjusting existing contract templates or scopes of work could encourage better coordination and information sharing. Implementing such measures could enable early identification and avoidance of environmental and utility impacts (Quiroga et al. 2010).

2.2.1.6. Utility Conflict Management/Matrices

Effective conflict management is centered around the use of utility conflict matrices, which must be maintained and updated throughout the project development process. These matrices are essential tools for tracking and managing utility conflicts and ensuring that they are identified and addressed proactively as new information becomes available at key project milestones (Kraus et al. 2015). The concept of UCM was developed through Second Strategic Highway Research Program (SHRP2) Project R15B, *Identification of Utility Conflicts and Solutions* (Quiroga et al. 2012). This research initiative introduced various tools that public agencies and utility professionals can adopt to manage utility conflicts more efficiently, reducing delays, cost overruns, and risks associated with utility relocations.

The implementation of UCM is a comprehensive, multistage process that systematically addresses the identification and resolution of utility conflicts throughout the project life cycle. Quiroga et al. (2024) recommend using these matrices to systematically depict the location of utility conflicts, document each conflict, and outline the process for analyzing resolution alternatives, ultimately highlighting the final selected solution. Although the exact number and placement of UCM activities and updates may vary depending on the specific project, a general framework can offer guidance. Figure 2-1 illustrates such a framework, highlighting six key concurrence points that correspond to crucial stages in the UCM process.



Quiroga et al. 2024

Figure 2-1. Framework for utility conflict management for design-bid-build projects

Several essential activities should be carried out at these concurrence points to effectively manage utility conflicts. These activities, detailed in Table 2-3, include coordination efforts, conflict analysis, and solution identification, all aimed at ensuring the seamless integration of

utility considerations into the project (Yadollahi and Piratla 2023). It is important to note that for effective implementation of UCM, it is crucial to actively involve all relevant stakeholders in the process, as UCM is a team effort and should not be solely the responsibility of the utility coordinator. Successful UCM is grounded in the principle that both DOTs and utility companies must collaborate to identify and resolve utility conflicts (Quiroga et al. 2024)

Table 2-3. Utility conflict management activities for design-bid-build projects

Stage	UCM Activities	
1	• Utility field investigations are not conducted at this stage. • Prepare realistic project scope (fiscally constrained).	• Identify major utility-related issues that might affect the project route, scope, or schedule. • Meet with utility owners about planned project.
2	• Send notifications of the highway project to utility owners. • Conduct preliminary utility investigation based on existing records (QLD). • Identify utility conflicts and conduct initial assessment using a utility layout and a preliminary utility conflict list.	• Focus on major physical constraints associated with utility facilities. • Determine where additional utility investigation is needed.
3	• Survey aboveground utility facilities (QLC). • Conduct utility investigation using geophysical techniques (QLB). • Identify or update utility conflicts using utility layout and preliminary utility conflict list.	• Request utility owners to confirm conflict locations, assess constructability challenges, and discuss potential resolution strategies. • Determine where more detailed investigations are needed. • Develop preliminary critical path schedule for utility relocations.
4	• Conduct geophysical investigation (QLB) as soon as possible if not done before. • Conduct utility test holes at specific locations (QLA). • Identify or update utility conflicts. • Analyze and review resolution strategies. • Notify utility owners of required relocation or adjustment.	• Design and coordinate utility relocation and protect-in-place measures. • Prepare utility relocation plans and schedules for inclusion in utility agreements. • Prepare or revise critical path schedule for utility relocations. • Monitor and inspect utility relocations. • Prepare utility as-built plans.
5	• Need for a utility investigation at this point should be minimal. • Finalize design of utility relocation and protect-in-place measures. • Finalize utility agreements. • Refine utility relocation schedules. • Monitor and inspect utility relocations and prepare utility as-built plans.	• Prepare utility construction plan. • Include utility plans and utility relocation schedules in PS&E package. • Prepare utility statement to include in the construction bid package.
6	• Need for a utility investigation at this point should be minimal. • Conduct preconstruction utility coordination meeting. • Conduct construction utility coordination meetings. • Monitor and inspect utility relocations and prepare as-built plans.	• Assess and resolve new utility conflicts and corresponding impacts that are uncovered during construction. • Update utility relocation schedules.

Source: Quiroga et al. 2024

The effective implementation of UCM brings several important benefits to the utility coordination process. As noted by Quiroga et al. (2024), it can be utilized to help in the preparation of the utility statement/certification that is required for the construction bid package. This statement typically outlines utility work that has been completed prior to construction, utilities that are not in conflict with the project, and utility work that must be completed during the construction phase.

Using UCM simplifies the discussion and resolution of specific utility conflicts, allowing all stakeholders—designers, utility coordinators, and utility owners—to visualize and understand utility constraints within a single document. When designers populate the UCM initially, they gain a deeper appreciation for utility issues, enabling more effective design earlier in the process. This shared understanding also facilitates coordination with utility owners, who can address conflicts based on a common document that identifies issues clearly, improving communication with reference to specific conflict IDs (Kraus et al. 2015).

UCM also serves as a valuable tool for improving internal communication within agencies. Utility coordinators and designers can distribute information effectively among internal staff, ensuring that utility conflicts are continuously monitored rather than neglected until they become critical problems. Additionally, UCM provides agency managers above the design level with a clearer view of the complexity and costs—both in terms of time and finances—associated with utility impacts (Piratla et al. 2024).

2.2.1.7. Include Utility Relocations within the Critical Path Assessment of a Project

Quiroga et al. (2024) note that utility relocation schedules are often presented as broad overviews, listing only general tasks and timeframes. This lack of detail can make it difficult to align utility work with the overall highway construction timeline. Quiroga et al. (2024) further recommend that these schedules be broken down into clear, logical phases and include specific tasks, durations, and key milestones. Using standard project management tools to create Gantt charts can help visualize these elements, identify dependencies, and highlight critical paths. Accuracy in these schedules is crucial, and if a utility owner fails to relocate infrastructure on time in an area needed for construction, the DOT owner may be held responsible for resulting delays and associated costs.

Additionally, utility relocation timelines should be coordinated with ROW acquisition schedules, especially when relocations involve existing easements or require new property acquisitions (Quiroga et al. 2024). Integrating these timelines for each utility owner helps all stakeholders understand the interdependencies and constraints involved. Important components to include in utility relocation schedules are fabrication lead times, acquisition of new easements, extended durations for tasks like fiber splicing, and any restrictions on service interruptions. These details become even more critical if utilities are not cleared before the project is advertised for bids (Quiroga et al. 2024).

2.2.1.8. Subsurface Utility Engineering

Perhaps the most important step in addressing utility issues is knowing what utilities are present and where they are located (Anspach 2010). Unfortunately, records and documentation regarding the location and attributes of underground utilities have historically been inaccurate or incomplete (Lew 2000). This lack of reliable information poses significant risks and challenges for agencies managing public ROWs. Research has shown that thorough investigation and documentation of underground utilities can mitigate many of these issues (Al-Bayati et al. 2022).

SUE has emerged as a vital engineering specialty dedicated to accurately mapping and analyzing underground infrastructure, facilitating the efficient, less disruptive, and lower-risk delivery of essential construction projects (Anspach 1996, Anspach and Scott 2019). Over the past few decades, SUE has become a formally recognized utility coordination support function rooted in the ASCE 38 standard. It is increasingly adopted by DOTs and has consistently demonstrated a significant return on investment (Lew 2000, Jeong et al. 2004, Sturgill et al. 2022, Adebiyi et al. 2023).

The ASCE 38-22 standard provides guidelines for conducting utility investigations. It specifies four quality level (QLs) attributes for individual utility features: Quality Level D (QLD), Quality Level C (QLC), Quality Level B (QLB), and Quality Level A (QLA) (Quiroga et al. 2024). By utilizing these four quality levels, SUE can define utilities at varying certifiable levels of reliability based on the characteristics of each project segment (Zembillas and Beyer 2004). ASCE 38-22 delineates the requirements, relative accuracy, and methodologies necessary to achieve each quality level, which are detailed as follows:

- **QLD** represents the lowest level of utility data quality. This level primarily consists of information gathered from existing utility records or verbal accounts, both of which are typically considered unreliable sources. While QLD can offer a general sense of utility congestion in an area, comprehensiveness and accuracy are often limited. This basic level of information is primarily useful for project planning and route selection activities.

- **QLC** is the most commonly utilized level of information. At this level, surveyors identify surface features associated with existing utilities and correlate this data with existing utility records (QLD information). A significant limitation of QLC is that it may miss directional changes of utilities that exist between surface features. Consequently, many underground utilities may be either omitted or inaccurately plotted. Therefore, QLC is most useful for rural projects where utilities are less prevalent or where relocation costs are not excessively high.

- **QLB** involves the use of appropriate surface geophysical methods to determine the existence and horizontal positioning of all utilities within the project boundaries. This process, known as “designating,” employs techniques such as electromagnetic pipe and cable locators, terrain conductivity measurements, metal detectors, and ground-penetrating radar (GPR) to accurately establish the horizontal location of utilities. Properly selecting and applying these

geophysical techniques are critical for achieving reliable QLB data. This level addresses challenges associated with inaccurate utility records, abandoned or unrecorded facilities, and lost references. The information obtained at this level can support preliminary engineering objectives and inform decisions regarding the placement of storm drainage systems, footings, foundations, and other design elements to avoid conflicts with existing utilities.

- **QLA** is the highest level of utility data quality, reserved for portions of utilities that are likely to conflict with the proposed project. Often referred to as "locating," QLA provides the highest degree of accuracy available and employs comprehensive SUE services. This level offers precise plan and profile mapping of underground utilities through nondestructive exposure methods. It includes detailed information about underground features' type, size, condition, material, and other characteristics.

Given the critical role of utility investigations in the project development and delivery process, a best practice is to conduct them as early as possible, with each QL contributing to a reduction in uncertainty regarding utility facility locations based on project requirements. Recognizing the lack of guidance on when and where SUE should be used for maximum cost-effectiveness (Ellis et al. 2009), several studies have provided recommendations. Quiroga et al. (2024) suggest the following overall guidelines:

- **Preliminary design (up to 30% design)**: Conduct a preliminary utility investigation using existing records (QLD), geophysical techniques (QLB), and aboveground utility features (QLC). It is generally advisable to first collect QLD data for the entire project before scheduling the QLB and QLC data collection.

- **Detailed design (30%–60% design)**: Implement utility investigations using test holes (QLA). Given the cost associated with test holes, it is crucial to strategically determine their locations based on criteria such as the outcomes of previous utility investigations and the need to know the elevation of underground utilities in critical areas (e.g., gas or high-pressure pipeline crossings, structure foundations, and culvert inlets and outlets).

To effectively implement these recommendations and fully leverage their benefits, it is crucial for key stakeholders involved in the utility coordination process to recognize the significance of SUE and the value it adds to the project (Ellis et al. 2009). As a result, training on SUE is also recommended.

Establishing a close connection between UCM and SUE is advisable, as this connection facilitates truly effective utility management (Ignacio and El-Rayes 2018). In line with this argument, Zembillas and Beyer (2004) highlight that, together, conflict analysis and SUE provide utility coordinators, designers, contractors, and utility companies with proactive tools for managing utilities, enabling them to identify potential conflicts early and propose solutions that can save both time and money. Ignacio and El-Rayes (2018) also note that without SUE, conflict analysis lacks depth, while SUE may be misguided without the insights provided by conflict

analysis. When these two processes collaborate closely, data gathering, processing, management, and distribution become a seamless operation.

2.2.1.9. Use of Utility Investigation and Impact Assessment Tools

Effective SUE implementation requires clarity on when and where it should be used (Ellis et al. 2009). To address this challenge, state agencies like the Pennsylvania Department of Transportation (PennDOT), Georgia Department of Transportation (GDOT), and Washington State Department of Transportation (WSDOT) have developed specific tools and guidelines to determine how and when SUE should be utilized and which SUE QL should be obtained (Piratla et al. 2024).

PennDOT, for instance, created Utility Impact Analysis (UIA), a spreadsheet tool to determine the appropriate utility investigation QL—typically between QLB or QLA—based on project requirements (Sinha et al. 2007, PennDOT 2019, Piratla et al. 2024). The UIA process involves two steps for determining SUE application and quality level requirements. Step 1 typically addresses the project as a whole, while Step 2 focuses on specific segments or locations. This segmentation is necessary since projects often vary in aspects like utility facility age or density across different areas.

Similarly, GDOT developed a utility impact rating form that assesses utility impact factors across 10 categories, yielding a score indicating a low, medium, or high utility impact level (GDOT 2008, Piratla et al. 2024). In 2018, GDOT refined its recommendations for each SUE QL:

- **QLD**: Used during concept development.
- **QLC**: Applied at the beginning of preliminary design for rural projects (when project mapping and survey control are established)
- **QLB**: Employed at preliminary design onset for urban projects, guiding initial design decisions regarding storm drainage, foundations, and footings with a focus on ensuring that the highway design avoids existing utility facilities.
- **QLA**: Collected after field plan reviews for final design, ideally after completing a UIA. QLA is applied at specific locations to support final design decisions and optimize utility placement, with an emphasis on achieving cost savings.

GDOT also suggests revisiting the UIA tool after significant design submissions (70%–90% completion) to address unresolved utility conflicts. Additionally, it provides checklists to ensure comprehensive SUE deliverables (GDOT 2021).

2.2.1.10. Constructability Reviews

A widely acknowledged issue identified by state DOTs is that construction documents often lack sufficient input to ensure that designs are buildable in an efficient and timely manner (Ellis and Thomas 2001). As a result, several researchers have recommended using formal constructability

reviews more effectively (Ellis and Thomas 2002). These reviews involve assessing and enhancing highway project contract documents to ensure reasonable bids and minimize problems during the construction phase.

Researchers such as Quiroga et al. (2024) emphasize the value of obtaining input from construction experts when evaluating utility conflicts and utility relocation plans. Utility issues play a critical role during construction and can be major sources of delay if not properly coordinated with all affected stakeholders (Quiroga et al. 2010). Therefore, it is advisable to include construction experts' input to identify potential issues that may arise during utility relocations in the field and issues that the highway contractor might find during construction. Quiroga et al. (2024) also recommend involving utility owners when necessary, as these stakeholders have in-depth knowledge of their own infrastructure systems.

Ellis and Thomas (2002) note that constructability reviews are typically triggered by predetermined project milestones, usually occurring at the 30%, 60%, and 95% stages of design development. However, given that the project development process varies across states and the design features completed at each milestone differ, the authors suggest that the approach to conducting these reviews should consider different factors, such as the complexity of the project and the availability of relevant project documents.

2.2.1.11. Consideration of Utility Work within the Project Schedule

Quiroga et al. (2024), in a research effort for the South Carolina Department of Transportation (SCDOT), identified several strategies to address critical utility delay factors affecting project delivery. One key recommendation was to include utility relocations in the project's critical path assessment. Yadollahi and Piratla (2023) further suggest that securing a dedicated utility window within the transportation project schedule is critical. This approach establishes a specific timeframe for utility companies to manage their relocations, enabling them to act promptly and meet deadlines efficiently.

To maximize the effectiveness of the utility relocation schedules, they should be organized into manageable, logical phases, detailing activities, durations, and milestones (Quiroga et al. 2024). In line with this, Piratla et al. (2024) emphasize the importance of enhancing the requirements for utility relocation schedules and ensuring that they are detailed and robust enough to be better integrated into the overall construction project schedule.

These schedules should account for factors that could significantly impact the timely completion of utility work, such as fabrication lead times, acquisition of replacement easements, and service disruption moratoriums—especially when relocations occur during highway construction (Quiroga et al. 2024). It is recommended that utility relocation schedules should be closely aligned with ROW acquisition timelines, particularly when relocations involve existing easements or depend on securing new ROW parcels.

2.2.1.12. Develop or Update Training and Certification Programs for Utility Coordination Stakeholders

Several studies, such as Ellis et al. (2009), have highlighted that many designers lack sufficient knowledge of the utility relocation process. This problem is often exacerbated by high turnover rates at DOTs, which result in less experienced personnel doing design. According to researchers, if DOT designers had a more comprehensive understanding of the complexities of utility systems, they could make a greater effort to reduce the need for relocations during highway design whenever feasible. Greater consideration of utilities in the design phase can lead to significant cost savings as designers implement innovative approaches that mitigate the need for relocations.

Similarly, Quiroga et al. (2010) emphasized the importance of training and professional development for utility coordination stakeholders, including project planners, design engineers, utility coordinators, managers, utility owners, consultants, and contractors. They noted that these stakeholders often face challenges navigating the complex array of federal and state laws, regulations, procedures, and protocols involved in utility coordination. Consequently, targeted training programs have been recommended to strengthen the foundational knowledge of new employees while fostering the continued professional development of experienced staff. As Ignacio and El-Rayes (2017) and Quiroga et al. (2010) pointed out, such practices not only enhance coordination, cooperation, and communication but also equip project personnel to improve their understanding of the utility coordination process, handle unexpected situations, and familiarize themselves with relevant DOT procedures and current laws and regulations.

A study conducted by Sturgill et al. (2017) to capture the current state of utility coordination practices across the United States revealed that many state DOTs rely on consultant-led utility coordination due to limited in-house staff, which has become a common challenge among transportation agencies. Agencies that participated in this study emphasized the need to first establish utility coordination certification programs or at least expand the availability of training to these consultants. Various states, including Colorado, Florida, Georgia, Minnesota, Pennsylvania, and Texas, have developed utility training courses offered both online and in person. These courses aim to familiarize personnel involved in utility projects with relevant procedures and the challenges that they may encounter and better prepare them for unforeseen circumstances (Ignacio and El-Rayes 2018, Quiroga et al. 2013).

Aligning with the recommendations of Quiroga et al. (2010), Anspach (2010) emphasized the need to broaden the scope of utility coordination training to include other stakeholders in addition to design staff and consultants. After evaluating best practices in case studies from the Virginia Department of Transportation (VDOT), GDOT, and PennDOT, Anspach (2010) recommended offering utility-related training not only to design staff but also to project managers, but with a more comprehensive approach. Moreover, he advocated for utility owners to receive training in highway plan reading, fostering better understanding and collaboration throughout the project life cycle.

2.2.1.13. Multilevel Memorandums of Understanding

As Scott (2012) noted, MOUs are an effective initiative that facilitates communication, coordination, and cooperation between state DOTs and utility partners. These MOUs aim to optimize relationships by beginning the engagement of utility stakeholders at the highest levels of their respective organizations. Similar to letters of intent, MOUs outline the objectives, obligations, and terms of agreement between transportation agencies and utility companies.

This practice is widely accepted in Australia due to its ability to encourage participation from all parties involved, and it has gained traction in the United States following the FHWA/American Association of State Highway and Transportation Officials (AASHTO) 2008 International Scanning Study (Quiroga et al. 2010). Several states have since adopted these agreements, in some cases incorporating partnering agreements, with positive results. For instance, the Ohio Department of Transportation (ODOT) uses a three-level MOU structure between its senior leadership and utility owners to facilitate cooperation and coordination. The first level of the MOU addresses general principles of cooperation, while the second level focuses on key issues during the design phase, such as budgeting and conflict resolution. The third level targets project-specific concerns (Quiroga et al. 2012, El-Rayes et al. 2017). Similarly, TxDOT has implemented MOUs with utility companies to formalize the foundation of their working relationship. These MOUs address key topics relevant to the project development process, particularly during the preliminary and detailed design phases. Although voluntary and nonbinding, they serve as a framework to guide collaboration and coordination between TxDOT and utilities throughout the project life cycle (Quiroga et al. 2010).

2.2.2. State-Specific Utility Coordination Approaches

The research team conducted a review of utility coordination and project development guidance manuals from a sample of state transportation agencies across the United States. This review aimed to gather information and develop a comprehensive understanding of how these agencies integrate utility coordination into their project development processes and how they implement various best practices recommended by practitioners and researchers. While other agencies may also serve as good references, the agencies selected were chosen based on the research team's expertise, familiarity, and judgment. The selection focused on agencies recognized for successfully implementing best practices, those that have recently undertaken research or efforts to improve utility coordination programs, and those noted for the effectiveness of particular aspects of their approaches. The agencies included in this review were the Delaware Department of Transportation (DelDOT), Indiana Department of Transportation (INDOT), North Carolina Department of Transportation (NCDOT), SCDOT, Nebraska Department of Transportation (NDOT), TxDOT, Tennessee Department of Transportation (TDOT), PennDOT, and Kentucky Transportation Cabinet (KYTC). The insights gained from this review offered valuable guidance for identifying potential improvement opportunities and formulating recommendations for the Iowa DOT. Key takeaways are provided in Appendix A.

2.3. International-Level Research Review

This section highlights key findings from international studies on best practices in utility coordination, offering valuable perspectives on effective strategies in the field across different contexts. Notably, some of these efforts involved examining established practices and advancements from other countries with the aim of adapting them for use in the United States.

2.3.1. European Right-of-Way and Utilities Best Practices (Moeller et al. 2002)

This initiative, sponsored by the FHWA, AASHTO, and NCHRP, involved a scanning study of best practices in ROW and utility services in England, Germany, Norway, and the Netherlands. Key findings of this research effort relevant to this study highlight the importance of enhanced coordination and communication between transportation agencies and utilities, which fosters better working relationships. The study found that highway agency utility section representatives successfully built strong relationships with utility companies by prioritizing communication skills—listening, asking questions, and discussing issues. A teamwork approach was found to be crucial, not only between highway and utility personnel but also within the highway agency itself. The scanning team encouraged state DOTs to adopt European attitudes and methods, including regular face-to-face meetings with utility representatives to discuss common challenges and foster amicable working relationships.

Moeller et al. (2002) also found that in several of these countries, a proactive approach to avoid utility relocations during highway construction through design has proven effective. Recommendations emphasize the need to identify all utilities early in the project development process and design around them whenever feasible. Other recommendations include involving ROW and utility representatives in the planning stage and recognizing ROW and utility activities as a critical path element in project management. Lastly, the study underscores the importance of formal training and ongoing employee development, suggesting the establishment of a pre-employment and continuous education program and exploring partnerships with colleges to facilitate this training.

2.3.2. Utilization of SUE to Improve the Effectiveness of Utility Relocation and Coordination Efforts on Highway Projects in Ontario (Arcand and Osman 2006)

This research evaluated the effective application of SUE as a tool for informing the design and coordination of utility-related issues in highway projects in Ontario, Canada. The study emphasizes that accurately depicting existing utilities should be a critical initial step in any highway design project. As noted by Arcand and Osman (2006), a comprehensive understanding of the presence and location of existing utilities, along with their impact on the overall project design, forms the foundation of any utility coordination effort. Without a precise map showing both aboveground and underground utility infrastructure, it is impossible to effectively design and manage the necessary relocations to accommodate the highway design.

The study recommends utilizing ASCE standards as the framework for all projects to ensure consistency across assignments. Projects with minimal utility impacts may rely on lower-quality utility information, while those with dense utility networks and numerous conflicts must depend on higher-quality data to manage associated risks effectively. Another recommendation is that the earlier data is collected, the more useful and beneficial it becomes. High-quality data available at the 30% design stage enables utility coordinators to initiate timely coordination with utility companies and develop an efficient strategy for utility conflict management.

2.3.3. Streamlining and Integrating ROW and Utility Processes with Planning, Environmental, and Design Processes in Australia and Canada (Campbell et al. 2009)

In 2008, the project team for this initiative visited Australia and Canada to study innovative ROW and utility processes that could benefit implementation efforts in the United States. Key lessons from this study included establishing MOUs and agreements with utilities to improve cooperation and coordination and to outline general principles and mutual intentions for collaboration. These agreements may cover aspects like cost distribution, information sharing, strategic planning, project management, and dispute resolution. Additional practices identified include creating project-specific roles and responsibilities templates based on project type and considerations, promoting utility coordination best practices during construction, developing methodologies for preliminary utility relocation cost estimates, and building frameworks to ensure that ROW and utility professionals are proficient in core disciplines. The widespread use of these strategies across nations further reinforces their strength, suggesting that they would provide significant value if implemented in the United States. (Campbell et al. 2009).

2.3.4. A Survey of Utility Coordination Practices in the Toronto Area (Monri 2015)

This project aimed to identify best practices for managing relocation requests among utility companies in the Greater Toronto Area. Monri (2015) highlighted that while transportation agencies must provide strong project management to mitigate utility impacts, utility companies also need efficient internal processes to meet agency requests effectively.

The utility companies interviewed agreed that utility coordination would improve if transportation agency staff understood their internal processes better. Many companies also noted that project owners often prioritize their needs without considering the strain on utilities, especially in cases where reimbursement is not required. The study further emphasized that effective utility coordination depends on the transportation agency's awareness of key factors, including that relocation is not the primary business of utility companies, that external processes that are out of the control of the utility (like permitting) take time, and that relocation costs can be substantial. Though legally obligated to relocate at their own expense, utility companies would appreciate consideration of cost mitigation strategies.

2.3.5. Guidelines for Coordination of Utility Relocations (TAC Public Utilities Management Subcommittee 2016)

The Transportation Association of Canada (TAC) – Public Utilities Management Subcommittee developed these guidelines as a template for public agencies to establish or enhance processes for utility relocation coordination. Agencies with existing processes can use this document as a best practices reference to ensure that all key elements are addressed and that practices remain consistent. A key deliverable of this effort was a flowchart (Figure 2-2) illustrating the coordination steps from the planning phase to post-construction. This flowchart's value lies not only in providing guidance on incorporating best practices, such as UCM and SUE, but in detailing the recommended timing for implementing these practices throughout project development.

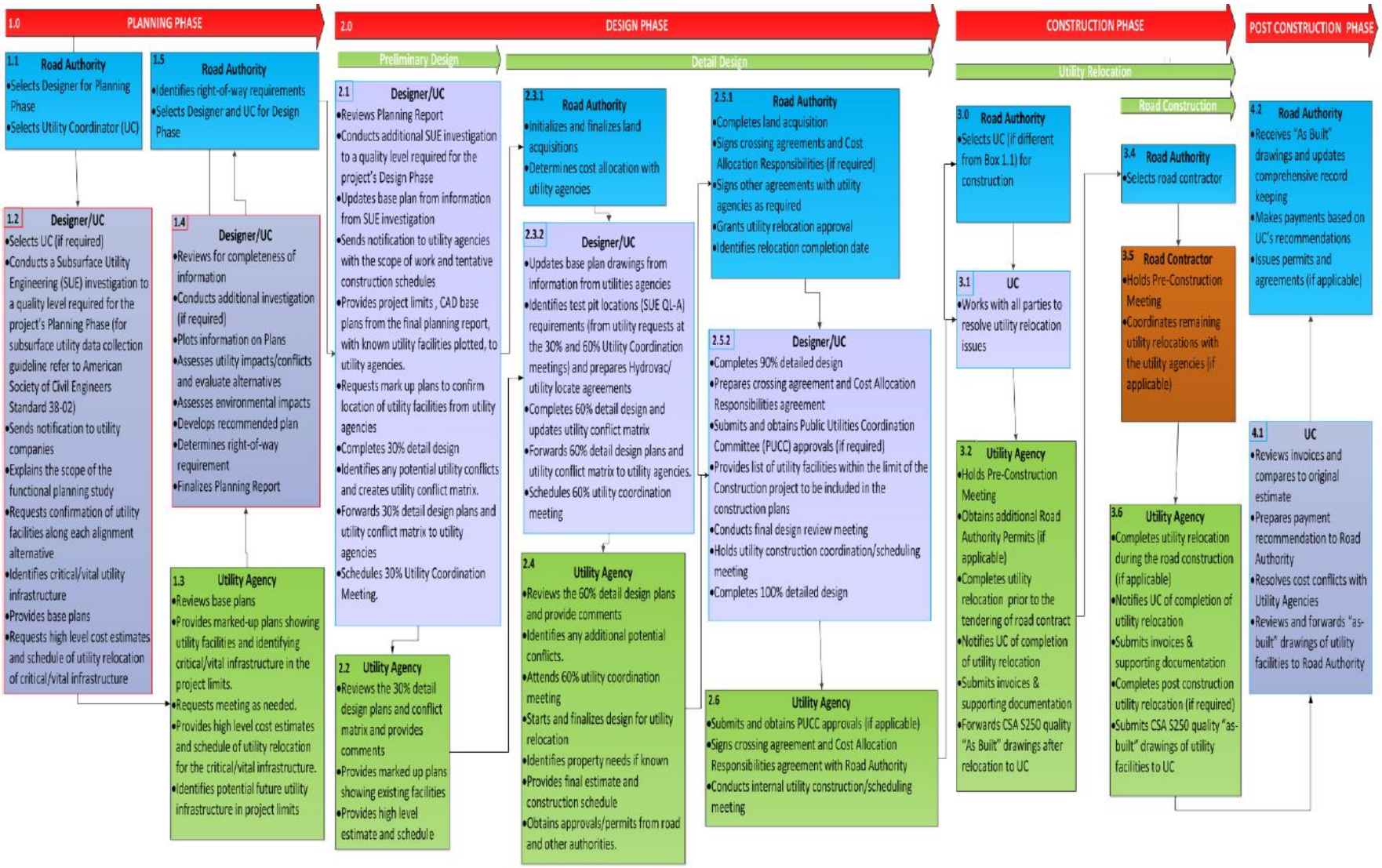


Figure 2-2. TAC flowchart for coordinating utility relocations

2.4. Literature Review Concluding Remarks

This chapter presents a substantial body of literature on effective utility coordination, offering valuable lessons and insights for the research team to apply to this study. However, it is noteworthy that each state DOT operates within its unique framework, characterized by distinct policies, processes, legislation, resources, priorities, and relationships with utility owners. These differences imply that practices effective in one state may not be feasible, appropriate, or permissible in another. Therefore, it is crucial to evaluate the feasibility of implementing these practices within the Iowa DOT's procedures and adapt recommendations from other states as needed to align with the Iowa DOT's specific requirements and standards.

Drawing on the key findings summarized in this chapter, the research team compiled a set of recommended best practices for further analysis. The feasibility and approaches for integrating these practices into the Iowa DOT's procedures are explored in the following chapters.

CHAPTER 3. ASSESSMENT OF THE CURRENT UTILITY COORDINATION APPROACH AT THE IOWA DOT

Chapter 3 describes and evaluates the Iowa DOT's current utility coordination approach to identify successes and potential improvement opportunities. This assessment included gathering and analyzing documented procedures and empirical data to perform the following tasks:

- Understand the utility coordination process, its main tasks/activities, and its alignment with the overall project development process
- Identify the methods by which utility data is collected and shared between the Iowa DOT and utility companies
- Identify the current project scheduling approaches to highlight where utility-related information is usually inserted into project decision-making
- Identify the main roles and responsibilities in the utility coordination process

3.1. Information Sources for the Assessment

The research team gathered information from various sources, including a review of Iowa DOT policies, guidance manuals, and internal documentation; surveys of key utility coordination stakeholders; and other outreach activities. This section offers a brief overview of each data collection source employed.

3.1.1. Review of Policy, Manuals, and Internal Documentation

The researchers conducted a content analysis of several Iowa DOT policy and guidance documents/manuals, including the following:

- *Project Development Process Manual: Guidelines for Implementing Iowa Department of Transportation's Project Development Process* (Iowa DOT 2013)
- *Policy for Accommodating and Adjustment of Utilities on the Primary Road System* (Iowa DOT 2012)
- *Policy for Accommodating Utilities on the County and City Non-Primary Federal-Aid Road System* (Iowa DOT 2006)
- *Instructional Memorandum 3.640 on Utility Accommodation and Coordination from the Local Systems Bureau to Counties and Cities* (Iowa DOT 2008)
- *Iowa Guide for Coordinating Utilities on Construction Projects* (Iowa DOT 2004)
- Other internal documentation shared by the Iowa DOT Statewide Utility Program Director

3.1.2. Survey of Key Utility Coordination Stakeholders

Online surveys were administered to gather feedback from three key stakeholder groups: (1) Iowa DOT internal staff, (2) Iowa DOT consultants, and (3) utility company representatives. Designed to collect empirical insights, these surveys complemented the information obtained

from written procedures, offering a more comprehensive understanding of the Iowa DOT's current utility coordination process and practices.

The surveys, presented in Appendix C, were developed utilizing the online surveying tool Qualtrics to facilitate the efficient distribution and retrieval of survey data. The questions were developed based on the findings of the literature review and the professional insights of the research team members. The distribution of the survey questionnaires was facilitated by the Iowa DOT Statewide Utility Program Director.

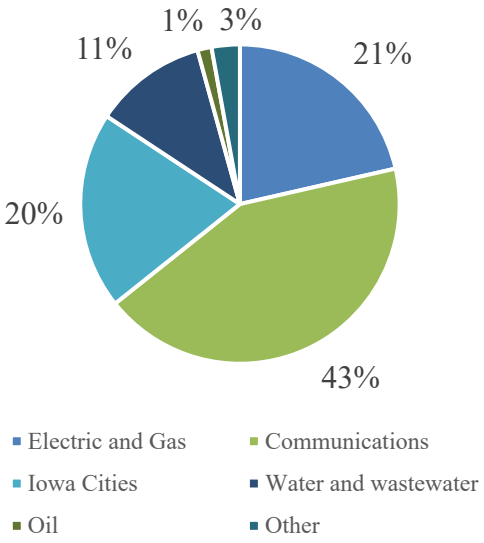
The combined responses from the three surveys totaled **97 complete responses**, with 10 responses from Iowa DOT internal staff, 17 from Iowa DOT consultants, and 70 from utility companies' representatives. Targeting these key groups enabled the research team to gather diverse perspectives on the Iowa DOT's utility coordination approach and identify best practices for potential implementation. This approach also allowed for comparison across these stakeholder groups, providing a well-rounded understanding of the current practice. Key takeaways from the survey data analysis are outlined in this chapter, with detailed findings from each group's survey available in Appendix D for a more comprehensive review.

The following is an overview of the responses received:

1. **Iowa DOT Internal Staff.** Obtaining feedback from Iowa DOT internal staff proved to be particularly valuable due to their in-depth familiarity with the processes and issues surrounding the utility coordination process. Insightful findings were gathered despite the low response rate of only 10 complete responses from this group. The participants' job titles included survey managers, DUCs, engineering operations technicians (EOTs), district engineers, and regional utility program coordinators. Half of the respondents reported having between 2 and 5 years of experience, while the other half reported more than 20 years of professional expertise.

2. **Iowa DOT Consultants.** Collecting feedback from Iowa DOT consultants was crucial to comparing their utility coordination approach with the DOT's in-house utility coordination approach. Despite a low response rate of only 17 participants, relevant information was collected. Survey respondents included representatives from nine roadway design consultants conducting utility coordination, two utility coordination consulting firms, and six other consulting companies. The diverse roles held by participants, ranging from ownership and leadership positions (owners/founders, directors of operations, and directors) to project-related roles (project managers, project engineers, and staking technicians/member service), indicate a broad spectrum of expertise and perspectives among respondents.

3. **Utility Companies Representatives.** Surveying representatives from utility companies also offered valuable information about the issues they consider important in the Iowa DOT's utility coordination approach. As illustrated in Figure 3-1, the survey obtained 70 responses from a diverse range of utility companies in Iowa, covering electricity, gas, oil, communications, water and wastewater, cities, and more.



Utility Type	Number of Responses
Electric and Gas	15
Communications	30
Water and Wastewater	8
Oil	1
Iowa Cities	14
Others	2

Figure 3-1. Survey participation breakdown of utility companies

3.1.3. FHWA's National Highway Institute Training: Utility Coordination for Highway Projects (FHWA-NHI-134006)

In January 2023, the Iowa DOT hosted the Utility Coordination for Highway Projects certification training offered by the FHWA through the NHI. Attendees included Iowa DOT personnel who participate in developing and delivering highway projects that involve the accommodation or relocation of utilities. Two research team members also participated, one serving as an instructor and the other as an attendee. Participation of the researchers allowed them to collect input and feedback regarding the following:

- **Current state of the practice for utility coordination**, to complement the information described in the DOT's policy and guidance manuals and validate the information gathered through the survey.
- **Areas for improvement**, to get empirical input from Iowa DOT personnel regarding those areas they believe need to be improved within the utility coordination process.
- **Potential practices for future implementation**, to uncover practices that Iowa DOT personnel believe, if properly implemented, can help to achieve the improvement needs identified above. Input and feedback regarding the feasibility of implementing those practices and their level of impact were also collected.

3.2. Description of the Utility Coordination Process within the Project Development Process

3.2.1. Project Development Process at the Iowa DOT

The primary reference for understanding the Iowa DOT's project development process is the *Project Development Process Manual: Guidelines for Implementing Iowa Department of Transportation's Project Development Process* (Iowa DOT 2013). This manual provides a comprehensive overview of the project development framework and offers detailed guidance on the key stages and tasks involved.

In Chapter 2 of the manual, Project Development Scheduling, the manual presents a list and descriptions of all of the tasks, or "events," that may be required to complete a project. Each event description details the required actions, purpose, necessary inputs, expected outputs, involved parties, and responsible office. However, the specific tasks or events selected for developing the project schedule depend on the project's type and complexity.

Table 3-1 presents a sample of events relevant to this research project's objectives. Identified by the research team, these events were selected because they (1) represent critical steps, documents, and milestones within the project development, (2) directly relate to the utility coordination process, and (3) are likely to require input from or produce outputs essential to utility coordination procedures. These selected events are central to evaluating and understanding the current utility coordination approach at the Iowa DOT and will be referenced throughout the rest of this report.

Table 3-1. Iowa DOT project development process events (relevant to this study)

Project Stage	Event Code	Event Name
Planning Stage	PL2	Planning Concept - Refine Alternatives
	CP1	Concurrence Point 01 - Purpose and Need
	CP2	Concurrence Point 02 - Alternatives to be Analyzed.
	VE1	Value Engineering Study during the Planning Phase
Preliminary Design Stage	U00	**Preliminary Utility Review**
	U01	**General Project Information Submitted to Utilities**
	CP3	Concurrence Point 3 - Alternatives to be Carried Forward
	CP4	Concurrence Point 4 - Preferred Alternative
	P00	Location Report (Planning Concept - Pre-Program)
	DT2/D01	Field Survey for DTM (formerly event D01)
	D02	Develop Field Exam Plans
	A03	FHWA Approval of Final Environmental Document (FONSI/ROD)
Final Design Stage	VE2	Value Engineering Study during the Design Phase
	U02	**Project Notification to Utilities**
	D05	Prepare ROW Plan Submittal
	R00	Plot Plan & Summary Sheets
	R01	Right of Way Design/Layout
	R07	Right of Way Field Exam
	R04	Right of Way Acquisition
	U03	**1st Plan Submittal to Utilities**
	U04	**2nd Plan Submittal to Utilities**
	U05	**Utility Agreement**
	U06	**Notice to Proceed to Utility**
	U07	**Utility Bid Attachment**

Descriptions of each event listed in Table 3-1 are provided below, except those exclusively related to the utility coordination process ([U00] to [U07]), which will be addressed later in this chapter.

3.2.1.1. Planning Stage Events

- **[PL2] Planning Concept - Refine Alternatives.** This event focuses on documenting the refinement of the range of alternatives identified in [PL1], Planning Concept - Range of Alternatives, adjusting them as needed to avoid or minimize impacts on environmental constraints highlighted during the environmental resources review. Based on this evaluation, specific alternatives are recommended for further refinement or set aside for further consideration. This process results in defining a potential impact area for each alternative to assess environmental implications and developing an opinion on a probable cost estimate for each alternative under consideration. The work done and decisions made are formally recorded in the Location Study Report and draft Planning Concept statement [P00].

- **[CP2] Concurrence Point 02 - Alternatives to be Analyzed.** This event aims to update resource agencies on the project's progress and obtain their concurrence on the range of alternatives to be analyzed. Key objectives include (1) implementing the National

Environmental Policy Act (NEPA) by assessing potential impacts on wetlands and US waters as early as possible in project development and minimizing these impacts where feasible, (2) conducting joint reviews with the Iowa DOT and resource agencies to agree on the alternatives for analysis, (3) identifying any agency concerns that may affect the selection of alternatives to be advanced, and (4) presenting a comprehensive range of avoidance and minimization options to help meet future permitting requirements.

- **[VE1] Value Engineering Study during the Planning Phase.** A multidisciplinary team develops alternatives, design variations, and other methods and concepts aimed at enhancing project value and/or reducing life-cycle costs without compromising safety, quality, or environmental standards. This event provides an opportunity to improve project quality, encourage innovation, eliminate costly or unnecessary design elements, and compare proposed designs to alternative VE solutions. Although the VE study can occur during any project phase, conducting it during the planning phase allows for early assessment of corridor and alignment decisions.

3.2.1.2. Preliminary Design Stage Events

- **[CP3] Concurrence Point 3 - Alternatives to be Carried Forward.** During this event, resource agencies receive an update on the project, allowing them to jointly review the selected alternatives to be carried forward and give concurrence on them. This step ensures that the information provided and the data collected are adequate for the resource agencies to reach concurrence and ensures that the project can continue to be advanced through the development process.

- **[CP4] Concurrence Point 4 - Preferred Alternative.** This event provides resource agencies with a status update on the project and facilitates a joint review to secure concurrence on the preferred alternative for the project. This step provides the necessary information to resource agencies to gain concurrence that the preferred alternative adequately addresses project-specific issues. [CP4] should occur before the FHWA approves the final decision document (finding of no significant impact [FONSI] or record of decision [ROD]).

- **[P00] Location Report (Planning Concept - Pre-Program).** This event involves documenting the engineering analysis in the Planning Concept statement, covering the development of a range of alternatives [PL1], their refinement [PL2], and the screening process to identify a preferred alternative. This statement records the project's engineering aspects, key decisions, acceptable design variations, and the rationale behind each alternative's development. Each project may be developed to varying levels of detail but must be clearly documented to ensure that other offices understand the decisions made and the reasons behind selecting the preferred alternative.

- **[DT2/D01] Field Survey for DTM (formerly event D01).** This event refines the preliminary digital terrain model (DTM) by gathering additional field survey data and photography details to improve accuracy for design purposes. The survey enhances the

model by incorporating critical details, such as utility locations, culvert and bridge data, pavement elevations at critical points, drainage, and property owner plats. This process aims to deliver detailed survey information essential for design details. Developing an accurate DTM relies on high-quality aerial photography as a foundational step.

- **[D02] Develop Field Exam Plans.** This event involves an on-site review of the project plans and location to identify potential issues related to various aspects, including vertical and horizontal alignment, roadway cross-sections, preliminary type, size, and location (TS&L) of structures, staging, traffic operations, drainage, ROW impacts, access points, environmental features, utilities, and interchange configurations. The primary objective is to assess how effectively the plans align with on-site conditions and meet the project's objectives.

- **[A03] FHWA Approval of Final Environmental Document (FONSI/ROD).** For projects where an environmental assessment (EA) has been completed, this event includes preparing and distributing the FONSI when no significant impacts are identified in the EA process. For projects with a completed final environmental impact statement (EIS), this event involves preparing and distributing the ROD.

3.2.1.3. Final Design Stage Events

- **[VE2] Value Engineering Study during the Design Phase.** A multidisciplinary team performs a VE study in the design phase to explore alternative designs and variations that could provide higher value or reduce project life-cycle costs while maintaining safety, quality, and environmental standards. This study focuses on improving project quality, encouraging innovation, removing nonessential design elements, and assessing whether alternative approaches can achieve project goals more cost-effectively.

- **[D05] Prepare ROW Plan Submittal.** This task involves submitting draft plans to the Office of ROW containing all necessary design details for completing the ROW layout. The plans define the project footprint and ROW boundaries, showing both temporary and permanent ground intercept lines. Key design elements include interchange configuration, access points, horizontal and vertical alignment, cross-sections, drainage, TS&L for bridges and culverts, borrow site size and location, stability berms and benches, staging requirements, and locations for signals, lighting, and other appurtenances that affect the ROW needed to construct and maintain the project.

- **[R00] Plot Plan & Summary Sheets.** This step involves developing plot plans and summary sheets summarizing ROW impacts parcel by parcel. These documents, plot plans, and summary sheets are provided to the district land surveyor for creating the Acquisition Plats and Legal Descriptions [T02]. This milestone event marks the completion of the ROW design and layout submission.

- **[R01] Right of Way Design/Layout.** This event involves performing ROW design and layout to establish both permanent and temporary ROW needs. The process includes

completing a comprehensive ROW plan with a parcel checklist and detailing property owners' names and areas designated for the proposed acquisition. The goal is to ensure adequate ROW design and layout in a way that meets public contact requirements while also creating an initial layout that can be adjusted based on stakeholder input.

- **[R04] ROW Acquisition.** Signed transfer documents are obtained from landowners to finalize the acquisition of land, temporary easements, access rights, or other necessary rights for the construction and maintenance of transportation projects. Acquisitions may proceed through friendly acquisition contracts or, if needed, eminent domain action if a contract is not signed by the owner.

- **[R07] ROW Field Exam.** This step involves performing a field review of the proposed ROW to evaluate the project's impacts on properties along the route. This on-site assessment enables the identification of any necessary last-minute design adjustments to reduce negative effects on affected properties while ensuring that all construction and maintenance requirements are adequately addressed within the planned ROW.

In addition to the descriptions of the events that constitute the project development process, the PDP guidance manual features a Gantt chart that illustrates the timeline for all of the events/tasks involved in this process. Presented in Appendix B, this Gantt chart serves as a generic framework/reference for scheduling these events, offering a comprehensive view of their alignment and relationships within the overall project development process. However, the actual project development timeline may vary based on specific project characteristics and requirements, as the project's type and complexity determine which events are applicable. According to the manual, projects are categorized into three basic types when developing the schedule: (1) major change (Type I project), (2) minor change (Type II project), and (3) stewardship (Type III project). Table 3-2 highlights the key differences among these types of projects.

Table 3-2. Iowa DOT project types

Characteristics	Major change (Type I project)	Minor change (Type II project	Stewardship Repair, Replacement, or Operational Improvement (Type III project)
Location	Located on a new alignment or is relocated along a major portion of the highway section.	Uses the existing location.	No change.
Grades	Uses completely new grade lines or retains very small segments of the existing grade lines.	Uses the existing grade lines.	No change requiring additional ROW acquisition except in isolated circumstances.
Lanes	Uses two lanes, changes from two lanes to multilane either divided or undivided, or includes ROW acquisition for future multilane construction	Remains the same in number but could allow widening.	No change; width may change, and turning lanes may be added.
ROW	Requires substantial ROW acquisition.	Usually, it requires some additional ROW acquisition.	No additional ROW acquisition is required except in isolated locations.
NEPA Classification	Typically requires an EIS and ROD or requires a major EA and FONSI	Typically requires an EA and FONSI or requires a countersigned categorical exclusion (CE).	Typically requires a countersigned CE or programmatic CE (PCE).

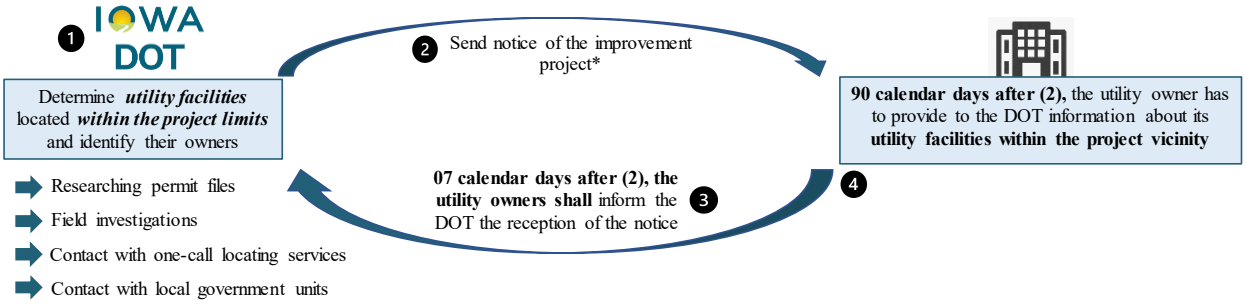
As presented in the literature review section of this report, several research initiatives utilize percentage intervals or milestones—typically set at 30%, 60%, and 90%—to evaluate and recommend the implementation of various best practices throughout the design development process. While the Gantt chart (Appendix B) offers a comprehensive overview of the timeline for all procedures involved in this process, neither the PDP guidance manual nor the chart includes references to these design completion percentages. To obtain this information and identify where in the process the design typically reaches 30%, 60%, and 90% completion, the research team gathered additional insights through discussions with Iowa DOT staff. Further details are provided later in this chapter.

3.2.2. Utility Coordination Process at the Iowa DOT

As detailed in the literature review section, the Iowa DOT Utility Program operates under the guidance of IAC rule 761—115(306A), known as the *Policy for Accommodating and Adjustment of Utilities on the Primary Road System* (2012). Rules 115.25 through 115.30 of this policy specifically address the adjustment and coordination of state highway improvement projects, commonly referred to as the POINT 25 process.

This policy covers the initial placement, adjustment, and maintenance of utility facilities in, on, above, or below the ROW of primary highways. It embodies the basic specifications and standards needed to ensure the integrity of the highway and the safety of its users. These

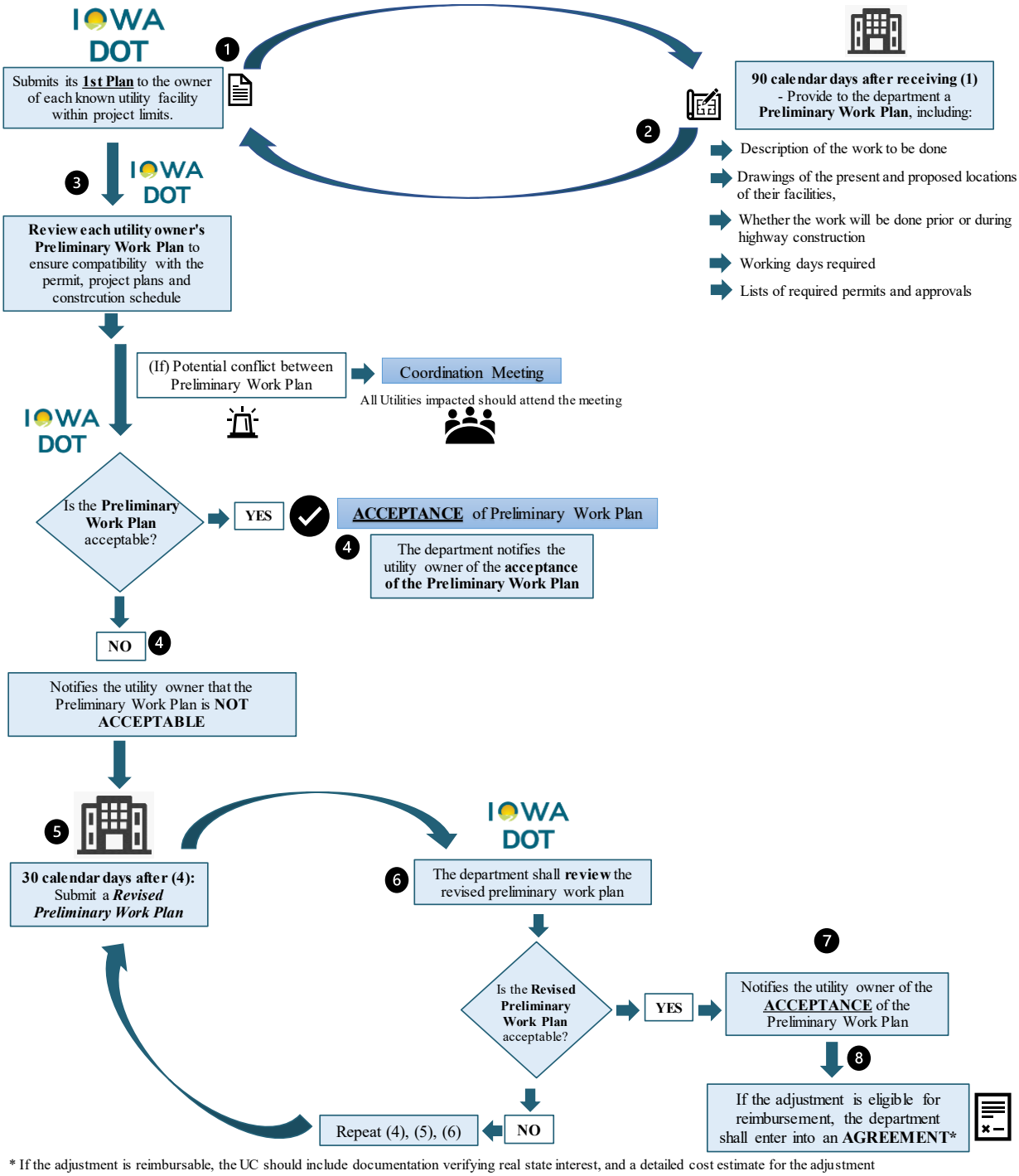
specifications apply to all state highway improvement projects, except for (1) projects that the Iowa DOT develops on an accelerated schedule and (2) projects with no anticipated utility adjustments. The research team has developed some visual representations, presented in Figures 3-2 through 3-4, for the information presented in this document regarding the main steps of the utility adjustment process.



*Including the route number of the highway, geographical limits of the project and a general description of the work to be done.

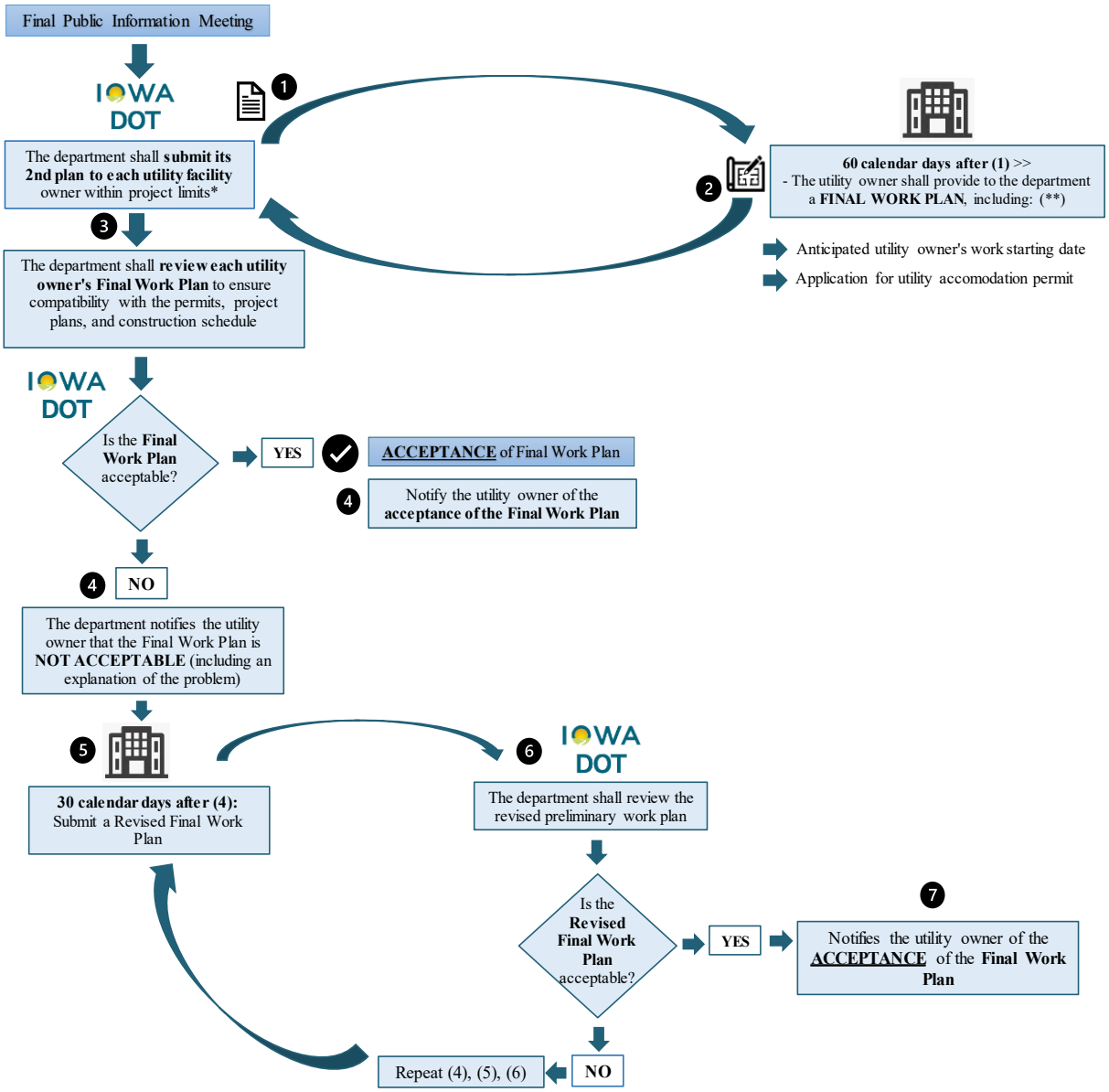
**Including information on any shared facilities with other companies. Reply regardless of whether or not it has facilities in the project's vicinity.

Figure 3-2. 761-115.26 Notice of the Project



* If the adjustment is reimbursable, the UC should include documentation verifying real state interest, and a detailed cost estimate for the adjustment

Figure 3-3. 761-115.27 First Plan Submission, Preliminary Work Plan, and Agreement



*The 2nd plan shall show any additional plan information or design changes the owner needs in order to complete its design (Clearly identify the differences between the first and second plans)
** If there are no changes to the preliminary work, the Utility only needs to notify the DOT that the preliminary work plan is now the final work plan.

Figure 3-4. 761-115.28 Second Plan Submission, Final Work Plan, and Permit Application

As shown in Table 3-1, the Iowa DOT PDP guidance manual outlines eight utility coordination events ([U00] to [U07]), described below, which are intended to prompt and record communications with utility companies in the different stages of the project development process. The dates of these events follow the requirements in sections 761.115.25 through 761.115.30 of the IAC, previously described.

While the Iowa DOT PDP guidance manual served as the primary reference for compiling these descriptions, additional insights were obtained from internal Iowa DOT documents shared with the research team. These supplementary sources proved invaluable for understanding the Iowa

DOT's current approach to utility coordination. Tables 3-3 through 3-10 capture this combined information, highlighting the key tasks at each U-event and the flow of information among them.

Table 3-3. U00: Preliminary Utility Review

Event	U00: Preliminary Utility Review
Action	▪ Included in every highway construction project, except on projects where utilities are unlikely. ▪ Overall, it involves conducting a preliminary review of utilities in the project area and updating the Program and Project Management System (PPMS) to reflect the information obtained. **Specific activities include the following:** ▪ If available, obtain the plans and draft concept and check for utility conflicts. ▪ Run the Design Request System (One Call) to determine the extent of utilities in the project area and put the reports in the project folder. ▪ Select the utilities present in PPMS and answer basic questions if possible. o Utilities present? Utilities impacted? Do we need additional U-events added to the project schedule? ▪ Determine the extent of utility knowledge or lack thereof. ▪ If a major/costly conflict is possible, communicate with the utility to determine the scope (may involve sending aerials) and whether early coordination is needed for possible design changes. ▪ If major conflicts are confirmed, DUC requests the addition of [U01]. ▪ Determine whether a project is a POINT 25 project. ▪ Put all information obtained in the project folders and update PPMS.
Purpose	▪ To determine possible conflicts with utilities in the area. ▪ To alert utilities to the upcoming project if it is warranted. ▪ To gather utility information that is easily obtained. ▪ To look for major conflicts and potentially high-cost relocations.
Input	A defined field study area bounding the range of alternatives to be developed.
Output	Preliminary information gathered and stored in the proper project folders.

Table 3-4. U01: Investigation of Major Utility Impacts

Event	U01: Investigation of Major Utility Impacts
Action	▪ Requested to be included in the project schedule only when major utilities are discovered in [U00]. Typical major utilities include pipelines, electric transmission lines, electric transformer stations, large-scale telecommunications duct banks, and very large water and sanitary sewer lines. ▪ Submit preliminary notices to utilities and request their present location information. May only be able to send aerials and concepts if that is all there is available. ▪ Request detailed maps from major utilities in the area and save any information in the project folder. ▪ Put information, update the PPMS, and provide information during the concurrence point process. ▪ Evaluate the benefit of a coordination meeting involving design.
Purpose	To determine possible conflicts in the preliminary design process so alignments can be chosen or altered to minimize utility relocation costs.
Input	Alternatives for [CP3] - Alternatives to be Carried Forward, chosen, and presented in spatial format.
Output	Conflict information to facilitate alignment selection in early design stages.

Table 3-5. U02: Project Notification to Utilities

Event	U02: Project Notification to Utilities
Action	▪ This event is required for **POINT 25 projects.** Begins after the alignment is selected. ▪ Overall, it involves providing preliminary notification to utilities in the project area and updating the PPMS to reflect the information obtained. This is normally the first notification to utilities. **Specific activities include the following:** ▪ Obtain the project plans and concept, if available, and check for utility conflicts. ▪ Send available information to utilities and request a reply within **90 days** (per the IAC). If plans are not available, limits/concept may be all that are sent out. ▪ Run the Design Request System (One Call) to determine the extent of utilities in the project area and put the reports in the project folder if not done previously. ▪ Select the utilities present in PPMS and answer basic questions if not done before. ▪ If a major conflict is possible, communicate with the utility to determine the scope and whether early coordination is needed for possible design changes. ▪ This may include an invitation to an Operational Planning Meeting (OPM) ▪ Put all information obtained in the project folders and update PPMS.
Purpose	▪ To determine the number of possible conflicts and which utilities are in the project area. ▪ To alert utilities of upcoming projects, if warranted. ▪ To gather utility information that is easily obtainable.
Input	Design Field Exam [D02] with field exam plans
Output	Preliminary information, including utility-provided maps and plans, if available, stored in the project utility folder.

Table 3-6. U03: 1st Plan Submittal to Utilities

Event	U03: 1st Plan Submittal to Utilities
Action	▪ This event is **required for POINT 25 Projects.** ▪ Submit ROW Layout [R01] and Plans to ROW [D05] drawings to the Utilities. Record information received from Utilities (their replies detailing whether they are impacted and their work plans if they are impacted are due within 90 days). ▪ Review the Preliminary Work Plans compatibility. **Specific activities include the following:** ▪ Send plans to all utilities unless it is known that they are not impacted. ▪ Select the utilities present in the PPMS and answer basic questions if possible. ▪ Communicate with utilities to revise plans if needed and request more information if needed. ▪ Utility Coordination Meetings should occur soon after the start of this event. ▪ Contact each utility company (either jointly or individually) prior to the [U03] due date to address any relocation concerns that may occur. ▪ Put all information obtained in the project folders and update PPMS.
Purpose	▪ To determine the possible utility conflicts and which utilities are in the area. ▪ To alert utilities to the upcoming project if it is warranted. ▪ To gather more information on utilities.
Input	Plans to ROW [D05] and ROW Layout [R01]
Output	Utility-provided maps and plans, if available, are stored in the project utility folder.

Table 3-7. U04: 2nd Plan Submittal to Utilities

Event	U04: 2nd Plan Submittal to Utilities
Action	▪ **Required for Point 25 projects.** ▪ If revisions have been made, submit revised ROW Layout [R01] and Plans to ROW [D05] drawings to the utility companies. Plans should be considered Final. ▪ Record information received from the utility companies (their replies detailing whether they are impacted and their work plans if they are impacted are due within 60 days of Iowa DOT [U04] drawing submittal). **Specific activities include:** ▪ Send plans to all utility companies unless it is known that they are not impacted. ▪ Send plans if there have been changes or if the Iowa DOT requires the utilities to change their plans since the first plan submittal [U03]. ▪ Utility Coordination Meetings should occur soon after the start of this event so that utilities and the DOT can use the information exchanged to coordinate plans and minimize delays. ▪ Communicate with utilities to revise plans if needed and request more information if needed. ▪ Contact each utility (jointly or individually) to address any relocation concerns that may occur. ▪ Review the compatibility of Final Relocation Plans and notify utilities of approval. ▪ Put all information obtained in the project folders and update the PPMS.
Purpose	To determine the final plans and schedule for utilities that require relocation because of the project.
Input	Plans to ROW [D05] and ROW Layout [R01]
Output	Utility-provided maps and plans, if available, stored in the project utility folder. Approved utility work plans and relocation schedule

Table 3-8. U05: Utility Agreement

Event	U05: Utility Agreement
Action	▪ Added by the Central Office only when required (when utilities are reimbursable.) ▪ Request cost estimates, plans, and easement documents from utilities that qualify for reimbursement. ▪ For utilities that meet requirements for reimbursement, write an agreement and have it signed by both the utility and Iowa DOT personnel. Put notes in the PPMS.
Purpose	To reimburse utilities that meet requirements for Iowa DOT coverage of relocation costs.
Input	Plans to ROW [D05] and ROW Layout [R01]
Output	Approved agreement to cover the cost of relocations when reimbursement is warranted

Table 3-9. U06: Notice to Proceed to Utility

Event	U06: Notice to Proceed to Utility
Action	▪ **Required for Point 25 projects** and recommended for all projects. ▪ Give utilities official notice to proceed with the relocation and record information in the PPMS. ▪ Notice is given at least 30 days before the utility is to move per its work plan. ▪ Typically, the ROW purchase must be complete or have a defined completion date before a notice to proceed may be issued (could be a future date)
Purpose	To give utilities the notice to proceed with their relocation.
Input	Completed ROW purchases (or at least have a defined completion date)
Output	Notification sent to utilities

Table 3-10. U07: Utility Bid Attachment (UBA)

Event	U07: Utility Bid Attachment (UBA)
Action	▪ **Required for Point 25 projects** and recommended for all projects. ▪ Prepare and submit the UBA to the Office of Contracts and record information in the PPMS. ▪ The UBA contains utility information of value to contractors (status of relocations and, if applicable, expected completion date) and is included in the contract documents for letting so that they can account for it in the bid price.
Purpose	To give contractors useful information they can use to bid on jobs where utilities may impact their costs.
Input	Information from the utility companies
Output	UBA document submitted to the Office of Contracts

In addition to the documented information, other relevant insights related to the U-events and the POINT 25 process were gathered through discussions with Iowa DOT staff:

- Although part of the POINT 25 process, Investigation of Major Utility Impacts [U01] is rarely used.

- **Operational Planning Meeting**. The Iowa DOT holds an OPM for specific projects when the design reaches approximately 30% completion. At this stage, the Notification to Utilities [U02] is issued, allowing for a combined invitation to the meeting. Although this meeting is part of the POINT 25 process, it is not explicitly labeled as such. In the section dedicated to utility discussions in this meeting, utility representatives are expected to indicate the locations of their existing facilities, share any plans for future installations, and, if not previously provided, submit system maps for the project area.

- **Project Notification to Utilities [U02]**. During this event, preliminary project plans are sent to utility companies to inform them of the project. These plans reflect data gathered from preliminary surveys, One Call services, and permit records. Utilities are asked to verify the accuracy of the information, provide details of their facilities, and identify any potential conflicts. Plans at this stage do not include cross-sections. Utility companies typically respond with one of the following: (1) no conflict, (2) maybe, or (3) definitely in conflict.

- **1st Utility Coordination Meeting**. For individual projects, the initial utility coordination meeting occurs after the 1st Plan Submittal to Utilities [U03].

Regarding the utility coordination approach for utilities located on non-primary highway ROW and utilities located in or adjacent to such roadways affected by Local Public Agencies (LPA) transportation projects, instructions are provided in *Instructional Memorandum 3.640 on Utility Accommodation and Coordination from the Local Systems Bureau to Counties and Cities* (Iowa DOT 2008). Appendix E of this report presents a flowchart illustrating this process. Discussions with Iowa DOT staff revealed that this document serves mainly as guidance rather than a set of mandatory requirements.

3.2.3. Alignment of the Utility Coordination Process within Project Development

After developing a comprehensive understanding of the Iowa DOT project development and utility coordination processes independently, the next step focused on examining their alignment. This analysis centered on how key events and milestones from each process align and integrate with each other.

The primary reference for mapping this alignment was the PDP guidance manual, which, as mentioned before, includes a Gantt chart illustrating where each U-event typically falls within the project development timeline. Additional insights came from discussions with Iowa DOT staff and findings from the NHI training. This information helped the research team identify where the design typically reaches 30%, 60%, and 90% completion in the project development process, as well as the events that occur at these intervals. Key takeaways are summarized below:

- The 1st Plan Submittal to Utilities [U03] and the 2nd Plan Submittal to Utilities [U04] occur when the design is around 60% and 90% complete, respectively.

- The first U-event, Preliminary Utility Review [U00], occurs at the project design concept stage (0% complete design). This U-event consists of identifying utilities located within the project limits through a preliminary survey, One Call service requested by the designer, and permit records.

- When horizontal design reaches roughly 30% (Field Exam [D02]), Project Notification to Utilities [U02] is issued. Field exam plans are shared with identified utility companies sourced from preliminary surveys, One Call service, and permit records. Utility companies review and verify this information, identifying conflicts by marking (1) no conflict, (2) maybe, or (3) definitely in conflict. Cross-sections are not included in [D02] plans.

- Once the ROW design/layout [R01] is complete, designers plot the ROW lines in the cross-section plans so that utility owners can see where they need to relocate on the project plans.

This information, along with the Gantt chart, informed the development of the graphic presented in Figure 3-5. As shown below, not all project development events are included. For the purpose of this research and specifically for this assessment, only those events identified and described in Section 3.2.1 of this report are illustrated in this figure. These events primarily include key milestones and events associated with planning, design, environmental, and ROW procedures.

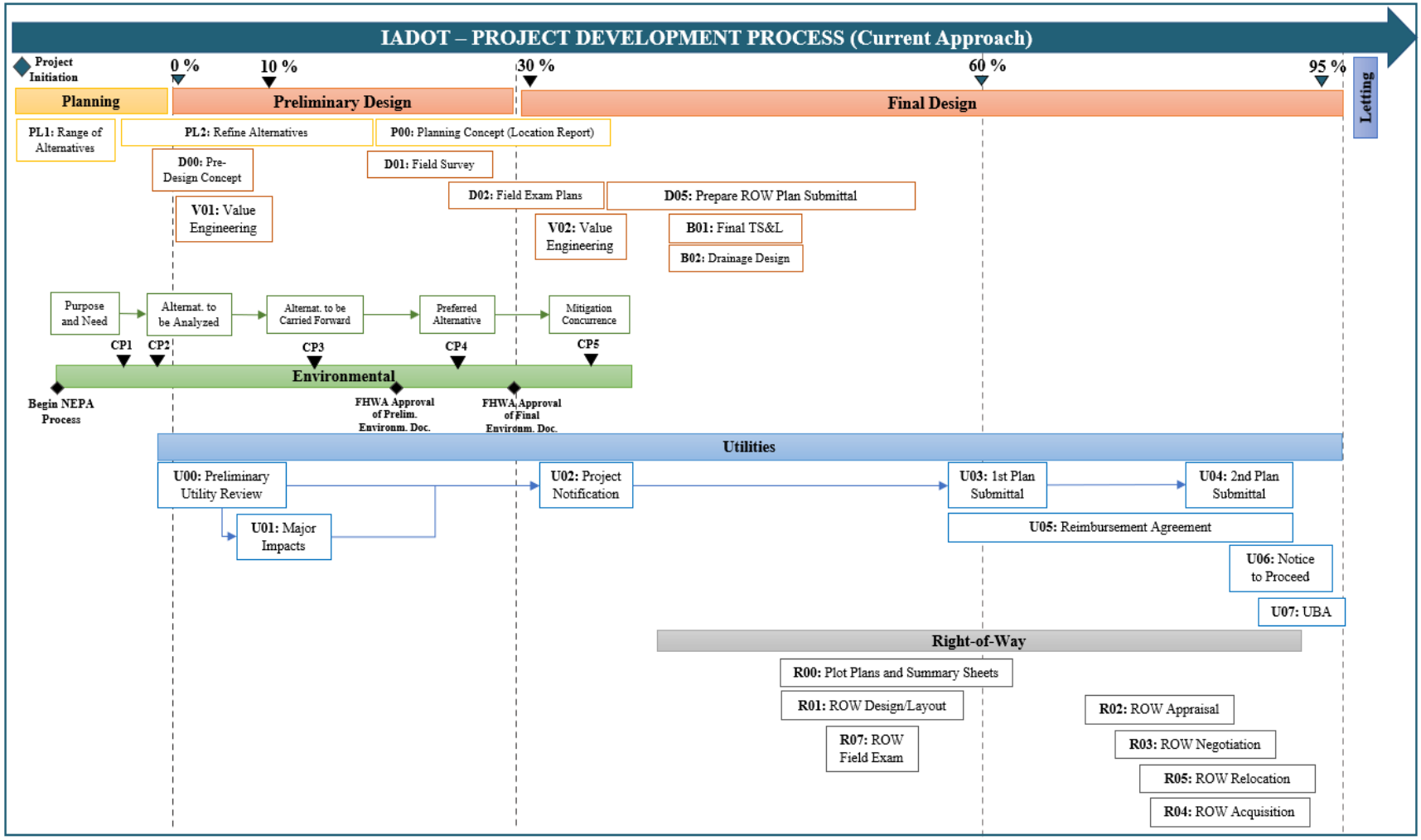


Figure 3-5. Iowa DOT alignment between project development and utility coordination processes

3.3. Utility Coordination Practices at the Iowa DOT

In addition to the written procedures, a primary source of information for identifying the Iowa DOT's utility coordination state of the practice was the survey of Iowa DOT internal staff, consultants, and utility companies described in Section 3.1.2. Several survey questions were specifically designed to pinpoint current practices in utility data collection and sharing and in utility company engagement and communication, assess the perceived effectiveness of these practices, and evaluate how project schedules account for utility coordination activities.

Note: To support survey respondents in referencing specific project development stages and design completion percentages/milestones, a simplified version of Figure 3-5 was included in the survey materials.

3.3.1. Utility Data Collection Timing

Iowa DOT staff and consultants were surveyed on the timing of utility data collection throughout project development. Table 3-11 presents a summary of their responses, showing the stages at which the majority of respondents typically collect the utility information listed in the first column. Data such as utility company name, authorized representative contact information, type, class, features of the facility, and horizontal location are generally gathered during the Preliminary Design Stage when the design is around 10%–30% complete. Information on vertical location, operational status, and facility characteristics and dimensions is mostly collected during the Final Design Stage (30%–60% design completion), while relocation schedules, cost estimates, property/ROW needs, and Build America, Buy American (BABA) requirements are primarily collected during the Final Design Stage (60%–90% design complete). Overall, the responses indicate that when consultants conduct the utility coordination work, much of this information tends to be collected earlier in the process compared to the timing followed by the Iowa DOT's internal staff.

Table 3-11. Timing of utility data collection

Utility Information	Iowa DOT Internal Staff	Iowa DOT Consultants
Utility company name	Planning and Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Utility owner representative contact information	Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Type of utility facility (e.g., water and sanitary sewer, power, gas, oil, communications, etc.)	Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Class of utility facility (e.g., transmission, distribution, or service)	Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Features of utility facility (e.g., water line, water manhole, water valves)	Preliminary Design (10%–30%)	Preliminary Design (10%–30%)
Horizontal location of utility facility	Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Vertical location of utility facility	Final Design (30%–60%) and not collected	Preliminary Design (10%–30%) and not collected
Utility facility characteristics (e.g., diameter, depth, material) and dimensions (e.g., width, height, length)	Final Design (30%–60%) and not collected	Preliminary Design (10%–30%) and Final Design (30%–60%)
Operational status (e.g., active, inactive, out of service, abandoned)	Final Design (30%–60%)	Preliminary Design (10%–30%)
Installation/relocation schedules	Final Design (60%–90%)	Final Design (30%–60%) and (60%–90%)
Installation/relocation cost estimates	Final Design (60%–90%)	Not collected
Installation/relocation property/ROW needs	Final Design (30%–60%) and (60%–90%)	Final Design (30%–60%)
BABA Requirements (if applicable)	Final Design (60%–90%)	Not collected

Additionally, utility companies were asked about the timing of providing information to the DOT for a specific project. The majority of responses indicated that details such as the confirmation of the existence of facilities within the project area, utility facility descriptions, general locations, service area maps, contact information of the authorized representative, type and class of the facility, and horizontal location of the facility are typically provided *when the design is around 30% complete*. Additionally, information regarding potential utility conflicts, facility characteristics, relocation schedules, relocation work descriptions, and ROW needs for relocations are mostly shared *when the DOT sends the 1st Plan Submittal (around 60% design complete)*.

3.3.2. Sources Employed to Collect Utility Data throughout the PDP Guidance Manual

Another aspect of utility data collection explored in the survey focused on the information sources that the DOT and/or its consultants utilized throughout the project development process. As shown in Table 3-12, most respondents reported using sources such as existing records, site visits, field reviews, and information provided by utility companies during the Preliminary Design Stage (10%–30% design completion). Additionally, One Call design tickets are primarily employed during the planning stage, while SUE was reported to be rarely used across stages.

Table 3-12. Information sources used to collect utility data

Information Source Used	Iowa DOT Internal Staff	Iowa DOT Consultants
Obtain by DOT location/surveying staff (e.g., permits, information from past projects)	Planning and Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Project field review/site visits	Preliminary Design (10%–30%)	Planning and Preliminary Design (10%–30%)
Referrals from other utility companies	Preliminary Design (10%–30%)	Not used
Provided by utility company	Preliminary Design (10%–30%)	Preliminary Design (10%–30%)
Design One Call marks	Planning Stage	Preliminary Design (10%–30%)
SUE QLD	Not used	Not used
SUE QLC	Not used	Not used
SUE QLB	Not used	Not used
SUE QLA	Not used	Not used

Regarding data collection practices for unknown, out-of-service, and abandoned utility facilities, both DOT internal staff and consultants indicated that no specific approach is in place for gathering this information. Furthermore, the written notice that utility companies are expected to submit for abandoned or no operative facilities is not enforceable.

3.3.3. Level of Implementation of Best Utility Coordination Practices

Iowa DOT staff and consultants were given a list of recommended utility coordination best practices known for their effectiveness in other states. Respondents were asked to assess their level of implementation within the Iowa DOT. Table 3-13 shows that most of these practices were rated as either "*not implemented*" or "*somewhat implemented but needing improvement*," revealing significant potential opportunities to enhance the Iowa DOT's utility coordination process.

Table 3-13. Level of implementation of recommended practices

Best Practice	Iowa DOT Internal Staff	Iowa DOT Consultants
Hold frequent meetings with utility companies to get their input on utility conflicts as the design progresses.	Somewhat implemented but needs improvement	Somewhat implemented but needs improvement
Use of SUE information in the design of the highway project to avoid or minimize utility relocations	Not implemented, but planning to implement	Somewhat implemented but needs improvement
Early involvement of utility owners (30% design complete or earlier)	Somewhat implemented but needs improvement/Not implemented but planning to implement	Somewhat implemented but needs improvement
Use of a standardized format for identifying and resolving utility conflicts and continually updating as the project progresses	Somewhat implemented but needs improvement	Not sure

Best Practice	Iowa DOT Internal Staff	Iowa DOT Consultants
Use a context-sensitive design approach (identify utility avoidance areas as early as possible.	Not implemented, but planning to implement	Somewhat implemented but needs improvement
Have a well-defined procedure for utility coordination process (e.g., utility coordination guidance manual)	Somewhat implemented but needs improvement	Somewhat implemented but needs improvement
Effective communication, collaboration, and coordination between the DOT and utilities	Somewhat implemented but needs improvement	Somewhat implemented but needs improvement
Use of standardized agreements	Not implemented, but planning to implement	Not sure
Use of utility corridors during project design	Not implemented, but planning to implement	Not sure
Consideration of utility relocation schedules in relation to project schedules	Somewhat implemented but needs improvement	Somewhat implemented but needs improvement
Training programs for consultants and utility companies on Iowa DOT utility coordination procedures and practices	Not implemented, but planning to implement	Not sure
Provide incentives to utility companies for early utility relocation	Not implemented	Not sure
Process for utility risk management	Not implemented	Not sure
Use of utility conflict management/matrices	Not implemented	Not sure
Timely acquisition of sufficient ROW for utility purposes	Not implemented	Not sure
Have a utility coordinator handle the project from start to finish	Implemented	Not sure
Develop a database of historical utility relocation cost estimate	Not implemented, but planning to implement	Not sure
Established procedure to share collected utility data with DOT functional groups (designers, ROW agents, environmental staff, etc.)	Somewhat implemented but needs improvement.	Not implemented, but planning to implement
Conduct on-site utility meetings or utility plan-in-hand visits with utility owners to determine utility conflicts.	Somewhat implemented but needs improvement	Somewhat implemented but needs improvement
Ask utility companies to provide information on their capital construction programs (to match DOT long-term plans with utility plans)	Not implemented	Not applicable
Recognize the importance of long-range highway/utilities coordination and hold periodic meetings with utility owners to share this information.	Somewhat implemented but needs improvement.	Not applicable
Get SUE QLB data as early as possible on projects where complex utility conflicts are known in advance.	Somewhat implemented but needs improvement.	Not implemented
Utility mapping system/data repository (utility-location information in a GIS-based system)	Not implemented	Somewhat implemented but needs improvement

3.3.4. Utility Coordination Process Perception

Iowa DOT staff were asked about the typical stage in the project development when utility coordination generally begins. Forty percent indicated that it starts during the Planning Stage, with the Design Request sent to One Call [U00] as the initial step. Conversely, 60% identified the Preliminary Design Stage (10%–30% design complete), noting that the process typically begins with the [D00] pre-design concept event. Respondents also highlighted that utility coordination is sometimes delayed until 30%–60% design completion, often due to communication gaps or delays in completing plans as scheduled.

Overall, the majority of survey responses (70%) indicated that the Iowa DOT's utility coordination approach is largely viewed by DOT staff as *"reactive - wait until needs are realized before addressing them,"* suggesting an opportunity to shift toward a more proactive approach to enhance coordination efficiency. In contrast, utility companies' perceptions were more varied: 32% viewed the approach as "*interactive - involving collaborative work with stakeholders to identify and address needs*," 46% considered it "*proactive - aiming to anticipate and address needs in a timely manner*," and 22% described it as "*reactive*."

From the list of best practices presented in Table 3-13, survey respondents were asked to identify the top eight practices they consider essential for effective utility coordination based on their experience. Table 3-14 summarizes their responses.

Table 3-14. Top eight effective utility coordination practices – Perception of survey participants

Utility Coordination Best Practice	Iowa DOT	Iowa DOT Consultants	Utility Companies
Regularly scheduled meetings with utility owners	☑ (1)	☑ (3)	☑ (7)
Use of SUE information in the design of the highway project to avoid or minimize utility relocations	☑ (2)	☑ (6)	
Early involvement of utility owners (30% design complete or earlier)	☑ (3)	☑ (1)	☑ (1)
Use a standardized format to identify and resolve utility conflicts and continually update it as the design progresses.	☑ (4)		☑ (8)
Use of context-sensitive design approach (identify utility avoidance areas as early as possible)	☑ (5)		
Have a well-defined procedure for the utility coordination process	☑ (6)	☑ (7)	
Effective communication, collaboration, and coordination between the DOT and utility owners	☑ (7)	☑ (2)	☑ (2)
Use of standardized agreements	☑ (8)		
Consideration of utility relocation schedules in relation to project schedule		☑ (4)	☑ (6)
Collaborative planning between DOT and Utility owners regarding long-term plans		☑ (5)	☑ (5)
Acquire sufficient ROW for utility work needs.		☑ (8)	☑ (4)
Early identification of utility relocation long lead items			☑ (3)

3.3.5. Timing of Utility Companies' Engagement

Another area of interest was the timing at which utility companies become involved in the utility coordination process. The utilities' responses showed that 43% of respondents are engaged during the Planning Stage, while 36% are engaged during the Preliminary Design Stage (10%–30% design completion). These results are encouraging, as early engagement of utility companies is highly recommended for effective utility coordination. However, it is important to note that this early involvement may only entail receiving a notice about the upcoming project rather than actively engaging in an interactive and collaborative effort with the DOT.

3.3.6. Communication Practices/Preferences

Responses from utilities indicate that most companies (76%) typically assign a single point of contact (a designated representative) to participate in utility coordination for a specific project. This practice is essential for streamlining communication and coordination with the Iowa DOT. Utilities also noted that the most effective communication means/channels for coordinating and sharing information between the DOT and their company include a combination of emails (31.40%), phone calls (21.74%), formal notices (19.81%), and in-person meetings (17.87%). Participants also commented on the effectiveness of site visits/meetings.

Responses from the three stakeholder groups surveyed highlighted inconsistent communication and collaboration between the DOT and utility companies. Ratings predominantly fell into "*extremely inadequate*," "*somewhat inadequate*," and "*neither adequate nor inadequate*" categories, reflecting a need for improved communication practices to support coordination throughout the project life cycle. This data indicates that both DOT staff and utility companies perceive room for strengthening interactions to ensure more effective coordination outcomes.

3.3.7. Implementation of SUE

When asked specifically about the existence of a formal procedure for implementing SUE at the Iowa DOT, survey respondents expressed a lack of consensus. The results indicated that 30% reported no specific plan, 20% were uncertain, and 50% affirmed that a procedure exists. Additional comments revealed that SUE is often utilized at the last minute rather than being integrated into the early stages of a project. One participant noted that SUE is typically requested only when a clear possibility of a utility conflict arises, prompting a collaborative decision-making process involving the district, the project management bureau representative, and the design team. Overall, the responses highlight a lack of consistent understanding regarding the use of SUE within the Iowa DOT.

3.3.8. Utility Conflict Management

Similarly, Iowa DOT survey participants were asked about the existence of a systematic approach for managing and tracking utility conflicts at the DOT. While most respondents indicated that no specific approach exists, some mentioned using PPMS to monitor utility

companies' involvement, with a primarily focus on tracking completion dates for various tasks. However, they emphasized that this information is collected and tracked only when utilities are cooperative. The monitored data includes utility conflict IDs, descriptions and locations of conflicts, responsible parties, the status of relocation work, estimated start and finish dates for relocations, ROW requirements, and utility agreements. Additionally, 50% of consultant responses indicated that they use spreadsheet formats for tracking purposes and, in some cases, GIS-based utility management systems, where each utility is represented in GIS to monitor its progress throughout the process. This approach enables graphical representation and reference data points. They also noted that tracking the resolution of certain conflicts is not feasible if utilities are not involved during the construction phase.

3.3.9. Utility Coordination Meetings

As noted in the literature review, holding meetings with utility owners and maintaining their engagement through project development is essential for building partnerships. In light of this, survey participants were asked about the timing of the first in-person utility coordination meeting and the frequency of coordination meetings as the project development progresses. Around half of the respondents indicated that the first meeting typically occurs during the Preliminary Design Stage (when the design is 30% complete). Conversely, the other half reported that the first in-person utility coordination meeting occurs during the Final Design Stage (when the design is 30%–60% complete). This variation can be attributed to the fact that the scheduling of meetings for a specific project is *determined by the Iowa DOT project team based on the project's needs or as requested by utilities*, which was also revealed through the survey.

3.3.10. Designing to Avoid, Minimize, and Mitigate Utility Conflicts When Feasible

DOT survey participants noted that while some designers at the Iowa DOT make an effort to design around utilities or modify roadway features to avoid or mitigate conflicts, others do not. This suggests that such an approach is not a widely adopted mindset or common practice encouraged by the Iowa DOT among designers. Conversely, responses from consulting companies indicate that designers frequently (42%) and occasionally (25%) opt to design around or redesign roadway features to address utility conflicts when necessary.

3.3.11. Data Sharing Practices among Iowa DOT Functional Groups

Acknowledging the importance of timely and effective sharing of utility data not only between the DOT and utilities but also among internal DOT functional groups, DOT staff were asked about the timing of data sharing with specific internal stakeholders. The results indicated that utility data is primarily shared with roadway designers and project managers during the Preliminary Design Stage (10%–30% design complete) and with ROW and environmental staff during the Final Design Stage (30%–60% design complete). Most respondents noted that utility data is typically not shared with drainage designers. Additionally, participants reported that the primary communication channels for sharing this data with these stakeholders are the ProjectWise project folder and emails. When information is not available through these channels, they typically seek it by reaching out to the DUCs.

Survey responses from Iowa DOT internal staff rated the effectiveness of this communication as "*somewhat effective*" (70%) or "*ineffective*" (30%), indicating room for improvement. Respondents noted that they usually struggle with not knowing where to find information, indicating challenges using the DOT's information management system.

3.3.12. Consultant-Led Utility Coordination

Consultant-led utility coordination is becoming increasingly common in the industry. To assess its adoption within the Iowa DOT, the DOT's staff and consultants were asked about the implementation of this practice, either through independent agreements or as part of the project design consultant agreements. Responses from Iowa DOT staff indicated that, while not widely used, consultants are hired for utility coordination on certain projects in Iowa, typically due to design complexity, utility-related challenges, or limited in-house staff. Consultants expressed similar views. Additionally, it was noted that the Iowa DOT does not have a formalized process for defining the scope of utility coordination services or evaluating their effectiveness.

Utility companies were surveyed on their perspectives regarding the effectiveness of consultant-led utility coordination versus coordination conducted directly by the DOT. Most respondents rated the coordination by consultants as equal to or better than the DOT's. They noted variability in consultant performance, with some excelling while others showing potential for improvement, depending on the specific company involved.

3.3.13. Other Practices

In addition to the survey data, the research team gained valuable insights during the NHI training, which clarified the Iowa DOT's approach to utility coordination and highlighted potential areas for improvement. Since this information came directly from Iowa DOT staff actively engaged in highway projects requiring utility involvement, this firsthand information provided empirical insights that revealed additional details not specified in written procedures. Below is a summary of the key details gathered during the training:

- During the development of the Planning Concept statement, staff from different disciplines conduct a field visit where they also look at markers, utilities attached to bridges, aboveground utilities, and potential major conflicts.
- The Iowa DOT's approach to utility investigations usually involves using One Call service, conducting field visits, reviewing the DOT's permit records and as-built plans, and contacting identified utility companies to ask for information.
- The utility investigation approach for a specific project is decided based on the type of project (major or minor project; rural, urban, in-town, or municipal project) and the complexity of the project.
- While some Iowa DOT projects have implemented SUE, there is no standardized procedure for its implementation. There is a need for additional guidance on the effective use of SUE, including information on ASCE 38-22, the use of SUE data in project development and decision-making, and guidelines for scoping SUE services.

- There is no verification process/step to ensure the accuracy of utility data plotted in drawings.
- UCM is not yet standard practice at the Iowa DOT. While UCM has been used in selected projects, attendees noted that additional training is necessary for successful implementation. Efforts are underway to incorporate UCM into the Masterwork system.
- The conflict analysis process at the Iowa DOT is led by the PM or the DUC.
- Some districts host regional utility coordination meetings, where they share information regarding upcoming transportation projects with utility companies.
- The Iowa DOT hosts annual meetings with utility companies to discuss upcoming projects. Information shared at these meetings is at a concept level.
- The Iowa DOT uses ROW staking as an incentive for utility companies.
- Constructability reviews do not happen for all projects. They occur mostly for large and very complex projects or projects with accelerated schedules. The approach for conducting them is more like a presentation/advertisement of the project.
- The Iowa DOT communicates utility-related information to the construction contractors through the UBA during the pre-construction meeting. Utilities are listed on the project plans.
- Local agencies are not required to follow state policy for permit procedures. They have their own policy, but it is based on state policy.
- Utility coordination practices vary across districts and lack standardization.
- There is no specific approach for sharing lessons learned across districts. However, district staff typically meet quarterly with the Central Office to discuss the practices being implemented.
- DUCs are typically aware of the companies operating in their districts and have a general idea of who they will be working with.
- The DOT does not have a cost estimate database for utilities.

3.4. Roles and Responsibilities of Key Utility Coordination Stakeholders

The Iowa DOT Utility Program team includes the Statewide Utility Program Director in the Transportation Development Division, the Utilities Section within the ROW Bureau of the same division, six district offices with DUCs, and 18 ETOs under the Field Operations Division. This team manages all aspects of utility coordination, from permitting to utility relocation, for the Iowa DOT's projects. In general terms, responsibilities are divided as follows:

- **Utilities Section Staff.** Responsible for notifying utility companies, distributing project-related information, preparing agreements if relocation costs are reimbursable, scheduling U-events within the project timeline, tracking communications between the DOT and utilities, and administering the DOT's utility policy.
- **DUCs and ETOs.** Work directly with utilities on project coordination and permitting utility facilities located on, above, or below the ROW. They also support DOT designers in preparing plans to avoid or minimize utility impacts.

In reviewing the Iowa DOT written procedures, the research team found that none of the documents reviewed clearly outlines the primary roles and responsibilities of all of the key stakeholders involved in the utility coordination process. Although the PDP guidance manual identifies the office responsible for each U-event, it provides limited guidance on specific roles and responsibilities. With the aid of information from the DOT's internal documents, the research team developed Table 3-15, compiling all information available on the key responsibilities of the DOT Central Office, DUCs, and utility companies at each U-event .

Table 3-15. Utility coordination roles and responsibilities of key stakeholders at each U-event

U-event	Central Office	District Utility Coordinator	Utility Company
U00 Preliminary Utility Review	▪ Using the draft concept, look for potential costly utility relocations. ▪ Request adding [U01] to the project schedule if needed. ▪ Request preliminary estimates from utilities with large relocations.	▪ Using the draft concept, determine if utilities are involved (yes or no) ▪ Identify utility facilities in the project area and their owners. ▪ Determine whether the project is a POINT 25 project and identify potential ROW needs. ▪ Determine if an [U01] event is necessary (potential major utility impacts)	▪ If requested, provide high-level estimates for major utility impacts.
U01 Major Utility Impacts	▪ Send [U01] form to utilities with major impacts. ▪ Request location information and preliminary estimate for major impacts. ▪ Review information sent by utilities to identify any major concerns. ▪ Attends OPM ▪ Review avoidance impact status and coordinate with the designer and DUC on alternatives.	▪ Track receipt confirmation acknowledgments from utilities. ▪ When information is provided by utilities, forward it to the designer for inclusion in the project plans. ▪ Review avoidance impact status sent by the designer and coordinate with utilities on alternatives. ▪ Determine if an OPM is needed. ▪ If so, hold OPM to coordinate design changes/alternatives with utilities.	▪ Review requests for more detailed information and high-level estimates. ▪ Acknowledge receipt of the request and send it back to DUC within 14 days. ▪ If major impacts are identified, send location information details (GIS) and high-level estimates to DUC. ▪ If needed, coordinate design changes/alternatives with DOT.

U-event	Central Office	District Utility Coordinator	Utility Company
U02 Project Notification to Utilities	▪ Review field exam plans and register [U02] start date for each utility ▪ Give access to [D02] project plans to utilities ▪ Notify the utility owner of the proposed project, requesting to confirm presence within project limits and other available information.	▪ Review field exam plans (provided by the designer) and perform a utility field exam if needed. ▪ Receive [U02] information from the utility company and relay it to the Central Office as necessary. ▪ Review [U02] transmittal and identify any major impact concerns. ▪ If a utility has requested to acquire easement replacement on their behalf, update PPMS.	▪ Complete the form and return it within seven calendar days. ▪ Review the [U02] request to confirm the presence of its facilities. ▪ Provide facility information within 90 calendar days and need for any ROW acquisitions by DOT. ▪ Notify the DUC if existing facilities are located outside the existing ROW and within the private easement.
U03 1st Plan Submittal to Utilities	▪ Review revised ROW plans and confirm utilities in PPMS ▪ Give access to [R01] project plans to utilities ▪ Send preliminary plan submittal to utilities. ▪ Forward utility easement needs to ROW.	▪ Contact each impacted utility either jointly or individually prior to the [U03] due date to address any relocation concerns that may occur. ▪ Review preliminary relocation work plan, compatibility. If incompatible, notify the utility as soon as practical. ▪ Review the request for reimbursement and, if acceptable, forward it to the Central Office to begin the agreement process. ▪ Forward easement needs to ROW design (if DOT is acquiring replacement easements.). Communicate advance ROW purchase needs. ▪ When the preliminary relocation plan is compatible and reasonable, notify the utility of its approval.	▪ Complete the receipt confirmation form and return it within seven calendar days. ▪ Review [U03] 1st Plan Submittal ▪ Supply DOT with a preliminary relocation plan (including new easement needs if DOT is acquiring replacement easements) and cross-sections within 90 calendar days. ▪ Request reimbursement for relocation from private easement. ▪ If comments are provided by the DOT, revise the work plan and resubmit within 30 calendar days.

U-event	Central Office	District Utility Coordinator	Utility Company
U04 2nd Plan Submittal to Utilities	▪ Review revised ROW plans and confirm utilities in PPMS ▪ send final plan submittal to utilities	▪ Review the compatibility of the final relocation plan. If incompatible, notify the utility as soon as practical. ▪ Contact each impacted utility either jointly or individually prior to the [U04] due date to address any relocation concerns that may occur. ▪ Review new requests for reimbursement and, if acceptable, forward them to the Central Office to begin the agreement process. ▪ When the final relocation plan is compatible and acceptable, notify the utility of its approval. ▪ Obtain approved permit information from utilities.	▪ Acknowledge receipt and return confirmation within seven calendar days. ▪ Review [U04] 2nd Plan Submittal and, if needed, revise its relocation work plan. ▪ Supply DOT with a final relocation plan and cross-sections within 60 calendar days. ▪ If comments are provided by the DOT, revise the final work plan and resubmit within 30 calendar days.
U05 Utility Reimbursement Agreement	▪ Review requests for reimbursement and negotiate utility agreements as necessary ONLY if utility is located off public ROW in a private easement. ▪ Request documentation from utilities (easement, estimates, plans) ▪ Verify that easements are for the correct area. ▪ Request consultant contract information from utilities. ▪ Reviews estimates provided by utilities. ▪ Prepares and negotiates utility agreements with utilities, including all related sub-processes. ▪ Distribute fully executed agreements to utilities. ▪ Review invoices and request approval to initiate payments.	▪ If applicable, inform Central Office that the utility will be using consultant services for design. ▪ Review agreements and provide comments to Central Office. ▪ When relocation is done, review relocation in relation to the work plan/permit and submit a signed certificate of completion (COC) to the Central Office.	▪ Provides private easement documentation, preliminary relocation plan, and relocation cost estimate to DUC during [U03] and [U04] processes and forwarded to Central Office for processing. ▪ Receive, review, and execute the agreement. ▪ As relocation work is complete, send invoices to DOT showing % complete. ▪ Completes relocation and submits COC to DUC.

U-event	Central Office	District Utility Coordinator	Utility Company
U06 Notice to Proceed		▪ Review the status of ROW acquisitions to ensure all needed parcels are acquired for relocation. ▪ Send notice to proceed to each utility company after their work plan is approved, all new ROW is in possession, or a defined date of possession is identified, and permits are issued.	▪ Submit utility accommodation permit and approved work plan to EOT. ▪ Proceed with relocation work. ▪ Prepares as-built plans for relocation work and submits them to DOT.
U07 Utility Bid Attachment		▪ Include issued permits/as-builts in UBA documentation. ▪ Submits the UBA to contracts to be included in the project proposal bidding documents.	▪ Provides an estimated but realistic relocation start and completion date.

3.5. Assessment and Identification of Improvement Opportunities

Key issues and challenges in the Iowa DOT utility coordination process were identified through the surveys, individual discussions with DOT personnel, and insights from the NHI training. As primary participants in the utility coordination process, these stakeholders offered valuable practical insights into areas where the current approach is not functioning effectively, providing a path for improvement opportunities. The issues/challenges are presented below in two sections: one for issues attributed to the Iowa DOT and another for those attributed to utility companies.

3.5.1. Iowa DOT

- The Identification of Major Utility Impacts [U01] event, which is part of the POINT 25 process, is rarely utilized. This event is designed to identify potential major utility conflicts early, allowing for timely coordination with utility owners and enabling adjustments to the project alignment to minimize conflicts.
- ROW limits [R01] are usually defined before reaching out to utility companies through the [U03] 1st Plan Submittal, meaning that those limits are set without considering ROW needs for utility relocations.
- The ROW acquisition [R04] process begins too late, leaving insufficient time for utilities to complete necessary relocation work. Waiting until [D05] to start ROW design does not always allow utilities to relocate their facilities on time.
- The 2nd Plan Submittal [U04] drawings do not account for ROW acquisitions that occur between the ROW design/layout [R01] and ROW acquisition [R04] stages. As a result, the information provided to utilities in this submittal is not always accurate.
- Storm sewer design is completed later in the design process, usually when the design is around 90% complete, which usually leads to conflicts with utilities.
- Utility companies are not involved in the design concept development phase and are typically engaged only once the project has advanced further into the design stage.

- Information shared by utility companies is not always reconciled with the topographic/record information. Sometimes, information is not even included in project plans.
- Designers lack a willingness to adjust or redesign plans to avoid or minimize utility conflicts, even when feasible, leading to missed opportunities for potential cost savings through these adjustments.
- When design modifications are made, utility companies are not always notified, which can lead to them working with inaccurate information.
- Cost estimates for utilities are not obtained until later in the design process (usually requested for the reimbursement agreements), meaning that this information is not considered when evaluating design alternatives.
- Project plans are not always updated to reflect corrections made by utilities regarding the plotted data.
- Project plans provided to contractors often fail to reconcile all available utility information. Sometimes, the plans reflect data from the preliminary survey rather than updated details on relocated utilities and proposed relocations, leading to confusion for the highway contractor.
- Communication and data-sharing procedures across the Iowa DOT's functional groups need improvement, as existing silos hinder effective teamwork.
- Iowa DOT personnel frequently use acronyms that differ from those used by utility companies, leading to confusion during meetings between the DOT and utility representatives.
- Utilities are viewed as outside parties rather than collaborative partners in the utility coordination effort.
- Essential factors related to utility companies are not accounted for, such as funding allocation timelines and the time required for utility design and material acquisition (long-lead material) for relocations.
- DUCs are often overloaded with work, making managing utility coordination especially challenging.

3.5.2. Utility Companies

- When the DOT requests information from utility companies, the detail and accuracy of the data provided often vary. Utility companies frequently maintain incomplete or outdated records and mapping, often submitting information based on what was provided during the permitting process, which can lead to inaccuracies. Despite policy requirements, as-built plans are rarely provided.
- Utilities sometimes inaccurately respond with a "*no conflict*" status even when conflicts exist.
- Utility companies face challenges in interpreting project designs and understanding design plans. There is a need for further training in plan reading and increased familiarity with Iowa DOT procedures and documentation.
- Utility companies often delay in responding to the Iowa DOT's information requests (U-events), with late submissions of work plans and permits creating even further setbacks.
- Frequent changes in the designated point of contact or authorized representative within utility companies disrupt the continuity of coordination efforts.

- Utility companies frequently do not provide relocation cost data until it is required for the utility agreement, resulting in major costs being excluded from the decision-making process when evaluating project alternatives.
- Utility companies rarely provide detailed relocation schedules or information on lead times. They typically offer only approximate completion dates. This lack of detail complicates the integration of relocation activities into the overall project schedule.
- Issues related to utility companies' workload, staffing, materials sourcing, protocol compliance, and budgeting for relocations often impede their effective participation in the coordination process.
- Utilities do not always attend coordination meetings. The survey results identified several contributing factors, including meeting notices not reaching the appropriate representatives, utility companies not receiving an invitation, scheduling conflicts, meetings held outside regular working hours, long travel distances, and high staff workloads, all of which hinder full participation.

3.5.3. Additional Areas for Improvement

In addition to the challenges outlined above, the research team, drawing on their experience and the assessment of all of the information presented in this chapter, identified additional areas for improvement. These areas provided the basis for the team's recommendations presented in Chapter 4, which aim to strengthen partnerships and enhance the effectiveness of utility coordination efforts at the Iowa DOT. The researchers' takeaways are outlined below.

3.5.3.1. Roles and Responsibilities of Utility Coordination Stakeholders

The reviewed documentation provided some insights into the roles and responsibilities of specific stakeholders, such as the DOT Central Office, DUCs, and utility companies, as summarized in Table 3-15. However, the research team identified a need for greater clarity and communication regarding this information. Findings from the literature review and the research team's experience emphasize that an integrated approach to utility coordination and project development requires clearly defined roles and responsibilities for all primary participants.

While the DUC may lead coordination efforts, effective utility coordination requires a team-based, collaborative approach that actively engages other key stakeholders. This highlights the importance of clearly defining the roles and responsibilities of additional key participants, such as the PM, designers, and consultants. Doing so can foster accountability, enabling each stakeholder to understand their contributions to and impact on the utility coordination process, ultimately leading to improved outcomes.

Survey responses reinforced this need. A substantial percentage of respondents—60% of DOT internal staff, 77% of DOT consultants, and 52% of utility company representatives—reported that roles and responsibilities within the Iowa DOT's procedures are unclear or only partially defined. This gap presents an opportunity for the Iowa DOT to refine and communicate this

information effectively, which would ensure that all stakeholders clearly understand their roles and responsibilities in the utility coordination process.

3.5.3.2. Utility Investigations Approach

The research team believes that there are several areas for improvement in the Iowa DOT's current utility investigations approach. As shown in Figure 3-6, utility data collected during the preliminary design phase, when key project alignment design decisions are made, primarily comes from One Call design tickets, permit file searches, field visits, and surveys. Unfortunately, this data is often incomplete or inaccurate, leaving designers to make assumptions about existing utility facilities and their locations within the project area. Without precise and reliable information, it becomes difficult to identify, manage, and resolve utility conflicts effectively. Additionally, as the design progresses, it becomes increasingly challenging to adjust the design to avoid or minimize these conflicts, leading to sometimes unnecessary relocations.

Relying on inaccurate utility data undermines the entire utility coordination process. It can lead to risks for contractors, potential change orders that could increase project costs, project delays, and safety concerns. Although some Iowa DOT projects have begun implementing SUE, the practice is still in the early stages of adoption and seems to be implemented only on a reactive basis. According to Iowa DOT staff, there is a need for clear guidance on how to effectively implement SUE, which could significantly improve the quality and timing of utility investigations in Iowa DOT projects.

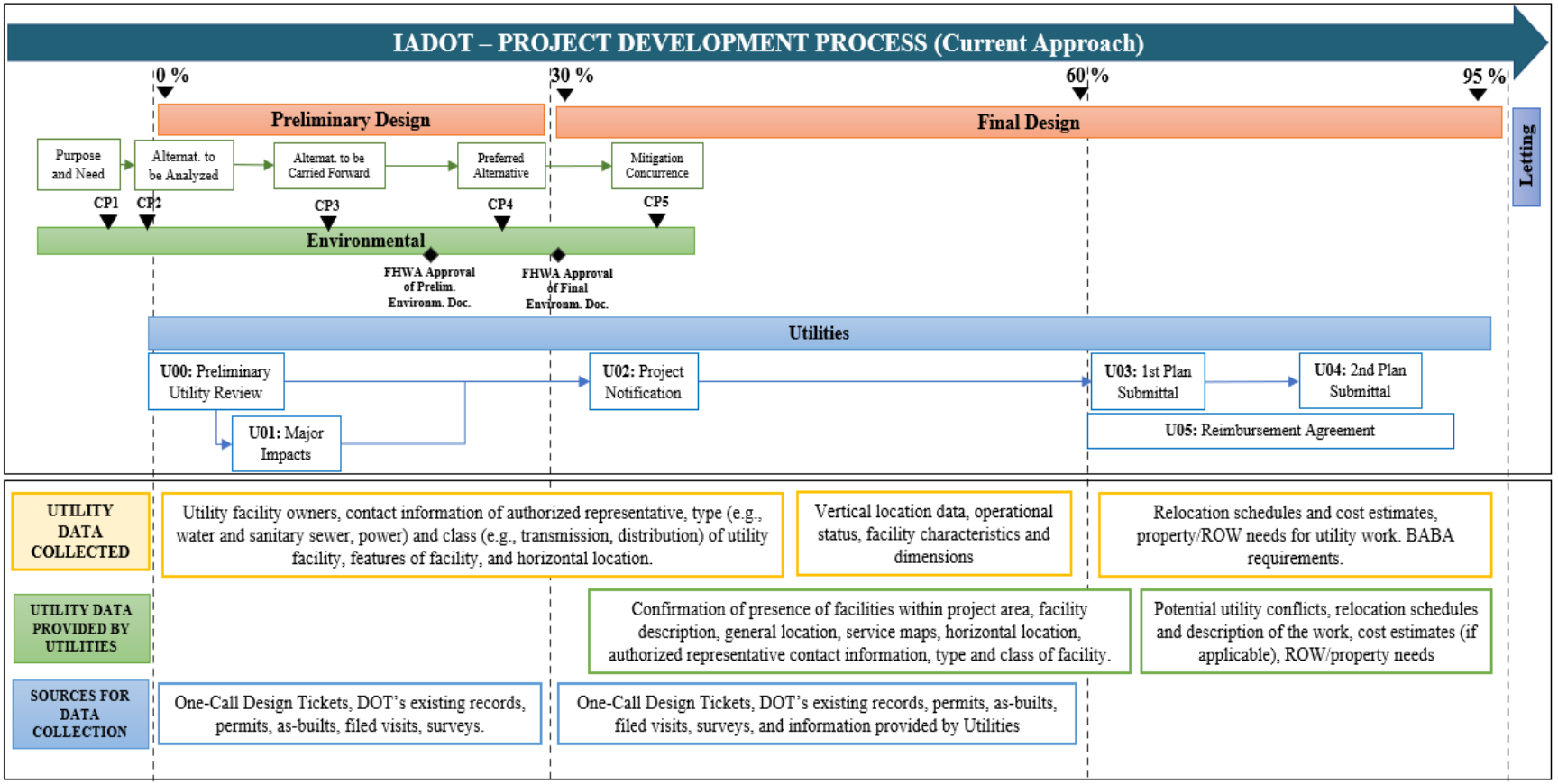


Figure 3-6. Utility data collection within the Iowa DOT project development process

3.5.3.3. Utility Coordination and Environmental

The research team conducted a high-level assessment of NEPA documentation from various projects available on the Iowa DOT's website. This review suggested a need to enhance how utilities are accounted for in the environmental document and during the concurrence point process (CPP).

The CPP encompasses [CP1] Purpose and Need, [CP2] Alternatives to be Analyzed, [CP3] Alternatives to be Carried Forward, [CP4] Preferred Alternative, and [CP5] Mitigation Concurrence. This process is designed to secure concurrence from resource agencies on early project development decisions. It is typically applied to major transportation projects that may involve an EA, an EIS, or an individual Section 404 permit. For each concurrence point, project information packages are prepared that contain essential details such as project location, description, history, public involvement and scoping outcomes, decision-making results, and engineering and environmental studies findings.

According to the Gantt chart presented in the Iowa DOT PDP guidance manual, [U00] Preliminary Utility Review and [U01] Investigation of Major Utility Impacts occur before [CP3] and [CP4]. Considering that, it would be expected that utility data gathered through these events will be considered in the environmental document and in the information packages prepared for each concurrence point. However, this was not reflected in the NEPA documents reviewed by the research team. According to the guidance manuals, [U01] Identification of Major Impacts should occur when project alternatives are being analyzed and narrowed down. However, as noted by DOT internal staff, the [U01] event is rarely utilized, meaning that this critical information may not even be considered when selecting the preferred project alternative. This may lead to late identification of major utility conflicts (high risk/cost) that can significantly impact the project scope, schedule, and cost.

Furthermore, as depicted in Figure 3-6, the preferred alternative is selected [CP4] before utility companies are formally notified of the project [U02]. This suggests that, as currently outlined, the information provided by utility owners through [U02] is not even considered in these key project decision points. Going through this decision-making process without accounting for potential utilities within the project area limits the ability of the project team to make informed, cost-effective decisions that could help avoid or minimize potential utility conflicts.

The research team believes that improvements should be made in the integration of utilities and environmental procedures/tasks. The Iowa DOT's internal staff need to understand how these two processes intersect and why it is crucial to be aware of the project's environmental constraints, permits, and commitments when coordinating utility relocation efforts. Currently, the written procedures do not provide any clear guidance on how and when these two disciplines need to partner to ensure that utility relocations do not violate any environmental permit and are properly accounted for in the NEPA documentation.

3.5.3.4. Utility Coordination and ROW

The current alignment between utility coordination and ROW events and the scope of the related activities/tasks suggest a need to better incorporate utility considerations during ROW engineering and acquisition efforts.

As illustrated in Figure 3-7, the ROW design/layout [R01] is completed before utility companies' input on potential conflicts and relocations is gathered, as [R01] currently occurs prior to the 1st Plan Submittal [U03]. This approach limits the opportunity to effectively account for the potential ROW needs of utilities that may require the relocation of their facilities within the project ROW. Not considering this during the design of the proposed ROW could potentially lead to insufficient space to accommodate those needs. DOT staff also noted that once the ROW design/layout [R01] is finalized, designers incorporate ROW lines into cross-section plans, which then indicate relocation areas for utility owners. However, not engaging with utilities to discuss potential ROW needs before establishing the project ROW may leave insufficient or overly congested space for utility relocations, making it challenging for utility owners to accommodate their facilities and meet spatial requirements to comply with their standards and industry regulations.

Additionally, the current approach delays the collection of easement and property rights documentation until [U05] Utility Reimbursement Agreement. The research team believes that this approach makes the process less effective, as waiting until this stage limits the ability of the utility coordinator, ROW agents, and PM to proactively identify ROW needs and recognize potential challenges, such as critical parcels that may be complex or costly to acquire. Collecting this information earlier would enable the project team to strategically prioritize ROW acquisitions and better plan for timely utility relocations. Iowa DOT staff highlighted this issue as well, noting that the ROW acquisition process [R04] often starts too late, which frequently leaves utilities with insufficient time to complete their required relocations.

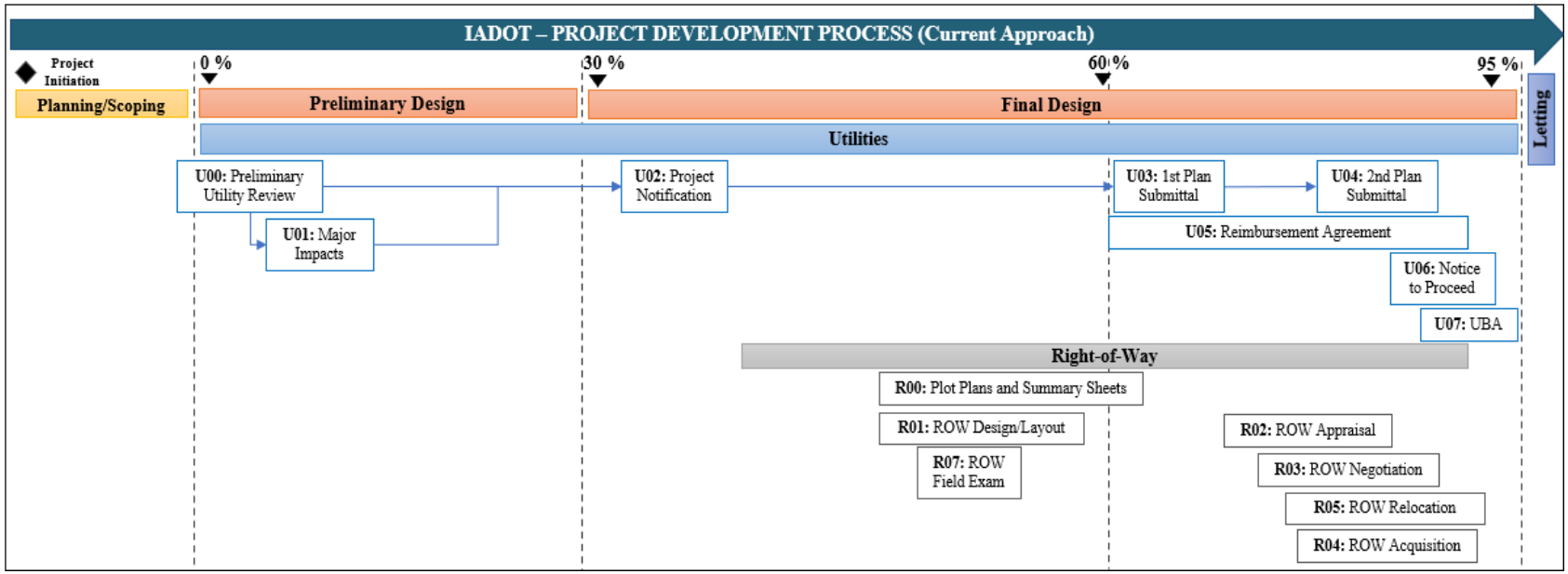


Figure 3-7. Alignment between ROW and utility coordination processes

CHAPTER 4. DEVELOPMENT OF PROPOSED PARTNERSHIP APPROACH

Building on the insights from the previous assessment, this chapter outlines the research team's recommendations to enhance utility coordination efforts at the Iowa DOT.

4.1. Utility Coordination Best Practices for Potential Implementation

To identify potential practices and strategies for enhancing the Iowa DOT's utility coordination approach, the research team recognized the importance of gathering insights from the stakeholders directly involved in the Iowa DOT's transportation projects that require the accommodation or relocation of utilities. To capture these insights, the research team utilized the surveys and the NHI training as opportunities to engage with stakeholders. These stakeholders, including Iowa DOT staff, Iowa DOT consultants, and utility companies, are uniquely positioned to provide critical input, as they are deeply familiar with the processes and ongoing challenges surrounding the utility coordination process.

Experience from previous projects has demonstrated that gaining stakeholder buy-in is an essential first step in effectively implementing new practices and fostering a willingness to embrace change. By rooting the research team's recommendations in feedback and ideas from those directly involved, the team has ensured that the proposed strategies are not only practical but also aligned with the needs and expectations of the main stakeholders, thereby increasing the likelihood of successful implementation and meaningful improvements.

Table 4-1 presents the information gathered through the surveys. A key strength of this data is the incorporation of utility companies' perspectives, whose insights, as primary stakeholders in the utility coordination process, significantly shaped the development of the Partnership Approach.

Table 4-1. Practices and strategies identified by Iowa DOT key stakeholders

Category	Iowa DOT staff	Iowa DOT Consultants	Utility Companies
Long-Term Coordination/ Relationship Building	Share DOT long-term plans with utilities and cities. Annual district-wide meetings with utilities to discuss future opportunities to collaborate.	Regular non-project-specific meetings (quarterly) with utility owners to identify and/or confirm the main point of contact.	*Treat each other like partners/neighbors instead of enemies in the same trench.* Proactively notify utilities of the DOT's upcoming projects and better communication to identify potential impacts.
Communication, Coordination, and Collaboration	Collaboration, communication, and proactive engagement, particularly in the early stages of the design process between designers and utility partners. Early collaboration, communication, and teamwork with survey and planning staff.	Start coordination earlier than [D02] Field Exam Plans Ensure all affected utilities (public and private) are aware of the project so they can plan the work needed on time. Providing utility companies with timely design information so that they have enough time to plan and complete the relocation work. Being responsive during the design stage and providing highly accurate location data and location field marking. Engaging and communicating with utility companies early to accurately identify facilities in the corridor and their locations, identify potential conflicts, and work with them to resolve them before final design starts.	Clear, open communication between both parties, the DOT and utilities, from start to finish. Collaborative work with all parties involved to develop the best, least intrusive way to complete the project. Early project notice sent to utilities, allowing time to plan and budget for potential relocations. This notification should include as much project information as possible. Improve communication between utilities, the DOT, and contractors. Coordinate proposed alignments of all utilities within a corridor. Meet in person and/or on-site to discuss project scope, potential conflicts, and construction timeline.

Category	Iowa DOT staff	Iowa DOT Consultants	Utility Companies
Stakeholders Management and Engagement		More flexibility with utilities based on their needs. Some relocation projects take a while for small companies to complete.	Early engagement of utilities, if possible, prior to the planning stage or during the concept stage. Total transparency of project goals and timelines. Establish expectations upfront and foster collaboration to achieve the optimal outcome. Constantly share information and concerns. Having a utility coordinator that responds in a timely manner and is open to working with the utility when situations are abnormal and difficult. Early communication and explanation of expectations. Realistic expectations for flexibility on relocations. Working with us regarding our concerns and constraints that impact costs significantly. Close collaboration between the DOT and utilities to meet everyone's needs.
ROW Management	Enhanced collaboration between ROW staff, designers, and district staff at the early stages [D02] to identify ROW needs on time and start the acquisition process.	Timely acquisition of ROW for utility relocation needs.	Acquiring enough ROW for relocation long before construction starts so utilities have enough time to design and complete relocation work on time.

Category	Iowa DOT staff	Iowa DOT Consultants	Utility Companies
Project and Utility Data Collection/ Sharing	Obtain utility information from utilities at the [D00] level and pass it on to all relevant parties (not only the district but also other staff).		Provide preliminary files (preferably in kmz format), which would be an easy way to perform a rapid screening to determine if our utilities will be impacted and to what extent. Sharing project plans at the various stages of the design development to review them and ensure utilities' safety requirements are incorporated into the plans. Communicating project plans/changes/ timing to all shareholders. Provide enough information to utilities so they can make informed decisions on whether/how we need to modify our system to accommodate the project. Notify all utilities if the project design changes.
Project and Utility Data Accuracy			Update project plans based on the corrections utilities provided on their facilities' location. In the presence of discrepancies between utility information and surveyor data, engage in discussions with utilities and collaborate to resolve any doubts.

Category	Iowa DOT staff	Iowa DOT Consultants	Utility Companies
Utility Conflicts Management/ Resolution	Identify and address utility conflicts early in the project to prevent or minimize conflicts when feasible. Make efforts to finish relocation work before construction starts. If not possible, plan relocation work to happen in coordination with the roadway construction.	Addressing all utility conflicts prior to the bid letting to avoid or minimize impacts during construction. Strive to complete all relocation before the construction stage begins.	Once the footprint of the project is established, work collaboratively to determine if project modifications can be made to minimize utility impacts and lower the project cost. Collaborative work with utilities to identify conflicts. Having meetings to go over the project in detail discussing possible conflicts. The project owner should inform utility representatives where conflicts are anticipated on the proposed design. Knowing well in advance where and when utilities need to be moved to accomplish the project. Outline the sequence and schedule for relocation work, specifying the tasks each company is responsible for and the corresponding timeline.
Administrative	Utility companies' staff need to be trained to read project plans properly.	Using relocation agreements with utilities that clearly identify their expected work, responsibilities, and the timeframe for the relocation.	
IT Solutions	Implementing a common location system, providing a standardized platform for utilities to share information.		
Field solutions		Enhancing the DOT's inspection of utilities' relocation work if it is completed during the construction stage.	

Category	Iowa DOT staff	Iowa DOT Consultants	Utility Companies
Legal/contractual/ Enforcement solutions	Leverage the Iowa Code to incentivize utility relocations, shifting some burden from the DOT to utility companies. Imposing liquidated damages on public utility companies that fail to relocate promptly as an incentive for utilities to adhere to relocation timelines.		

While the survey provided valuable insights into the perspectives of Iowa DOT internal staff, the insights gathered during the NHI training offered a more comprehensive understanding of their viewpoints on potential practices for implementation. The training not only involved a larger group of participants but also included input from designers and PMs—perspectives not captured in the survey. This broader range of input made the data set more thorough and well rounded. The practices and strategies identified by training participants are listed below:

- Foster a cultural shift within the Iowa DOT and with utility owners (partnership)
- Share DOT long-range plans with utility companies.
- Host utility coordination meetings during the early stages of the project development based on specific project needs.
- Early coordination and frequent communication among external and internal utility coordination stakeholders (designers, DUCs, PMs, utility companies, etc.), especially during the pre-design phase.
- Improve utility data sharing procedures among all project parties (break communication silos within the Iowa DOT)
- Involve DUCs and EOTs during the concept development stage and field reviews.
- Involve utility staff from project inception through all phases (especially on concurrence points).
- Identify all utility stakeholders (external and internal) during the pre-design phase.
- Account for relocation schedules in the project schedule (make sure the milestones align)
- Consider relocation estimates for utility-related work when evaluating project alignment alternatives.
- Include a utility item on the NEPA checklist to create awareness of what utilities are within the project area.
- Prioritize the acquisition of ROW land for utility needs.
- Consider schedule change impacts because of ROW needs.
- Conduct utility inspections/field visits before concept development.
- Improve survey quality on complex projects.
- Before the survey request, ask utility owners to provide all existing information on their facilities so that it can be verified during the survey.
- Request drawings of sufficient detail to utility companies.
- Obtain better and earlier utility information through the implementation of SUE during the preliminary survey.
- Use SUE early in the process for potential major utility impacts (i.e., utilities that represent a safety risk, such as gas facilities)
- Before the survey request, collaborate with utility owners to define the SUE service scope.
- Depict information on existing utility facilities on cross-section plans.
- Verify the information on the location of utility facilities (prioritize potential high-risk/critical utility conflicts.)
- Implement utility-related constructability reviews and make the DUC part of the constructability review team.
- Improve accuracy of utility investigations for conflict analysis.
- Implement UCM during the preliminary and final design stages to track utility conflicts and resolutions.

- Provide designers with training on UCM so that they can begin the conflict analysis and collaborate with the DUC and utility owners.
- Implement field inspections during utility relocations to obtain as-built information.
- Make utility companies more accountable/liable for the completion of their relocation work.

Notably, the training participants identified certain practices that had not emerged in the survey data. This could be due to the instructors introducing these practices during the training, likely helping participants recognize their value and potential benefits. This observation suggests that offering training focused on incorporating these practices into the Iowa DOT procedures could be instrumental in securing buy-in from utility coordination stakeholders.

In addition to identifying practices and strategies for potential implementation, inputs were collected on their perceived level of impact and feasibility (ease) of implementation with the aid of the matrix presented in Figure 4-1. This feedback offered the research team valuable insights into how these stakeholders evaluate the value of these practices and the potential for their successful adoption. Key takeaways are presented below.

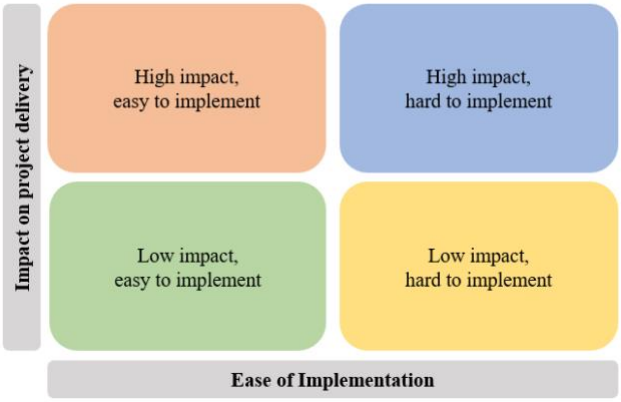


Figure 4-1. Implementation feasibility and impact matrix

The following activities are low impact and easy to implement:

- Collaborate with utility companies to identify potential solutions for utility conflicts.
- Encourage the participation of all utility stakeholders during field visits, especially the designer.
- Engage utility owners early in the process by sharing project design concept information.
- Implement SUE in all highway projects.

The following activities are high impact and easy to implement:

- Use incentives.
- Document identified utility conflicts in a list as part of the design documents.

- Consider utility data during the NEPA process timeframe before finishing the project concept (utility checkpoint).
- Make field visits mandatory for each project to identify utility facilities and potential conflicts.
- Hold a utility coordination meeting after the development of the design concept [D00].
- Encourage proactive participation of the utility coordinator during the concept and design phase.
- Enforce utility companies to provide accurate as-built plans.
- Develop guidance (toolbox) on design standards to avoid or minimize utility conflicts when feasible.
- Deliver training on utilities to functional groups that participate in the development and delivery of projects that involve utility accommodation.
- Encourage designers to conduct a conflict analysis during design development and to think "outside the box" to avoid, minimize, or mitigate utility conflicts when safe and feasible.
- Request that designers document the reasons why avoidance of utilities is not possible.
- Identify and collect information on existing utility facilities and potential conflicts during the development of the design concept.
- Encourage earlier coordination, communication, and collaboration between the designer and the utility coordinator (during planning and preliminary design).
- Implement MOUs.

The following activities are high impact and hard to implement:

- Update utility accommodation policy and technical documentation.
- Hold accountable nonresponsive utilities through policy.
- Get accurate information on the location of facilities from utility companies.
- Change the design criteria ("get out of the way" mindset).
- Discuss potential ROW needs for utilities during the concept stage or at least before ROW engineering begins (Everyone Knows Where Everyone Goes).
- Conduct constructability reviews on all projects.
- Depict existing utilities on the project plans and consider them during the development and evaluation of project design alternatives.
- Build an as-built repository.

The following activity is low impact and hard to implement:

- Use utility corridors.

Lastly, the researchers also drew upon the findings of the SPR-RE22(013)-8H-00 effort. As noted in the literature review, the SPR-RE22(013)-8H-00 research team engaged a diverse group of stakeholders, including Iowa DOT staff, utility company representatives, and construction community members through the Iowa AGC. This collaborative effort allowed the team to develop a roadmap for improving the Iowa DOT's utility coordination approach, as presented in Section 2.1.

4.2. Proposed Partnership Approach for the Utility Coordination Process

The research team thoroughly analyzed the strategies and best practices presented in the previous section to identify the most effective ways to tailor and integrate them into the Iowa DOT's utility coordination procedures. Although not all practices were considered, they collectively provided a foundation for developing the Partnership Approach. The research team members used their expertise to carefully select and adapt the most appropriate strategies and practices, focusing on addressing existing issues and challenges and improving the overall utility coordination process.

4.2.1. Principles of the Partnership Approach

As the research team gained a deeper understanding of the Iowa DOT's current utility coordination process and the mindset of its key stakeholders, it became evident that certain foundational principles must be first fully embraced by everyone involved in this process for the successful implementation of the proposed recommendations. Achieving buy-in from all key stakeholders is essential for these principles to be accepted and to drive the necessary changes to improve utility coordination efforts in Iowa DOT projects. The research team identified eight core principles, presented in Figure 4-2, that served as the foundation for the recommendations of this new approach.

Figure 4-2. Principles of the Partnership Approach

4.2.1.1. Positive and Collaborative Relationships

Utility coordination is largely a collaborative effort built on strong relationships and communication among all involved stakeholders. These positive working relationships greatly enhance stakeholders' willingness to collaborate effectively. Therefore, efforts must focus on building and maintaining relationships based on trust and commitment to establish lasting partnerships between the Iowa DOT and utility owners, as a lack of trust can hinder stakeholder engagement. This principle underscores the importance of transforming adversarial dynamics into collaborative business relationships centered around shared goals. The adversarial approach of enforcing the "get out of the way" mindset only leads to more frustration, whereas building and maintaining a relational model has been proven to improve utility coordination efforts effectively.

4.2.1.2. Avoid, Minimize, Accommodate when Feasible

Assuming that a utility can simply "get out of the way" is one of the most impractical and ineffective positions a design team can adopt. Iowa DOT staff must understand that effective utility coordination is not about asking utilities to simply get out of the way but about collaborating with them to address utility impacts through a prioritized approach: first attempting to avoid conflicts, then minimizing conflicts when avoidance is not feasible, and finally accommodating utilities, such as through relocation. Adopting this mindset for both reimbursable and nonreimbursable utilities promotes a more strategic and cooperative approach to utility coordination.

This does not mean that designers should try to avoid utility facilities at all costs, but rather that they should make reasonable efforts to minimize overall project costs for the public while balancing the needs of all involved stakeholders.

4.2.1.3. Reliable Utility Data for Better Project Decisions

Successfully integrating utility information into project development starts with a comprehensive and accurate assessment of the existing utility infrastructure's location and attributes. Iowa DOT project teams should conduct appropriate levels of utility investigations to collect necessary data for building reliability in project delivery. Collecting reliable data on utilities that may be impacted by a project early in the development process is crucial because when design is advanced, there is often a reluctance to redesign, especially when it comes to avoiding utilities. High-performing teams will ensure that all collected utility data is fully integrated into the design decisions. Improving the identification of existing utility infrastructure and making well-informed project decisions to address potential impacts on that infrastructure brings both immediate and long-term benefits to the successful delivery of the Iowa DOT's program.

4.2.1.4. Timely and Proactive Engagement of Utility Coordination Stakeholders

Engaging stakeholders proactively and in a timely manner in the utility coordination process increases partnership and leads to improved coordination outcomes. This effort should include not only utility partners but also all other stakeholders who may be impacted by or have an influence on utility coordination activities, such as project managers, designers, ROW agents, environmental agents, consultants, construction engineers, surveyors, and others. Timely and continuous engagement of these stakeholders allows for more coordination and collaboration opportunities, enabling them to explore solutions that can help avoid or minimize utility relocations.

4.2.1.5. Normalize Treating Utilities as Business Partners

Utility coordinators should actively promote the partnership mindset, ensuring that all project team members view utility companies as collaborative business partners rather than obstacles. By fostering this mindset, coordinators can encourage greater participation and responsiveness from utility owners, leading to better project decision-making and stronger relationships.

To uphold this principle, utility coordinators should position themselves as strategic partners to utilities, treating them with the same respect they would expect in return. This involves honest communication and a genuine effort to understand utility partners by listening to their goals, priorities, interests, expectations, needs, concerns, and constraints and taking these into account during coordination efforts.

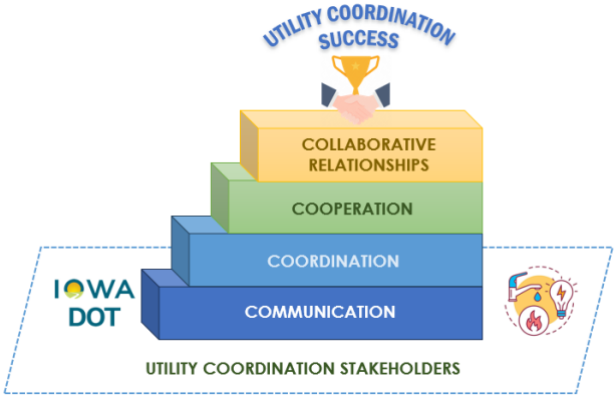
4.2.1.6. Everyone Knows Where Everyone Goes

As previously emphasized, effective utility coordination is not about asking utilities to merely "get out of the way"; it is about working collaboratively with them to avoid, minimize, or accommodate conflicts. However, when relocations are necessary, it is crucial to engage proactively with utility partners to discuss suggested alignments for relocations, ensuring that "everyone knows where everyone goes." This mantra is particularly important when utilities need to relocate within the public ROW, as it allows for thoughtful consideration of their ROW needs and ensures that adequate space is incorporated into the project design to accommodate these utilities. Utility coordinators and designers must be aware of potential relocation areas, space requirements for each utility, and any spatial constraints dictated by legal or industry standards, ensuring that this information is accounted for in the project design.

4.2.1.7. Reinforce the 3Cs: Communication, Coordination, and Cooperation

Implementing the 3Cs—communication, coordination, and cooperation—is fundamental in the Partnership Approach. These three concepts, equally important, must be applied together from the outset of the project. This allows all stakeholders—both external and internal—to break down silos and foster a collaborative environment in the utility coordination process.

As shown in Figure 4-3, the concept of the 3Cs is represented as a ladder metaphor that illustrates relationship building among utility coordination stakeholders as a progressive journey, escalating from communication to coordination and finally to cooperation.



Adapted from NCHRP Report 788

Figure 4-3. The 3Cs ladder to collaborative relationships in utility coordination

Each step represents an essential phase in developing collaborative relationships among these stakeholders:

- **Communication** is the first step of the ladder, which focuses on exchanging project and utility information and knowledge. Communication ensures that all stakeholders are adequately informed and that the information is shared and understood, setting the groundwork for higher levels of collaboration.
- **Coordination** is the second step of the ladder, where utility coordination stakeholders move from merely sharing information to aligning their actions and timelines (POINT 25 process). Coordination focuses on organizing efforts by defining roles, synchronizing tasks, and ensuring that all parties work interdependently toward shared objectives.
- **Cooperation** is the third and final step of the ladder, where utility coordination stakeholders elevate their efforts to active collaboration. At this step, stakeholders move beyond task alignment to jointly tackle challenges, optimize solutions, and work collectively to achieve common goals. Cooperation fosters trust, shared responsibility, and a sense of collective ownership, ensuring the successful delivery of the utility coordination process.

4.2.1.8. Shared Vision and Accountability for Success

The Partnership Approach emphasizes a shift to teamwork grounded in shared goals, with all utility coordination stakeholders actively contributing as part of a unified team committed to project success.

Utility coordination requires collaboration among diverse stakeholders, each with unique goals, priorities, and roles in the decision-making process. These differences can affect both willingness to collaborate and satisfaction with project outcomes. To address these differences, fostering a

shared sense of purpose among utility coordination stakeholders is essential to increasing the possibility of success.

All stakeholders must have a clear understanding of the project's overall goals, utility coordination objectives, and how their priorities align with these goals and objectives. Establishing and clearly communicating shared objectives creates a unified vision, fostering accountability and enabling stakeholders to perform their roles effectively while making goal-oriented decisions. This shared understanding promotes collaboration and encourages all parties to work together toward common goals. A key aspect of this effort is ensuring that utility coordination objectives are fully aligned with the broader project goals.

4.2.2. Incorporation of Best Practices into Iowa DOT Procedures

Building on the previously outlined principles, this section details the research team's specific recommendations for integrating best practices into the utility coordination process and improving its alignment within the Iowa DOT PDP guidance manual. The recommendations are presented in two sections: one addressing specific suggestions for each U-event of the PDP guidance manual and another offering complementary recommendations for the effective implementation of the Partnership Approach.

4.2.2.1. Recommendations for the Utility Coordination Process

The utility coordination process outlined in Figures 4-4 and 4-5 and in Tables 4-2 through 4-10 is intended to be flexible and adaptable to the specific needs of each project. While certain tasks are required by the IAC, the process also includes additional recommended activities that may be implemented at the utility coordinator's discretion. The utility coordinator, in collaboration with the project team, should evaluate the project's characteristics and determine the appropriate level of coordination required.

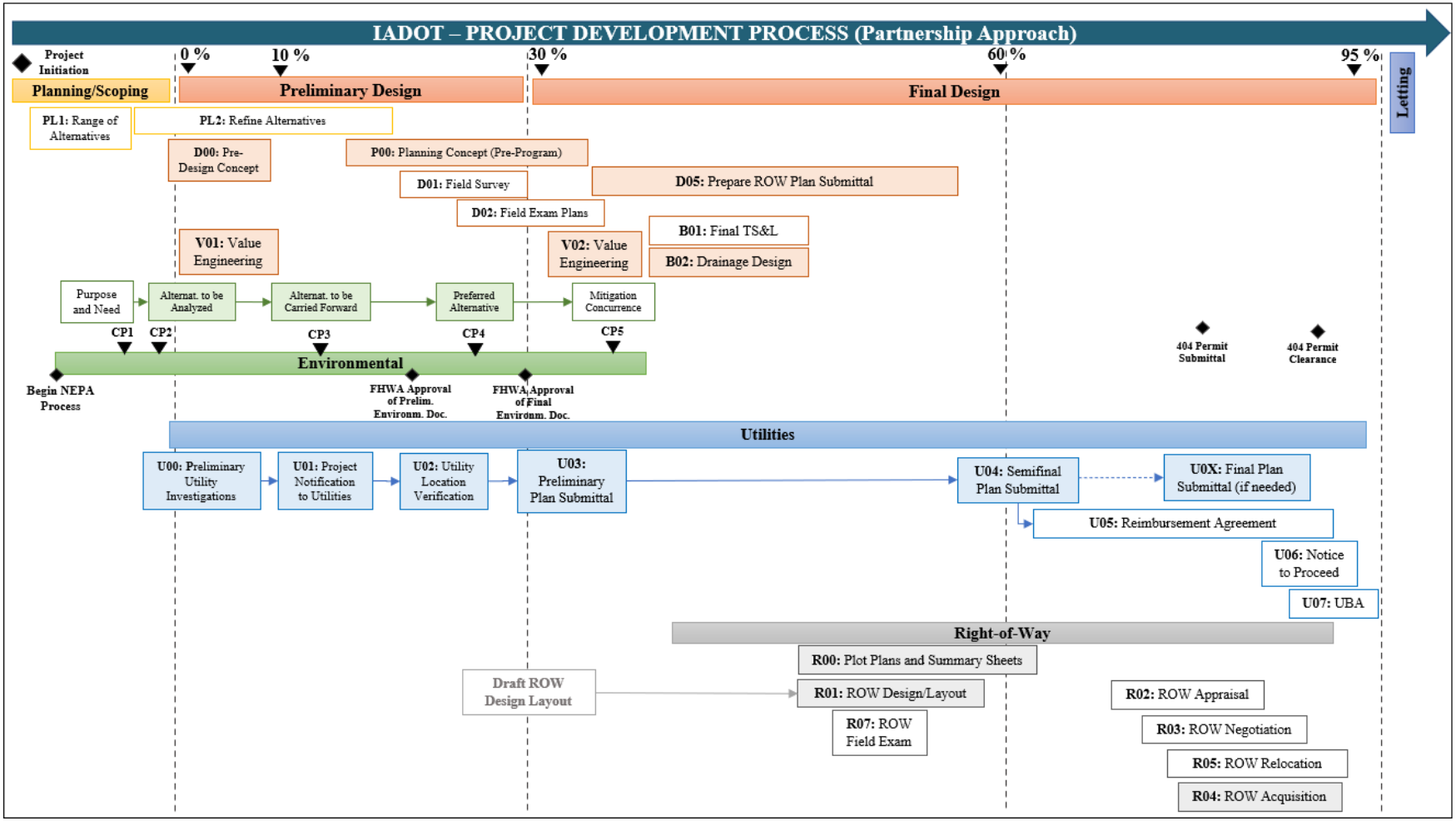


Figure 4-4. Iowa DOT project development process under the Partnership Approach

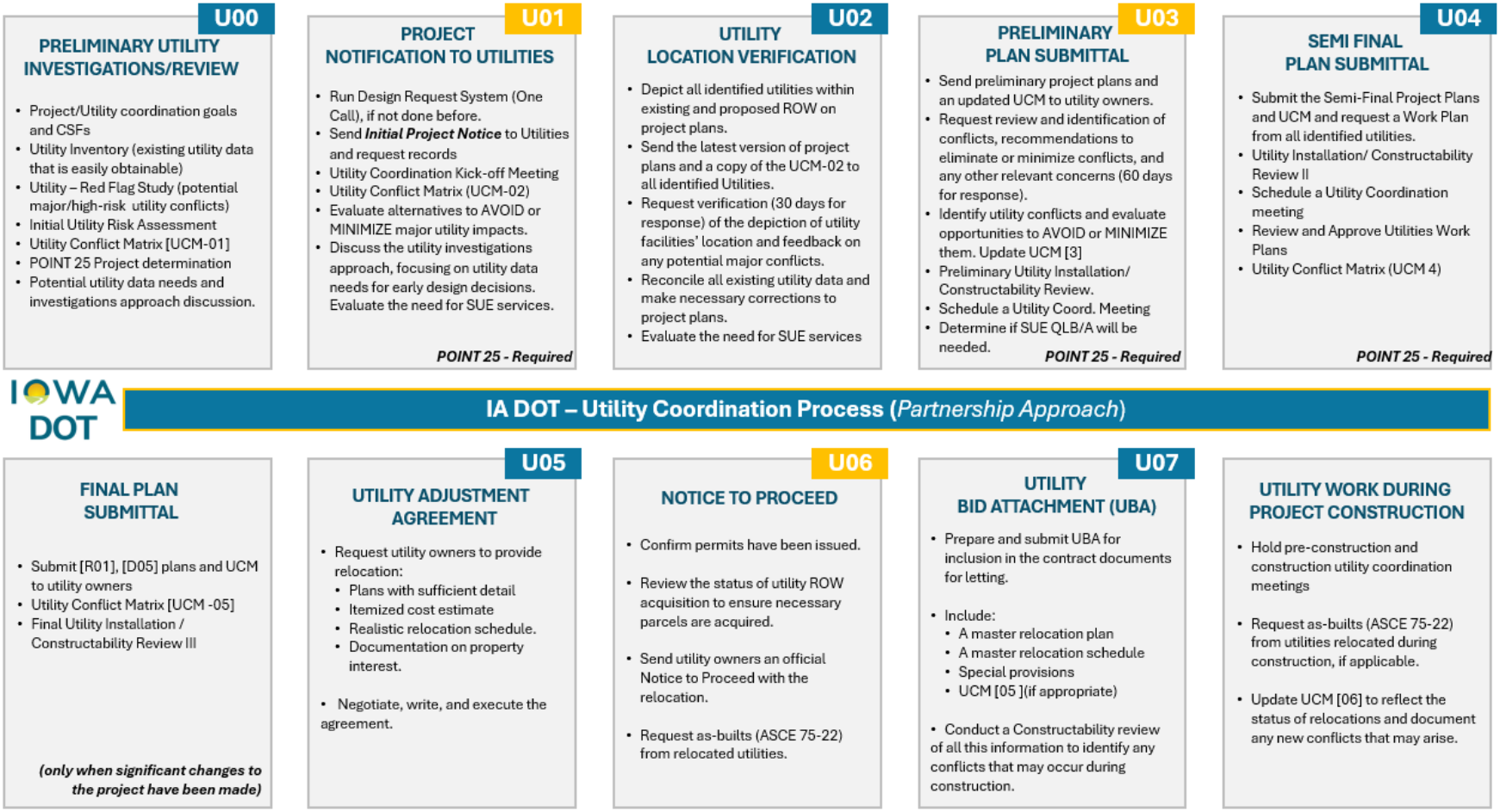


Figure 4-5. Iowa DOT utility coordination process under the Partnership Approach

Table 4-2. U00: Preliminary Utility Investigation/Review

Event	U00: Preliminary Utility Investigation/Review
Adm. Rule	115.26(1)
Action	This event is required for **every highway construction project** unless utilities are highly unlikely. Ideally, this event should take place at the very beginning of the project, when the design is approximately 0%–10% complete. **Specific Iowa DOT activities include the following:** - **Project and Utility Coordination Goals**. The Utility Coordinator and PM discuss the project scope, schedule, budget, and overall goals and critical success factors (CSFs). Based on this discussion, utility coordination goals are established to guide efforts in subsequent events. - **Utility Inventory.** Based on the available information on the project draft concept, all existing utility data that is easily obtainable is collected and reviewed to identify utilities potentially located within the project area. All of these utilities are documented in a **utility inventory**, including data on facility owners, approximate locations, and any other available information. Data may be obtained by: o Researching permit and maps files maintained by the Iowa DOT o Conducting field investigations o Running the Design Request System (One Call) o Contacting local government units o Researching any other reasonable data source (i.e., Google Earth or aerial maps) - **Utility Red Flag Study.** Based on the collected information, perform a preliminary review of utilities in the project area, looking for potential major utility impacts ("utility red flags" - critical, complex, high-risk/cost facilities) that can significantly affect the project scope, cost, and schedule. This review may consist of a desktop review followed by a field review/visit, if necessary. The Utility Coordinator then evaluates the risks those major utility impacts pose on the project and communicates the findings to the PM for consideration in the project concept and the analysis of alignment alternatives. It is highly recommended that rough estimates of those major utility impacts be developed for consideration in the analysis and selection of the preferred project alternative. Potential major issues/impacts could be documented in an **initial UCM [01].** Based on these findings, the Utility Coordinator evaluates the project's complexity regarding utilities and, in collaboration with the PM, **defines the scope of early utility coordination efforts**, as this will inform subsequent actions. This includes identifying major impacts that may require additional effort, time, and resources for coordination so that proactive measures can be taken. If needed, initial contact with major utilities should begin. - Determine whether the project is **a POINT 25 Project**. - The PM and Utility Coordinator collaborate to discuss **potential utility data needs and the project utility investigations approach/strategy**, especially for those critical/major facilities. This discussion should address whether the project's utility

	data needs can be met by running the Design Request System, contacting utility owners, surveying the project area, engaging SUE consultants, or other approaches. - **Upload all information to the project folder in PPMS**. The PM and Utility Coordinator collaborate with each other and the relevant project team members to ensure that the collected utility data is incorporated into project plans and documents (e.g., concurrence point information packages, value engineering studies, etc.)
Purpose	This event aims: - To set utility coordination goals based on project overall goals and CSFs. - To develop a utility inventory and document utilities potentially located within the project area. - To conduct a Utility-Red Flag study to identify potential major/complex utility impacts within the project area and conduct an initial utility risk assessment. - To set up the initial UCM [01] and document any identified major/complex utility impact. - To assess and determine the project's early utility coordination needs (scope) to prioritize and proactively plan efforts. - To identify whether the project qualifies as a POINT 25 project. - To discuss the potential utility data needs for the project and evaluate the appropriateness of the investigation methods to meet those needs.
Input	- Planning study corridor (field study area bounding the range of alternatives to be developed) - [PL1] Planning Concept – Range of Alternatives - Maps and digital aerial photographs showing alternative project corridors: Planning level DTM [DT1] - Permit files, maps maintained by the Iowa DOT (as-built), GIS data sets - One Call design ticket and contact with local government units - Any other pertinent project information that is available.
Output	- Utility coordination goals. - Preliminary information and a list of utilities potentially located within the project area (utility inventory) - Potential major utility impacts (critical/complex/high-risk/cost utilities) located within the project area documented in an initial UCM [01]. - Scope for early utility coordination efforts, focusing on critical utility impacts. - Discussion on potential utility data needs and utility investigation approach/strategy. - Utility information stored in the project folder in PPMS and shared with pertinent team members.

Table 4-3. U01: Project Notification to Utilities (Location Data Request)

Event	U01: Project Notification to Utilities (Location Data Request)
Adm. Rule	115.26(2) and 115.26(3b)

Action	This event is **required for all POINT 25 projects** and should take place as early as possible—ideally when the design is around 10% complete.
	Specific Iowa DOT activities include the following:
	- If not done previously, run the **Design Request System** (One Call) to determine utilities potentially located in the project area.
	- **Gather all relevant project information** to be sent to identified utility owners, such as:
	  o Available information on project concept [D00], location, route number, and geographical limits.
	  o A general description of the work to be done
	  o Important schedule milestones (i.e., plan sets, ready for contracts date, letting date)
	  o Iowa DOT representative contact information for coordination purposes (Utility Coordinator).
	- Send **Initial Project Notice to all utility owners** thought to have facilities within the project limits. Request them to confirm if they have facilities within the project area and, if so, to submit information regarding their facilities (location and attributes), including any proof of compensatory interest that could lead to reimbursement. Project information to be sent to utility owners should include at least the items listed above.
	The initial notice may include **an invitation to a Utility Coordination Kick-off Meeting**, which should be scheduled with sufficient time for utility owners to review the project information.
	- **Once responses from utility owners are received:**
	  o **Update the utility inventory** with any new information provided. Update the project utility companies list by confirming which utilities are in the project area and selecting them in PPMS.
	  o The Utility Coordinator and Designer review the information provided by utility owners along with the most up-to-date project design information, **check for potential utility conflicts, and update the UCM [02].** Emphasis should be on identifying major physical constraints related to utilities not identified before. Any potential major conflict that may significantly impact the project scope, cost, schedule, or ROW needs should be identified and communicated to the PM, as it should be factored into early project decision-making. The Utility Coordinator and the Designer should work together to "*think outside the box*" and evaluate design options to AVOID or MINIMIZE major utility impacts.
	  o If not done along with the Initial Project Notice, **schedule a Utility Coordination Kick-off Meeting** with all potentially impacted utility owners that have confirmed ownership of facilities within the project area. This meeting should allow to:
	  ▪ Introduce and describe the project scope, location, schedule, goals, and CSFs, as well as utility coordination goals.

	▪ Discuss and outline expectations for utility owners (e.g., deliverables, timeframes, coordination needs, etc.) ▪ Establish the Iowa DOT's and utility owners' points of contact. ▪ Discuss any relevant information regarding reimbursement eligibility. ▪ Discuss existing property interests that may lead to reimbursable positions, especially for major utility conflicts, as they can significantly impact project funding. Discuss any potential easement replacement needs. ▪ Gather relevant information and discuss the magnitude of their utility infrastructure and the level of risk they pose to the project. Discussion may also involve any planned alterations to existing facilities or installation of new facilities within the project limits. ▪ Discuss any special requirements and restrictions (e.g., BABA compliance), potential major ROW needs, challenges for ROW property acquisition for relocations, special coordination needs (i.e., service outages), any factors that may affect project schedule and coordination timelines (i.e., lengthy design times, long lead items). ▪ Identify utility owners who may require closer coordination and engagement efforts or additional assistance. Discuss communication plan for working with utility owners. - Considering the gathered information, past experiences (i.e., utilities known for their lack of participation and responsiveness), and the magnitude and complexity of the utility infrastructure, the Utility Coordinator should plan coordination efforts to strategically engage with the utility owners. - **Utility Investigation Approach.** Discuss and reassess utility data needs and the appropriate approach for utility investigations. The Utility Coordinator, PM, and Designer collaborate to discuss investigation strategies, methods, and timing to meet the project's utility data requirements, with a particular focus on data needs for critical/major utility impacts to be considered in early design. This may include evaluating the need for **SUE** investigations and discussing the scope of the service (required quality levels or specific project areas for investigations). - The Utility Coordinator collaborates with the PM and Designer to **ensure that gathered utility data is integrated into the highway design process and shared with relevant project team members** (e.g., ROW, Survey, and Environmental sections). For example, any proof of compensatory interest, major ROW impact, or information on potential easement replacement needs should be communicated/provided to the ROW Section for review and consideration. Any data on major utility impacts or potential utility ROW needs should be communicated to the Environmental office for consideration in the development of the environmental document. This is important since the information gathered during this event could lead to project scope, schedule, or budget adjustments. - Upload all information to the project folder in PPMS to reflect the information obtained. **Specific utility owners' activities include the following:** - **Within 30 days**, respond to the Initial Notice in writing with the following information: o Contact information of the utility owners' authorized representative who will be in charge of the coordination regarding the project **AND** o Form filled with the information requested, including a **declaration that the utility owner has facilities within the project area** and attaching available data on the location of its facilities, attributes (type, size, number of

	pipes/conduits, material, approximate depths, etc.), and any other relevant information (e.g., service supplied, property interest documentation, potential need for easement replacement acquisition by the Iowa DOT, other utility owners owning facilities that coexist with the utility owner's facilities), **OR** o Form filled **certifying that the utility owner has no facilities within the project area.** - If SUE services are required, utility owners should proactively collaborate with the Iowa DOT's SUE Consultant and Utility Coordinator by providing any requested information.
Purpose	- To run Design Request System (One Call) if not done before. - To formally notify identified utility owners about the proposed improvement project, send them all relevant available project information and request utility records (location, attributes, and any other relevant information). - To determine/confirm which utilities are located within the project area and identify potential utility conflicts (especially major/critical conflicts). To update the UCM [02] - To gather utility information to be considered during the preliminary design stage for choosing the highway alignment or altering it to avoid or minimize utility impacts, if feasible. - To schedule and hold a Utility Coordination Kick-off Meeting. - To determine utility investigation needs and appropriate approach. To discuss and determine if SUE Service is needed. - To refine the scope of early utility coordination efforts, considering project needs and utility owners' communication and engagement needs. - To share relevant data on major utility impacts with pertinent project team members for its consideration (i.e., ROW, Environmental, Survey team members)
Input	- General project information relevant to utility coordination. - Alternatives to be analyzed [CP2], including areas of potential impact for each alternative. - Utility inventory and potential major conflicts documented in UCM [01]. - Planning study corridor (field study area bounding the range of alternatives to be developed) - Pre-Design Concept [D00], Draft Concept Statement [P00], Location Study Report
Output	- Updated *utility inventory* based on utility-provided records (location and attributes of existing utilities within the project area and any other relevant information, including contact information or utility authorized representative) - Confirmation of ownership of utility facilities within the project area and updated utility companies list in PPMS. - Conflict information to facilitate the evaluation of options for avoiding or minimizing utility impacts and selecting project alignment in early design stages. - UCM [02] documenting potential major conflicts. - Information stored in the project folder in PPMS and shared with pertinent/relevant team members.

Table 4-4. U02: Utility Location Verification

Event	U02: Utility Location Verification
Action	This event is **recommended for all POINT 25 projects,** preferably before the horizontal alignment is defined. **Specific Iowa DOT activities include the following:** - Once records are obtained from utility owners [U01], the PM, Surveyor, and Utility Coordinator collaborate to verify the location information provided by the Utilities. This verification can be done by having Surveyors validate the utility records in the field—preferably during the Field Survey for the DTM [DT2]—or by cross-referencing the utility records with the collected survey data. - The Designer **lists and depicts on project plans [D02] all identified utilities within the existing and proposed ROW.** The Utility Coordinator ensures that the Designer has access to all information provided by Utilities [U01] and to the utility inventory. Depiction should follow the ASCE 38-22 standard. - Once project plans are ready, the Utility Coordinator sends them to the identified utility owner's authorized representatives with a letter requesting them to **verify in writing that the information on their facilities depicted on the project plans is accurate.** Responses should be submitted **within 30 days** after the reception of this letter. o In conjunction with the plans, a copy of the latest UCM may also be sent so that utility owners can use it to provide input on identified conflicts. The Utility Coordinator should provide any required guidance or assistance. It is recommended that utilities verify the depiction of their facilities at this stage—before the horizontal alignment is selected—as this enables more informed project decisions to avoid conflicts and reinforces accountability for the information provided in their records. If discrepancies arise from comparing utility records with survey data, they should be addressed in collaboration with the utility owners. - If any utility owner has not sent the information on their facilities requested through [U01] or is not responsive, the Iowa DOT should contact them again through this letter. - **Once responses are received from utility owners:** o The Utility Coordinator ensures this information is reconciled and shared with the appropriate team members. o If needed, the Designers **make necessary corrections to the utility information plotted on the plan sheets** (based on utility owners' responses). If further collaboration with a utility is needed to make corrections and discuss any inconsistency, an individual meeting may be arranged. o The Utility Coordinator collaborates with the Designer to identify utility conflicts and look for design alternatives to AVOID or MINIMIZE them, if feasible. If provided, input from utility owners should also be considered. **The identification of conflicts should be a team effort.** If needed, the Utility Coordinator may schedule a meeting with the utility to discuss utility conflict resolution strategies. o The PM, Utility Coordinator, and Designer collaborate to reevaluate utility data needs and determine the best utility investigations approach to meet those needs.

	For each potential conflict, determine whether QLB or QLA test hole data are needed to better identify or confirm utility facilities that may be in conflict. - As project design progresses and the interaction with utility owners increases, the Utility Coordinator should identify the communication and engagement needs of the different utilities, which should help determine appropriate strategies to effectively engage them based on the project and stakeholder-specific needs. - Information regarding utilities should be updated in the project folder in PPMS. The Utility Coordinator collaborates with the PM to ensure everyone is aware and has access to the most up-to-date utility information. **Specific utility owners' activities include the following:** - Review the accuracy of the facilities depicted in the project plans sent by the Iowa DOT. - **Within 30 days**, respond to the verification request in writing with the following information: o To the best of their information, **a confirmation in writing that the depiction of their facilities is accurate** OR o A **statement indicating the depiction is inaccurate** and a detailed description or **markups of the correct location**. - If information on their facilities has not been provided before, all available and relevant information should be sent to the Iowa DOT. This may include information on the type, size, approximate depths, property interest documentation, private services that may be affected, any planned alterations to existing facilities, or installation of new facilities within the project limits. - If SUE services have been hired, collaborate with the Utility Coordinator and SUE consultant by providing any information requested by the consultant.
Purpose	- To depict all gathered information on utilities location on the project plans. - To verify the accuracy of the utility information plotted on the plans. - To identify or confirm utility conflicts based on the information provided by utility owners. - To identify utility stakeholders' communication and engagement needs so that appropriate strategies can be proactively planned. - To determine any utility data needs and discuss appropriate investigation approaches/strategies.
Input	- Alternatives for Concurrence Point 3 – Alternatives to be Carried Forward [CP3] chosen and presented in a spatial format. - Latest version of the project design plans. - Updated utility companies list in PPMS and contact information of representatives. - All utility information collected so far, including information provided by utility owners, department surveys, or any other pertinent source. - Updated UCM [02]
Output	- Confirmation that the project plans accurately reflect the collected utility data. - Potential major conflict identified to facilitate alignment selection and plan and prioritize efforts regarding data collection, coordination, and engagement. - All available information stored in the project folder in PPMS and shared with pertinent team members.

Table 4-5. U03: Preliminary Plans Submittal to Utilities

Event	U03: Preliminary Plans Submittal to Utilities

Action	This event is **required for all POINT 25 projects**. Activities of this event should occur when the design is approximately 30% complete.
	
	Specific Iowa DOT activities include the following:
	
	- Send the utility owner's authorized representatives a **copy of the preliminary project plans [D02 – Field Exam Plans] and a copy of the latest UCM**. Request their review and identification/confirmation of potential utility conflicts, recommendations to eliminate or minimize conflicts, and any other relevant conflict-related information and concerns.
	  o If available, a draft ROW Layout [R01] should also be shared with utility owners to facilitate conflict assessment within the proposed ROW.
	  o If needed, the Utility Coordinator, in collaboration with the Designer, should assist Utilities with the technical interpretation of project plans and the use of the UCM.
	  o If already identified, it is recommended that preliminary project plans include callouts or markups highlighting environmentally sensitive/protected areas/features where utility impacts must be avoided. If not possible, information should be at least communicated for consideration in coordination efforts.
	
	- **Once responses are received from utility owners:**
	  o The Utility Coordinator collaborates with the Designer to identify, assess, and verify utility conflicts while exploring opportunities that may help to AVOID or MINIMIZE them. This also involves updating the UCM [03] and documenting any newly identified conflict and resolution strategies as they are determined or refined.
	  ▪ Any feedback provided by utilities should be considered if feasible. If further clarification or discussion is needed to evaluate a potential conflict solution, an individual meeting with the utility should be scheduled.
	  ▪ If a **constructability review** has been performed, any finding related to utility conflicts should be documented in the UCM. Making geometric changes increases in difficulty after this point, so this is a good opportunity to make efforts to avoid utility conflicts.
	  ▪ If SUE data has been collected, it should be used to identify conflicts. If not, the UCM can guide the strategic selection of locations for obtaining more accurate data, such as SUE QLB or QLA. The Utility Coordinator, Designer, and PM collaborate to make the decision and define the service scope. The goal should be to ensure that accurate and comprehensive utility data is available to move forward with the final design.
	  o **Schedule a Utility Coordination Meeting** with all utility owners that are impacted by the project. Topics to be covered may include, but are not limited to:
	  ▪ Refined project scope and any important schedule milestones (plan sets, ready for contracts date, letting date)
	  ▪ If relocation is unavoidable or has been determined to be the most cost-effective solution, begin coordination of utility relocations with utility owners. Discuss any relevant factors that may affect coordination timelines, special needs, requirements, and restrictions.

- Any potential ROW needs, in case relocations are unavoidable, as well as any existing property interests that may lead to reimbursable positions and potential easement replacement needs.
- Any requirements if the utility qualifies for reimbursement and requires a consultant engineer.
- Any identified environmentally sensitive areas/features, permits, and commitments that should be considered in coordination efforts. The goal is to ensure utility owners are aware of these factors when planning relocations, helping to prevent utility impacts on protected areas and violations of environmental project permits or commitments.
- Encourage utility owners to collaborate with each other, if applicable, especially for those utilities that share facilities or whose relocations may create some dependencies.

o If applicable, review any need/request for preliminary engineering and review cost estimates prepared by utilities.

- **Information regarding utilities should be updated in the project folder in PPMS**. The Utility Coordinator should collaborate with the PM and Designer to ensure all relevant project team members are aware of and have access to the most current utility data.

- Based on information collected from utilities and their responsiveness and participation so far, **determine any necessary adjustments to the communication and engagement strategies** in order to meet project and utility stakeholder needs. The Utility Coordinator should strategically plan and prioritize engagement efforts to achieve effective and timely participation of utility owners.

Specific utility owners' activities include the following:

- Review the preliminary project plans and UCM and identify potential conflicts or concerns.
- **Declare in writing whether or not there are conflicts** between the improvement project and its utility facilities.
- If conflicts have been identified, recommend design changes that may help to AVOID or MINIMIZE utility impacts, for consideration of the Designer.
- If not done before, verify the depiction of their facilities in the project preliminary plans.
- Mark any inaccuracy, potential utility relocation, or potential ROW need for relocations in the preliminary plans.
- Provide any other relevant information such as permits that may be required, any coordination needs with other utility owners, dependencies (either with other utilities' work or highway contractor's work), etc.
- **Within 60 days**, return the markup preliminary project plans, UCM, and information described above.
- Provide input to the Utility Coordinator to determine whether more accurate information should be obtained. If SUE services have been hired, provide any information requested by the consultant.
- If utilities are eligible for reimbursement, provide the Iowa DOT with a detailed cost estimate for preliminary engineering. The Iowa DOT will evaluate eligibility.
- If a coordination meeting has been scheduled, the authorized representative should attend the meeting with all of the necessary information that may help to identify conflicts and discuss potential solutions.

Purpose	- To send preliminary project plans to utility owners impacted by the highway improvement project and get feedback on potential conflicts with their facilities. - To make any necessary corrections to the project's preliminary plans and improve the accuracy of utility information shown in the plans (plan and profile sheets). - To schedule a Utility Coordination Meeting. - To update the utility investigations approach/strategies based on project needs. - To look for opportunities to avoid or minimize utility conflicts, evaluate potential solutions, and update the UCM in collaboration with utility owners.
Input	- [D02] Field Exam Plans, and, if available, a draft ROW Layout [R01] Plans. - Up-to-date UCM showing conflict information to document and track actions and decisions regarding conflicts. - Up-to-date utility companies listed in PPMS
Output	- Confirmation that there are no conflicts between the improvement project and utility facilities. - Updated UCM documenting identified conflicts and all relevant information. - Utility conflict information to be considered during the final design development. - Updated utility investigations approach/strategies, if applicable. - Information regarding potential ROW needs for utility relocations. - Utility information stored in the project folder in PPMS and shared with pertinent project team members.

Table 4-6. U04: Semifinal Plans Submittal to Utilities

Event	U04: Semifinal Plans Submittal to Utilities
Adm. Rule	115.27
Action	This event is **required for all POINT 25 Projects**. Activities of this event should occur when the design is approximately 60% complete. **Specific Iowa DOT activities include the following:** - **Submit the Semi-Final Project Plans—**typically including the ROW Layout [R01] and Design Plans [D05]—**and request a Work Plan** from all identified utility companies. Project Plans should have enough detail so that utilities can prepare their Work Plans. These Work Plans should be submitted **within 90 days** of the Iowa DOT's submission of the Semi-Final Project Plans. If significant project design changes have occurred since the last submittal [U03], they should be communicated/marked on the plans properly. If available, send a copy of the UCM with the most up-to-date information regarding utility conflicts. - Conduct a **utility-related constructability review** of the project plans to identify any minor design changes necessary to mitigate conflicts. If conflicts are identified or resolution strategies are defined, the UCM should be updated accordingly. - After distributing the Semi-Final Project Plans to utility owners, it is highly recommended that **a utility coordination meeting be scheduled**. Ideally, this meeting should be held after utilities have had sufficient time to review the submitted materials. The Designer and PM should be invited to provide support to the Utility Coordinator. The agenda for this meeting may include: o Communicate considerations for developing Work Plans, such as requirements for relocation plans, cost estimates, relocation schedule, any additional documents that need to be submitted, etc. o Discuss deadlines for submitting Work Plans and relevant project deadlines. o Discuss proposed utility locations. o Discuss any environmental considerations to be taken into account when developing Work Plans. o Encourage collaboration among utility owners, if needed. - **Once responses from utility owners have been received:** o Review Work Plans and verify compatibility with Federal, State, and Local requirements, highway project design plans, the project construction schedule, and compatibility with other Utilities' Work Plans. ***Note***: It is recommended to collaborate with the environmental team to review Work Plans to determine if a permit action is needed and to ensure the relocation plan does not affect an environmental protected area and is properly accounted for in the project environmental document. o Review the cost estimate for reimbursable relocations. o If the Iowa DOT identifies any incompatibility or revision need after reviewing the Work Plans, it should be sent back to the utility owner with a request for

revision and resubmission. Revisions should be resubmitted **within 30 days**. If coordination with other utilities is required, additional time might be granted.

- Once revisions are done, if applicable, notify the utility owner if the Work Plan is approved or rejected. The Work Plan should consider the interests of the Iowa DOT, the contractor, utility owners, and the public. The Iowa DOT shall adopt a Work Plan that ensures the safety and reliability of the utility facilities and the highway and avoids unnecessary costs or delays.
- Update the status of the conflicts in the UCM to reflect any decision made regarding utility conflicts.
- If close coordination with certain utilities is necessary or if there is a concern about the Work Plan, schedule a meeting (individually or jointly) to revise the work plans.

- Information regarding utilities should be updated in the project folder in PPMS. The Utility Coordinator should collaborate with the PM to ensure everyone is aware and has access to the most up-to-date utility information.

Specific utility owners' activities include the following:

- Review semifinal project documentation sent by the Iowa DOT (plans, cross-sections, UCM, and any other information provided)
- Prepare a Work plan and submit it **within 90 days** after the Iowa DOT submits the Semi-Final Project Plans.
- **The Work Plan should include, at minimum**:

  a) A narrative description of what work the utility owner will do
  b) A drawing of sufficient detail showing the present and proposed locations of the utility owner's facilities in relation to the highway project plan.
  c) Confirmation of whether the utility owner will be able to complete the relocation by itself or if work should be completed by the Iowa DOT's contractor.
  d) Whether the work is dependent on work by another utility owner
  e) Whether the work can be done prior to highway construction or must be coordinated with the highway contractor.
  f) The number of working days required to complete the work.
  g) Easement documents
  h) Any other relevant information (special requirements and needs -such as permits, access, notice, and coordination requirements- timeline to obtain required permits, lead times to order materials or to obtain ROW, etc.)
  i) Any other information that may impact the Iowa DOT's contractor work.

  If the relocation is reimbursable, a detailed cost estimate for the relocation work (including appropriate credits for betterments or salvage) and copies of property interest documents should be included.

- If revisions to the Work Plan are requested, revise the Work Plan and resubmit it to the Iowa DOT.
- Attend any utility coordination meeting scheduled by the Iowa DOT with the appropriate information to facilitate coordination.

	- If the information required to utility owners is not provided within the timeframes established here or as agreed by both parties, the Iowa DOT has the right to initiate no compliance procedures.
Purpose	- To develop the Work Plans for utilities that require relocation because of the project.
Input	- Plans to Right of Way [D05] - Right of Way Layout [R01] - Latest version of the UCM
Output	- Utility Work Plans stored in the project utility folder.

Table 4-7. U0X: Final Plans Submittal to Utilities

Event	U0X: Final Plans Submittal to Utilities
Action	This event is **not required for POINT 25 Projects.** It should be scheduled **only if needed when significant changes to the project have been made.** **Specific Iowa DOT activities include the following:** - **Submit revised Right of Way Layout [R01] and [D05] plans to the utility owners** if significant revisions have been made. Plans should be sent to all utilities unless it is known that they are not impacted. Plans should clearly show what changes have been made since the Semifinal Project Plans submittal. Any other relevant final information, such as the construction schedule or the latest version of the UCM, should be sent in conjunction with the plans. - **Once responses from utility owners have been received:** o Review the revised Work Plan sent by the utility owners and verify compatibility with Federal, State, and Local requirements, the latest highway project design plans, the project construction schedule, and other Utilities' Work Plans. ▪ If an incompatibility or revision need has been identified, collaborate with the utility owner until the Work Plan is approved. o Review any new request for reimbursement and approve or reject it, if applicable. o Any decision made regarding utility conflicts should be documented in the UCM. o Information regarding utilities should be updated in the project folder in PPMS. **Specific utility owners' activities include the following:** - Review the final information sent by the Iowa DOT, including final plans, construction schedule, and any other relevant documentation. - Look for any changes made since the submission of the semifinal information and determine if changes have to be made to the preliminary work plan or if that plan can be considered as the final work plan. - Responses should be submitted within 30 days after receiving the submittal of the final plan. Extra time should be requested if additional collaboration with other UCs is necessary.
Purpose	- To revise and approve Utility Work Plans, if needed.
Input	- Plans to Right of Way [D05] - Right of Way Layout [R01]
Output	- Approved Utility Work Plans stored in the project utility folder

Table 4-8. U05: Utility Adjustment Agreement

Event	U05: Utility Adjustment Agreement
Action	This is only required when utilities are eligible for reimbursement (on private easement). Eligibility is determined by Central Office. **Specific Iowa DOT activities include the following:** - Most of the information required for the agreement should already have been provided by utility owners through [U03] and [U04]. The information submitted by each utility owner eligible for reimbursement should include the following: a) **Utility relocation plans with sufficient detail.** Plans should be to scale and clearly identify the location of existing (in use and out of service/abandoned), temporary, and proposed utilities with respect to the proposed highway design within the construction limits. Any additional instructions that may aid in understanding the relocation work should also be included. b) An **itemized utility relocation cost estimate** reflecting the work required to complete the relocation. Estimates should be reasonable and detailed enough for the Iowa DOT to verify accuracy before approval. c) A **realistic utility relocation schedule** that considers all activities necessary to relocate the utility. At minimum, the utility owner should identify the relocation start date, the duration of the construction activities, and a completion date that can be relied on by the Iowa DOT and the general contractor. The Utility Coordinator and utility owner should collaborate to assess factors that may impact the relocation timeline, such as specific milestones, advance notice(s) requirements, site preparation, workforce mobilization, material procurement, site access restrictions, and the sequencing or phasing of work with other utilities or the contractor. d) If not done before, any documentation on property interest (existing easements). Once provided, review and verify documentation with ROW staff. Ideally, the adjustment agreement should also include the following: o A clear description of the work needed to relocate the utility. o The terms and conditions regarding the relocation work. o The responsibilities of each party (Iowa DOT and utility owners). o If the relocation work will be completed during construction, include any requirements for the contractor. o The actions to be taken in case of noncompliance with state requirements. - Review all information provided by the utility owner, write the agreement, and have it signed by both the utility and the Iowa DOT. - If relocation design and/or construction is not performed by the utility's own forces, review all bids submitted by the utility owner and approve or reject them. - Pre-audit and staff action is completed in amounts of more than $50,000. - Put notes in PPMS. **Specific utility owners' activities include the following:** - Provide all information requested by the Iowa DOT.

	- If relocation design and/or construction is not performed by the utility's own forces, communicate it to the Iowa DOT and submit a bid for review. - Receive, review, and execute utility adjustment agreements. - As relocation work is in progress, submit invoices. - When relocation work is complete, submit a Certificate of Completion.
Purpose	To enter into an agreement with those utility companies whose relocation work is eligible for reimbursement. To document the negotiations between the Iowa DOT and the utility company. To reimburse utilities that meet requirements for Iowa DOT coverage of relocation costs.
Input	- Plans to Right of Way [D05] - Right of Way Layout [R01]
Output	- Approved agreement to cover the cost of relocations when reimbursement is warranted.

Table 4-9. U06: Notice to Proceed to Utilities

Event	U06: Notice to Proceed to Utilities

Action	This event is **required for Point 25 projects** and recommended for all projects.
	
	The ROW purchase must be completed, or a defined possession date identified. If coordination with the highway contractor is required before relocation can begin, notice may be delayed until after the letting.
	
	Notice is given **at least 30 days before** the utility is to move per its approved Work Plan.
	
	Specific Iowa DOT activities include the following:
	
	- The Utility Coordination should:
	  o Confirm that permits have been issued by the Iowa DOT.
	  o Review the status of the ROW acquisition to make sure all needed parcels for relocations are acquired.
	  o Send utilities individual official notice to proceed with the relocation and record information in the PPMS.
	
	Specific utility owner's activities include the following:
	
	- Receive Notice to Proceed from the Iowa DOT.
	- Send the Iowa DOT a notice of commencement of work (48 hours prior), proceed with relocation work, and send notice of completion of work.
	- Prepares as-built plans for relocation work (ideally following ASCE 75-22 Standard) and submits them to the Iowa DOT.

Purpose	- To give utility owners notice to proceed with their relocation.
Input	- Completed ROW purchases
Output	- Notification sent to utility owners.

Table 4-10. U07: Utility Bid Attachment (UBA)

Event	U07: Utility Bid Attachment (UBA)
Action	**Required for Point 25 projects** and recommended for all projects. **Specific Iowa DOT activities include the following:** Prepare and submit the UBA to the Office of Contracts, documenting the level of utility coordination completed on the project and the current status of that coordination. The UBA is included in the contract documents for letting so that Contractors can account for it in the bid price. The UBA is a resume of the utility work for the project and contains utility information valuable to the highway contractor, ideally documenting: - All existing utilities that are located within the project area but **are not in conflict**. - Utility work **completed prior to construction**, - Utility relocation work that has been **arranged to occur during construction**, with expected completion dates, if applicable. If properly maintained, the latest revision of the UCM [UCM5] should already include all this information, making it a key input for developing the UBA. In such cases, **the UCM might also be attached**, as it should document all known conflicts and their resolutions. The UBA should also include a **consolidated "master" plan and schedule** that communicates when and where utilities will be relocated. They are developed from the individual Work Plans provided by utility companies so that the information can be included in the construction bid package. Ideally, the Utility Coordinator will prepare: - A **master utility relocation plan** that identifies utility facilities that remain or need to be protected in place, those that were relocated prior to project letting, those that will be relocated during construction, those that will be put out of service, and those that are abandoned. This document should be considered "*for reference only"* and not sealed by a Professional. - A **master utility relocation schedule - Gantt chart** detailing the construction phases during which temporary and permanent relocations will take place to ensure alignment with highway construction. This schedule should also include: 1) relocations durations, sequences, dependencies, and estimated start and end dates; 2) preparatory work required before relocations can begin; and 3) any necessary coordination with utility owners. This should allow the contractor to account for relocation schedules within the project schedule and to make sure key milestones align. A reference for this master relocation schedule is presented in Appendix G. - **Utility special provisions** detailing the scope of utility relocations, work responsibilities, maintenance of traffic requirements and responsibilities, utility outage restrictions, access availability requirements, and any other associated conditions and relevant factors. Once all of the information is gathered, it is recommended to **conduct a constructability review**. This review can either be part of the project's overall constructability review, if not already completed, or done by collaborating with construction staff. The goal is to identify any potential utility conflicts that might arise during construction. Information should be documented in the PPMS.
Purpose	- To provide prospective bidders with useful information for planning their work and

	preparing bids on projects where utilities may impact costs. This reduces uncertainties and risks, ultimately leading to lower bid prices.
Input	- Information provided by utility companies through their individual relocation Work Plans. - Latest version of the UCM [UCM5]
Output	- UBA document, including above recommended attachments, submitted to the Office of Contracts

4.2.2.2. Complementary Recommendations for the Implementation of the Partnership Approach

To effectively implement the proposed Partnership Approach, the research team developed a set of additional recommendations that, along with those outlined in the previous section, support the overall adoption of this approach. Recognizing that utility coordination intersects with other disciplines and is not an isolated process, these recommendations extend to other events in the Iowa DOT project development process where creating utility awareness is essential. Additionally, further guidance is provided to assist in implementing the suggested best practices at each U-event presented in Section 4.2.2.1.

A. Early Utility Coordination. Proactive utility coordination begins early in the project development process, as **it is critical to refine the project scope, budget, and schedule with utility awareness**. Utility impacts are often overlooked at this stage, which can result in underfunded projects and delays. This highlights the importance of incorporating utility awareness from the project's outset. Accordingly, **the research team has developed the following recommendations**:

- Conduct a preliminary review of utilities in the project area to identify potential major/complex utilities that could significantly impact the project's scope, cost, and schedule. As noted in Section 4.2.2, this is known as a Utility Red Flag Study and is recommended to be performed at the [U00] event, as major utility impacts can influence design decisions during the project alignment alternative selection. When a Utility Red Flag Study is conducted, the involvement and proactive participation of utility staff, preferably the utility coordinator, during the concept development phase is highly recommended. While a desktop review can serve as a valuable resource for identifying these utility red flags, proactive coordinators should also consider conducting a site visit to identify and assess unrecognized major impacts on the existing utility infrastructure.

  Along with the identification of utility red flags, another recommended task to be performed at the [U00] and [U01] events is an initial utility risk assessment. The utility coordinator should assess the level of risk that these major utility impacts pose on the project scope, schedule, cost, and any other success factor established. This requires the utility coordinator to collaborate with the PM to first ensure a clear understanding of the project goals and CSFs. Common risks to be considered may include complex infrastructure serving critical facilities, long lead times for materials, budget or schedule constraints, potential ROW acquisition challenges, etc. While conducting a utility-related risk assessment at this stage is

recommended, this should be a continuous effort throughout the project development process. This is further elaborated later in this chapter.

- Findings of the Utility Red Flag Study and the initial risk assessment should be promptly communicated to the PM and relevant/pertinent team members, such as environmental and design offices, for consideration in the project concept and in the development, refinement, and evaluation of a range of alternatives. Depending on the project complexity, it could be useful to document these findings on an initial UCM or utility conflict list (see [U00]), as this can become a key input for other project development process events/documents, such as the following:

    - **[PL2] Planning Concept - Refine Alternatives**: Led by the environmental office, this event focuses on documenting the refinement of the identified range of alternatives and adjusting them to avoid or minimize potential environmental impacts. Based on this evaluation, some alternatives will be recommended for further refinement, while others may be set aside. Findings are documented in [P00].

    - **[P00] Planning Concept Statement:** Led by the environmental office, this event complements the NEPA environmental document development and documents in a statement the engineering analysis involved in developing, refining, and screening the range of alternatives, decisions made, acceptable design variations, and the thought and intent behind the development of the alternatives so that other offices, such as the design office, know the decisions made and why the preferred alternative was selected.

    - **[D00] - Pre-Design Concept:** Led by the design office, this event documents feasible alternatives for a proposed highway improvement project and identifies the selected alternative, project history, traffic estimates, accident history, cost estimates, and issues for each alternative. [D00] documents the engineering aspects of a project, decisions made, acceptable design variations, and the thought process used in developing each alternative.

- Appendix F provides two exhibits comparing the approaches of the Iowa DOT and INDOT in accounting for major utilities within the project alternative analysis and selection process. Notably, INDOT's approach includes developing representative cost estimates for major utilities, which allows these estimates to be factored into the comparison and selection of project alternatives. While the Iowa DOT currently lacks its own established utility cost database, the Iowa DOT should consider developing one in the future. In the meantime, preliminary estimates can be developed based on coordinators' previous experience or by comparing potential relocations to relocation costs from previous projects. The key objective is to account for this information in a timely manner, enabling project teams to make more informed, cost-effective decisions and mitigate the risk of significant budget impacts that could lead to major funding issues.

- Early in the project development process, efforts should be made to collect documentation from utility owners regarding any compensatory property interest that could lead to reimbursement (see [U01], [U02], [U03]). This information is essential for utility staff to make initial assessments of significant utility impacts that may be reimbursable and could influence the project's scope, budget, and schedule. The gathered information should be communicated to the PM to ensure that it is incorporated into key project decisions and to facilitate proactive planning to prevent unforeseen impacts.

- Identifying these potential major utility impacts and assessing their risk to the project early in the process not only provides critical input for the project scoping and preferred alternative selection but also informs the scope for early utility coordination efforts, allowing the utility coordinator to proactively engage with those major utility owners and collaborate to evaluate possible design changes to avoid or minimize conflicts before the horizontal alignment is chosen.

B. Integration of Utility Coordination and the Environmental Processes. As noted in the literature review, the intersection between utility coordination and the environmental process is often overlooked and insufficiently addressed. In many cases, utility conflict identification begins only after the environmental review process is complete, resulting in NEPA studies being approved without a clear understanding of potential utility relocations.

The research team observed this issue while evaluating the Iowa DOT's current approach. As highlighted in Chapter 3, **there is a clear need to enhance the integration of utility coordination and environmental activities within the Iowa DOT project development process**. Project team members must recognize the intersection of these disciplines and understand the importance of evaluating proposed utility relocation efforts to ensure that they are properly considered in the environmental document and do not negatively affect the project's environmental permits and commitments. **The research team has developed some recommendations for improvement**:

- **Fostering a collaborative working relationship between the environmental and utility teams is essential.** This will allow them to work together effectively to avoid, minimize, or mitigate environmental impacts caused by utilities. Such collaboration should also focus on ensuring that utility relocation activities align with NEPA requirements and environmental permitting considerations and commitments.

- As shown in Figure 4-6, the alignment suggested by the Partnership Approach for the concurrence point process and the utility coordination process defines [CP2], [CP3], and [CP4]—key decision points for analyzing, comparing, and narrowing down project alternatives—along with [U00], [U01], and [U02], which occur concurrently before the design reaches 30% completion and the project alignment is defined.

  It is highly recommended that the information packages prepared for each concurrence point properly account for major utility-related issues within the project area that may impact the project's scope, cost, and schedule, information ideally gathered through the U00, U01, and

U02 events. This will help ensure that more complete data is available at these key decision points and that potential major utility issues are factored into the decision-making process and included in the environmental document. By raising utility awareness throughout the CPP, the project team will be better equipped to make more informed and cost-effective decisions and potentially avoid or minimize utility impacts.

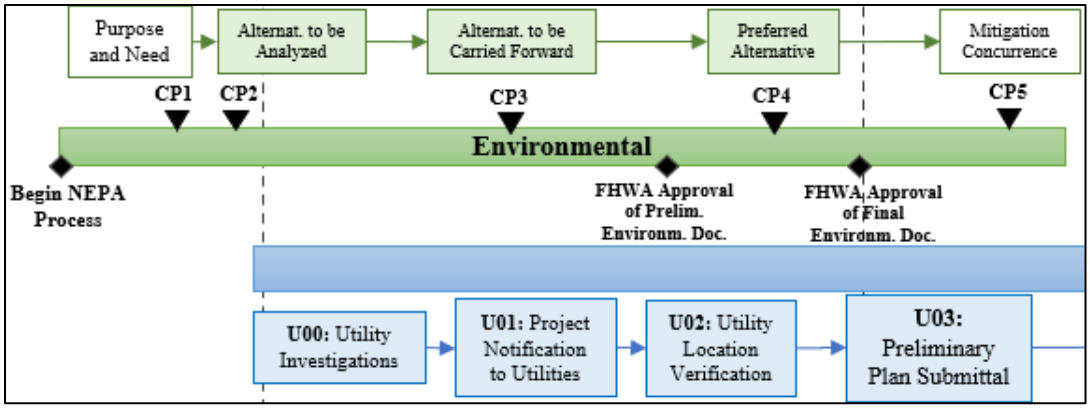


Figure 4-6. Utility coordination and the concurrence point process

- The utility coordinator should partner with the environmental team to understand the sensitive and protected environmental features within the project area and communicate this information to utility owners as needed. This will help utilities consider these factors when planning and designing their relocation work plans. The information can be discussed in coordination meetings with utility stakeholders to ensure that they are aware of the importance of avoiding impacts on these features. This proactive approach also facilitates identifying and coordinating necessary permits or modifications to existing permit applications due to utility impacts. While conducting these tasks, it is crucial to account for the time required to process these environmental permit applications, as potential environmental reevaluation, additional environmental technical studies, or changes needed to the permit applications can lead to project delays.

  As the [U03], [U04], and, if applicable, [U0X] events take place, and relocation efforts—including the identification of utility ROW needs—are coordinated with utility owners, **the utility coordinator and the environmental team should collaborate to review the proposed relocation plans**. This partnership should **ensure that the proposed relocations do not impact any delineated environmental features and that relocation plans are properly accounted for in the NEPA study and environmental permit documentation.** The utility coordinator must ensure that all utility relocation plans have been reviewed by the environmental team prior to approval. Environmental team members should evaluate proposed relocation areas, excavation plans, site restoration measures, and construction methods to ensure compliance with NEPA, permitting requirements, and associated restrictions.

C. Integration of Utility Coordination and ROW Engineering and Acquisition Processes. To enhance the integration of utility coordination and ROW activities, it is essential to stop

treating them as separate procedures and focus on their alignment within the broader project development process. Early integration of these two processes allows for more effective planning and helps minimize delays associated with ROW issues. Recommendations of the Partnership Approach to strengthen this integration within the Iowa DOT project development process are closely aligned with the principle "everyone knows where everyone goes." As previously described, this principle suggests that when relocations are necessary, it is crucial to proactively engage with utility partners and designers to discuss suggested alignments for relocations and ensure that adequate space is incorporated into the project ROW design to accommodate these utilities. Additionally, utility coordinators should collaborate closely with the ROW office to ensure that ROW needs for utility work are thoroughly addressed. This involves efforts such as identifying critical parcels, determining potential utility property interests, recognizing associated complexities and challenges for timely acquisition, developing strategies to prioritize ROW acquisition efforts early in the process, and tracking the progress of the ROW acquisition. Although ROW funding is typically approved during the final design stage and identifying ROW needs can be challenging without preliminary relocation plans, these collaborative efforts early in project development will enhance the project team's ability to make informed decisions and proactively address project ROW needs. **Specific recommendations to be implemented in these early stages include the following:**

- Adjusting utility facilities often requires acquiring new/additional ROW, which can sometimes be expensive and time-consuming. These requirements should be proactively addressed and prioritized as part of a comprehensive project ROW acquisition strategy. **The utility coordinator should take advantage of the interaction opportunities that [U01], [U02], and [U03] provide and partner with utility owners to identify ROW needs for potential relocations. This information should be communicated to the PM, designers, and ROW office to enable more efficient planning and ensure timely ROW acquisition.** If possible, ROW staff should be encouraged to attend pertinent utility coordination meetings so that they can be aware and consider what areas of the ROW are required to accommodate utilities effectively. The project team must anticipate these ROW needs by securing adequate project ROW to accommodate utility adjustments or by requiring utilities to obtain the necessary easements for their facilities.

- As recommended above, the project team should identify property rights within the project limits early in the process to identify potential ROW needs and determine reimbursable positions for utility relocations. This includes assessing whether the Iowa DOT holds sufficient ownership of the existing ROW and identifying property interests owned by utilities**. U-events, such as [U01], [U02], and [U03], are great opportunities to request that utilities provide any existing documentation for compensable interests (easements, prior rights, etc.).** By collecting this information and conducting this assessment early, the project team can anticipate challenges and complexities related to acquiring ROW and develop a strategy to effectively address them.

- **Developing a preliminary "draft" ROW layout [R01] and identifying replacement easement needs for utilities early in the project development process is highly recommended. The draft resulting from [R01] should ideally be developed within the**

timeframe of the [D02] window. This proactive approach can streamline coordination with utilities and the ROW and easement acquisition process. Additionally, it could provide an opportunity to account for utility relocation ROW needs during the environmental review process. Delaying the evaluation of ROW and replacement easement requirements until late in the final design stage can create significant challenges, potentially leading to delays in the ROW acquisition process, which may subsequently delay utility relocations.

While the above recommendations are reflected in the description of the U-events of the Partnership Approach presented above, **it is also important to raise utility awareness during the specific ROW events of the project development process**. This should help ensure that utility ROW requirements are adequately considered in the ROW design and acquisition processes, particularly during the following related events:

- **Plans to ROW [D05]:** While this is considered a design event, the purpose of this event is to provide the Office of ROW with all of the design information necessary to complete the ROW layout. [D05] plans define the project footprint and ROW boundaries and include any information that affects the ROW needed to construct and maintain the project. Thus, it is important that the utility coordinator collaborates with the design team to ensure that utility data gathered through the [U00], [U01], [U02], and [U03] events is properly accounted for in the development of these plans, especially information that can potentially influence ROW needs for utility adjustments. Discussions with utilities on potential ROW needs should happen before ROW engineering begins. This is critical, as [D05] plans are key inputs for the other ROW events.

- **Right of Way Field Exam [R07]:** This event aims to provide an on-site review of the proposed design in order to make final adjustments, if needed, to minimize adverse impacts on affected properties while ensuring that all construction and maintenance needs are covered by the proposed ROW. Involving the utility coordinator in this review presents a valuable opportunity to identify potential ROW layout [R01] revisions based on utility impacts and needs.

- **Right of Way Design/Layout [R01]:** This event aims to provide sufficient ROW design and layout to accomplish public contact requirements. The output of [R01] is an initial ROW layout pending stakeholder input. As [R01] is being developed, the utility coordinator should collaborate with ROW designers to ensure that the project ROW accommodates the necessary space for utility facility relocations while addressing any spatial restrictions required to meet legal and industry standards. Additionally, it is highly recommended to work with utility owners to minimize the necessary ROW by prioritizing “required space” over “preferred space.”

- **Plot Plan & Summary Sheets [R00]:** This event involves the submittal of the completed ROW design and layout, which summarizes ROW impacts on a parcel-by-parcel basis. As [R00] is being developed, a good practice is for the utility coordinator to partner with the designers and ROW office to identify and prioritize parcels for early acquisition once ROW

funding is approved. This prioritization should focus on parcels with significant utility impacts or those critical for utility owners requiring early relocation.

- **ROW Acquisition [R04]:** During the ROW acquisition phase, it is recommended for utility staff to track the progress to confirm that it aligns with project timelines and ensure that the required ROW properties are acquired in a timely manner to allow for the utility to complete relocation work on time. It is also recommended that an acquisition strategy be developed that prioritizes critical parcels for utility work in order to avoid any potential delays in relocation work due to ROW not being available.

D. Utility Investigations – Subsurface Utility Engineering. Understanding the potential impacts of a project on existing utility infrastructure is essential for successful project delivery. The first step in addressing these impacts is to identify the presence and proximity of utilities within the project area. Collecting accurate and detailed information about the location and characteristics of existing utilities is crucial for minimizing potential conflicts and is often the most important step in effectively managing utility-related issues. Key considerations are as follows:

- While the scope, quality, and timing of utility investigations may differ from project to project, every project benefits from a thoughtful and diligent approach to identifying existing utilities. The recommendations outlined in Section 4.2.2 for implementation at various U-events can serve as a guiding framework. However, determining the appropriate investigation strategy should be a collaborative effort among the utility coordinator, designer, and project manager that considers each project's specific goals, needs, and characteristics. Ultimately, these investigations should yield sufficient detail to understand how the construction of the proposed project may affect the operation and maintenance of existing utilities and should enable timely and effective mitigation of potential impacts. Additional recommendations and a more detailed description of the suggested activities introduced earlier are presented below.

- As outlined in [U00] Preliminary Utility Investigation/Review, the first step in establishing an investigation approach is to gather all existing utility data that is easily obtainable. This may include reviewing permit and map files maintained by the Iowa DOT, conducting field investigations, submitting a Design Request System (One Call) ticket, and contacting local government agencies. The information collected should be documented in a utility inventory. This effort should begin early, ideally by the time the project reaches roughly 10% completion.

- The utility inventory serves as a tool to identify potential utility-related challenges and major risks and supports early initial decisions about the appropriate investigation approach. The PM, utility coordinator, and designer should then begin discussing how to best meet the project's utility data needs, whether through reviewing One Call records, obtaining records from utility owners, conducting field surveys, engaging SUE consultants, or other methods. At this point, particular attention should be given to data needs for critical or major utility facilities identified during the Utility Red Flag Study, as collecting this data will support

more informed design decisions and facilitate the avoidance or mitigation of impacts before the horizontal alignment is defined.

- During [U01] Initial Project Notice to all Utility Owners, confirmation of the presence of utilities within the project is obtained, and utility owners are expected to provide all available information regarding their facilities (location and attributes). Once this confirmation and these records are received, the utility coordinator, in collaboration with the designer and PM, should be able to reassess utility data needs and discuss investigation strategies, methods, and timing for utility investigations. This should include evaluating the need for SUE investigations and discussing the scope of the service (required quality levels or specific project areas for investigations).

- As outlined in Section 4.2.2.1, it is recommended that utility data needs and investigation strategies be reassessed as the project design progresses, specifically during U-events [U00], [U01], [U02], and [U03]. This recommendation aligns with the FHWA's recommended practice of using a risk-based approach to collect accurate utility location data during the preconstruction phase. The research team strongly encourages the Iowa DOT to adopt this practice by determining the appropriate level of utility investigation for each project and revisiting additional needs as the project advances. This iterative approach focuses on identifying areas with the highest potential for utility and design conflicts, where additional investigation and data collection would be most beneficial. If properly managed and updated and if conflicts are identified, the UCM can guide the strategic selection of locations for obtaining more accurate data, such as SUE QLB or QLA.

E. Utility Conflict Management. The implementation of UCM is a comprehensive, multistage process designed to systematically identify and resolve utility conflicts throughout the project life cycle. Ideally, the conflict matrices should capture and organize the following information:

- **Utility Conflict Data:** This includes details such as utility location, type, and ownership and the identification of potential conflicts with the project.
- **Resolution Data:** This encompasses proposed alternatives to address the identified conflicts, an analysis of these alternatives, selection of the most appropriate/cost-effective resolution, and execution of the chosen solution.

The effective use of this tool ensures that utility conflicts are identified and addressed as new project and utility information becomes available. To achieve this, UCMs should be managed as living documents that are continuously updated and maintained at different milestones throughout the project development and delivery process. Additionally, for UCM to be successfully implemented, active involvement from all relevant stakeholders is essential. **UCM is inherently a team effort and should not be the sole responsibility of the utility coordinator.**

Considering this and drawing on the approaches described by Taylor et al. (2021) for KYTC and by Quiroga et al. (2024), the research team has developed a reference framework to integrate

UCM into the Iowa DOT's project development and utility coordination processes. While the eight principles of the Partnership Approach are relevant for the successful implementation of this practice, the process should be driven by the "avoid, minimize, accommodate when feasible" principle. As shown in Figure 4-7, this principle emphasizes collaboration among stakeholders to avoid, minimize, and accommodate utility conflicts—in that order of preference—even in cases where utilities are not reimbursable.

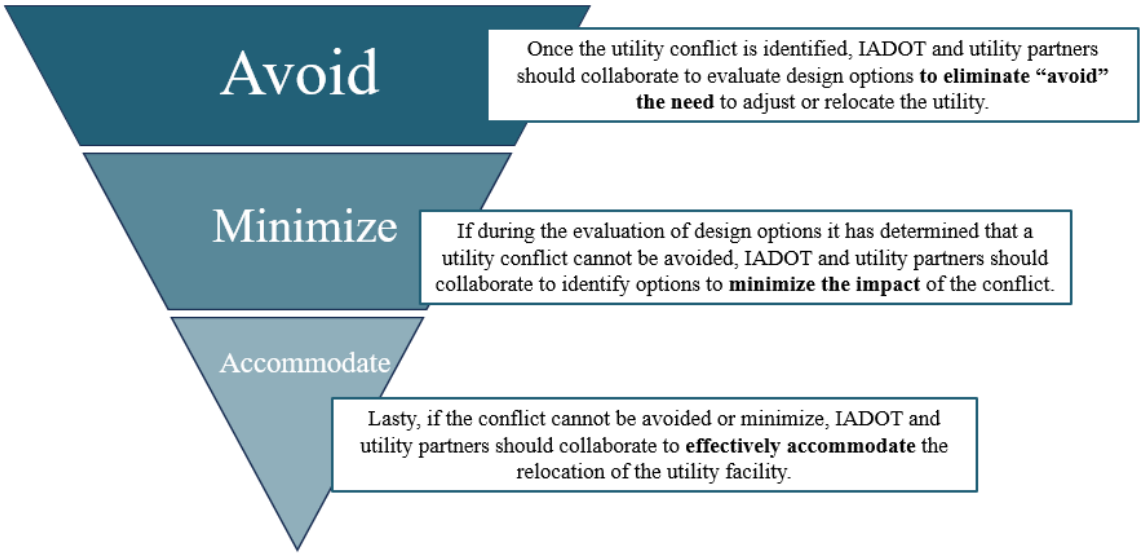


Figure 4-7. Avoid, minimize, accommodate approach

As shown in Figure 4-8, six key review points were identified at different U-events. Specific activities should be conducted at each of these milestones to effectively manage utility conflicts. These activities, detailed in Table 4-11, are intended to ensure the smooth integration of utility considerations into the project development process. While the number and placement of UCM review points may vary depending on the unique characteristics of each project, this framework provides a general guideline for implementing UCM effectively.

Specific tasks for implementing UCM in the Iowa DOT utility coordination process were outlined in Section 4.2.2.1. Table 4-11 is intended to provide further detail on the purpose of and considerations at each UCM review point.

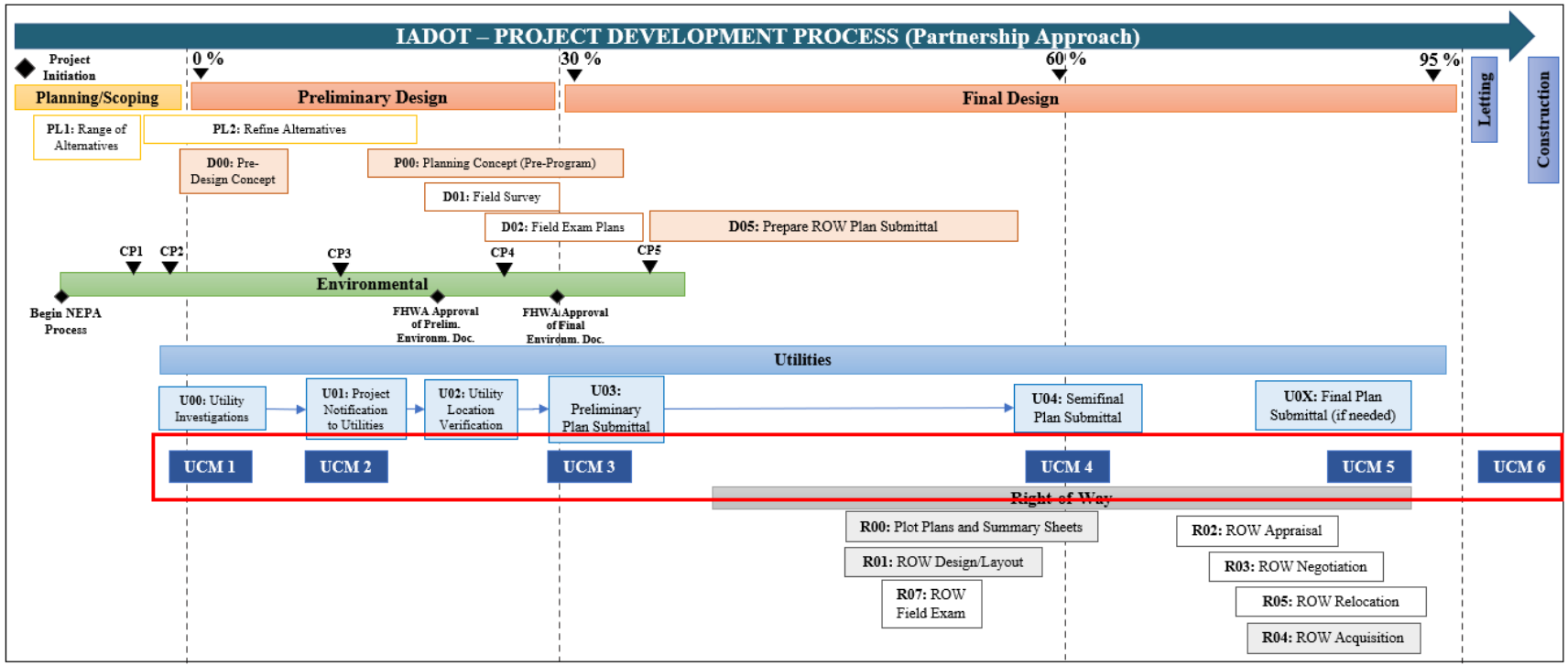


Figure 4-8. UCM process within the Iowa DOT project development process

Table 4-11. UCM activities within the Iowa DOT project development process

Project Stage	UCM	UCM Activities
Project Initiation / [U00]	**UCM-1**	[U00] involves performing a preliminary review of utilities in the project area and identifying potential major utility-related issues (red flags) that could impact the project's route, scope, cost, or schedule. Establishing the initial UCM at this stage and documenting these potential major/critical conflicts enables the project team to account for these utilities during alternative alignment analyses, consider options to **avoid** major conflicts, and develop a more realistic project scope.
Design 15%–20% / [U01]	**UCM-2**	At [U01], utilities are notified of the project and asked to confirm whether their facilities are within the project area and, if so, to provide information about them. Using their responses and any other available data, the designer and utility coordinator should collaborate to determine whether significant utility impacts are anticipated and update the UCM accordingly. The emphasis at this review point should be on identifying major physical constraints related to utilities not identified before, as this information must be accounted for in identifying alternatives to be carried forward [CP3] and selecting the preferred alternative [CP4]. This effort will allow the design team to think "outside the box" and evaluate adjustment options to help **avoid** or **minimize** utility conflicts, enabling more informed project decisions.
Design 30% / [U03]	**UCM–3**	This review point occurs when the design reaches approximately 30% completion, with the horizontal and vertical alignments nearing finalization. At this stage, [U03], more comprehensive utility data should be available, and utility owners should have confirmed/verified the locations of their facilities. To the extent possible based on the available information, the design team and utility coordinator should collaborate to assess and confirm what utility conflicts are anticipated. Preliminary project plans and the latest version of the UCM should be shared with utilities to request that they confirm conflict locations, evaluate constructability challenges, and provide input on potential resolution strategies. Collaboration among these stakeholders is critical to identify opportunities for further design modifications or utility protection measures that can help **avoid** or **minimize** conflicts. If needed, coordination meetings should be held with utilities to allow for a more detailed discussion. If SUE data has been collected, the availability of more detailed and reliable utility information will facilitate the identification and documentation of utility conflicts, enabling a more thorough analysis of resolution strategies. If SUE data is not yet available, the UCM can guide the strategic selection of locations for obtaining more accurate data, such as SUE QLB or QLA. The design team should update the UCM to reflect utility conflicts and resolution strategies as they are identified or refined. If a constructability review has been conducted, any utility-related findings, including potential conflicts and proposed resolutions, should be documented in the UCM.

Project Stage	UCM	UCM Activities
Design 60% / [U04]	**UCM–4**	This review point occurs when the design is around 60% complete [U04], with the horizontal and vertical alignments in place and cross-section plans and drainage design available. Furthermore, higher SUE data should be available, allowing the identification and confirmation of utility conflicts. The design team and utility coordinator should collaborate to review and identify conflicts, review and update conflict resolution strategies, analyze protect-in-place measures, and further explore any design alternatives to **avoid** or **minimize** conflicts. If a constructability review has been conducted, any utility-related findings, including potential conflicts and proposed resolutions, should be documented in the UCM.
Design 90% / [U05]	**UCM-5**	This review point occurs when the design is around 90% complete. At this stage, utility relocation designs are being finalized, and protect-in-place measures are being determined, presenting an opportunity to mitigate any remaining conflicts. Any new conflicts or issues identified during the final constructability/installation review should also be documented in the UCM. By this point, certain utility relocations are underway, particularly those not included in the roadway project contract. The UCM should be utilized to document, track, and monitor the progress and completion of these relocation efforts. Additionally, resolutions to utility conflicts should be reviewed and updated in the UCM. Once updated, the UCM can assist in the preparation of the UBA [U07] for inclusion in the bid package, as it should have information on the status of the utility work completed before construction, utilities that are not in conflict with the project, and utility work that must be completed during the construction phase.
Construction / [U06]	**UCM–6**	The final review point should occur during the construction stage, as utility relocation work may still be in progress; some utilities may need to be relocated as part of the roadway contract, and new utility conflicts could arise during construction. The UCM should be updated to include any new conflicts and reflect the resolution status of previously identified conflicts. The UCM could be a very useful tool for the pre-construction and construction utility coordination meetings. Although the utility coordinator may no longer be involved at this stage, a properly updated and managed UCM can greatly assist construction staff in coordinating utility relocation efforts that take place during the construction stage.

One of the most frequently cited challenges by Iowa DOT internal staff is the presence of communication silos within the Iowa DOT. While not a standalone solution, UCMs contribute to addressing this issue. The adoption of UCM is expected to streamline the discussion and resolution of utility conflicts by providing a shared document that allows key stakeholders—designers, utility coordinators, and utility owners—to visualize and understand utility constraints and issues while collaborating to identify the most cost-effective solutions. Moreover, UCMs are valuable tools for enhancing communication within agencies, allowing utility coordinators and designers to share critical information effectively across team members. **To maximize their**

effectiveness, UCMs should involve contributions from all relevant disciplines, including drainage, traffic, construction, and others.

It is strongly recommended that designers begin populating the UCM with conflict data **so that they can gain a deeper understanding of utility issues**. This will enable the designers to proactively address each conflict and ensure that the issues are resolved and integrated into the project plans and are not overlooked or allowed to escalate into major problems later.

F. Utility Coordination Stakeholders Management and Engagement. While specific related tasks for each U-event are recommended in Section 4.2.2.1, the research team believes that understanding the rationale behind these recommendations is crucial for their successful implementation. Therefore, this section aims to provide Iowa DOT staff with the necessary context and detail to help them recognize the value that these tasks add to the utility coordination process and how they contribute to achieving better utility stakeholder engagement.

The POINT 25 process offers a general framework that establishes the baseline for engaging with stakeholders. However, these steps alone may not always be sufficient to address the unique needs of both the project and its utility stakeholders. Projects are inherently unique, and the level of effort required to effectively engage with some utility stakeholders will vary based on different factors.

Effective and proactive utility coordination requires more than merely following prescribed steps, exchanging information at key milestones, and completing checklist items. **Utility coordinators must understand that treating utility owners as true partners often involves going beyond formal processes.** This includes dedicating time to understanding their interests, priorities, needs, concerns, and constraints—insights that should guide coordinators' actions to foster meaningful and productive engagement. Ultimately, this approach fosters stronger, more genuine partnerships that benefit all stakeholders and the project.

Building on stakeholder management and engagement principles, the research team has developed recommendations based on the Partnership Approach that can be integrated into the POINT 25 process to guide Iowa DOT utility coordinators in strategically tailoring their engagement approaches when managing different utility stakeholders in a project**. Coordinators must recognize that engagement strategies should not be one-size-fits-all solutions, as each utility coordination stakeholder may have unique needs, priorities, concerns, and behaviors.** For example, a large utility company experienced with Iowa DOT projects may require less support than a smaller, less experienced company, which may need more guidance to understand the project and determine the next steps. Additionally, some utilities may be more responsive and willing to cooperate, while others may require more effort to engage effectively. By strategically adjusting their strategies to meet these varied engagement dynamics, utility coordinators can enhance stakeholders' participation and responsiveness.

Figure 4-9 illustrates an iterative process comprising three main components that utility coordinators can use to effectively plan and implement stakeholder engagement strategies when coordinating utilities in Iowa DOT highway projects.

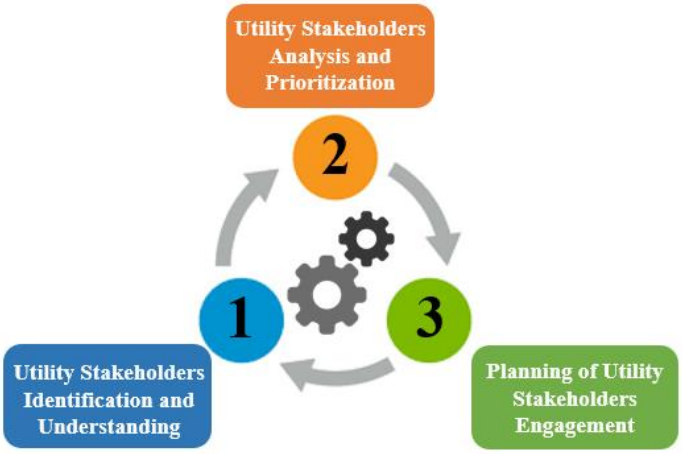


Figure 4-9. Utility coordination stakeholder engagement framework

Component 1, Utility Stakeholders Identification and Understanding, emphasizes understanding project goals, identifying utility stakeholders, and making efforts to gather relevant information to better understand these stakeholders. This is crucial for determining the most effective engagement approach for each utility stakeholder involved in the project. Key emphases of this component are as follows:

- **Identifying and communicating project goals is crucial**. As the project scope is defined, the goals are established as well. Clearly understanding and transparently communicating project goals to all utility stakeholders is a key step in the coordination process, as these goals serve as a foundation for subsequent actions, including utility stakeholder engagement. This will also enable utility coordinators to establish CSFs for the utility coordination process and set expectations for all stakeholders, which must also be communicated to foster a collaborative environment. (See recommendations for [U00] and [U01].)
- **Identifying utility stakeholders early in the process is essential.** Within the Partnership Approach for the POINT 25 process, this identification begins at the [U00] event, where an initial list of utility companies potentially located in the project area is developed. However, as the project progresses and more precise utility data is gathered through the subsequent U-events, adjustments to this list may be necessary.
- **Simply identifying utility stakeholders is not enough.** Each of these stakeholders has distinct interests and stakes in the project's decision-making outcomes. Utility coordinators must recognize this to effectively convey expectations and align them with the project's goals. Understanding utility stakeholders' interests and priorities is key, as they influence stakeholders' behaviors and attitudes toward the project. Additionally, each stakeholder operates with its own needs, requirements, and constraints, such as regulatory obligations, resource limitations, seasonal restrictions, specifications, industry requirements, and safety standards. For example, a small utility company may need more flexibility, as relocations can take longer due to resource constraints. **The Iowa DOT must recognize that project decisions should serve the public's best interest, which means finding a balance between the needs of the Iowa DOT and the needs of utilities** rather than prioritizing one over the other. This mindset should apply to both reimbursable and nonreimbursable utilities.

Understanding all of these aspects provides valuable insights that proactive utility coordinators need to assess and consider, as failing to do so may lead to opposition, which can negatively impact utility stakeholder engagement. Utility coordinators should also be mindful that the more they understand each stakeholder—for example, in terms of their policies, internal business practices, and decision-making processes as they relate to utility coordination—the better they can understand stakeholders' decisions and actions in the project. Iowa DOT project teams must recognize that effective utility coordination requires acknowledging that utility relocations are not the primary business of utility companies, that external factors like permitting or long lead times for materials can introduce delays beyond the control of utilities, and that relocation costs can be substantial for utilities and require thoughtful budget planning.

While the POINT 25 process provides the necessary steps to exchange project and utility data, identify and resolve utility conflicts, and coordinate necessary relocations, the utility coordinator should be responsible for engaging with each utility stakeholder to gather the information previously described in this component. This engagement will typically go beyond formal notices and correspondence and occur through phone calls, emails, or individual and group meetings. While some stakeholders may voluntarily provide some of this information, **it is the utility coordinator's initiative and communication and active listening skills that are key to obtaining a comprehensive understanding of each utility stakeholder's needs, concerns, priorities, constraints, etc.** This gathered information should be communicated to the pertinent project team members for consideration in project decisions, as well as thoroughly considered when assessing and engaging with each utility stakeholder, as this information will inform more effective, tailored engagement and communication strategies.

Component 2, Utility Stakeholders Analysis and Prioritization, addresses a crucial yet often overlooked aspect of stakeholder management: the need to differentiate and prioritize stakeholders. Utility sections in DOTs, including the Iowa DOT, often face resource limitations. As noted in Chapter 3, the high workload of utility coordinators can sometimes hinder their ability to effectively engage with utility owners. Differentiating and prioritizing utility stakeholders ensures that resources (time and effort) are strategically allocated to those with the greatest impact on the project. By focusing engagement efforts on these stakeholders, utility-related risks can be minimized, and potential roadblocks can be avoided.

That being said, utility coordinators should conduct a utility stakeholder assessment to prioritize and strategically design engagement efforts. While there are different approaches to do so, this assessment should incorporate information previously collected from each stakeholder in Component 1 and the utility coordinator's own experience from previous projects. For instance, utility companies might be assessed based on factors such as the sensitivity of the facility (e.g., national security or 911 lines), the complexity and criticality of the utility infrastructure, constraints imposed on the project by the utility (e.g., lead times, seasonal restrictions, industry requirements), and dependencies with other utility relocations. Utility coordinators should also consider factors to understand utility stakeholders' influence, such as the impact of their facilities on the project's critical path and budget, the time and effort required for coordination, the capacity of the utility to engage in the process, and the flexibility of the relocation process.

Furthermore, as the project progresses and utility relocation details become clearer, the influence of certain utility stakeholders may shift. Practitioners must recognize these changes and adjust their engagement strategies accordingly. Observing stakeholders, staying informed about their activities, and anticipating potential shifts in their interests and priorities are essential elements of relationship-building and fall within the responsibilities of the utility coordinator. Recognizing and addressing this dynamism is key to proactive stakeholder engagement, in that it ensures that the utility coordinator can handle changes effectively rather than reacting to them as they arise.

While it is up to the utility coordinator to define the best approach for differentiating and prioritizing utility stakeholders, some recommendations can serve as helpful references. Figure 4-10, as suggested in a study for KYTC (Taylor et al. 2021), presents an interest-impact matrix that classifies stakeholders into four groups and recommends different levels of engagement for each group.

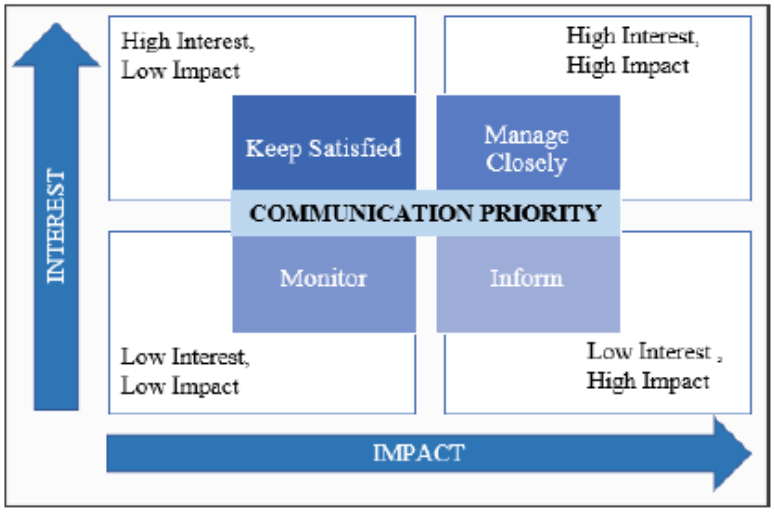


Figure 4-10. Interest/Impact matrix for stakeholder engagement

Similarly, another approach, presented in Figure 4-11, is outlined in the *Utility Coordination Process Manual* published by Alberta Transportation (2020) as part of the recommended Stakeholder Register and Communication Plan template. As shown in this figure, the approach uses a matrix to classify stakeholders based on their influence and level of support.

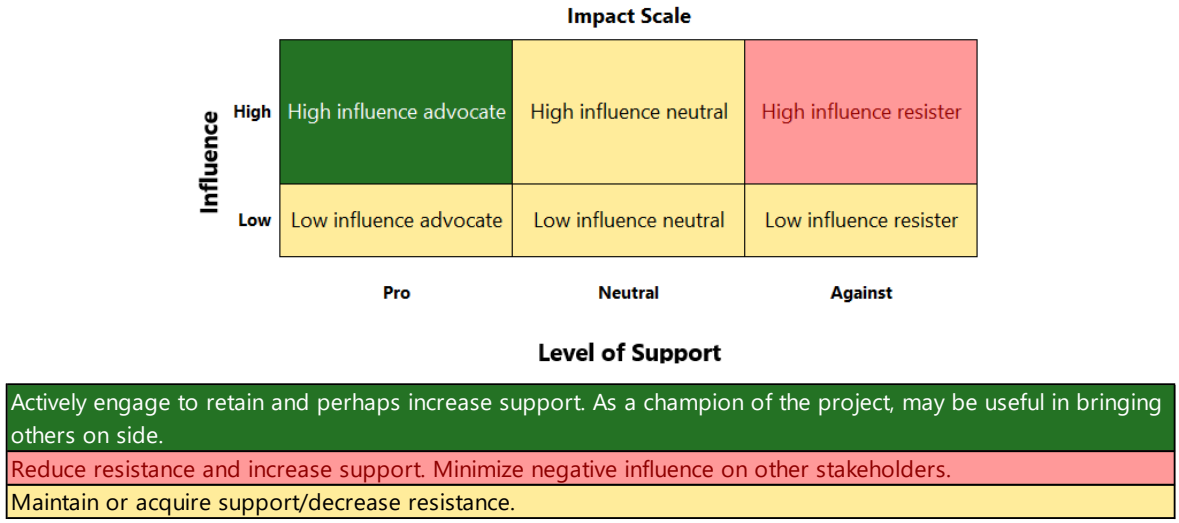


Figure 4-11. Influence/Level of support matrix for stakeholder engagement

While these matrices can be formally documented in documents like a utility stakeholders engagement/communication plan, the key takeaway lies in their underlying concept. The goal is not to increase the workload for utility coordinators but to provide strategic guidance for their actions, ensuring the most effective engagement with various utility stakeholders. By strategically allocating their efforts, utility coordinators can prevent negative impacts, particularly from stakeholders who could significantly influence utility coordination and the project's overall success.

Component 3, Planning Utility Stakeholders Engagement, involves defining the most appropriate engagement strategies by using the information gathered and analyzed in the previous components. These strategies must remain flexible to accommodate the varying engagement needs of the different utility stakeholders. Proactive utility coordinators will tailor their strategies to align with stakeholder preferences to improve responses and overall engagement.

As utility coordinators gain experience and establish relationships with utility stakeholders, they develop a better understanding of which engagement and communication strategies are most effective for certain stakeholders. This understanding helps utility coordinators anticipate stakeholder responsiveness and adjust their engagement strategies accordingly. Furthermore, as the project progresses and utility stakeholders are engaged, it is recommended that the effectiveness of the engagement strategies be continuously monitored so that necessary adjustments can be made if needed.

Similar to the matrices noted in Component 2, these engagement and communication strategies can be documented in a utility stakeholders engagement/communication plan. A template for reference, outlined in the *Utility Coordination Process Manual* published by Alberta Transportation (2020), can be found at https://open.alberta.ca/dataset/dbb7c4c9-001c-44bc-8182-cde14d479398/resource/7b9ca058-3649-4acb-86e2-7024a263c4b7/download/trans-utility-coordination-process-manual.pdf. This template highlights key elements to document, including

a list of stakeholders, their assessment and prioritization, and an engagement/communication plan. The plan specifies communication methods, timing, frequency, points of contact, and desired engagement outcomes.

An overarching component, **Utility Stakeholders Engagement**, focuses on implementing the engagement strategies developed in Component 3. Figure 4-12 shows that this component influences all three preceding components. This is because information regarding stakeholders' interests, needs, concerns, priorities, and constraints (Component 1) is typically gathered through ongoing interactions and conversations with the utility stakeholders. Similarly, the insights needed to assess and prioritize these stakeholders (Component 2)—such as their level of support, impact, and influence—and to identify the most appropriate engagement strategies (Component 3) are collected throughout as the project progresses and communication and interaction with stakeholders take place.

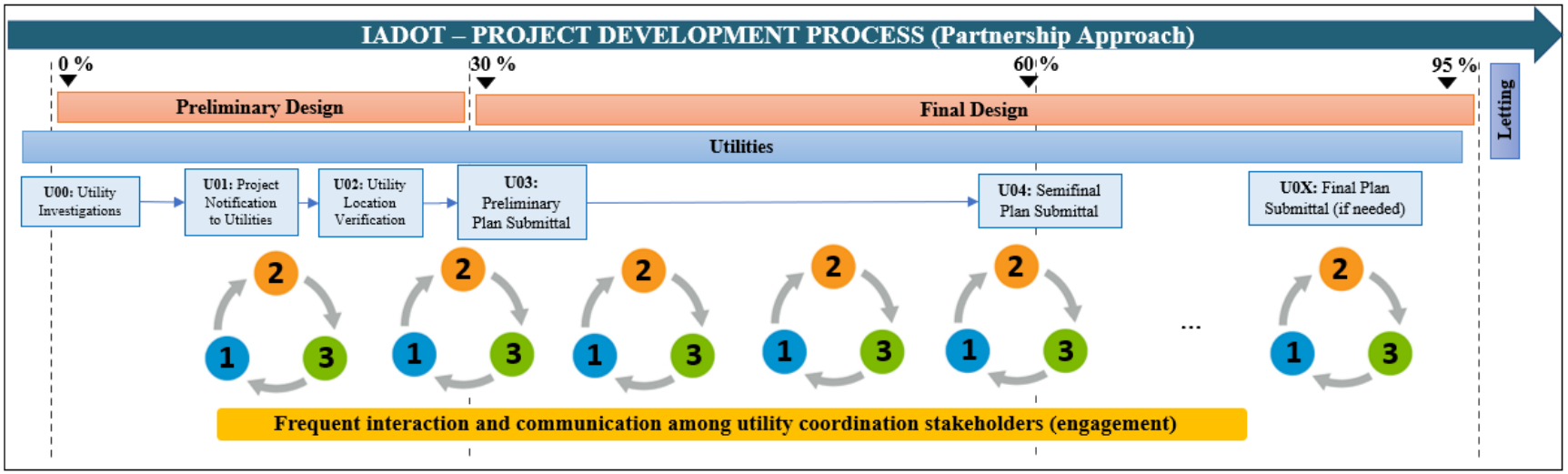


Figure 4-12. Framework for utility coordination stakeholder management and engagement

It is noteworthy that a key factor, if not the most important, in successful utility stakeholder engagement is the existing collaborative working relationships with them. These relationships, which require time and effort to cultivate, facilitate the collection of valuable information specific to each stakeholder and the identification of the most appropriate approach to engage them in a given project. Additionally, the involvement of a highly skilled utility coordinator is crucial for successful engagement. The coordinator's expertise, along with his or her analytical and interpersonal skills, plays a critical role in facilitating each component of this framework.

Note: The recommendations in this section, while primarily focused on enhancing engagement with utility owners—who are one of the primary utility coordination stakeholders—should also highlight how important it is for the utility coordinator to recognize that other stakeholders, internal and external, are involved in this process. These stakeholders may not always be directly engaged in utility coordination activities, but their involvement is still crucial. They can both influence the outcomes of utility coordination efforts and be impacted by them, either positively or negatively. As such, their timely and effective engagement should also be part of the utility coordinator's overall coordination efforts. These stakeholders might include the following:

- Utility owners (in-house staff, consultants, contractors)
- DOT design team, project manager, construction staff, ROW staff, surveying staff, planning staff, environmental staff, and any other supporting teams.
- DOT consultants (design, locating services/SUE consultants)
- Local public agencies

The goal of raising the DUC's awareness of these stakeholders is to ensure engagement with them—whether to a minor or major degree, depending on the project's specific needs—to prevent any negative impact on utility coordination success. For example, failure to engage with ROW staff when coordinating ROW needs for utilities in a timely manner could delay the ROW acquisition process and, consequently, affect the utility coordination process and the project. Similarly, failure to involve environmental staff when aligning relocation efforts with environmental permits and commitments could lead to delays. On the other hand, proactively engaging these stakeholders can significantly enhance the utility coordination outcomes.

It is common practice for efforts to focus mainly on stakeholders with a direct impact or those directly affected by the utility coordination process, typically the utility owners. In contrast, indirect stakeholders are often managed reactively, only being addressed when issues arise, which can negatively impact the utility coordination process. This is a mindset that the Partnership Approach aims to change.

G. Constructability Reviews. As outlined in the literature review, constructability reviews are generally recommended to take place at multiple stages within the project development process—typically at 30%, 60%, and 90% design milestones—to achieve optimal results. However, since project development processes differ among states, and the design features completed at each milestone can vary, the timing of these reviews should be tailored to the specific state's development process and project context. Factors to be considered include the project's complexity and the availability of relevant project documents at different design

submissions, such as the preliminary alignment, final alignment, drainage design, and near-finalized project plans. These reviews should involve staff from various offices working on the project, as their collective input is essential to identify and address potential conflicts, including utility impacts, before construction begins. **Based on this understanding, the research team has developed the following recommendations**:

- As the PDP guidance manual outlines, the Iowa DOT project development process does not explicitly include events dedicated to constructability reviews. The research team believes that incorporating such events would add significant value to the process and promote best practices for conducting these reviews. While it is possible that these reviews are being conducted as part of other events, this is not clearly stated in the current guidance manual.

- To maximize their effectiveness, constructability reviews should be structured as a multistage process occurring at various points in the project development process. Drawing from approaches used by other state agencies, such as INDOT, and considering the Iowa DOT project development procedures, **the research team recommends that constructability reviews be conducted at the stages outlined in Table 4-12**.

Table 4-12. Recommended timing for utility-related constructability reviews

Timing	Constructability Review Focus/Considerations for Utilities
[D02] – Field Exam Plans (30% design completion) or once the preferred alternative has been selected.	Conducting a constructability review at this stage helps identify omissions, design errors, or potential areas where utility impacts should be avoided before proceeding with a detailed design. Making geometric changes becomes increasingly difficulty after this point, so this review provides the optimal opportunity to avoid relocations.
[D05] – Plans to ROW or when design is 60% complete	Although opportunities to avoid utility conflicts should have decreased by this point, conducting a constructability review at this stage should help identify necessary minor design changes to mitigate conflicts.
90% design completion	A review at this stage should include reviewing all utility relocation packages, especially the ones that will occur during construction. The review should evaluate the feasibility of proposed utility relocations, focusing on phasing, sequencing, any dependencies, maintenance of traffic plans, site access, and other construction-related factors. These details should be communicated to the construction contractor, preferably during a pre-bid meeting, to avoid problems during the construction phase and ensure project success.

These suggested milestones provide a general framework. However, the ultimate decision on the need for fewer or additional reviews, as well as their timing, should take into account the specific characteristics and complexity of the project, as well as the availability of relevant design submittals. The following should be considered:

- Conducting an **effective constructability review requires a thorough analysis of highway project plans and involves collaboration with various stakeholders** to determine whether

proposed roadway and utility features can be constructed. During the NHI training, participants were asked to describe the Iowa DOT's approach to constructability reviews, and the responses revealed that there is potential to enhance and refine current practices. INDOT has developed a constructability review process, available for reference at https://www.in.gov/indot/3405.htm. INDOT's process highlights reviews at the 30%, 60%, and 90% plan development stages and defines staff responsibilities for successful execution. It also provides checklists customized for varying project complexities and each stage of the review process.

- **To be truly effective, a constructability review must consider the utility's ability to relocate**; otherwise, it remains incomplete and introduces potential project risks. Therefore, **incorporating input from utility owners during these reviews is highly recommended**, as they bring essential expertise about their own infrastructure systems. Including utility owners and utility coordinators in constructability review meetings or having construction engineers assess utility conflicts and relocation plans (i.e., implementing utility-specific constructability reviews) helps identify potential challenges related to utility relocations to determine the best course of action. It also highlights issues that the highway contractor may face during construction.

- **Constructability reviewers should evaluate both existing and proposed alignments for highway and utility facilities, including any temporary alignments**. During these reviews, they should conduct tasks such as the following (Quiroga et al. 2024):

    - Evaluate how construction equipment (e.g., cranes or drill shafts) might affect nearby underground or aboveground utility facilities. This includes identifying risks like vibration impacts or weight constraints on utilities and proposing mitigation measures.
    - Examine proposed construction designs for subsurface conflicts, such as storm sewers located below existing utilities, and determine appropriate protective measures for the affected facilities.
    - Consider situations where cranes or other equipment are operating near electrical lines. Determine whether de-energization or protective measures are necessary to ensure worker and public safety.
    - Review and determine appropriate strategies for handling utility facilities containing hazardous materials. Decide whether removal, isolation, or protection of these facilities best aligns with project requirements.
    - Determine strategies for removing or managing abandoned utility facilities, evaluating whether utility owners should remove them or whether assigning removal to the highway contractor is more practical for the project.
    - Identify potential hidden conflicts between construction activities and utilities that may not appear in the final design and evaluate potential solutions, such as protect-in-place measures.
    - Analyze the impact of temporary traffic measures, such as detours and phasing, on utility facilities, even if no conflicts are present in the final highway plans.

H. Risk Assessment and Management Approach to Utility Coordination. The current Iowa DOT PDP guidance manual does not explicitly outline a specific event for project risk assessment and management. However, these activities may be addressed as part of general project management efforts. If so, it is recommended that the utility coordinator collaborate with the project manager to raise awareness of identified utility-related risks, ensuring that they are addressed within the project's risk management process and that appropriate strategies for resolution are identified.

Additionally, the research team has proposed specific tasks at various U-events to encourage utility coordinators to adopt a risk assessment and management mindset as part of their utility coordination efforts. While these tasks were outlined in Section 4.2.2.1, this section provides additional context for their implementation and emphasizes the importance of this practice.

Utilities and their complex interactions with transportation infrastructure can pose significant risks to a project's scope, schedule, and budget (e.g., when infrastructure serves critical/complex facilities, a project features materials with long lead times and BABA requirements, or a critical goal exists to open projects to traffic). Therefore, the **utility coordination process should be approached as a utility risk assessment and management practice throughout the project development process**. While it is crucial to begin this risk assessment as early as possible—ideally during project scoping—so that it can inform the decision-making of the project team, risk assessment should remain an ongoing effort. As new information emerges and the project progresses, the risk assessment can be refined, and necessary actions to avoid and mitigate identified risks can be determined.

It is important for the utility coordinator to not only identify these risks but also communicate them to the project manager and design team as soon as possible, allowing the project manager and design team to evaluate how these risks might affect the project's scope, schedule, and budget. Furthermore, this early identification and assessment of utility risks can inform the next steps of the utility coordination efforts, such as determining utility investigation needs or identifying high-risk utilities that may require more intensive engagement efforts.

While utility risks will vary based on the specific characteristics and complexity of the project, the following list of utility-related factors, developed through the national effort described in *NCHRP Research Report 1110: Minimizing Utility Issues During Construction; A Guide* (Quiroga et al. 2024), provides an overview of potential risks for reference:

- Differing site conditions
- Delays in acquiring critical parcels
- Delays in getting utility owners to respond and begin coordination
- Inaccurate or incomplete utility facility data during design
- Errors in plans, specifications, or cost estimates
- Delays in getting utility owners to schedule utility relocations in the field
- Delays in acquiring all parcels
- Changes in highway design prior to letting

- Unrealistic timeframes by project owners for utility coordination and utility relocations
- Delays in identifying and resolving utility conflicts
- Delays in acquiring replacement easements for utility relocations
- Inadequate utility relocation schedules
- Utility owners holding off on relocation design until right of way has been acquired
- Unrealistic timeframes by utility owner for completing utility relocation work in the field
- Utility owners holding off on relocation design until project plans are at least 60% or 90% complete
- Delays in obtaining permits
- Inadequate coordination or sequencing among utility owners using common poles or duct banks
- Delays in getting responses from utility owners when there are highway construction changes that necessitate coordination
- Inadequate utility relocation plans
- ROW encroachments or features impeding utility relocations

I. Adopting a Value Engineering Approach. The current Iowa DOT PDP guidance manual incorporates two VE events—[VE1] and [VE2]—which, while flexible in timing, are typically recommended to occur during the planning stage and when the design is around 30% complete, respectively. These events could provide valuable opportunities to **generate and evaluate alternatives, design variations, or methods to avoid unnecessary utility relocations and/or minimize impacts on existing utilities when feasible.** To maximize the effectiveness of these events, it is essential for the utility coordinator to collaborate with the design team in order to ensure that all utility data gathered during the [U00], [U01], [U02], and [U03] events is considered during the VE studies. This effort will promote utility awareness and enhance the quality of these evaluations and the design team's ability to make informed and cost-effective decisions.

Beyond these specific VE events, the research team strongly recommends **adopting a value engineering mindset as the overarching approach to managing utility impacts when evaluating project and utility relocation alternatives**. The design team should aim to reduce overall project costs, including both the Iowa DOT's expenses and utility relocation costs, irrespective of reimbursement responsibilities. **The overarching goal should always be to maximize public value**. It is also recommended that the evaluation consider how the duration of the relocations will impact the project schedule. The consideration of the value of such impacts will vary depending on the individual project's characteristics.

J. Training Programs. As highlighted in the literature review, many researchers emphasize the importance of training and professional development for utility coordination stakeholders, including project planners, designers, utility coordinators, project managers, utility owners, consultants, and contractors. Targeted training programs can strengthen foundational knowledge for new employees and support the ongoing professional growth of experienced staff.

This recommendation was also highlighted as a key practice for improving the Iowa DOT utility coordination approach by the stakeholders who participated in the project's surveys and the NHI training. Based on their feedback, **the following recommendations should be considered for developing and delivering a training program for Iowa DOT utility coordination stakeholders**:

- Provide training on effective utility coordination to Iowa DOT functional groups (e.g., designers, project managers, ROW staff) to help them understand how their roles contribute to the success of the process and how their decisions affect utilities.
- Offer training to designers on the utility coordination/relocation process, utility avoidance, and the impact of design decisions on utilities in order to encourage them to make a greater effort to reduce the need for relocations during highway design when feasible.
- Provide training to designers on the effective use of UCM to conduct utility conflict analysis so that they can collaborate with utility coordinators and utility companies to proactively address utility conflict identification and resolution and consider creative approaches to avoid, minimize, or mitigate utility impacts when feasible.
- Offer training on the POINT 25 process and best practices being implemented by the Iowa DOT to utility companies, Iowa DOT staff, and local agencies, as respondents indicated that understanding the process, its steps, and its requirements can enhance compliance. This could also include practices from the Partnership Approach.
- Provide training to utility companies on highway project plan reading to improve understanding and collaboration throughout the project life cycle.

K. Other Recommendations. As consistently emphasized throughout this report, establishing partnering relationships with utilities is crucial for successful utility coordination. One widely recommended practice to support this effort is for the Iowa DOT to share long-range project plans with utility partners. This would enable utility partners to anticipate potential major impacts on their facilities and incorporate this information into their own planning. While not all utilities may be willing to share their long-range plans, it is still beneficial to seek this information, as aligning Iowa DOT projects and utility projects can benefit both parties. For example, if a utility is planning an expansion or reconstruction, it may coincide with a planned highway project. In such cases, the Iowa DOT and the utility can explore opportunities to align their efforts, ultimately optimizing resources and serving the public's best interest.

Other considerations include the following:

- The Iowa DOT already hosts an annual meeting with utility partners, which is a valuable practice for strengthening these working relationships. This effort can be further enhanced through district-wide meetings—some of which are already in place—to discuss upcoming projects, potential impacts, and opportunities for collaboration. These meetings can provide a platform for open dialogue, which can help improve coordination and foster stronger partnerships between the Iowa DOT and utilities.

- Feedback gathered through the survey of Iowa DOT stakeholders suggested updating the utility accommodation policy and guidance manuals. Based on its own review of these

documents, the research team also believes that the Iowa DOT should consider implementing this recommendation eventually, as doing so could benefit the Iowa DOT Utility Program. During the review, the research team noted several inconsistencies between the existing documents regarding terminology and descriptions of procedures, which could create confusion among users. The research team also identified opportunities for improvement in both the project development and utility coordination manuals, including the need for better guidance on how these processes align and on implementing utility coordination best practices.

- A recurring recommendation from different Iowa DOT stakeholders was to implement penalties for utilities due to noncompliance, particularly with work plans and schedules, and to hold utilities more accountable/liable for completing their relocation work and for being nonresponsive. While the POINT 25 process allows for penalties in cases of delays, including measures such as withholding future permits from noncompliant utility companies, it is important to consider that enforcing these penalties could hinder collaboration and foster adversarial relationships with utility companies. However, there might be cases where such penalties are necessary.

4.3. Recommended Roles and Responsibilities

Successful utility coordination is a team effort and requires active participation from multiple stakeholders. As discussed above, all key stakeholders should have a clear understanding of their roles and responsibilities and be committed to fulfilling them. The roles and responsibilities outlined in this section are designed to support the Iowa DOT in implementing the Partnership Approach introduced in this chapter.

4.3.1. Regional Utility Program Coordinator

- Monitors and communicates utility coordination progress and status
- Prepares high-level utility relocation cost estimates for project programming
- Updates U-events in the PPMS (as needed) and provides the status of U-events for production schedule meetings
- Attends project management team meetings to address utility concerns
- Coordinates projects with utility coordinators
- Assists in obtaining accurate utility information (location and attributes) from utility owners:
    - Reviews requests to perform SUE for utility investigations
    - Requests approval to perform SUE for utility investigations
    - Drafts scope and agreements to perform SUE for utility investigations
- Performs utility field exams for potential impacts to utility facilities and project-driven utility relocations (as needed)
- Performs engineering reviews of highway plans for potential impacts to utility facilities
- Reviews highway plans for impacts to privately owned utility connections

- Sends notifications and plan submittals to utility owners for project coordination:
    - Requests a response and work plans by a specific date
    - Requests estimates and drawings for reimbursable work
    - Reviews Iowa DOT plan revisions for impacts to utilities
- Sends updated plans and additional plan information and cross-sections to utility owners (as needed)
- Receives/reviews requests for reimbursement:
    - Reviews plans and cost estimates submitted from utility owners for policy compliance
    - Requests additional information from utility owners regarding relocation plans and cost estimates
    - Arranges for additional plan information and cross-sections to be sent to utility owners
- Requests field reviews of utility plans as needed
- Draft utility reimbursement agreements for utility owners and negotiates them
- Requests COCs from utility owners for work performed

4.3.2. District Utility Coordinator

- Performs utility coordination functions for highway projects
- Establishes utility coordination goals based on overall project goals and CSFs
- Assists with the collection and review of existing utility data and ensures that it is properly documented in the utility inventory:
    - Ensures that all known utility owners in the project vicinity are added to the project in the PPMS
- Assists in conducting a preliminary review of potential major utility impacts (Utility Red Flag Study) and in evaluating the risks these impacts may pose to the project
- Defines the utility coordination scope based on project-specific needs and characteristics
- Identifies utility data needs and determines the best utility investigation approach/strategies to meet those needs
- If SUE is found to be necessary for the project, performs the following actions:
    - Acquires cost estimates for SUE investigations
    - Defines and develops the scope of SUE services based on project needs
    - Submits a request to perform SUE to the Central Office
- Strategically plans engagement and communication efforts based on project and utility owners' needs

- Gathers any relevant project information to be shared and communicated to utility owners
- Works with the designer to evaluate design alternatives to avoid or minimize major utility impacts
- Schedules and leads utility coordination meetings for highway projects
- Monitors and tracks the status of relocations in the PPMS
- Monitors the status of parcels needed for utility relocations
- Monitors project letting schedules to ensure timely relocations
- Informs the Central Office of letting schedule conflicts and potential delays related to relocations
- Serves as the main contact for the project with utility companies
- Answers day-to-day questions regarding the project
- Assembles information for plan submittals to utility owners in the PPMS for appropriate U-events
- Notifies the Central Office when plans are ready to send for U-events
- Receives/reviews transmittals and work plans for utility owners:

    - Sends follow-up and reminder letters to utility owners as needed throughout project development
    - Reviews/approves utility work plans for compliance with the project
    - Prepares/sends work plan approval to utility owners
    - Prepares/sends compliance/noncompliance notices to utility owners regarding relocation plans
    - Prepares/sends the notice to proceed to the utility when relocation may begin
    - Prepares/submits UBAs with the status of relocation for plan turn-in

- Updates the PPMS to show when utility owners request that the Iowa DOT acquire replacement easements
- Updates the PPMS to show when advanced ROW purchase of parcels is required
- Updates the PPMS to show which parcels are needed for utility relocations
- Provides utility owners' easement needs to the ROW design section for incorporation into ROW design
- Monitors and tracks the status of U-events in the PPMS throughout project development
- Performs engineering reviews of highway plans for potential impacts to utility facilities
- Performs field exams for potential impacts to utility facilities and project-driven relocations (as needed)
- Assists in preparing high-level utility relocation cost estimates for project programming
- Receives requests for reimbursement for relocations from utility owners
- Performs initial reviews of project-driven utility cost estimates
- Requests additional information from utilities regarding plans and estimates
- Sends additional plan information and cross-sections to utility owners when requested
- Reviews draft agreements for compliance with the project
- Receives, reviews, and approves COCs and, once completed, sends them to the Central Office
- Assists in permitting coordination with EOTs and the Central Office (as needed)

- Attends project team meetings to provide utility status and monitor further impacts

4.3.3. Engineering Operations Technician

- Receives, reviews, and approves/denies utility permits
- Performs field reviews for permit requests
- Serves as the main contact for permit-related field issues with utility owners
- Coordinates permit request reviews with the utility coordinator (as needed)
- Performs engineering reviews of highway plans for potential impacts to utilities (as needed)
- Performs field exams for potential impacts to utility facilities and project-driven relocations
- Assists in obtaining accurate utility location information from utility owners for GIS integration
- Assists in reviewing utility work plans for highway projects (as needed)
- Assists in monitoring utility relocation status throughout project development
- Assists in monitoring project letting schedules to ensure timely relocation by utility owners
- Informs the Central Office of letting schedule conflicts and potential delays related to relocations or permits
- Attends utility coordination meetings (as needed)

4.3.4. Project Manager

- Communicates overall project goals and CSFs to the utility coordinator, as well as any relevant information regarding project scope, schedule, and budget
- Collaborates with the utility coordinator to determine utility coordination goals and scope based on the project's goals and specific needs and characteristics
- Collaborates with the utility section to determine whether the project is a POINT 25 project
- Communicates any changes to the project's scope, schedule, or budget to the utility section and/or utility coordinator in a timely manner
- Collaborates with the utility coordinator to assess and manage the risk that utility impacts may pose to the project scope, budget, and schedule
- Supports early collection of existing utility data, ensures its integration into project documentation, and ensures that relevant team members are aware of and have access to it
- Helps foster utility awareness across the project team throughout all phases of development
- Promotes interdisciplinary collaboration among functional groups, such as the ROW, environmental, and survey teams, alongside utility stakeholders
- Facilitates discussions with the designer and utility coordinator to identify utility data needs and define the approach to utility investigations
- Determines the timing of and coordinates utility-related constructability reviews as appropriate throughout project development

4.3.5. Design Team

- Depicts all known utility facilities (locations and attributes) within the project area on highway plans. Use of ASCE 38-22 standards for this depiction is strongly recommended.
- Identifies when more accurate utility location data is needed and communicates those needs to the PM and utility coordinator
- Reconciles utility data from multiple sources, identifies discrepancies, and collaborates with utility owners to correct inaccuracies in utility depictions
- Identifies critical areas where potential utility conflicts may significantly impact the project and communicates these to the PM and utility coordinator
- Collaborates with the PM and utility coordinator to define project-specific utility data needs and determine the appropriate approach for utility investigations
- When SUE services are to be used, provides input to help define the scope by recommending investigation areas (test hole needs), appropriate quality levels, and expected deliverables based on project design needs
- Integrates SUE data into design plans to improve the accuracy of utility depictions
- Prepares and updates highway design plans for submittal to utility owners at required utility coordination steps/events
- Collaborates with the utility coordinator to identify and document conflicts between the proposed design and existing utilities in the UCM
- Collaborates with the utility coordinator to manage and update the UCM throughout project development
- Evaluates design alternatives and implements feasible modifications to avoid, minimize, or mitigate utility conflicts
- Assists utility owners in interpreting project plans and the UCM when requested
- Leads or supports meetings with utility owners to review design alternatives and discuss options to avoid or reduce conflicts
- Identifies ROW needs associated with utility relocations and provides recommendations to the utility coordinator and ROW acquisition staff to guide timely and strategic property acquisition

4.3.6. Survey Team

- Requests utility location information through One Call Design Request
- Measures and documents the location of existing utility facilities in the project area
- Provides all collected utility survey information to the designer and utility coordinator
- Depicts as best as possible utility facility locations on highway design plans (ASCE 38-22)
- Provides recommendations to scope project utility investigations and determines whether advance investigations (SUE QLB/QLA) are needed
- Works with the utility coordinator and utility owners to obtain utility location information for plan and GIS integration

4.3.7. Assistant District Engineer

- Monitors and assists in utility coordination functions
- Performs engineering reviews of highway plans for potential utility impacts (as needed)
- Assists in reviews of utility relocation work plans for highway projects (as needed)
- Advises in decisions on whether SUE is required for specific project locations
- Attends utility coordination meetings (as required)
- Assists in monitoring utility relocation status throughout project development
- Assists in monitoring project letting schedules to ensure timely relocation by utility companies
- Reviews UBAs with the status of utility relocations

4.3.8. Resident Construction Engineer

- Assists in utility coordination functions
- Answers questions related to construction regarding utility coordination activities
- Performs engineering reviews of highway plans for potential utility impacts (as needed)
- Assists in reviews of utility relocation work plans (as needed)
- Advises in decisions on whether SUE is required for specific project locations
- Attends utility coordination meetings (as requested)
- Assists in monitoring utility relocation status to ensure timely relocation
- Advises the utility coordinator on approval of certificates of completion
- Acts as the point of contact for construction-related issues between the Iowa DOT and utility owners

4.3.9. ROW Staff

4.3.9.1. ROW Utilities Section Supervisor

- Ensures that the proposed ROW design minimizes impacts to utility facilities
- Ensures that privately owned utility connections/relocations are noted in the ROW design
- Ensures that the ROW design accommodates property needs for utility relocations
- Ensures that utility easements for relocations are incorporated into ROW design plans when requested in advance [Draft R01]
- Ensures that ROW design plans are submitted to the utilities section for distribution to utility owners
- Ensures that high-level utility relocation cost estimates are included during project programming

4.3.9.2. ROW Acquisition Supervisor

- Reviews and verifies proof/documentation of compensatory interests provided by utility owners

- Collaborates with the utility coordinator to identify potential challenges or complexities related to ROW acquisition that may affect utility relocations and the project timeline
- Collaborates with the utility coordinator to identify critical parcels for utility relocations and strategically prioritize their acquisition to allow utility owners sufficient time to complete their work
- Ensures that advance ROW purchase parcels needed for utility relocations are acquired
- Ensures that necessary easements for utility relocations are identified and acquired
- Monitors the status of ROW acquisition and promptly shares relevant updates with the utility coordinator
- Attends utility coordination meetings and supports the utility coordinator during these meetings (as needed)

4.3.10. Utility Owners

The approach to partnership cannot occur without willing utility partners. Utility owners should engage in partnership with the Iowa DOT at appropriate levels and consistently throughout the project life cycle. Overall responsibilities of utility owners include the following:

- Identifies and provides the contact information of a person designated as the authorized representative for coordination purposes. This person should be the main point of contact between the utility owner and the Iowa DOT.
- Confirms the presence of utility facilities within the project area and, if applicable, provides all existing and relevant information on the facilities (location and attributes)
- Communicates any known or anticipated upcoming utility facility work in the project area to facilitate effective coordination with the highway project
- Provides input on potential major utility impacts (high cost/risk, complex facilities) to the Iowa DOT as early as possible
- Verifies the accuracy of the utility facility location information shown in the project plans, provides detailed descriptions or markups when corrections are needed, and assists the designer in resolving discrepancies, if requested
- As early as possible, communicates the following to the utility coordinator:

    - Any potential factors that could affect the project schedule or coordination timeline (e.g., lengthy design times, long lead items)
    - Any special restrictions (e.g., work or outage restrictions), requirements (e.g., BABA compliance, permits that may be required, coordination needs, joint use or third-party installation requirements), and potential challenges
    - Whether existing facilities are located outside of the existing ROW and within private easements and, if applicable, proof of compensatory interests when the proposed work may lead to reimbursement
    - Any potential easement replacement needs
    - Any other relevant information for consideration of the Iowa DOT

- If requested, provides input/recommendations to help define the scope of utility investigations

- If applicable, provides any information requested by the SUE consultant
- Reviews project plans and identifies potential utility conflicts, providing recommendations to eliminate or minimize impacts. If requested, collaborates with the utility coordinator and designer to discuss these recommendations and determine the most cost-effective solution.
- Discusses with the utility coordinator the locations of any potential temporary or permanent additional ROW needs or easements necessary for utility relocations
- Responds on time to all information requests from the Iowa DOT
- Proactively participates in joint and/or individual utility coordination meetings scheduled by the Iowa DOT
- Prepares the utility work plan based on the project design and submits it to the Iowa DOT within the specified timeframe:

    - Communicates any situation where the utility owner's work is dependent on other utilities' work or the Iowa DOT highway contractor's activities
    - Communicates any factors that may impact the relocation schedule or contractor work timeline
    - Communicates any requirement or coordination needs to successfully complete the relocation work

- If requested, revises the utility work plan and resubmits it within the specified timeframe
- If work is reimbursable and applicable, obtains approval from the Iowa DOT to utilize outside preliminary engineering and construction forces
- When work is reimbursable, provides any necessary information requested by the Iowa DOT for the utility adjustment agreement, including relocation drawings, an itemized utility relocation cost estimate, a realistic relocation schedule, private easement documentation, and any other relevant information
- When work is reimbursable, receives, reviews, and executes the utility adjustment agreement.
- Request any necessary permits in a timely manner
- Once a notice to proceed has been issued, executes the approved relocation work plan within the approved timeline and budget. If applicable, coordinates with other utility owners that may be impacted during relocation work.
- As relocation work is completed, submits accurate invoices to the Iowa DOT showing the percentage complete
- Once relocations have been completed, submits the certificate of completion and provides as-builts of the relocation work to the Iowa DOT

CHAPTER 5. RECOMMENDED REVISIONS TO GUIDANCE MANUALS AND POLICY

This chapter provides recommendations for updates to key Iowa DOT guidance manuals and policies to support the recommendations presented in Chapter 4 and facilitate their potential implementation.

5.1. Project Development Process Manual: Guidelines for Implementing Iowa Department of Transportation's Project Development Process

The PDP guidance manual provides information about the interdependencies and recommended sequence of events within the project development process. While the sequences between events can be difficult to understand, the Gantt charts presented in the appendices to this report offer a general idea of how utility coordination activities (U-events) align with other project development events. However, the research team noticed that it is challenging to relate events across different manuals and internal documents.

The review revealed inconsistencies in the terminology used across different documents, such as the *Project Development Process Manual: Guidelines for Implementing Iowa Department of Transportation's Project Development Process* (Iowa DOT 2013) and the *Iowa Guide to Utility Coordination*. These discrepancies make it difficult to fully understand the processes and may cause confusion. For example, [U00] is referred to by various names, including "In-House Preliminary Utility Review," "Supplemental Information," "Information Gathering Pre-design," and "Preliminary Survey – Investigation." Similarly, [U01] is called "Evaluation of Existing Utility Facilities," " Investigation of Major Utility Facility," "Information Gathering Very Early in the Design," "General Information Submittal," and "Major Utility Impacts."

Chapter 1 of this manual presents the principles that guide the project development process at the Iowa DOT. These principles are (a) multidisciplinary project management, (b) Iowa DOT district leadership, (c) early problem identification, (d) uniform, integrated development process, (e) avoidance of environmental impacts, (f) context-sensitive solutions, including context-sensitive design, (g) proactive stakeholder involvement and consensus building, and (h) merged compliance with NEPA and Section 404 requirements. The research team believes this approach can serve as the ideal foundation for the cultural shift needed in the Iowa DOT utility coordination approach. Therefore, it would be advisable to either reflect the importance of these principles in the utility coordination-related guidance documents or emphasize the importance of considering utilities throughout the project development process in this manual chapter.

Furthermore, the research team believes that emphasizing the importance of utilities in the project development process, starting from the early stages, in a manner similar to how environmental efforts are approached in the PDP guidance manual, can improve the utility coordination mindset within the Iowa DOT. The approach described in Section 1.2.5, Avoidance of Environmental Impacts, can serve as a reference for the approach that should be adopted to avoid utility impacts.

Chapter 5, Guidance for PMTs, suggests that the foundation of the Iowa DOT's Project Management Team (PMT) concept is multidisciplinary collaboration and the collective development of a specific project with input from all affected offices. The research team noticed that this chapter does not mention the participation of the utility coordinator, either as a member of the PMT or as a support function. Although the selection of PMT members and support functions is decided on a case-by-case basis, it would be beneficial to at least highlight that the participation of utility coordinators should be considered when assembling the PMT. This could help create awareness among team members about the importance of their interaction with the utility coordinator.

In addition, the information and guidance presented in Chapter 5, Guidance for PMTs, should align with the descriptions of the roles and responsibilities of utility coordinators in other Iowa DOT documents, such as the *Iowa Guide to Utility Coordination*. The concepts in this latter document provide a solid approach, but it is important to ensure that these ideas are consistently conveyed across all guidance documents. For example, Chapter 5 of the PDP guidance manual outlines the variety of meetings that occur during project development. While the active participation of utility coordinators in some of these meetings is strongly recommended, their involvement is not clearly established either here or in other guidance documents.

Chapter 6 highlights the importance of adopting a context-sensitive design approach to avoid impacts on environmentally sensitive areas, historic resources, communities, and other resources, but it does not specifically mention utilities. Researchers have recommended that designers should also be mindful of existing utilities in the project area when developing highway designs. By adopting a context-sensitive approach to utilities, the design team can modify the project design to avoid or minimize conflicts with existing utilities without sacrificing safety or project functionality. Therefore, it would be advisable to emphasize that considering utilities within the context-sensitive design approach can help avoid unnecessary utility conflicts. Relevant sections of this chapter where this recommendation could be included are Section 6.5.7, Horizontal and Vertical Alignment, or Section 6.5.8, Avoidance of Impacts. This addition may help create awareness that designers should consider utility impacts when developing their designs.

The concepts regarding stakeholder involvement presented in Chapter 7, Guide to Stakeholder Involvement, are an ideal approach to engaging utility owners. However, the research team noted that it is currently unclear whether utility owners should be included in the Public Involvement Plan (PIP). According to Section 7.4.2, stakeholders are defined as follows:

> [T]hose who have a vested interest in the land that lies within the limits of the corridor being studied for transportation improvement. It is essential to reach out to stakeholders early. Not only do they have a right to be involved in the decision-making, but they often have extensive knowledge about the area as well, enabling them to provide valuable input. The PMT is key to identifying the stakeholders.

According to this definition, utility owners should be included in the PIP. However, after reviewing several PIPs available on the Iowa DOT's website, it appears that utility owners are not typically addressed as stakeholders in the document. Therefore, it would be beneficial to

either include utility owners as stakeholders in the PIP where applicable or, alternatively, reflect the stakeholder involvement approach presented in Chapter 7 of the PDP guidance manual in the utility coordination guidance manuals and policies regarding the engagement of utility owners throughout the development and delivery of transportation projects.

5.2. Review of Laws, Administrative Rules, and Policies

Regarding utility accommodation and coordination, the research team conducted a review of the following:

- Iowa Code, Title VIII
- Iowa Administrative Code, Chapter 115: Utility Accommodation, sections 761.115.25 through 761.115.30: Utility Facility Adjustments for Highway Improvement Projects
- Iowa DOT *Policy for Accommodating and Adjustment of Utilities on the Primary Road System*

Additionally, during this research project, Executive Order 10 was issued, calling for a comprehensive review of all Iowa Administrative Rules. The research team assisted Iowa DOT staff in a review of the rules related to utility relocations (e.g., the POINT 25 process) and highway projects to identify recommendations.

These policy reviews were presented and discussed with Iowa DOT utility staff. As they have been previously provided, they are not included herein to avoid confusion with in-process policy revisions and updates.

CHAPTER 6. CONCLUSIONS

Building on the insights from the assessment described in this report, this chapter summarizes the research team's recommendations to enhance utility coordination efforts at the Iowa DOT. Utility conflicts are frequently cited as a significant cause of construction delays and increased highway project costs. These are issues also experienced by the Iowa DOT. This report presents recommendations to better align utility coordination procedures with the Iowa DOT's project development process and enhance partnerships with utility stakeholders to avoid or potentially minimize these negative impacts. To develop these recommendations, the research team conducted a comprehensive review of state, national, and international studies, along with utility guidance manuals from other US state transportation agencies, to identify best practices that could be implemented at the Iowa DOT to enhance utility coordination and project delivery outcomes. Through an assessment of the Iowa DOT's current utility coordination approach, the research team mapped the project development process and evaluated this process and existing practices. There was additionally a review of existing policies and guidance manuals, as well as surveys of and discussions with key stakeholders such as Iowa DOT internal staff, Iowa DOT consultants, and utility company representatives. Based on the collected data, the research team identified a range of challenges and opportunities for improvement.

The research team identified potential practices and strategies for improving the Iowa DOT's utility coordination approach by gathering insights from stakeholders directly involved in the Iowa DOT's transportation projects, survey feedback, and the other methods previously described. These insights are summarized below in terms of key issues and recommendations.

Key issues highlighted within this study include the following:

1. **Utility-Related Delays**: Utility relocations are a significant cause of project delays and increased costs, as evidenced by both national reviews and Iowa DOT-specific data.
2. **Inefficient Current Practices**: Existing methods often prioritize utility relocation late in the design process, leading to inefficiencies and strained relationships with utility stakeholders. There may be little or no consideration of design alterations to avoid utility impacts.
3. **Lack of Stakeholder Trust and Engagement**: The inefficient practices, lack of communication, and adversarial approach in utility coordination breed a lack of trust and engagement among stakeholders.

To address these issues, the following recommendations are proposed:

1. **Best Practices**: Early coordination, accurate utility data collection, and fostering partnerships are essential strategies to improve project timelines and outcomes. These practices are encompassed within the Partnership Approach, which is further discussed below.
2. **Early Integration of Utility Stakeholders**: Incorporate utility companies into the early stages of project development to identify potential conflicts and develop collaborative solutions. This includes conducting preliminary reviews of utilities in the project area, performing utility risk assessments, and engaging utility stakeholders early in the process.

3. **Improved Data Collection and Sharing**: Establish standardized procedures for acquiring and sharing precise utility location and attribute information. This involves using SUE techniques, verifying utility information with utility owners, and updating project plans based on accurate utility data.
4. **Enhanced Coordination Methods**: Develop clear roles and responsibilities for all stakeholders involved in utility coordination and project development. This includes strategically engaging with all utility coordination stakeholders, conducting utility-related constructability reviews, and implementing UCM processes.
5. **Policy and Legislative Revisions**: Update Iowa DOT policies and guidelines to reflect the proposed improvements in utility coordination practices. This includes revising utility accommodation policies, holding nonresponsive utilities accountable, and leveraging the Iowa Code to incentivize timely utility relocations.

The proposed recommendations—including adjustments to the timing and scope of utility coordination activities and the integration of best practices—were primarily shaped by feedback from key Iowa DOT stakeholders, who possess the deepest understanding of current improvement needs and whose buy-in is essential for successful implementation in the future. These recommendations were consolidated into a proposed Partnership Approach, which seeks to enhance the Iowa DOT's utility coordination process to reduce related delays and cost overruns.

The Partnership Approach outlines eight core principles that stakeholders should adopt to effectively implement the suggested changes and best practices. These principles are as follows:

- Positive and Collaborative Relationships
- Avoid, Minimize, and Mitigate Utility Conflicts when Feasible
- Reliable Utility Data for Better Project Decisions
- Timely and Proactive Engagement of Utility Coordination Stakeholders
- Normalize Treating Utilities as Business Partners
- Everyone Knows Where Everyone Goes
- Reinforce the 3Cs: Communication, Coordination, and Cooperation
- Shared Vision and Accountability for Success among Utility Coordination Stakeholders

These core principles reflect the mindset behind all of the recommendations developed in this study and encompass suggestions for implementation at various stages and during various events of the utility coordination process, as well as in procedures from intersecting disciplines. This report provides guidance to support the Iowa DOT in adopting the Partnership Approach, along with proposed revisions to the Iowa DOT's policies and guidance manuals.

By implementing these recommendations, the Iowa DOT can streamline its project development processes, reduce utility-related delays, and foster a more collaborative environment with utility stakeholders. This will ultimately benefit project managers, designers, utility coordinators, and the public by ensuring more efficient and cost-effective highway projects.

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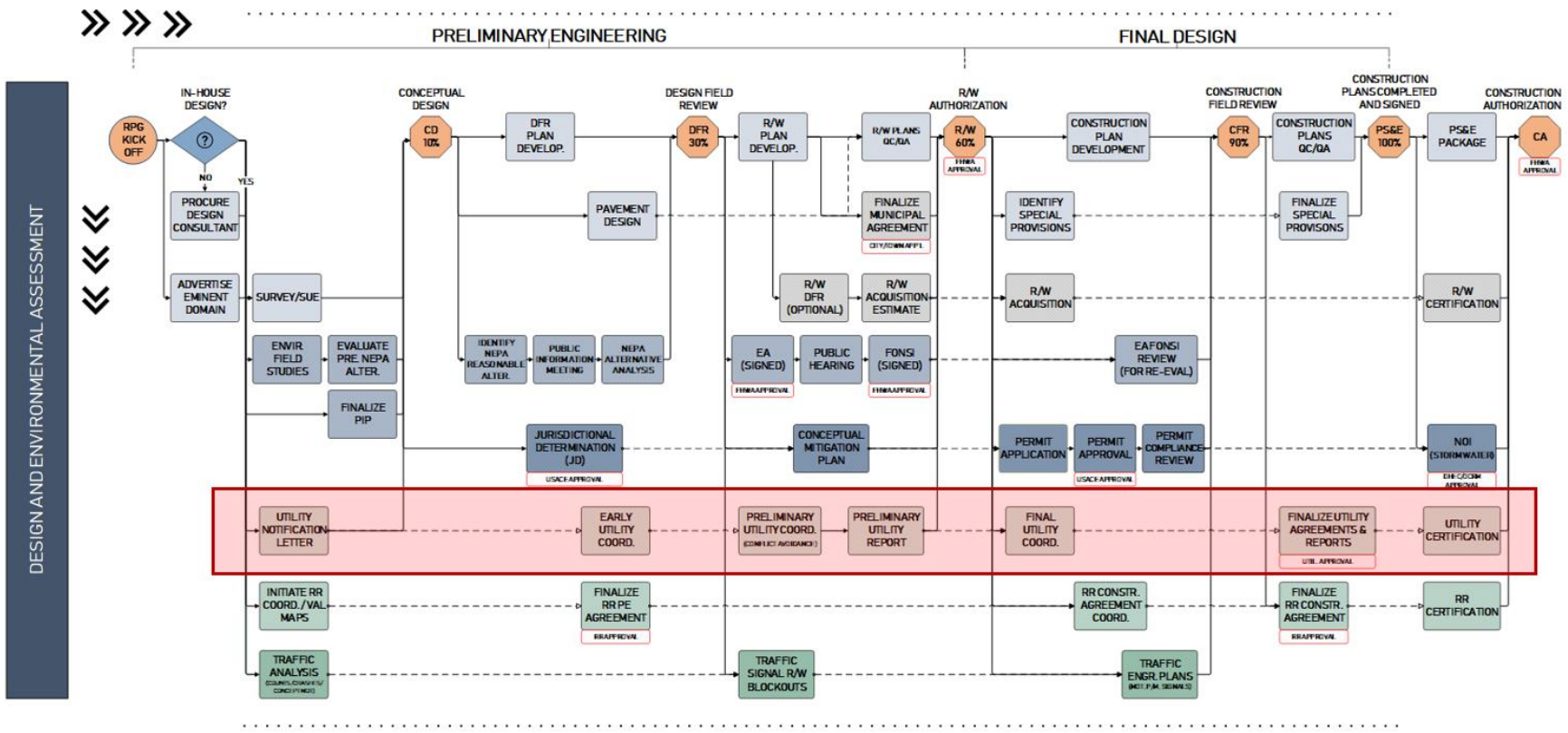
APPENDIX A. UTILITY COORDINATION APPROACHES AT OTHER STATE TRANSPORTATION AGENCIES

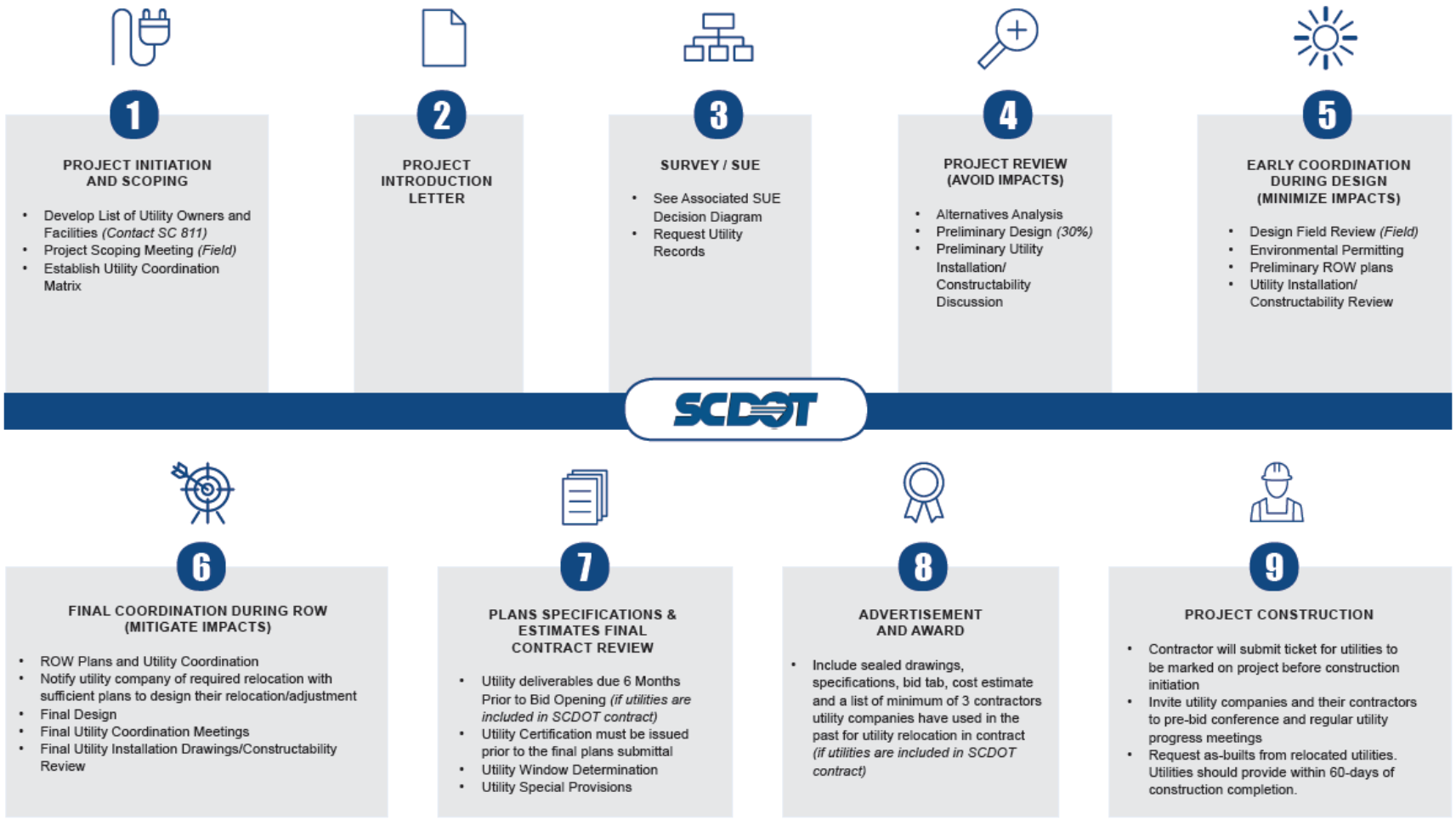
As discussed in Section 2.2.2, the research team reviewed utility coordination guidance manuals from several state transportation agencies to understand how they integrate utility coordination into their project development processes and to gather details on the implementation of different best practices. This section outlines some of these agencies' approaches, which were used as references to inform potential improvements for the Iowa DOT.

A.1. South Carolina Department of Transportation (SCDOT)

The documents reviewed to understand this state's approach included the SCDOT *Utility Accommodations Manual* (SCDOT 2019a), the *South Carolina Department of Transportation Preconstruction Project Development Process* (SCDOT 2019b), and other technical materials available on its website. The figures below provide an overview of this state's utility coordination process and best practices.



SCDOT Project Development Process (PDP): EA/FONSI Flowchart
Source: SCDOT 2022



SCDOT Utility Coordination Process Milestones
Source: SCDOT 2017

Using SUE for Utility Coordination

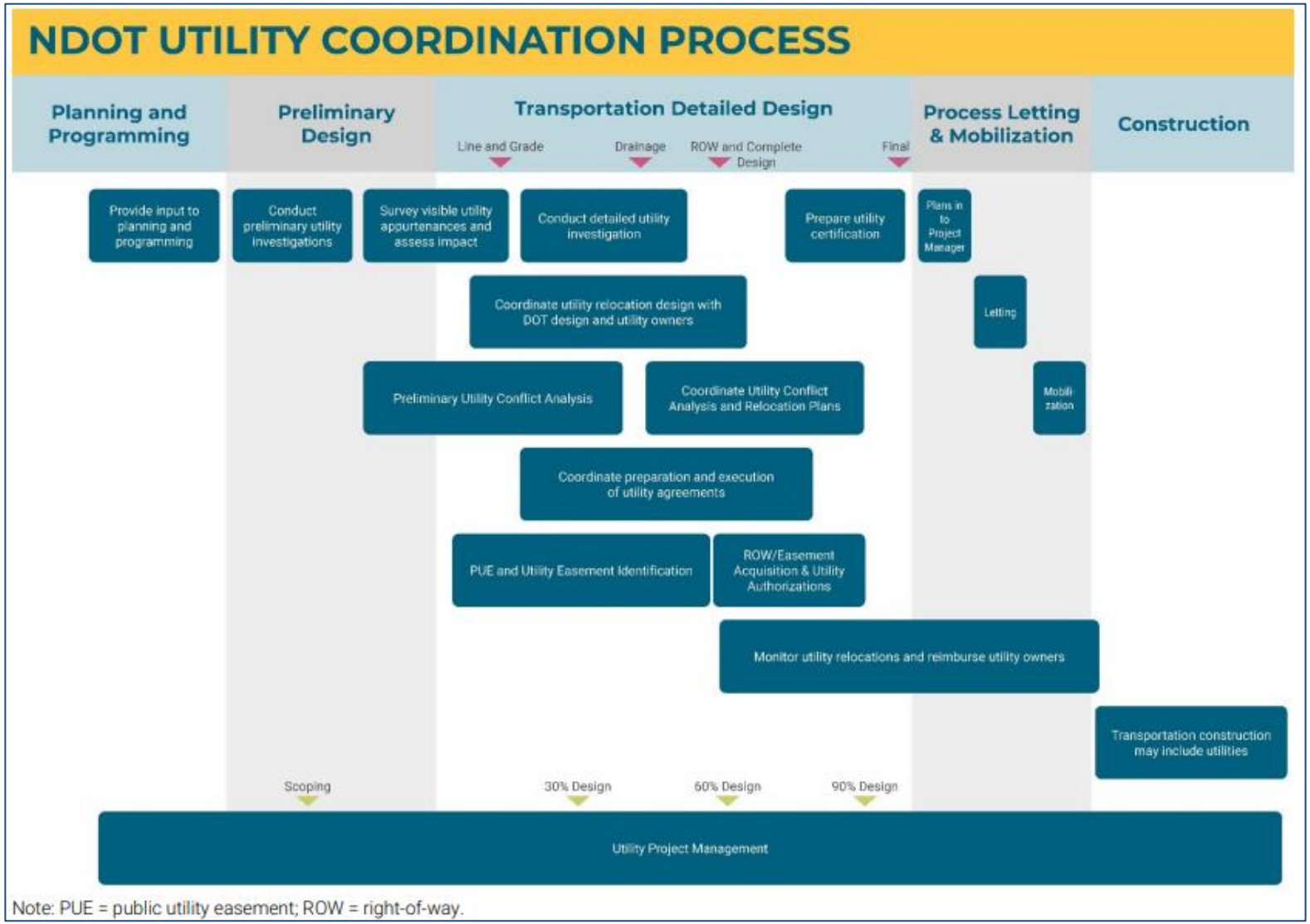
The following demonstrates what level of SUE information should be utilized at each stage in the Project Development Process:

	Stage of Project	SUE Information Utilized	Additional Option	Utility Coordination Benefits
Project Initiation & Scoping	Establish Utility Inventory for project and confirm general locations at the field scoping meeting. Contact utility to obtain utility plans and/or records. Set up initial Utility Conflict Matrix.	• 811 Utility Inventory • Utility Records • Utility Conflict Matrix	• Utilities marked in field	• Confirm Inventory • Avoid – Consider Utilities in alternative alignment analysis
Surveys	Document SUE recommendations and initiate SUE consultant contracts. Utilize the Survey and SUE information to estimate whether significant utility impacts are anticipated.	• Visible Features • Utility 811 Design Ticket	• Survey Utilities marked in field • Pull manhole depths and connectivity	• Increase accuracy of Utilities information
Preliminary Design	Strategic review of potential conflicts with preliminary design, select test hole locations. Utilize SUE consultant or Utility Company request for test hole information and utility details.	• Utility Survey/Data • Utility Conflict Matrix • Jurisdictional Areas	• Utilities pot holes in field • SUE consultant test hole data	• Minimize Utilities conflicts with design adjustments • Determine Environmental Permit Requirement
Design Field Review	Review conflicts in the field and explore any further design alterations or utility protections/reinforcements to AVOID or MINIMIZE conflicts.	• Data reviewed in field	• Invite Utilities to DFR	• Confirm conflicts • Minimize Utilities conflicts • Utilities relocation delivery
Preliminary ROW Plans	SUE data utilized for drainage design and incorporated into plans for determination of unavoidable conflicts. Utilize cross section exhibits for discussion of potential relocations and any tracts requiring ROW acquisition priority.	• SUE Utilities Sheets • Utility Conflict Tables • Environmental Permit Requirements	• Plan & Profile Utilities conflict Exhibits • Include Utilities in permits	• Confirm conflicts • Protection alternatives • Minimize Utilities conflicts • Permitting Method • Constructability/ Installation Review
Final Design	Utility plan sheets (U-Sheets) incorporated into final plans. MITIGATE any final conflicts, review and finalize utility deliverables (plans, permits, agreements, letter, PS&E, etc..).	• Utility Conflict Matrix	• Include Utilities in contract • Establish Utilities window • Utilities Special Provisions	• Final Utilities packages • Assistance to Utilities • Adherence to schedule • Final Constructability/ Installation Review
PS&E	All utility deliverables submitted; Utility Certification to be issued. Utility relocations can be added to U-sheets for information only if desired.	• Final Utilities Relocation Plan: • Relocation Plans, agreements, letters		• Meet Schedule • Utility Certification
Construction	Review information with utility companies and contractors at pre-construction meeting.	• Construction Plans with Utility Sheets	• Utilities relocations on Utilities sheets	• No construction delay • Increase job site safety

SCDOT SUE Decision Diagram
Source: SCDOT 2017

A.2. Nebraska Department of Transportation (NDOT)

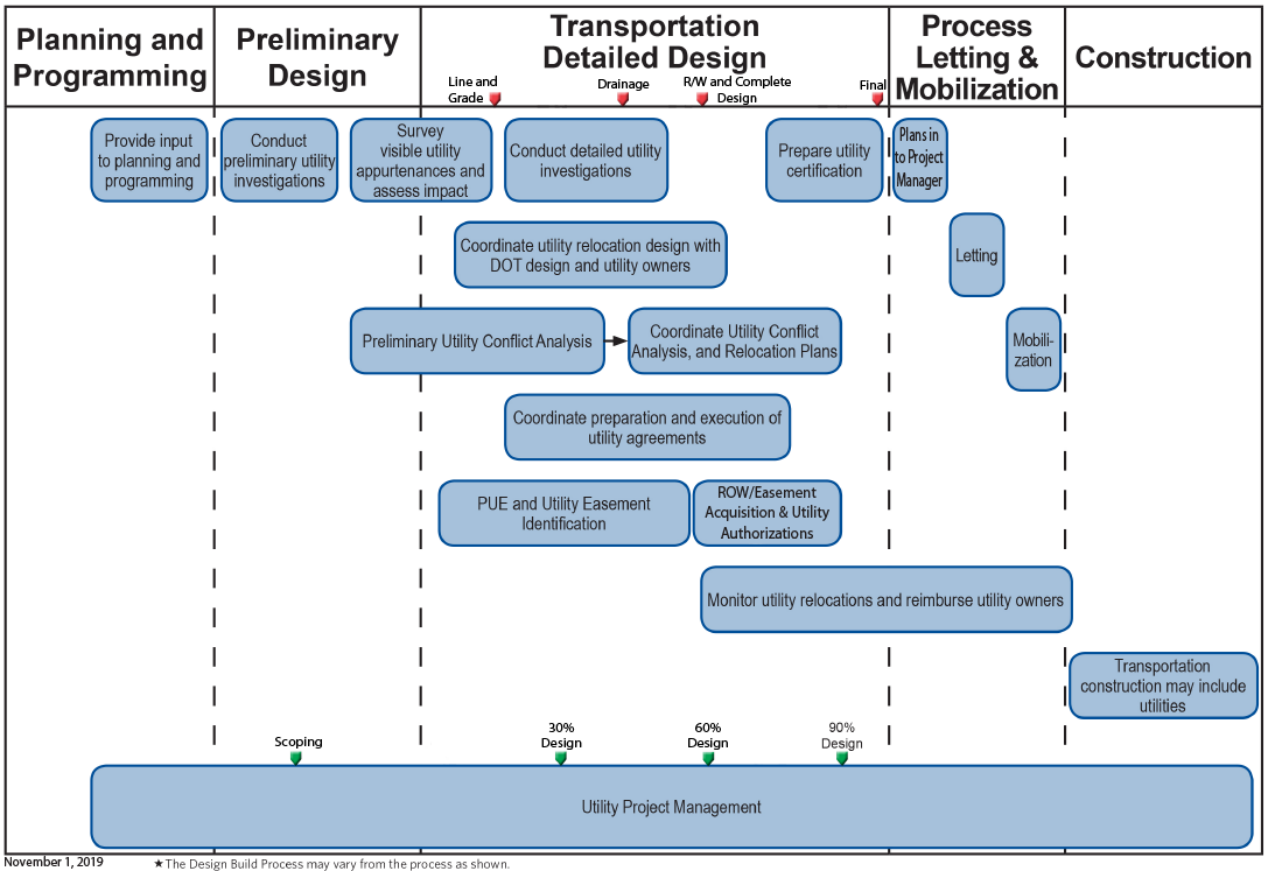
NDOT recently updated its utility accommodation policy in 2024. The figure below provides an overview of how utility coordination tasks align with NDOT's project development and delivery process. A more detailed description of the expectations and implications of each task can be found in the policy manual.



NDOT Utility Coordination Process Chart
Source: NDOT 2024

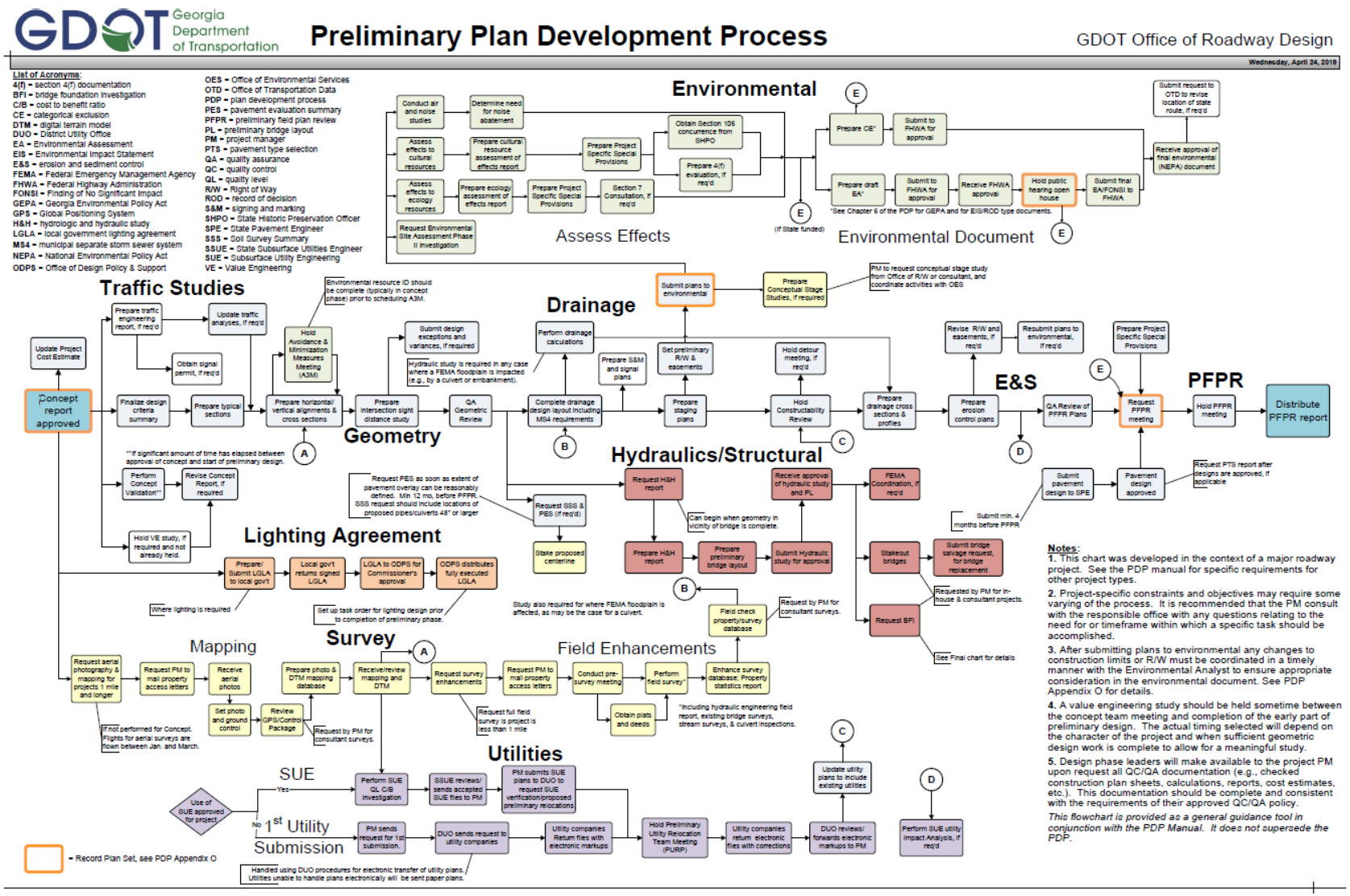
A.3. North Carolina Department of Transportation (NCDOT)

The documents reviewed to understand this state's approach included the *NCDOT Utilities Accommodation Manual* (NCDOT 2022), *Location & Surveys Subsurface Utility Engineering* (NCDOT 2006), *Project Management Guide* (NCDOT 2021), and the *Project Delivery Network (PDN)* (NCDOT 2023). The key steps of the utility coordination process begin during the planning phase, and its integration within the overall project development process is illustrated in the figure below. These steps are further detailed in the NCDOT *Utilities Accommodation Manual* (NCDOT 2022), which also provides comprehensive guidance on implementing SUE and UCM and managing utility stakeholders.

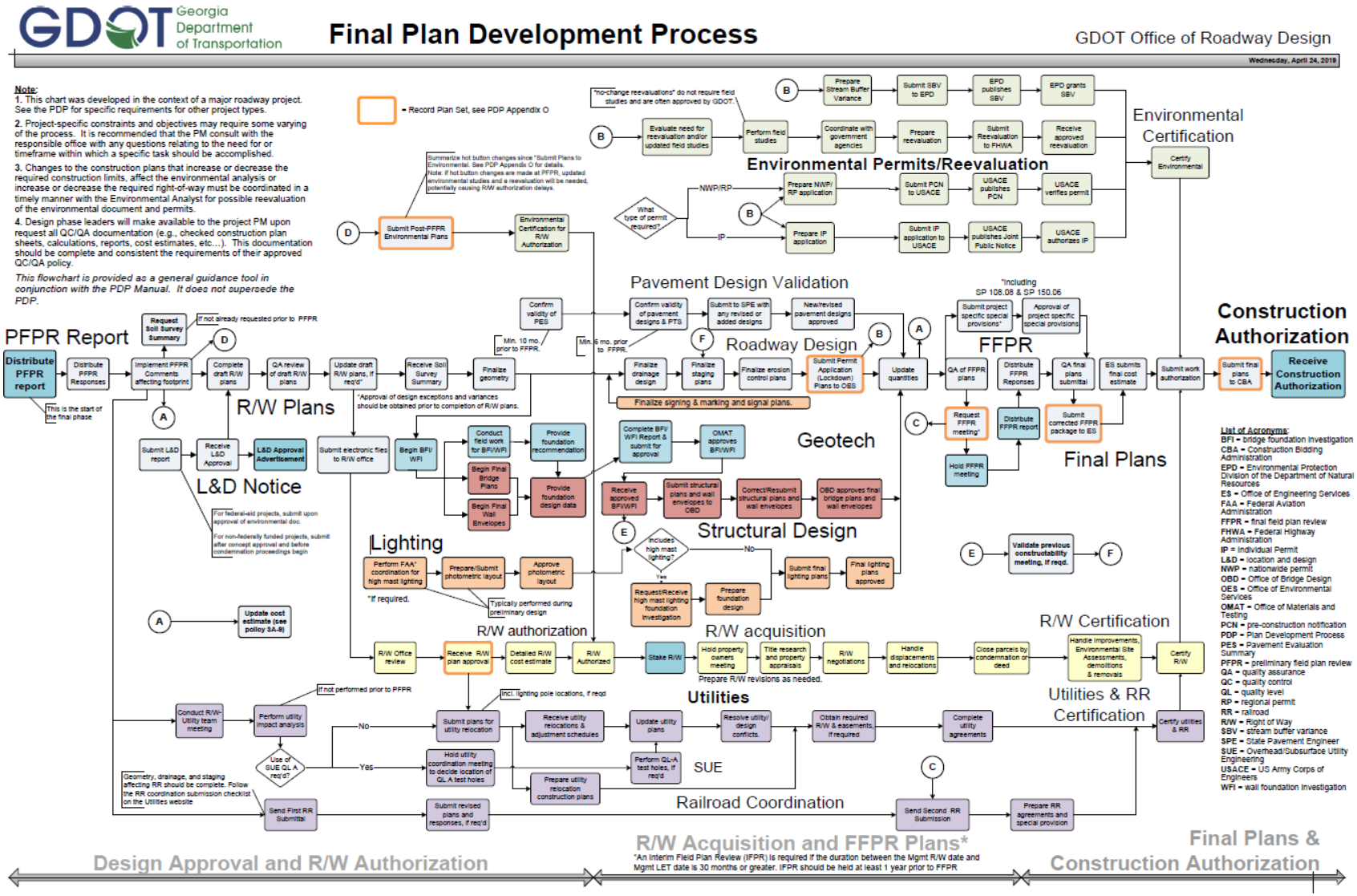


NCDOT Utility Coordination Process Aligned to the Project Development Process
Source: NCDOT 2022

A.4. Georgia Department of Transportation (GDOT)

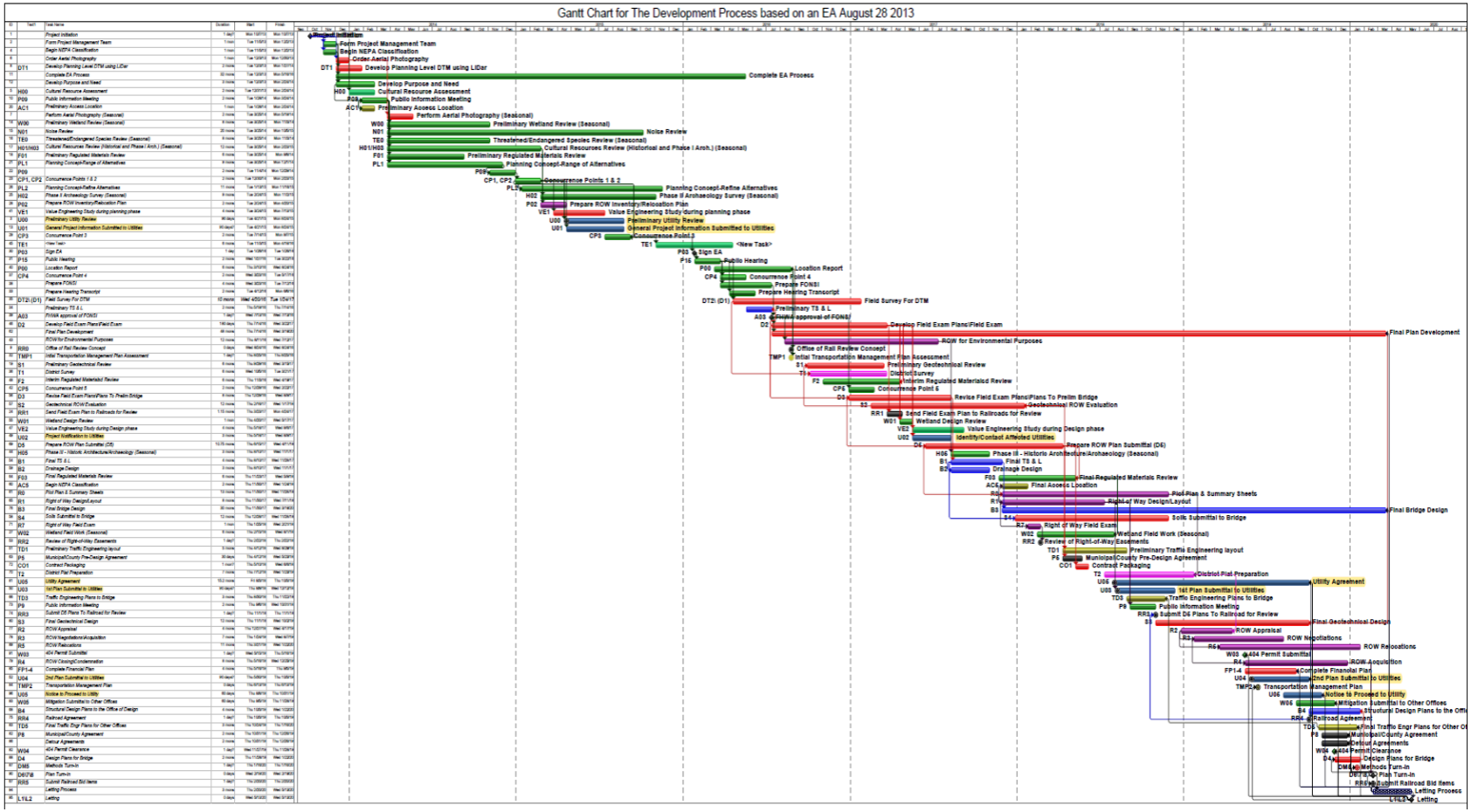


Preliminary Plan Development Process (2019)



GDOT Final Plan Development Process (2019)
Source: GDOT manuals and guides website

APPENDIX B. IOWA DOT PROJECT DEVELOPMENT PROCESS GANTT CHARTS



APPENDIX C. SURVEY QUESTIONNAIRE

C.1 Survey Questionnaire (DOT Staff)

Introduction:

The following questionnaire is part of the data collection process for the Iowa DOT Research Project: Project Development and Utility Coordination as Partnership. The primary goal of this project is to develop procedures for incorporating utility stakeholders as partners in the Iowa DOT project development process. The questionnaire has two sections that aim to collect information, including:

Section 1:

- Current state-of-the-practice for utility data collection and sharing within Iowa DOT projects
- Project schedules and accountability for utility coordination activities

Section 2:

- Currently used utility coordination practices and their effectiveness
- Potential utility coordination practices for future adoption

The research team greatly appreciates your help in completing this 20-minute questionnaire. If you have any questions, please contact the principal investigator for this research project: Roy Sturgill (*sturgill@iastate.edu*) Thank you!

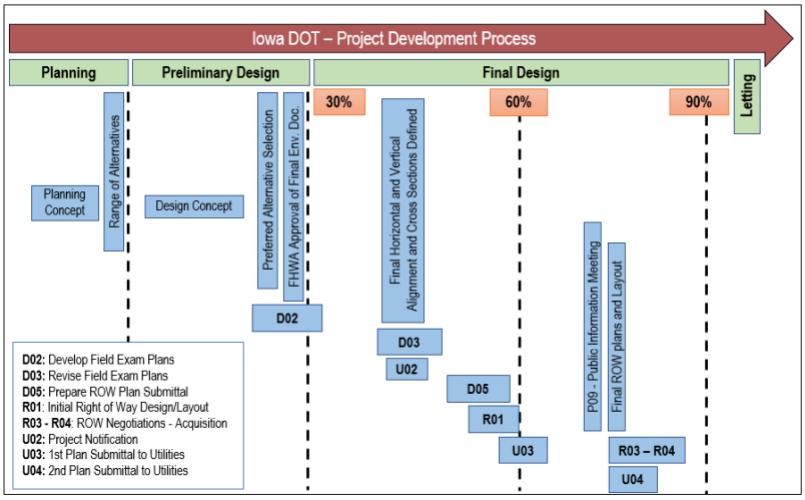
Participant Information

- Name:
- Position/title:
- Division, office, bureau:
- District:
- Years of experience:
- Email address:

Section 01:

a) **Current State-of-the-practice for Utility Data Collection and Sharing within Iowa DOT Projects**
b) **Project schedules' accountability for utility coordination activities.**

The following graphic was developed based on the Iowa DOT policy and guidance manuals. Please use the graphic as a reference for the timeframes mentioned in the following questions.



1. **When is the following information about utility facilities typically collected within the highway project development process?**

Information	Planning Stage	Preliminary Design (10%–30%)	Final Design (30-60%)	Final Design (60-90%)	Not collected
Utility company name and address					
Utility owner representative´s contact information (phone number and email address)					
Type of utility facility (e.g., water and sanitary sewer, power, gas, oil, communications, etc.)					
Class of utility facility (e.g., transmission, distribution, or service)					
Features of utility facility (e.g., water line, water manhole, water valves)					
Horizontal location of utility facility					
Vertical location of utility facility					
Utility facility characteristics (e.g., diameter, depth, material) and dimensions (e.g., width, height, length)					
Utility facility capacity					
Operational status (e.g., active, inactive, out of service, abandoned)					
Customers affected					
Installation/relocation schedules					
Installation/relocation cost estimates					
Installation/relocation property/ROW needs					
Buy America requirements for materials					
Other:					

2. **What information sources are used to collect utility data for the development of project design plans at each of the following project development stages/timeframes? Please mark all that apply.**

Information Source	Planning Stage	Preliminary Design (10%–30%)	Final Design (30-60%)	Final Design (60-90%)	Not used
DOT location/surveying staff obtain utility records (e.g., existing information from permits, recorded utility easements, agency as-built plans, field survey information)					
Project field review/site visits					
Referrals from other utility owners					
Utility owners send all their existing records and information					
Design One Call marks					
Construction One Call marks					
Subsurface Utility Engineering Services (QL-D)					
Subsurface Utility Engineering Services (QL-C)					
Subsurface Utility Engineering Services (QL-B)					
Subsurface Utility Engineering Services (QL-A)					

Utility Surveys and proposed plans tied to Project or DOT control datum					
Other:					

3. **Does the Iowa DOT have a specific approach to collecting data for unknown, out-of-service, and abandoned utility facilities? If yes, please provide a brief description.**
    - Yes (Description)
    - No
    - Not sure

4. **The following practices are related to utility data collection and sharing. Based on your perception, please mark the rating option that best describes the level of implementation of each of them within IA DOT.**

Practice	Implemented	Somewhat implemented but needs improvement	No implemented, but planning to implement	No implemented	Not sure
Utility Mapping System / Data Repository (utility location information entered into a GIS-based system)					
Use of Subsurface Utility Engineering (SUE) for projects where high-quality levels of information are needed for design purposes					
Get QL-B mapping as early as possible on projects where the existence of complex utility conflicts is known in advance					
Recognize the importance of long-range highway/utility coordination and hold periodic meetings (monthly, quarterly, annual) with utility owners to share this information					
Ask utility owners to provide information on their capital construction programs (matching utility infrastructure plans to long-term highway plans)					
Conduct on-site utility meetings or utility plan-in-hands with utility companies to determine utility conflicts.					
Hold frequent joint meetings with utility owners as design progresses to get their input on utility conflicts					
Established procedure to share collected utility data between DOT functional groups (Designers, ROW staff, environmental, etc.)					

5. **How would you rate the effectiveness of the communication and data sharing <u>regarding utilities</u> between the Iowa DOT functional groups (e.g., designers, utility coordinators, environmental staff, ROW staff, consultants, etc.)?**
    - Extremely Effective

- Very Effective
- Effective
- Somewhat effective
- Not effective

6. **What are the main challenges/barriers to effective communication and data sharing regarding utilities between the Iowa DOT functional groups (e.g., designers, district utility coordinators, environmental staff, ROW staff, consultants, etc.)?**

   -

7. **At what stage in the project development process does the utility coordination process typically begin? Please indicate the first activity/step that occurs within this process.**

   - During Schematic Phase / Planning
     - ____________________
   - Preliminary Design Stage (10-30% Design Complete)
     - ____________________
   - Final Design Stage (30-60% Design Complete)
     - ____________________
   - Final Design Stage (60-90% Design Complete)
     - ____________________

8. **When is the utility location information typically shared with the following project stakeholders?**

Project Stakeholder	Planning Stage	Preliminary Design (10-30%)	Final Design (30-60%)	Final Design (60-90%)	Not shared
Roadway Designers					
Drainage Designers					
Project Managers					
Environmental staff					
ROW staff					

9. **Based on the previous question, what is the main communication means/channel to share that information with those project stakeholders?**

   -

Section 02:

a. **Current Iowa DOT Utility Coordination Practices and their Effectiveness.**
b. **Potential utility coordination practices for future adoption.**

10. **Please choose the statement that best describes the Iowa DOT's typical approach to the utility coordination process.**
    - **Proactive** – Try to anticipate needs and accomplish them in a timely manner.
    - **Reactive** – Wait until needs are realized and then start to address them
    - **Interactive** – Work collaboratively with stakeholders involved in the identification and addressing of needs.

11. **Does the Iowa DOT have a mechanism to measure/evaluate the effectiveness of the utility coordination process? If yes, please provide a brief description.**
    - Yes (brief description)
    - No

- Not sure

12. **Briefly describe what you consider an "effective utility coordination"?**

    ----

13. **From the following list, what core elements would you consider the most important for effective utility coordination? Please mark your top eight choices.**
    - Have a well-defined procedure for the utility coordination process (e.g., Utility Coordination Guidance Manual)
    - Early involvement of utility owners (30% design complete or earlier)
    - Effective communication, collaboration, and coordination between the DOT and utility owners
    - Have a utility coordinator handle the project from start to finish
    - Use of utility corridors during project design
    - Acquire sufficient ROW for utility purposes
    - Use of Subsurface Utility Engineering (SUE) information in the design of the highway project to avoid or minimize utility relocations
    - Use a context-sensitive design approach (identify utility avoidance areas as early as possible)
    - Use of a standardized format for identifying and resolving utility conflicts and continually update it as the design progresses
    - Use of Utility Conflict Management/Matrices (UCM)
    - Process for utility risk management
    - Regularly scheduled meetings with utility owners
    - Use of standardized utility agreements
    - Considerations of costs & reimbursements for design/construction versus utility relocations
    - Develop a database of historical utility relocation costs to generate the best possible cost estimate.
    - Consideration of utility relocation schedules in relation to project schedules
    - Pay for relocations that are traditionally non-reimbursable
    - Provide incentives to utility companies for early utility relocation
    - Collaborative planning with utility owners (matching utility infrastructure plans to long-term highway plans)
    - Training programs for consultants and utility owners' personnel on Iowa DOT utility coordination process and highway plan reading

14. **Based on your perception, please mark the rating of implementation that best describes each of the utility coordination practices for Iowa DOT.**

Best practice	Implemented	Somewhat implemented but needs improvement	No implemented, but planning to implement	No implemented	Not sure
Practices carried forward from Q13.					

15. **Please list any other practice not listed above, innovative approach, or other ideas that you believe may potentially benefit the Iowa DOT utility coordination process.**

    ----

16. **Based on your previous response, could you please describe the main challenges to implementing those practices?**

    ----

17. **Based on your perception, how often do designers design around or redesign a roadway feature to avoid or minimize a utility conflict?**
    - Very Frequently
    - Frequently
    - Occasionally
    - Rarely
    - Very Rarely
    - Never

18. **When does the first in-person utility coordination meeting <u>usually</u> occur?**
    - During Schematic Phase / Planning
    - Preliminary Design Stage (10-30% Design Complete)
    - Final Design Stage (30-60% Design Complete)
    - Final Design Stage (60-90% Design Complete)

19. **How often does the Iowa DOT typically host meetings with Utility Companies (regarding an individual project) during the following project development stages?**

Project Stage	Weekly /Biweekly meetings	Monthly meetings	Quarterly meetings	Annual meetings	As requested by the DOT project development team	As requested by Utility Companies
Schematic/Planning						
Preliminary Design (10-30%)						
Final Design (30-60%)						
Final Design (60-90%)						

20. **How would you rate the level of communication and collaboration between the Iowa DOT and Utility Companies during the following project development stages?**

Project Stage	Extremely inadequate	Somewhat Inadequate	Neither adequate nor inadequate	Somewhat adequate	Extremely adequate
Schematic/Planning					
Preliminary Design (10-30%)					
Final Design (30-60%)					
Final Design (60-90%)					

21. **Does the Iowa DOT have an approach/procedure to manage and keep track of utility conflicts? If yes, please provide a brief description.**
    - Yes (Description)
    - No
    - Not sure

(21-a) What type of information do you track when managing utility conflicts? Please mark all that apply.
- Utility conflict ID
- Transportation project ID
- Utility conflict description
- Utility conflict location
- Utility conflict length
- Utility property needs / ROW needs
- Proposed utility conflict resolution
- Responsible party for the proposed resolution
- Cost estimate (s)

- Utility agreement information
- Estimated and actual start and finish date of utility relocation
- Relocation status (percentage complete)
- Payment information
- Other: _____

22. Based on your perspective, please mark the rating option that best describes each statement.

	Very weak understanding	**Weak understanding**	**Neutral understanding**	**Strong understanding**
Level of understanding the Iowa DOT design staff has on utility issues.				
Level of understanding Utility Companies have on the Iowa DOT utility coordination process.				

23. Regarding utility coordination, would you say that the Iowa DOT has clearly defined the roles and responsibilities of each project party (e.g., project managers, designers, utility coordinators, ROW staff, consultants, and utility owners)?

- Yes
- Yes, but it needs improvement
- No

24. List three major issues/challenges (e.g., ROW issues, utility coordination workload, poor communication, etc.) you feel the Iowa DOT utility coordination process faces and indicate whether they are caused by the Iowa DOT, Utility Companies, or both.

Iowa DOT - Utility Coordination Issues	**Responsible Party** *(Iowa DOT, Utility Companies, Both)*

25. Does the Iowa DOT use consultant-led utility coordination, either as a stand-alone utility consultant agreement or as part of a project design consultant agreement?

- Yes
- No
- Not sure

(25-a) What are the main reasons for Iowa DOT to use consultant-led utility coordination? Please select the top three reasons.

- Project overall complexity
- Project design complexity
- Utility-related complexity
- Limited in-house staff
- Lack of in-house expertise
- Other

(25-b) Does the Iowa DOT have a defined procedure for setting the scope of utility coordination services?

- Yes
- No
- Not sure

(25-c) Does Iowa DOT have any procedures to evaluate performance/effectiveness in consultant-led utility coordination?

- Yes
- No
- Not sure

(25-d) How would you rate consultant-led utility coordination, either as a stand-alone agreement or as part of a project design consultant agreement, relative to in-house utility coordination?

- Better
- Same
- Worse

26. Does the Iowa DOT have an approach/procedure to scope Subsurface Utility Engineering (SUE) services? If yes, please provide a brief description.

- Yes (description)
- No
- Not Sure

27. If the Iowa DOT would provide training related to utility coordination, what topics would be most beneficial for improving the utility coordination process?

- Utility relocation costs
- The time necessary for utility companies to design and relocate
- Utility design constraints (e.g., manhole maximum depths, distances between structures, distances from other utilities, etc.)
- Utility right of way and minimum clearance issues
- Utility accommodation policies/rules
- Utility conflict resolution methods
- Other

28. Would you be willing to participate in a follow-up interview?

- Yes
- No

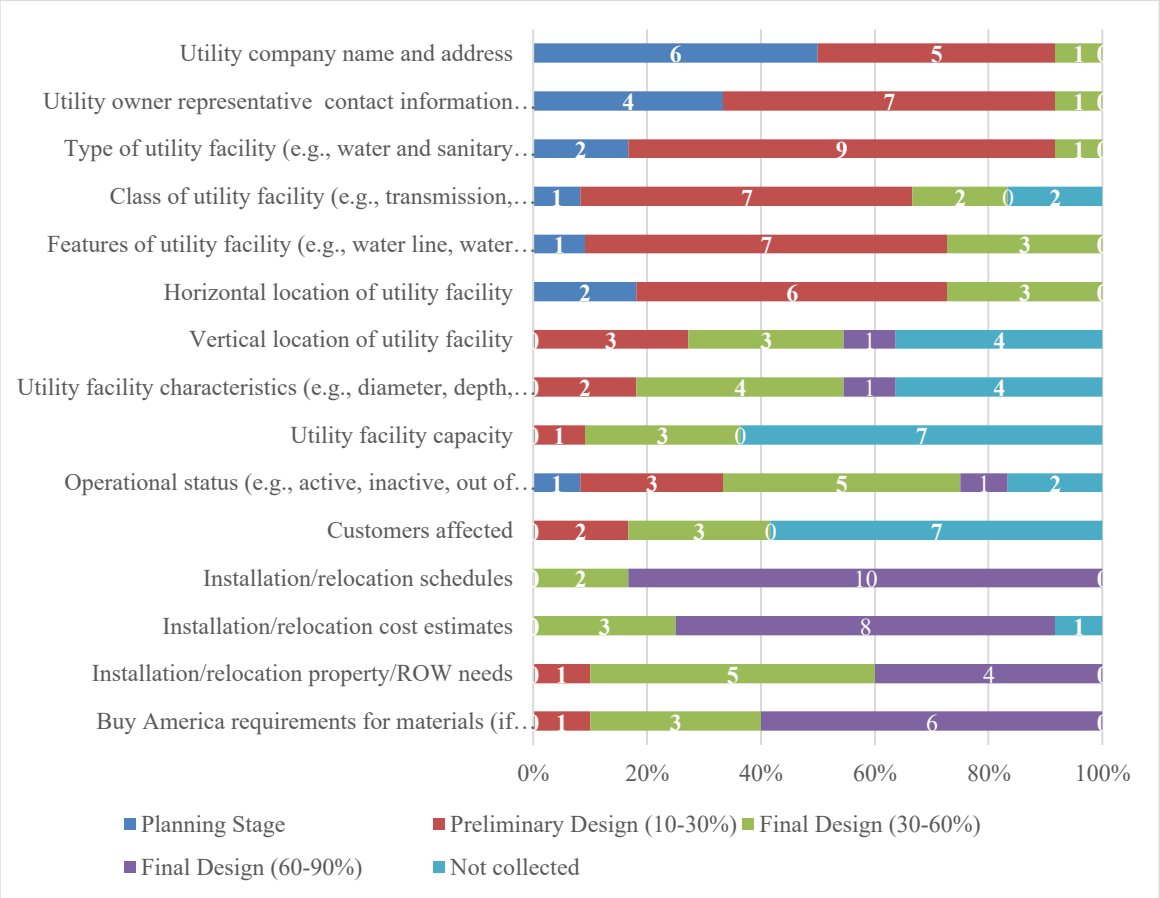
APPENDIX D. SURVEY RESULTS

D.1. Iowa DOT Internal Staff

Obtaining feedback from Iowa DOT internal staff proved to be particularly valuable due to their in-depth familiarity with the processes and issues surrounding the utility coordination process. Despite the low response rate of only 10 complete responses from this group, notable and interesting insights were gathered. The participants' job titles spanned several categories, including survey managers, district utility coordinators, engineering operations technicians, district engineers, and regional utility program coordinators. Notably, a discernible distinction emerged within the cohort of 10 participants based on their years of professional experience. Half of the respondents reported having between 2 and 5 years of experience, while the other half boasted more than 20 years of professional expertise. Survey findings are presented as follows.

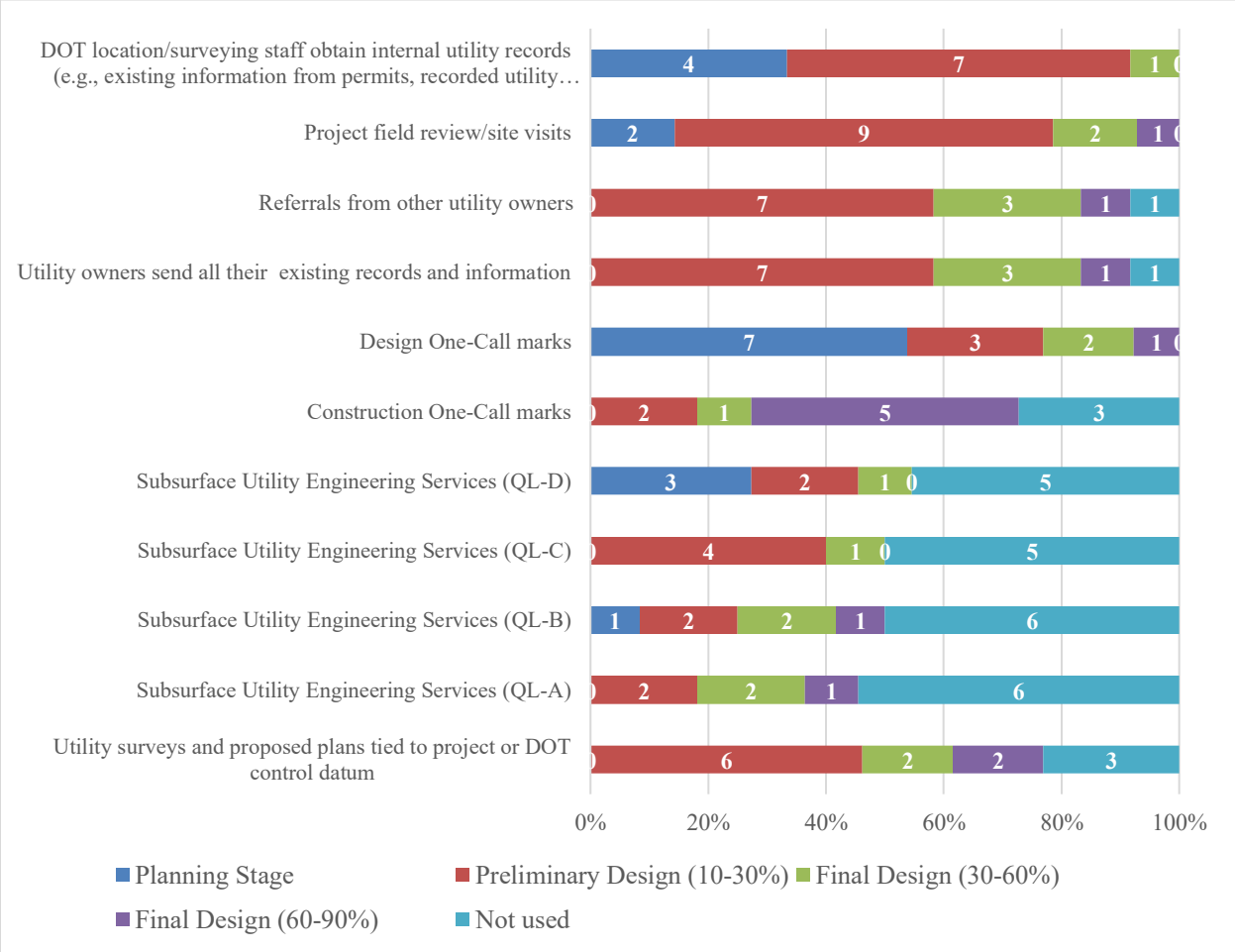
Section 1:

Participants were asked about the collection of utility data at various stages of project development.



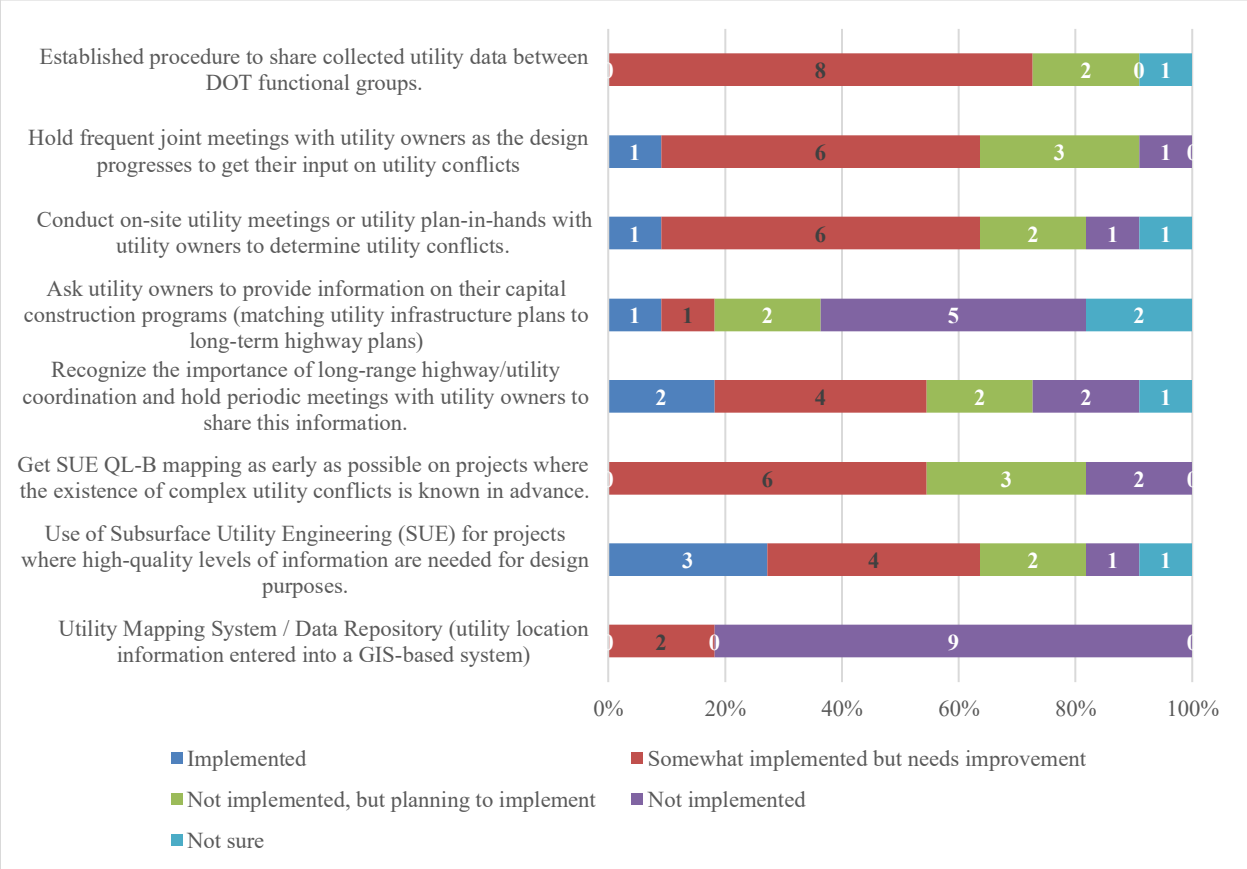
As illustrated above, information such as the utility company name, representative contact details, type and class of utility facility, as well as features and horizontal location of utility facilities, is predominantly gathered during the Preliminary Design Stage (10%–30% design completion). In contrast, details regarding vertical location and characteristics of utility facilities are either acquired during the Final Design Stage (30%–60% design completion) or are not gathered at all. During the Final Design Stage (60%–90% design completion), the focus shifts to collecting information such as relocation schedules and cost estimates, ROW requirements, and Buy America requirements for materials.

Regarding the sources utilized to acquire utility data at various stages of the project development process, findings revealed that design One Call marks are used mainly in the Planning Stage. During the Preliminary Design Stage (10%–30% design completion), the primary information sources include internal utility records from DOT location/surveying staff (e.g., existing data from permits, recorded utility easements, as-built plans, and field survey information), project field reviews/site visits, referrals from other utility entities, utility surveys, and proposed plans tied to project or DOT control datum, and information provided by the utilities themselves. Notably, the majority of responses concerning SUE services indicated minimal usage, with one participant noting that the adoption of SUE is a relatively recent practice for the Iowa DOT.



Most respondents agreed that the Iowa DOT does not have a specific approach for collecting data on unknown, out-of-service, and abandoned utility facilities.

A short list of recommended practices concerning utility data collection and sharing, derived from the literature review, was provided to the participants. They were then asked to rate these practices according to their level of implementation within the Iowa DOT. Results revealed that some of those practices are implemented at the Iowa DOT, but there is still room for improvement. These practices include conducting on-site utility meetings or utility plan-in-hands with utilities to determine utility conflicts, holding frequent joint meetings with utilities as the design progresses to get their input on utility conflicts, getting SUE QL-B mapping as early as possible on projects where the existence of complex utility conflicts is known in advance, and establishing a procedure to share collected utility data between DOT functional groups (designers, ROW agents, environmental agents, consultants, etc.)

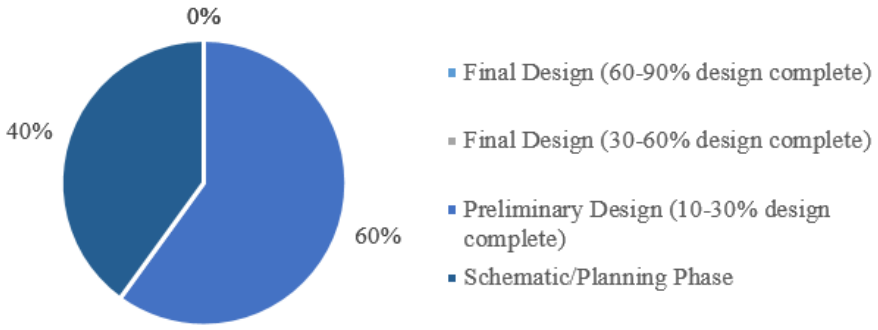


Participants were asked to rate the effectiveness of communication and data sharing regarding utilities among Iowa DOT functional groups. The responses highlight potential for enhancement, as all participants rated it either “somewhat effective” (70%) or “non-effective” (30%).

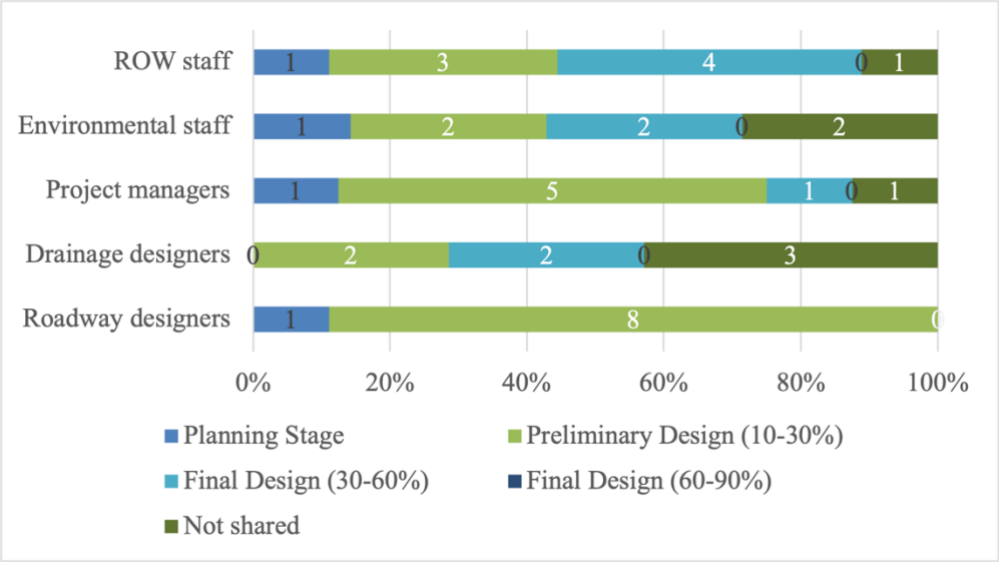
Building on the previous point, participants mentioned that the main challenges/barriers to effective communication and data sharing regarding utilities between the Iowa DOT functional groups include the following:

- Not knowing where to find information which indicates not adequate use of the DOT's information system.
- Lack of teamwork and a siloed approach among internal Iowa DOT groups, making it harder to communicate smoothly.
- Getting timely and accurate information from utility companies, including problems with the format of the received information.
- Ensuring information provided by utilities is included in project plans, as information does not always seem to be incorporated into the project plans.
- Low attendance of utilities at project meetings.

Participants were asked about the typical stage in the project development process when the utility coordination process begins and to identify the first utility activity or step within this process. On one side, 40% selected "During Schematic Phase/Planning," highlighting that the initial step is the Design Request sent to One Call ([U00]), which occurs after the concept meeting but before the field examination. On the other hand, 60% chose the "Preliminary Design Stage" and identified the first step as the [D0] event. However, they also noted that this doesn't consistently happen, as utility coordination occasionally gets delayed until 30%–60% of design completion due to a lack of communication or delays in completing plans as scheduled.

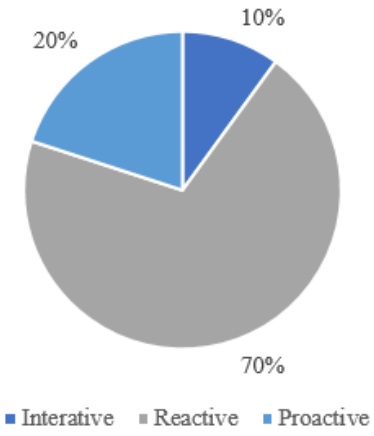


Recognizing the significance of timely and efficient sharing of utility data among all utility coordination stakeholders, participants were questioned about the timing of sharing collected utility data with various stakeholders. Additionally, according to participants, the primary communication channels for sharing utility data with these stakeholders are the ProjectWise project folder and emails. In instances where information is not available there, they seek it through requests to the district utility coordinator.



Section 2:

Survey participants were asked to choose the statement that best characterizes the Iowa DOT's typical utility coordination approach. Responses provide insights into the predominant approach, "reactive," suggesting room for potential shifts toward a more interactive or even proactive approach, which would be optimal to enhance the efficiency of utility coordination efforts.



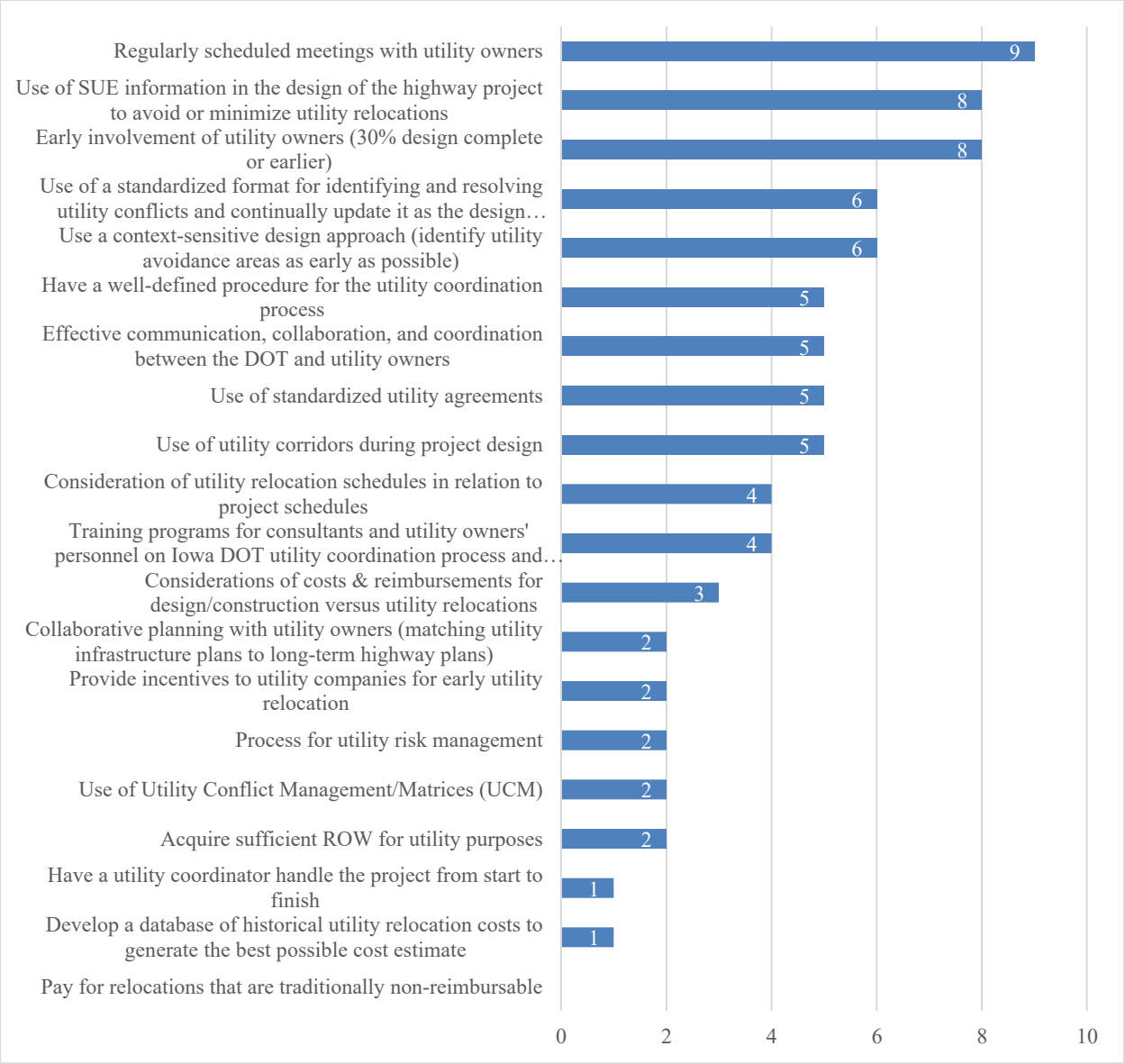
- **Interactive** (Work collaboratively with stakeholders involved in the identification and addressing of needs.)
- **Reactive** (wait until needs are realized before addressing them)
- **Proactive** (Try to anticipate needs and accomplish them timely)

All survey participants unanimously indicated that the Iowa DOT currently lacks a mechanism for measuring or evaluating the effectiveness of the utility coordination process. This collective response underscores a distinct opportunity for the development of more formalized measures to assess the effectiveness of utility coordination. Additionally, participants described "effective utility coordination" as follows:

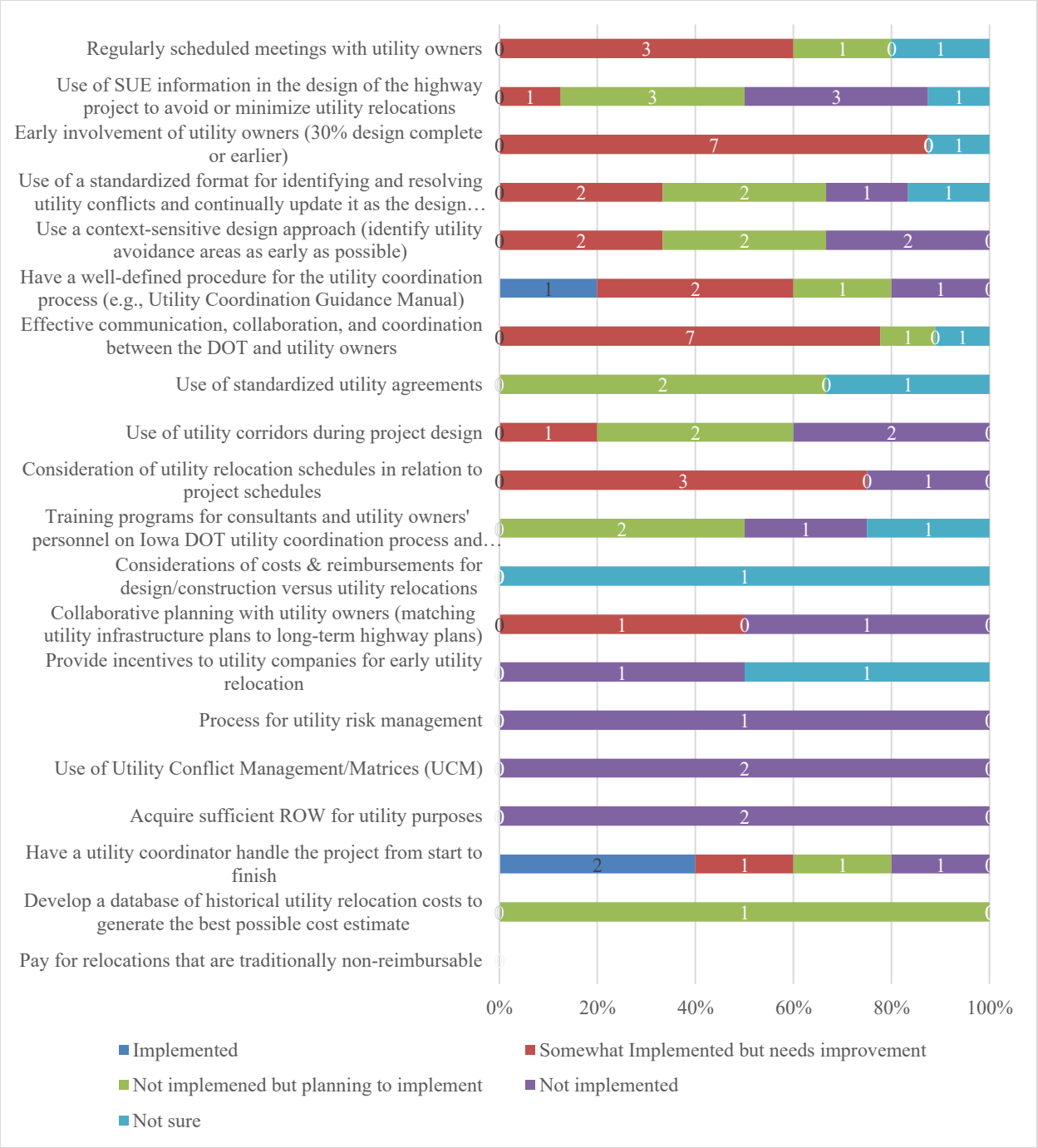
- Collaboration, communication, and proactive engagement, particularly in the early stages of the design process between designers and utility partners.

- Identify and address utility conflicts early in the project to prevent or minimize conflicts when feasible.
- Early collaboration, communication, and teamwork with survey and planning staff.
- Enhanced collaboration between ROW staff, Designers, and District staff at the very early stages [D02] to identify ROW needs on time and start the acquisition process. Waiting until [D05] to start ROW design does not always allow utilities to relocate their facilities on time.
- Obtain utility information from utilities at the [D00] level and pass it on to all relevant parties (not only the district but also other staff).
- Make efforts to finish relocation work before construction starts. If not possible, plan relocation work to happen in coordination with the roadway construction.
- Regular meetings with utilities, both project-specific and annual district-wide meetings. Discuss future opportunities to collaborate during district meetings.
- Utility companies' staff are trained to read project plans properly.

Participants were asked about the practices they consider the most important for effective utility coordination based on their experience. It is important to note the respondents were only allowed to select the top eight choices from the list provided to them. As shown below, there is a consensus for the top nine effective practices.



Building on the previous question, participants were prompted to assess how well these practices are currently implemented at the Iowa DOT. As shown below, results clearly show opportunities for improvement, as the levels of implementation of the top eight practices for effective utility coordination were mainly rated as "somewhat implemented but needs improvement," "not implemented but planning to implement," and "not implemented." These responses align with the findings from the previous question, indicating that if a specific practice is not utilized by the Iowa DOT, it is unlikely to be considered among their top practices for effective utility coordination. For instance, the lack of implementation of the "use of UCM" may explain why respondents do not recognize its potential to enhance the effectiveness of utility coordination.



Other practices mentioned by the respondents that may potentially benefit the Iowa DOT utility coordination process include the following:

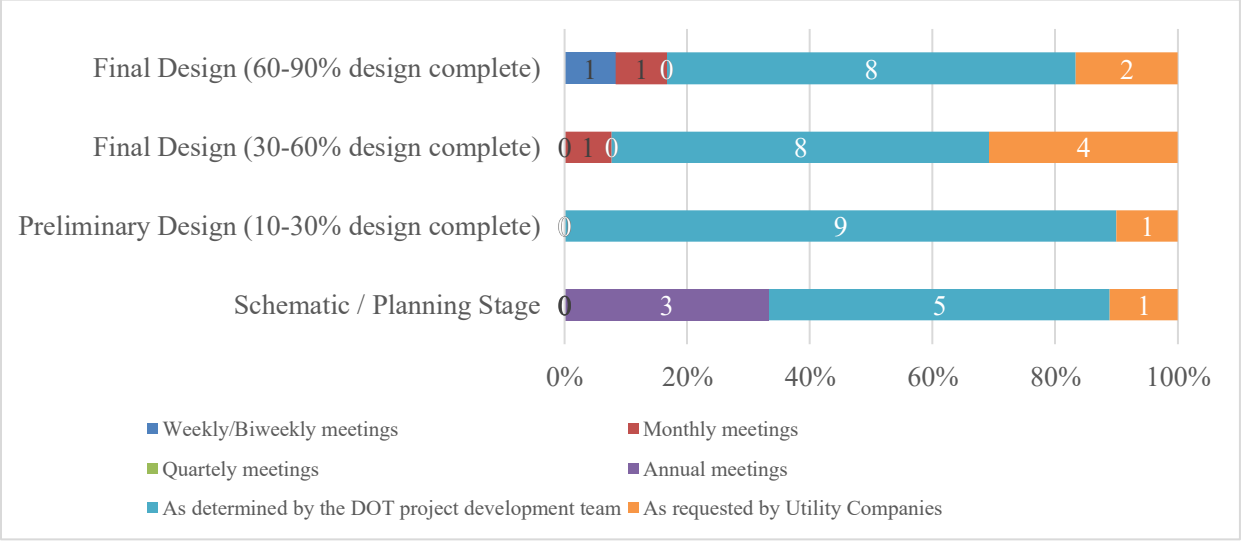
- Imposing liquidated damages on public utility companies that fail to relocate promptly as an incentive for utilities to adhere to relocation timelines.
- Leverage the Iowa Code to incentivize utility relocations, shifting some burden from the DOT to utility companies.

- Implementing a common location system, providing a standardized platform for utilities to share information.

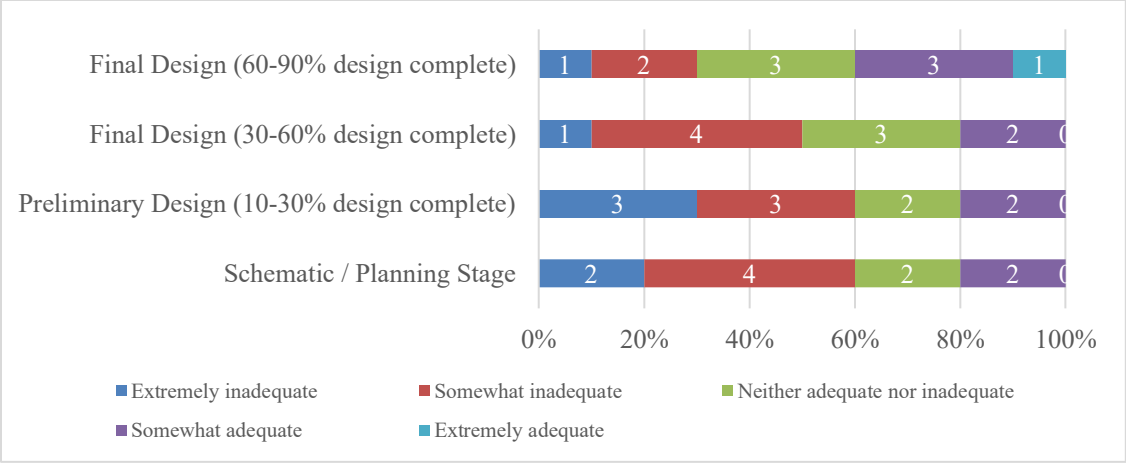
Participants were questioned about the frequency with which designers at the Iowa DOT design around or redesign a roadway feature to mitigate utility conflicts. The responses indicate a diverse frequency, ranging from very rarely to frequently. This suggests a lack of consistency and highlights the need for a more systematic and proactive approach to addressing utility conflicts.

Inquired about the timing of the first in-person utility coordination meeting, survey participants provided a split response. Half of the respondents indicated that this meeting typically occurs during the Preliminary Design Stage (design is 10%–30% complete). Conversely, the other half mentioned that the first in-person utility coordination meeting occurs during the Final Design Stage (30%–60% design completion).

Expanding on the previous question, participants were asked about the frequency of Iowa DOT-hosted meetings with utility companies (regarding an individual project) at each stage of the project development process. The findings show that meetings happen mainly "as determined by the DOT project team." As shown below, the frequency of meetings goes up as the project moves forward. They start with yearly meetings in the planning stage and increase to monthly and sometimes weekly/biweekly meetings in the final stage.

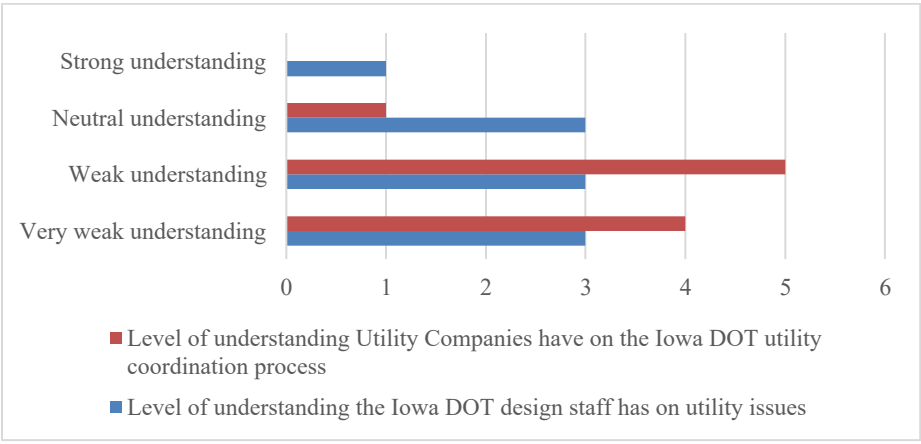


Survey participants were required to rate the level of communication and collaboration between the DOT and utilities at each stage of the project development process. The responses illustrate varied opinions, with a prevailing observation suggesting a need for improvement. Ratings predominantly include categories such as "extremely inadequate," "somewhat inadequate," and "neither adequate nor inadequate," indicating a potential for enhancements in this aspect.



Participants were asked about the existence of a systematic approach for managing utility conflicts at the Iowa DOT. While the majority stated that there is no such approach, two participants mentioned the presence of a procedure. They highlighted using the PPMS to track utility companies' involvement but only tracking completion dates of various items. However, they pointed out that this information is collected and tracked only if utilities cooperate. The tracked information encompasses utility conflict ID, description, location, responsible parties and status of relocation work, estimated start and finish dates, ROW needs, and utility agreements. These insights suggest a potential need for more robust and effective procedures to manage and monitor utility conflicts within the organization.

Survey participants were questioned to evaluate the following: (a) the level of understanding among Iowa DOT design staff regarding utility issues and (b) the understanding utility companies have about the Iowa DOT utility coordination process. Regarding the former, more than half (60%) expressed a weak or very weak understanding. Concerning the latter, the majority of responses (90%) indicated a very weak or weak understanding. These responses underscore perceived knowledge gaps among Iowa DOT design staff and utility companies, indicating potential areas for training and improvement.



When asked about the clarity in the definition of roles and responsibilities among various stakeholders in utility coordination at the Iowa DOT, the majority (60% of participants) indicated a need for improvement. This implies an opportunity to enhance and communicate these roles more effectively for an efficient utility coordination process.

Participants were prompted to identify three major utility coordination issues or challenges faced by the Iowa DOT and indicate whether these issues/challenges were caused by the DOT, utility companies, or both. Responses are presented below.

Iowa DOT	Utility Companies	Iowa DOT and Utility Companies
• Utility installations on projects with faster turnaround times to letting. • Timely ROW acquisition • DUC workload • Poor teamwork and communication within various sections of the DOT • Tracking utility responses • Designers are not always willing to accommodate existing utilities and to recognize the cost savings of avoiding and minimizing conflicts.	• Obtaining locations of utilities in a timely and adequate manner. • Lack of responses from utilities at U-events • Challenges reading project plans. • Relocating utilities promptly and correctly. • Delays in providing work plans and permits • Getting a reponse of "no conflict" from the utility when in fact they are in conflict. • Utilities do no have records of their own facilities. • Utilities are aware that the Iowa DOT cannot take action on conflicting facilities beyond issuing notifications and corresponding with them.	• Working around existing or proposed structures • Defining roles and responsibilities for relocation • Inaccuracies in utility locations (especially depths) • Poor communication and follow-through • Need for improved collaboration and communication channels

Participants were questioned about the Iowa DOT's adoption of consultant-led utility coordination, either through an independent utility consultant agreement or as part of the project design consultant agreement. The findings revealed that 30% were uncertain, 50% confirmed non-utilization of consultant-led utility coordination, and 20% acknowledged its use within the DOT. Factors influencing the decision to engage a consultant included project and design complexity, utility-related intricacies, and a lack of in-house expertise. Importantly, participants noted an absence of a defined procedure for establishing the scope of utility coordination services and evaluating their effectiveness within the DOT. These insights emphasize the need for greater clarity and procedural development in consultant-led utility coordination at the Iowa DOT.

Regarding the utilization of SUE at the Iowa DOT, the survey revealed a lack of consensus. Results showed that 30% stated there is no specific plan, 20% were unsure, and 50% confirmed the existence of a procedure. Comments provided give more insights, like the observation that using SUE tends to happen more at the last minute instead of being part of the early stages of a project. One participant mentioned that SUE is requested when there is a clear possibility of a utility conflict, leading to a joint decision-making process involving the district, project management bureau representative, and design team. Overall, the responses suggest a lack of consistent understanding or consensus on how SUE is used, indicating potential areas for implementation of this practice within the Iowa DOT.

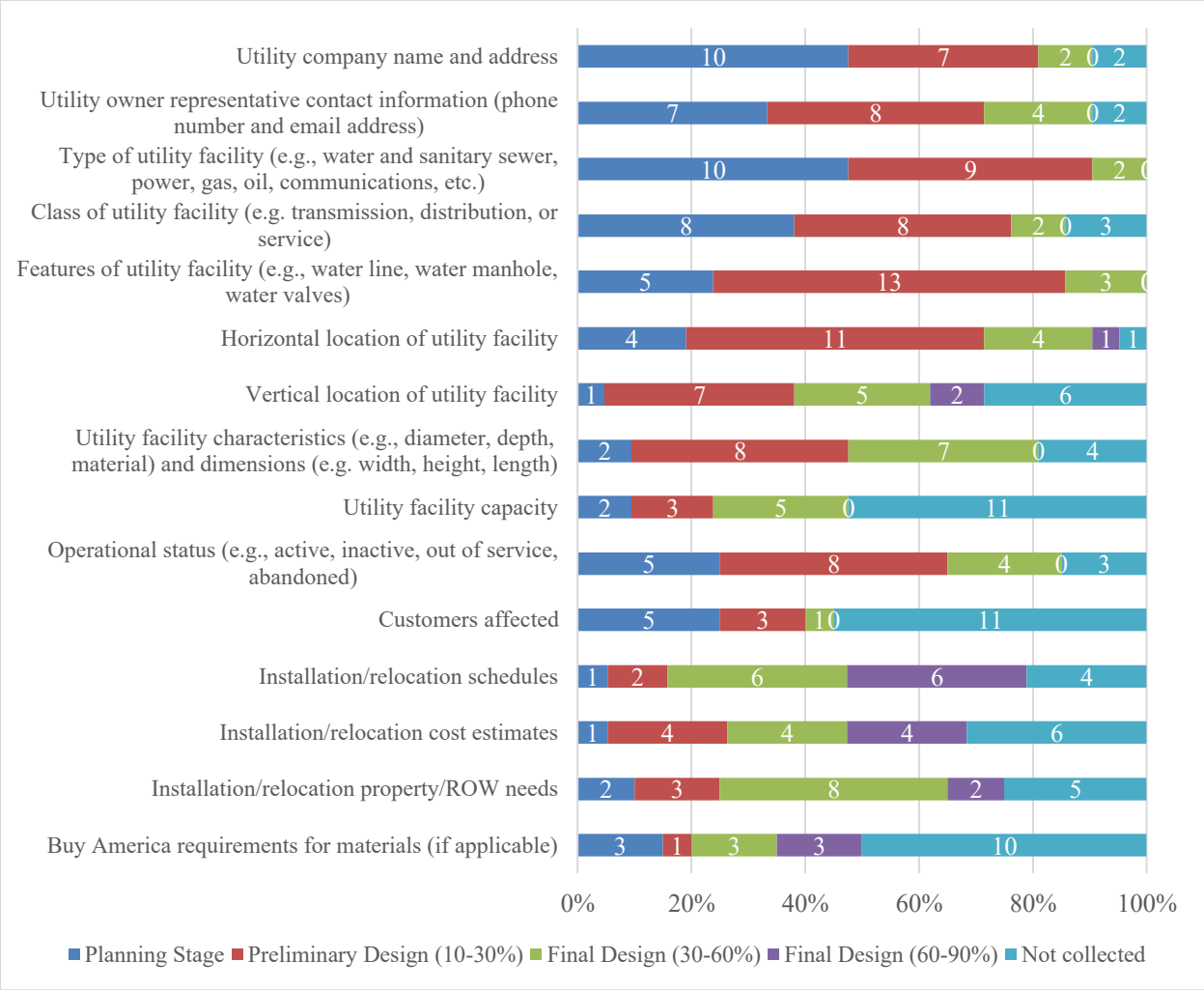
Survey participants were queried about the most helpful topics for enhancing utility coordination at the Iowa DOT through potential training. The top three areas of interest included (1) rules and policies for dealing with utilities, (2) understanding the timelines for utility planning and relocation, and (3) effective conflict resolution methods when utilities clash. These preferences indicate a collective interest in learning about the regulations governing utilities, the timelines for utility planning and relocation, and effective conflict resolution strategies.

D.2. Iowa DOT Consultants

Collecting feedback from Iowa DOT consultants was crucial to comparing their utility coordination approach with the DOT's in-house utility coordination approach. Despite a low response rate of only 17 participants, relevant information was collected. Survey respondents included representatives from nine roadway design consultants conducting utility coordination, two utility coordination consulting firms, and six other consulting companies. The diverse roles held by participants, ranging from ownership and leadership positions (owner/founder, director of operations, and directors) to project-related roles (project managers, project engineers, and staking technician/member service), indicate a broad spectrum of expertise and perspectives among Iowa DOT consultants.

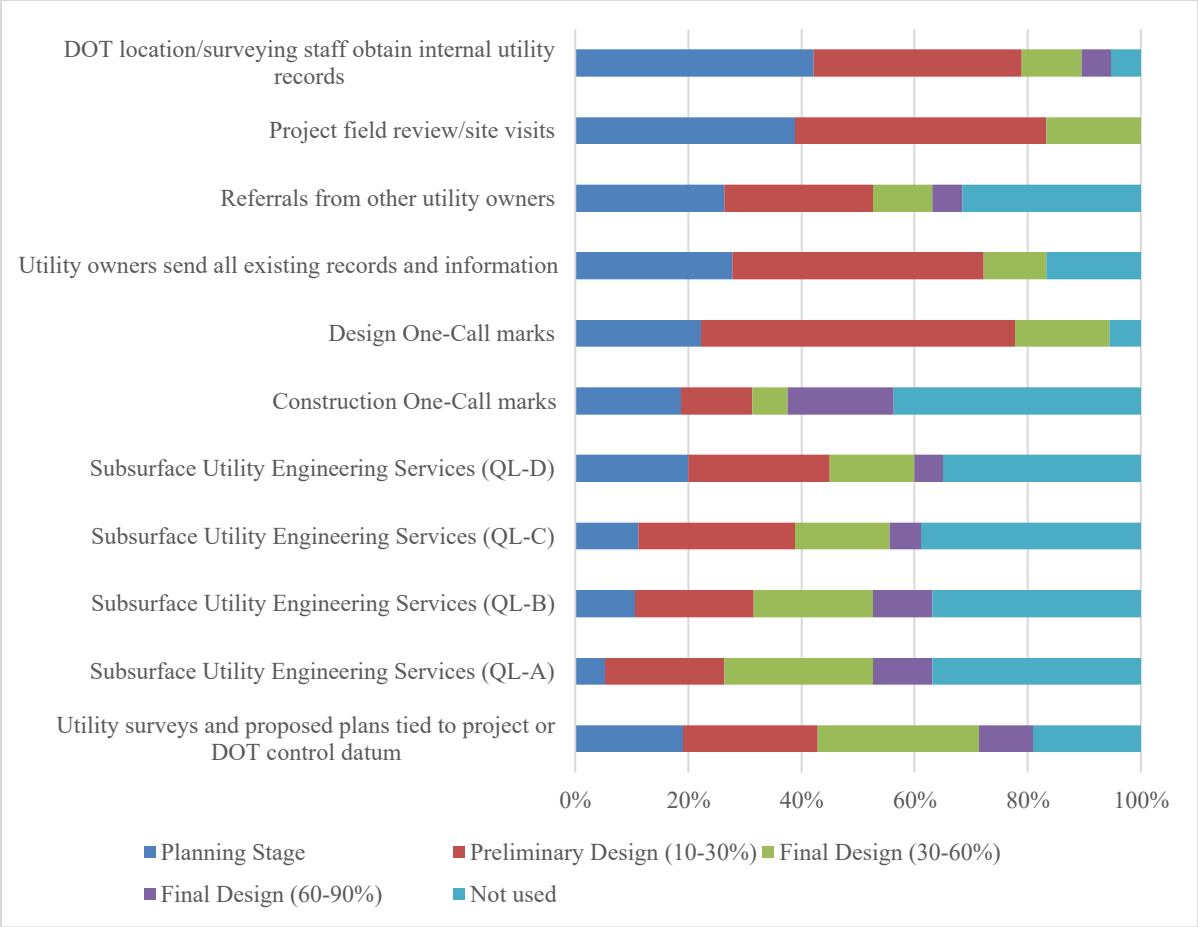
Section 1:

In response to whether they must follow the Iowa DOT's procedures for obtaining utility data, 60% indicated compliance, and 40% reported not being required to adhere to these procedures. No clear link emerged between this compliance and the type of consulting service provided, whether it involved utility coordination as part of road design consulting or as a standalone utility coordination service.



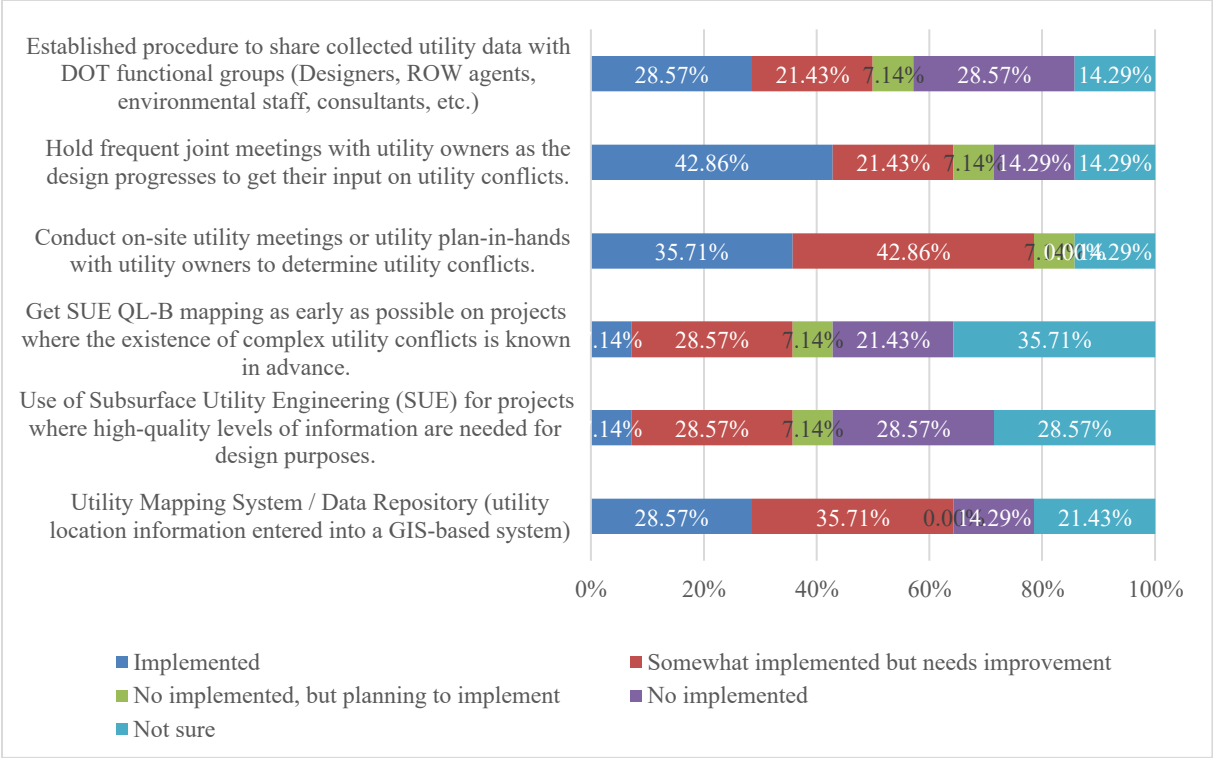
Consultants were asked about the collection of utility information at various stages of project development. As shown above, data such as the utility company name and representative contact information, type and class of utility facility, as well as features and horizontal location of utility facilities, is predominantly gathered during the Planning Stage and Preliminary Design Stage (10%–30%). Vertical location, operational status, and characteristics of utilities are mainly collected at the Preliminary Design Stage (10%–30%). Information on ROW property needs is collected during the Final Design Stage (30%–60% design complete). During the Final Design Stage (30%–60% design complete), the focus shifts to collecting information such as relocation schedules and ROW requirements.

Participants were asked about the sources used to obtain utility data at each stage of the project development process. The primary information sources in the Preliminary Design Stage (10%–30% design complete) include site visits, utility companies' records, and design One Call marks. Additionally, the majority of respondents noted that SUE is not being employed.



Regarding their approaches to collecting data for unknown, out-of-service, and abandoned utility facilities, most respondents, except one, stated that their companies lack a specific approach for such situations. The singular respondent with an approach mentioned collaborating with utility companies to hire and pothole unknown utility locations, primarily focusing on conflict points.

Participants were provided with a concise list of practices related to utility data collection and sharing, and then asked to assess the implementation levels of those practices within their respective companies. The results revealed that SUE services are not implemented in the majority of cases. Moreover, there appears to be room for improvement in frequently meeting with utility owners and utilizing a utility mapping system.

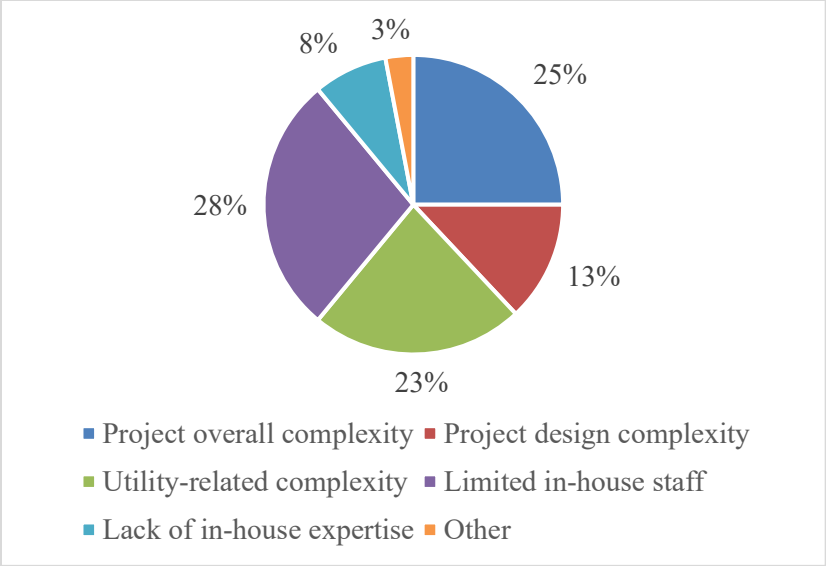


When evaluating the effectiveness of communication and data sharing within Iowa DOT functional groups (including designers, utility coordinators, environmental staff, ROW agents, consultants, etc.), respondents from consulting firms presented a balanced viewpoint. Fifty percent of the respondents considered communication and data sharing "effective," while the other half considered it "somewhat effective." According to them, the main communication channels to share utility data with those stakeholder groups are through the utility coordination staff, plan submittals (CAD files and PDF drawings), emails, and meetings.

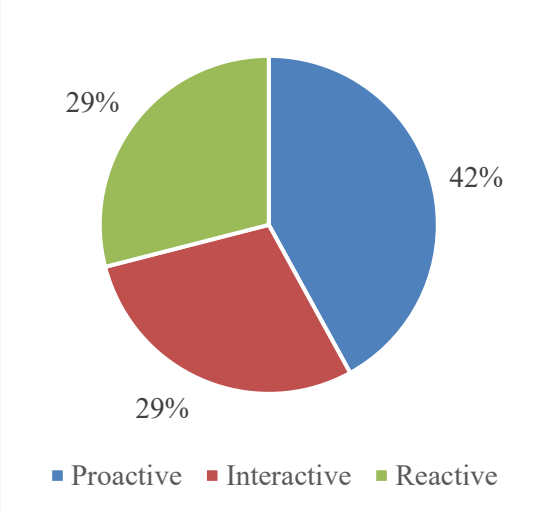
Expanding upon the earlier observation, participants highlighted the primary challenges and barriers hindering effective communication and data sharing among Iowa DOT functional groups. These challenges include issues with the accuracy and format of the information shared by utility companies (older plans), difficulties in convening utilities for meetings, issues with facilitating effective data sharing among private utility owners, and lack of collaborative efforts of the DOT, design team, and consultants.

Section 2:

Participants were asked to identify the top three factors they think influence the Iowa DOT´s decision to use consultant-led utility coordination the most. The survey revealed that, among the options, limited in-house staff (28%) emerged as a prominent reason, closely followed by project overall complexity (25%) and utility-related complexity (23%). Additionally, participants noted the absence of a defined procedure within the Iowa DOT for scoping the utility coordination consulting service.



Participants were asked to select the statement that best characterizes their typical approach to utility coordination within their organizations. While it is encouraging that a majority (42%) opted for the "proactive" option, these results suggest a potential area for improvement in fostering more proactive strategies to enhance utility coordination practices.



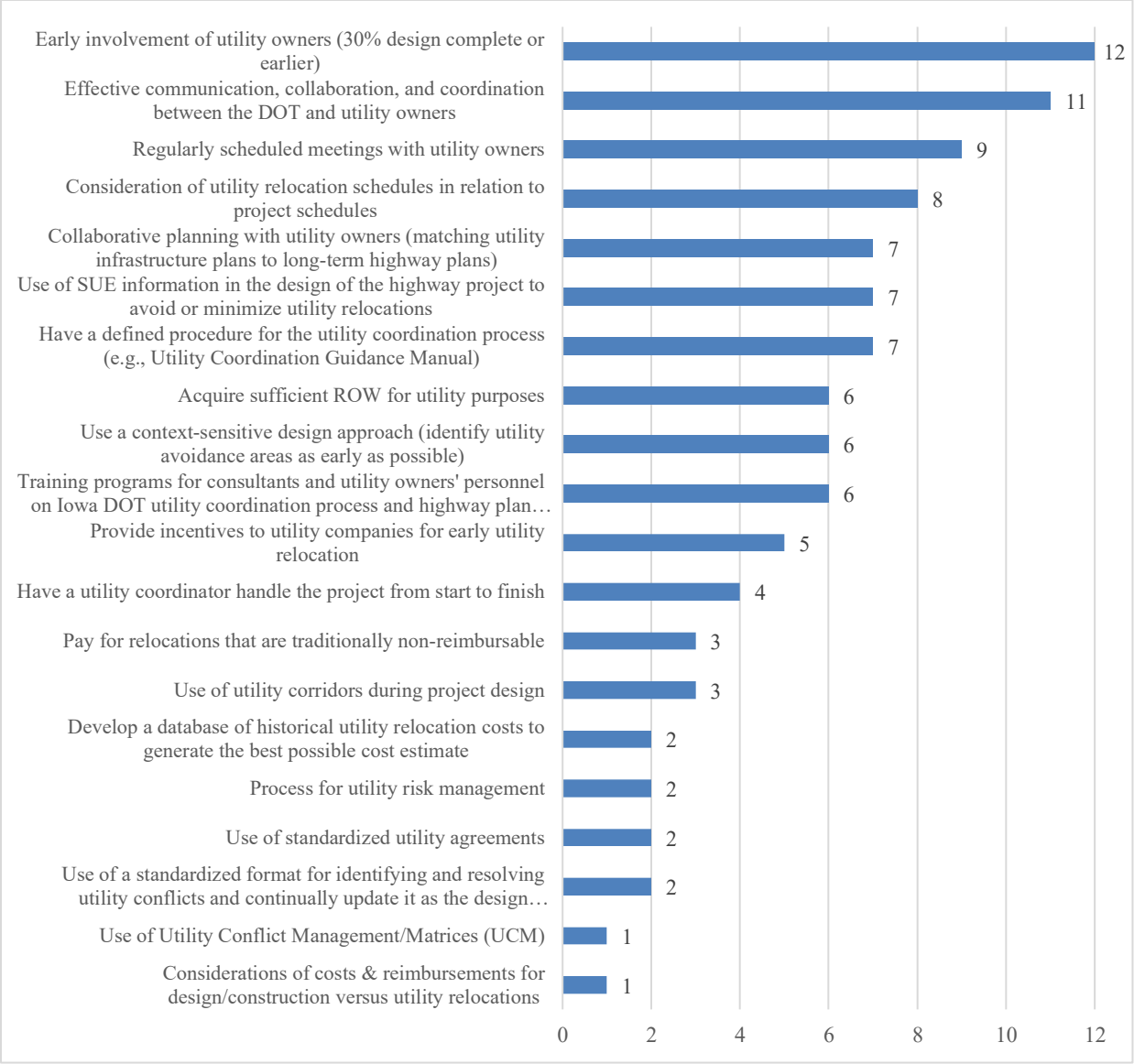
- **Interactive** (Work collaboratively with stakeholders involved in the identification and addressing of needs.)
- **Reactive** (wait until needs are realized before addressing them)
- **Proactive** (Try to anticipate needs and accomplish them timely)

All participants agreed that their companies do not have internal mechanisms to measure or assess the effectiveness of utility coordination consulting services. Furthermore, when questioned about the practices of the Iowa DOT, all participants stated that there is no established procedure in place to evaluate the effectiveness of utility coordination consulting services. This shared absence suggests an opportunity for both consulting companies and the DOT to explore and establish processes for assessment.

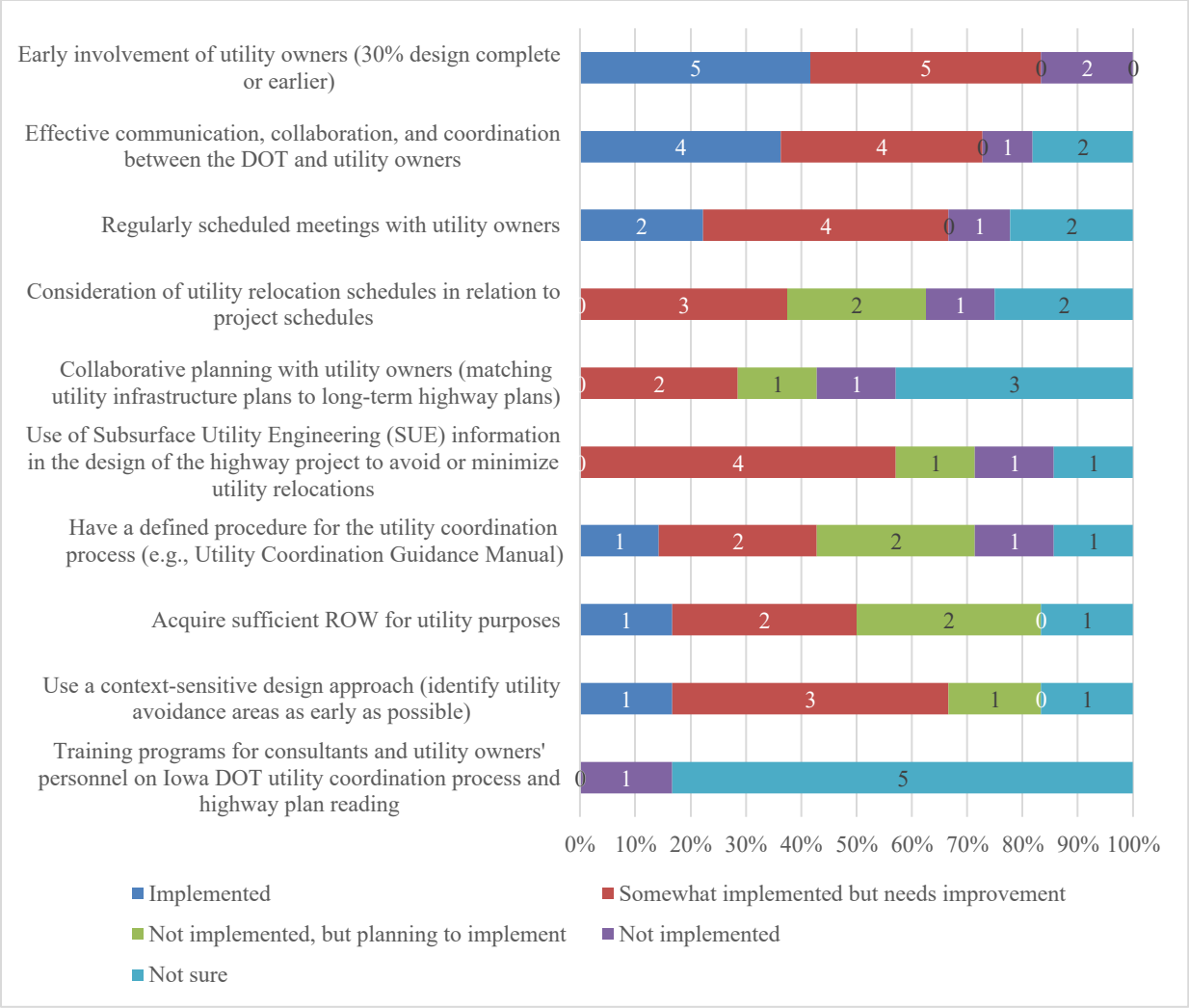
Participants were asked to describe what they consider "effective utility coordination," and several key themes emerged from their responses:

- Providing utility companies with timely design information so that they have enough time to plan and complete the relocation work.
- Engaging and communicating with utility companies early to accurately identify facilities in the corridor and their locations, identify potential conflicts, and work with them to develop a resolution of those conflicts before final design starts.
- Addressing all utility conflicts prior to the bid letting to avoid or minimize impacts during construction.
- Accurately marking the utility facilities on the field.
- Ensure all affected utilities (public and private) are aware of the project so they can plan the work needed on time.
- Being responsive during the design stage and providing highly accurate location data and field marking locations.

Delving further into the previous question, survey participants were asked about the practices they deemed most crucial for effective utility coordination. It's important to note that respondents were limited to selecting their top eight preferences from a provided list of practices. The results below underscore a consensus on the identified top 10 effective practices.



After identifying the top practices for effective utility coordination, participants were asked about the extent to which these practices were implemented within their organizations. The results highlight different areas for improvement, as the implementation levels of some of these key practices, such as “regularly scheduled meetings with utilities,” “use of SUE information in the design to minimize utility conflicts,” and “use of a context-sensitive design approach;” were mostly rated as “somewhat implemented but needs improvement.”



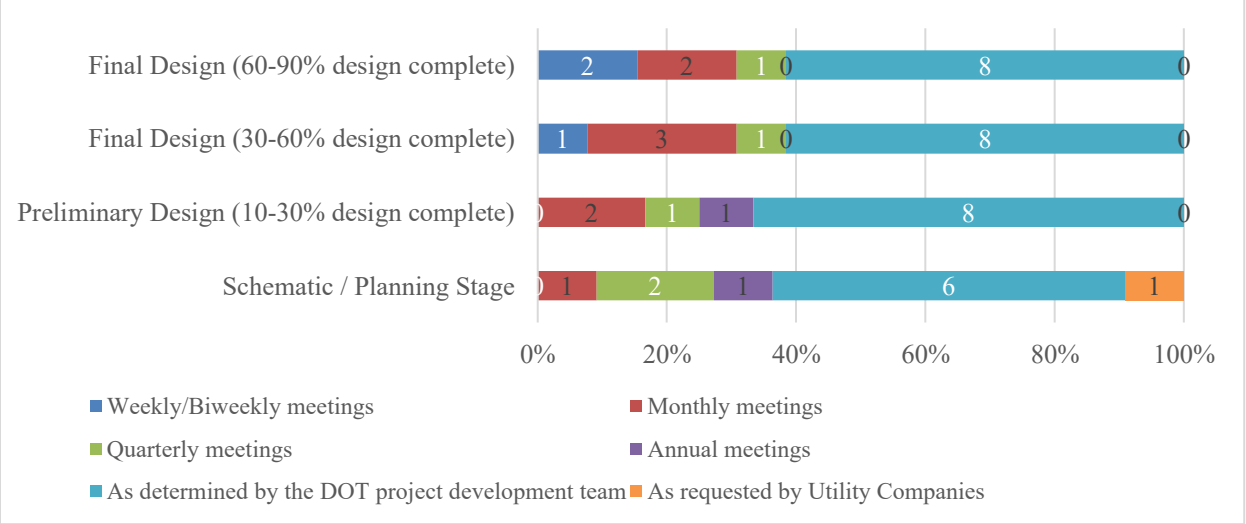
Survey respondents also proposed additional practices that could potentially enhance the Iowa DOT utility coordination approach, including the following:

- Using relocation agreements with utilities that clearly identify their expected work, responsibilities, and the timeframe for the relocation.
- More flexibility with utilities based on their needs. Some relocation projects take a while for small companies to complete.
- Enhancing the DOT's inspection of utilities' relocation work if it is completed during the construction stage.
- Strive to complete all relocation before the construction stage begins.
- Timely acquisition of ROW for utility relocation needs.
- Regular non-project-specific meetings (quarterly) with utility owners to identify and/or confirm the main point of contact.
- Start coordination earlier than [D02] Field Exam Plans

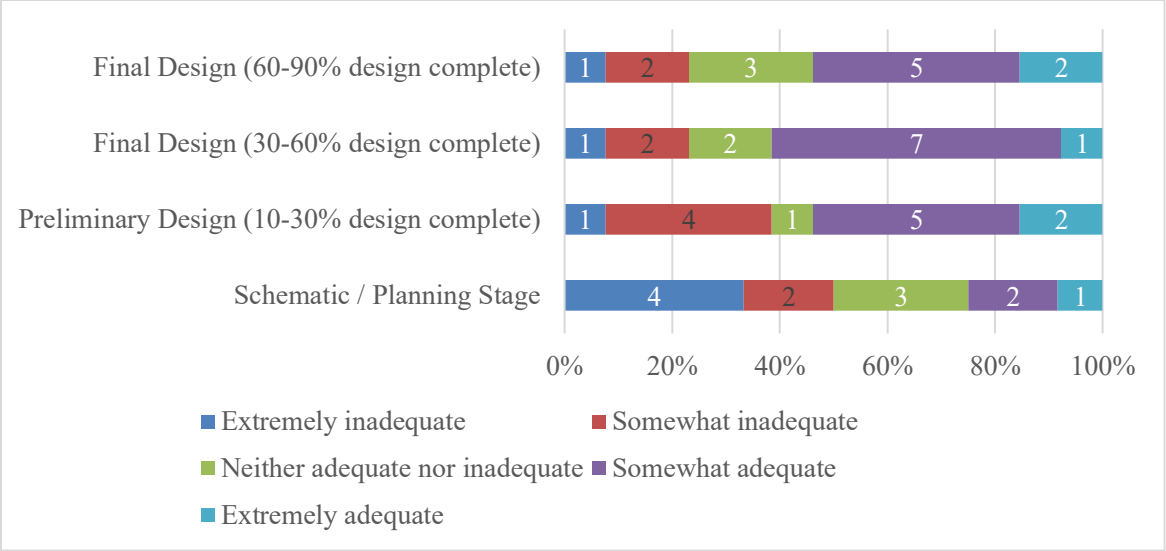
Participants were asked how often designers choose to either design around or redesign a roadway feature to address utility conflicts when it is feasible and safe. The majority of respondents chose “frequently” (42%) and “occasionally” (25%). While these results are encouraging, there appears to be room for improvement in this aspect.

Participants were queried about the typical timing of the first in-person utility coordination meeting, and responses revealed two main stages. The majority (46%) indicated that the first utility coordination meeting usually occurs during the Preliminary Design Stage (10%–30% design complete. Additionally, 38% of participants noted that the first in-person utility coordination meeting typically occurs during the Final Design Stage (30%–60% design complete.) This insight provides a snapshot of the common points in the project development process when in-person utility coordination meetings are initiated.

Building on the previous question, survey participants were asked about how often utility coordination meetings, specific to individual projects, occur at each stage of the project development process. The findings show that utility coordination meetings usually happen “as determined by the DOT project team” at every stage.



Participants hold diverse opinions on rating the level of communication and collaboration with utility companies. It is noteworthy that the predominant rating for the Preliminary Design (10%–30% design complete), Final Design (30%–60% design complete), and Final Design (60%–90% design complete) Stages is “somewhat adequate.” Conversely, the prevailing rating for the Schematic/Planning Stage is “extremely inadequate,” indicating a potential area for improvement in communication and collaboration between consultants and utility companies at this stage.



Survey participants indicated that approximately 50% of them have an approach or procedure in place to manage and keep track of utility conflicts. Among the described approaches, consultants mentioned utilizing spreadsheet formats for tracking purposes. Additionally, respondents highlighted the use of GIS-based utility management systems, wherein each utility is placed in GIS to track its progress within the process. This approach allows for graphical representation and data points for reference. Another respondent emphasized the variation in approaches based on project complexity, ranging from callouts on plans to a GIS database that spatially tracks conflicts by location. However, they noted that tracking the resolution of some conflicts is not possible if they are not involved in the construction stage.

Regarding the information tracked in managing utility conflicts, respondents primarily mentioned utility conflict ID, description, and location; relocation work status; proposed utility conflict resolution; and the responsible party for the proposed resolution.

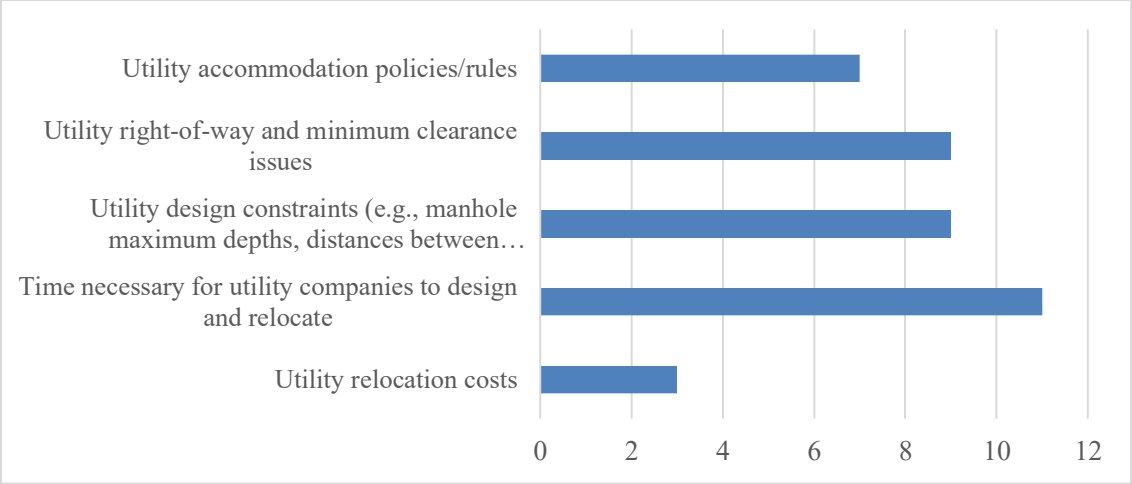
Participants were prompted to assess the level of understanding that (a) Iowa DOT design staff has on utility issues and (b) utility companies have on the Iowa DOT utility coordination process. The predominant response for both (a) and (b) was “neutral understanding.” This implies that there is potential for improvement or further development in understanding between the parties involved.

Acknowledging the importance of clearly defining the roles and responsibilities of each project party involved in utility coordination, participants were asked about their perception of how well these roles and responsibilities are defined within the Iowa DOT. The majority of the responses fall into the “yes, but need improvement” (39%) and “not clearly defined” (38%). This suggests a shared sentiment among respondents that there is room for enhancement of clarity in defining the roles and responsibilities of each project party in the context of utility coordination.

Participants were requested to mention three major issues or challenges faced by the Iowa DOT utility coordination process and indicate whether these challenges were caused by the DOT, utility companies, or both. Responses are presented below.

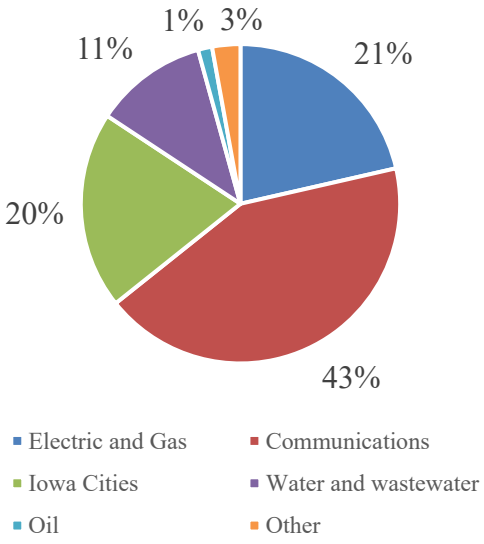
Iowa DOT	Utility Companies	Iowa DOT and Utility Companies
• Poor communication • Financing • Utilities are asked to relocate based on preliminary plans, but these plans change and utilitieshave to relocate again. • The ROW acquisition process starts late, providing insufficient time for utilities to complete relocation work. • Early coordination and engagement of utilities is needed.	• Man power and materials sourcing • Timeless marking of utilities • Poor Utility Record Keeping/Mapping • Utility Designer Workload • Relocation work is not completed on time. • accurate information • Inadequate as-built information • Rotating point of contact • Lack of timely response from certain utilities. • Utility companies are not engaged until the project is further in design	• Timely communication • Lack of inspection of relocated facilities • Lack of a defined communication protocol

Survey respondents were presented with a list of potential training topics and asked to choose the top three options they believe are most needed to enhance the Iowa DOT utility coordination process. The top three selected topics were identified as (1) the time necessary for utility companies to design and relocate, (2) utility design constraints, and (3) issues related to utility right of way and minimum clearance. These chosen topics indicate a shared interest in addressing challenges and gaining insights into key aspects of utility companies' work and considerations.



D.3. Utility Companies

Interviewing representatives from utility companies offered valuable information about the issues they consider important in utility relocation. The survey included 70 responses from various utility companies in Iowa, covering electricity, gas, oil, communications, water and wastewater, Iowa cities, and more. These 70 distinct responses represented a diverse range of utilities, as illustrated below.

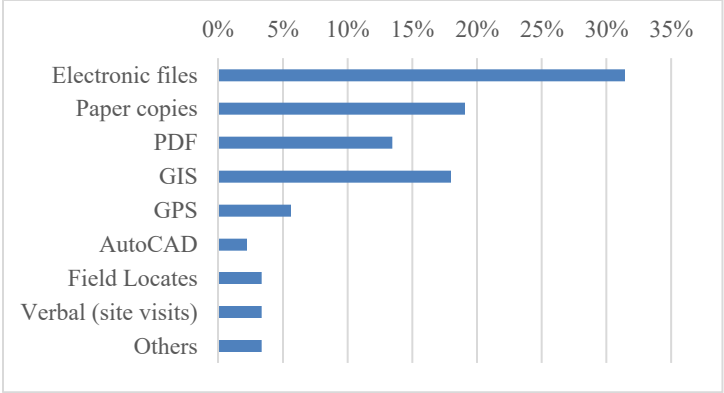


Utility Type	Number of Responses
Electric and Gas	15
Communications	30
Water and Wastewater	22
Oil	1
Others	2

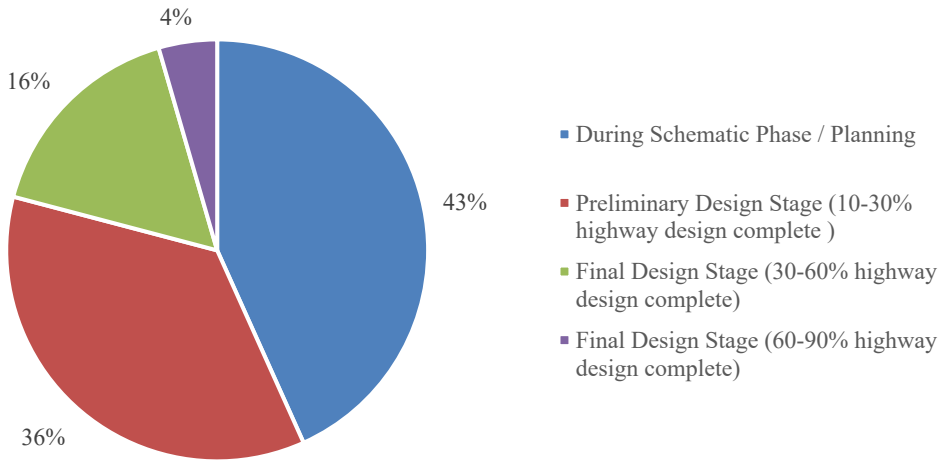
Participants were asked about the timing of providing specific information to the Iowa DOT for a specific project. The responses indicated that details such as the confirmation of the existence of facilities within the project area, utility facility descriptions, general locations, service area maps, contact information of the authorized representative, type and class of facility, and horizontal location of the facility are typically supplied when the DOT sends the General Information Submittal. Additionally, information regarding potential utility conflicts, horizontal location, facility characteristics, relocation schedules, relocation work descriptions, and ROW needs for

relocations are shared when the DOT sends the 1st Plan Submittal (60% design complete). Some information, including utility facility capacity, customer impact, relocation cost estimates, Buy America requirements, and required coordination with other utilities, appears to be infrequently provided, according to the majority of respondents.

Participants were queried about the most common format for submitting information about the location of their facilities to the Iowa DOT. As shown below, the responses indicated that electronic files were the most common format (31% of participants). Paper copies were the next most common (19% of participants), followed closely by GIS with 18%.

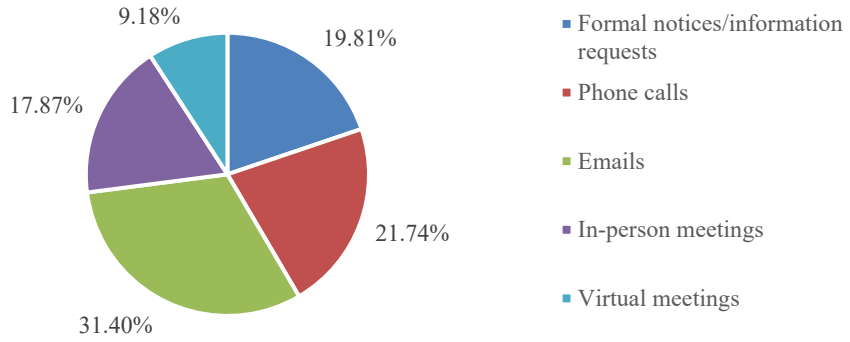


One area of interest was the timeframe at which utility companies engage in the utility coordination process within the Iowa DOT's projects. The responses revealed that 43% of participants are engaged during the Schematic Phase/Planning, while 36% get involved during the Preliminary Design Stage (10%–30% highway design complete). These results are promising, as early engagement of utility companies is highly advised for effective utility coordination within the overall project development timeline.

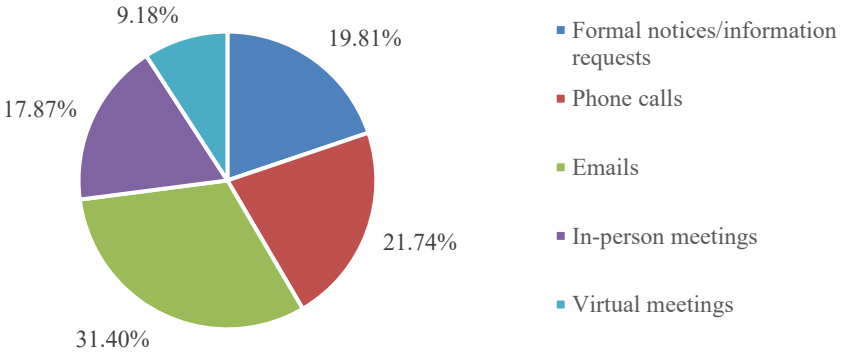


Participants were queried about whether their company/agency utilizes a single point of contact (a designated representative) to participate in the utility coordination for a specific project. The findings indicated that a significant majority of companies (76%) employ this approach, designating a representative to serve as the main point of contact for a specific project. This practice is instrumental in streamlining communication and coordination with the Iowa DOT.

According to the participants, the most effective communication means/channels for coordinating and sharing information between the Iowa DOT and their company/agency include emails (31.40%) and phone calls (21.74%). Participants also commented on the effectiveness of site visits/meetings.



Participants were tasked to describe, based on their experience, the Iowa DOT's utility coordination approach with the terms "proactive," "interactive," and "reactive." Results revealed that 45% of respondents recognize the DOT's approach as proactive. Another 32% defined it as interactive, and 22% describe it as as reactive. These findings underscore the potential for fostering an even more proactive strategy to enhance the efficiency of utility coordination practices.

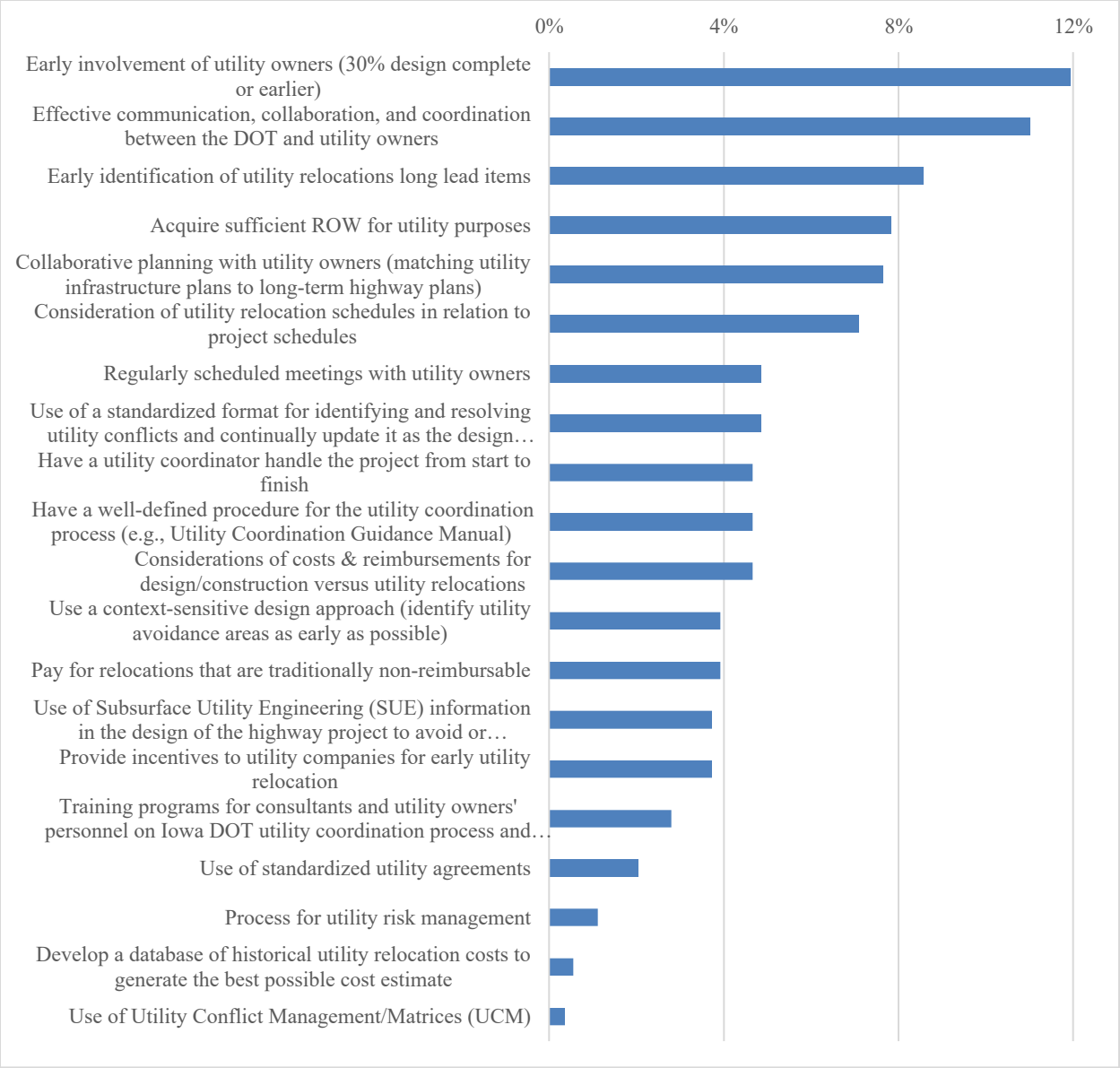


Participants provided their own definitions of "effective utility coordination." Key themes emerged from their responses:

- **Proactive notification** of the DOT's upcoming projects to utilities.
- **Early project notice** sent to utilities, allowing time to plan and budget for potential relocations. This notification should include as much project information as possible.
- **Communicating project plans/changes**/timing to all shareholders.
- **Establish expectations upfront** and foster collaboration to achieve the optimal outcome.
- Better communication is needed to identify the impacts of future Iowa DOT projects.
- **Collaborative work** with all parties involved to come up with the best, least intrusive way to get the project completed.
- **Clear, open communication** between both parties, the DOT and Utilities, from start to finish.
- **Close collaboration** between the DOT and utilities to meet everyone's needs.
- Constantly **share information and concerns**.

- Having **enough time to complete relocation work** before construction starts.
- Meet in person and/or on-site to discuss project scope, potential conflicts, and construction timeline.
- Collaborative work with utilities to identify conflicts. Having meetings to go over the project in detail discussing possible conflicts.
- The project owner should inform utility representatives where conflicts are anticipated on the proposed design.
- Early engagement of utilities, if possible, prior to the planning stage or during the concept stage.
- Total transparency of project goals and timelines.
- Coordination of proposed alignments of all utilities within a corridor.
- Outline the sequence and schedule for relocation work, specifying the tasks each company is responsible for and the corresponding timeline.
- Knowing well in advance where and when utilities need to be moved to accomplish the project.
- Sharing project plans at the various stages of the design development to review them and make sure utilities' safety requirements are incorporated into the plans.
- Make sure that all of the project is designed before any utilities are relocated. Not asking utilities to relocate with project preliminary plans, as they change later and utilities are required to relocate again.
- Having a utility coordinator that responds in a timely manner and is open to working with the utility when situations are abnormal and difficult.
- Acquiring enough ROW for relocation long before construction starts so that utilities have enough time to design and complete relocation work on time.
- Notices to the public outlining timelines for projects and clearly addressing how impacts will be handled if anything unforeseen arises.
- Update project plans based on the corrections provided by utilities on the location of their facilities. This information is not always corrected the first time.
- In the presence of discrepancies between utility information and surveyor data, engage in discussions with utilities and collaborate to resolve any doubts.
- Early communication and explanation of expectations. Realistic expectations for flexibility on relocations. Working with us regarding our concerns and constraints that impact costs significantly.
- Provide enough information to utilities so they can make informed decisions on whether/how we need to modify our system to accommodate the project.
- Provide preliminary files (preferably in kmz format), which would be an easy way to perform a rapid screening to determine if our utilities will be impacted and to what extent.
- Once the footprint of the project is established, work collaboratively to determine if project modifications can be made to minimize utility impacts and lower the project cost.

Further delving into particular aspects of effective utility coordination, participants in the survey were specifically questioned about the practices they considered essential for ensuring effective utility coordination. Participants were constrained to choose their top eight preferences from a predefined list of practices. The ensuing results highlight a consensus on the top 10 practices deemed effective by the respondents.

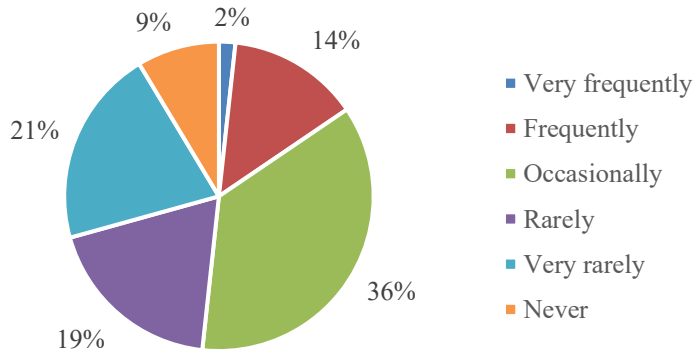


After identifying the top practices for effective utility coordination, participants were asked about the extent to which these practices were implemented within their organizations. The results highlight different areas for improvement, as the implementation levels of some of these key practices were mostly rated as "somewhat implemented but needs improvement" or "not implemented." Participants also proposed additional practices that could potentially enhance the Iowa DOT utility coordination approach, including the following:

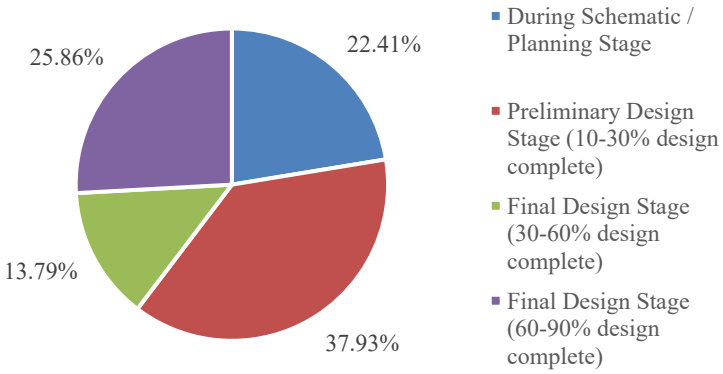
- Utilize GIS shapefile or geodatabase (GDB) format to share project information on the front end to identify conflicts earlier.
- Improve communication between utilities, the DOT, and contractors.
- Notify all utilities if the project design changes.
- Share long-term DOT plans with utilities and cities.

- Treat each other like partners/neighbors instead of enemies in the same trench.

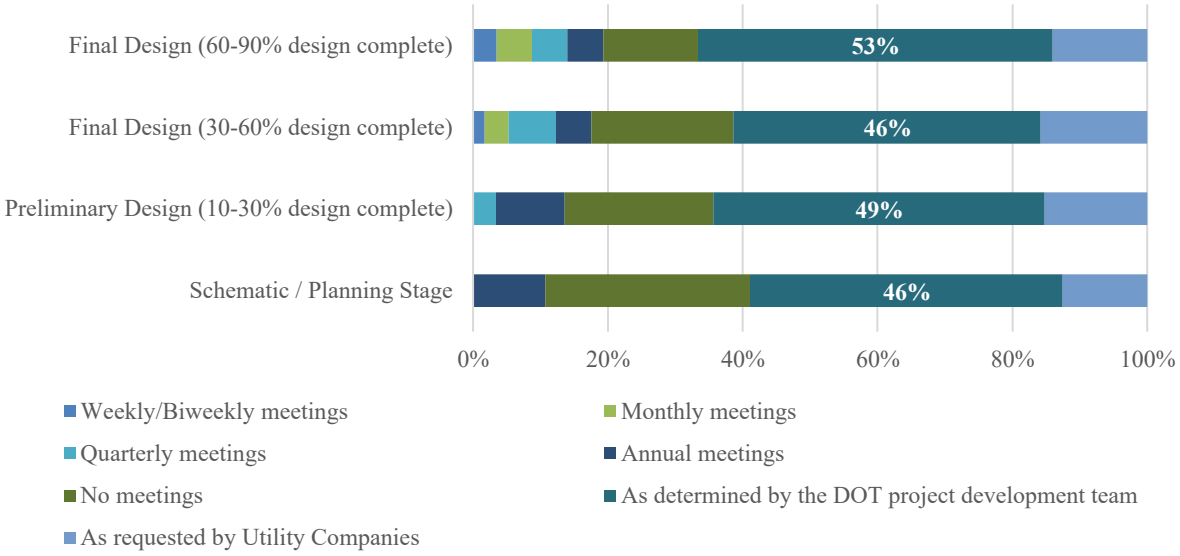
Survey participants were asked about the frequency with which DOT designers opt to design around or modify a roadway feature to mitigate utility conflicts. While 14% expressed that designers frequently take such measures, a notable 20% mentioned it occurs very rarely, and an additional 19% reported that designers rarely opt to redesign roadway features to minimize utility conflicts.

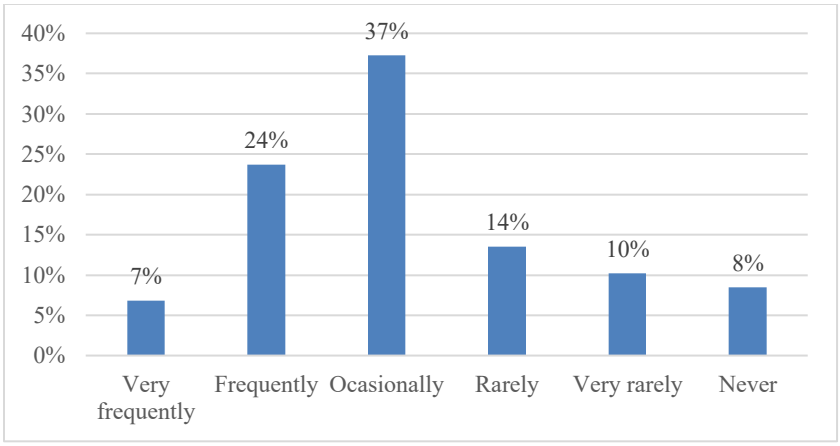


When asked about the timing of the first in-person utility coordination meeting for Iowa DOT projects, the majority of participants (37.93%) indicated that this meeting typically occurs during the Preliminary Design Stage when the design is 10%–30% complete. Following closely, 25.86% of respondents mentioned that the first in-person utility coordination meeting usually occurs during the Final Design Stage when the design is 60%–90% complete.



Delving further into the frequency of meetings between the Iowa DOT and utility companies, survey participants were questioned about the frequency of these meetings at each project development stage. The outcomes revealed that there is no set schedule for these meetings. Instead, the DOT project development team determines the occurrence of meetings, suggesting a project-specific approach to engaging with utility companies. The survey also inquired about participants' attendance at Iowa DOT public information meetings, revealing that 37% participate occasionally and 24% participate frequently.



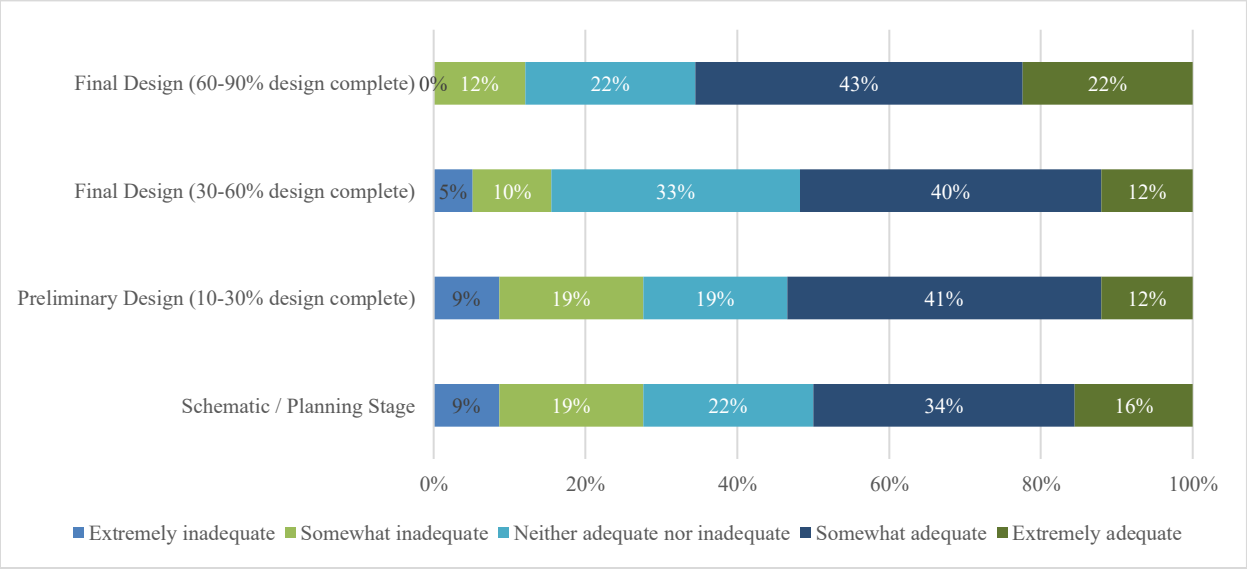


Survey respondents provided insights into the main reasons that might deter them from attending a utility coordination meeting hosted by the Iowa DOT. These reasons include the following:

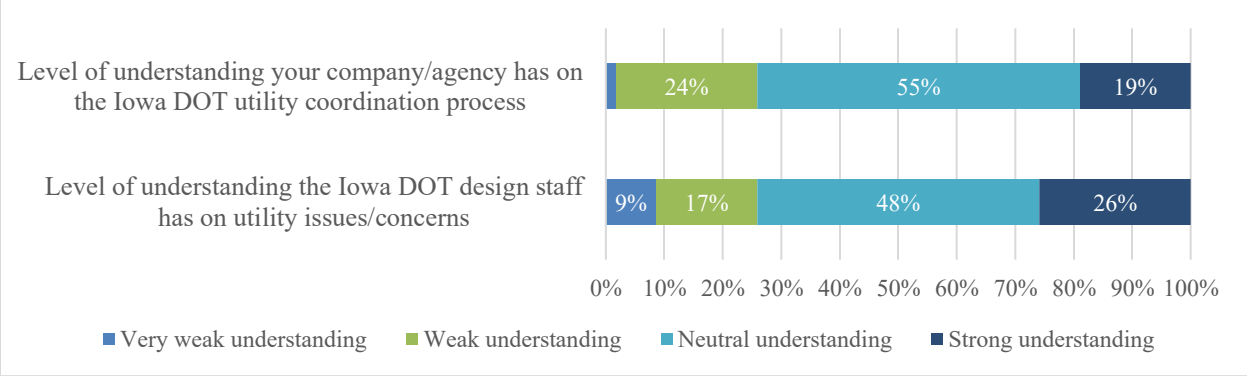
- Having relocation plans already approved or completed
- Notice of meeting not making its way to the correct person in the project area
- Not being invited to/notified about the meeting
- Not having utility facilities within the project area
- Schedule conflicts with the utility coordination meeting time
- Facilities not having conflicts with the proposed project
- Meeting being held after normal working hours
- Travel time and location of the meeting
- Staff workload (it is not always possible to make all meetings in person)

Concerning the communication and collaboration between the Iowa DOT and utility companies throughout different project development stages, as shown below, most respondents rated

"somewhat adequate" for all stages, with a secondary rating of "neither adequate nor inadequate." While these results indicate a promising baseline, they also suggest a potential opportunity for enhancements in the Iowa DOT's approach to engaging with utilities.



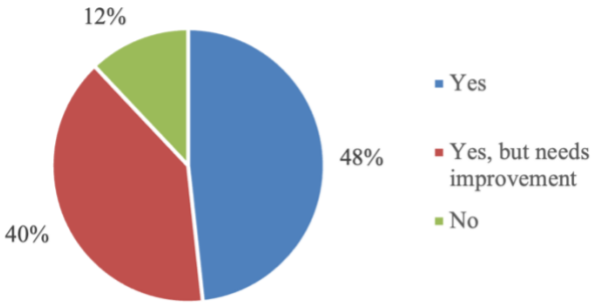
Participants in the survey were asked to assess their perspectives on two key aspects: (a) the level of understanding the Iowa DOT design staff possesses on utility issues/concerns and (b) the level of understanding their own company/agency has on the Iowa DOT utility coordination process. The prevailing response, marked by the majority of participants, was a "neutral understanding" of both aspects. Findings suggest an avenue for improvement, potentially through training initiatives, to foster enhanced mutual understanding between utility companies and the Iowa DOT.



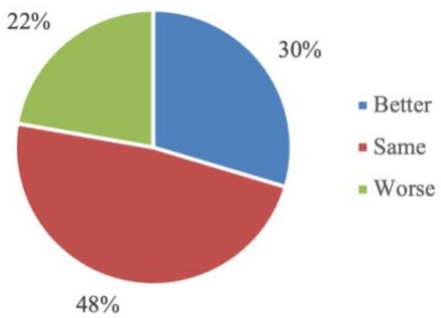
Participants were inquired about the topics that utility companies would find most beneficial for training provided by the Iowa DOT to enhance the utility coordination process. Notably, the top three choices among participants were "utility accommodation policies/rules" (26%), "utility coordination processes and issues" (24%), and "importance of communication and cooperation during coordination" (27%). These results show their interest in enhancing their level of

understanding of the Iowa DOT utility coordination process. Additionally, participants suggested other potential topics such as joint trench for utilities, permitting requirements and processes, and the provision of a chart of contacts within the DOT to facilitate communication. These findings offer valuable insights for the Iowa DOT to develop and tailor potential training programs.

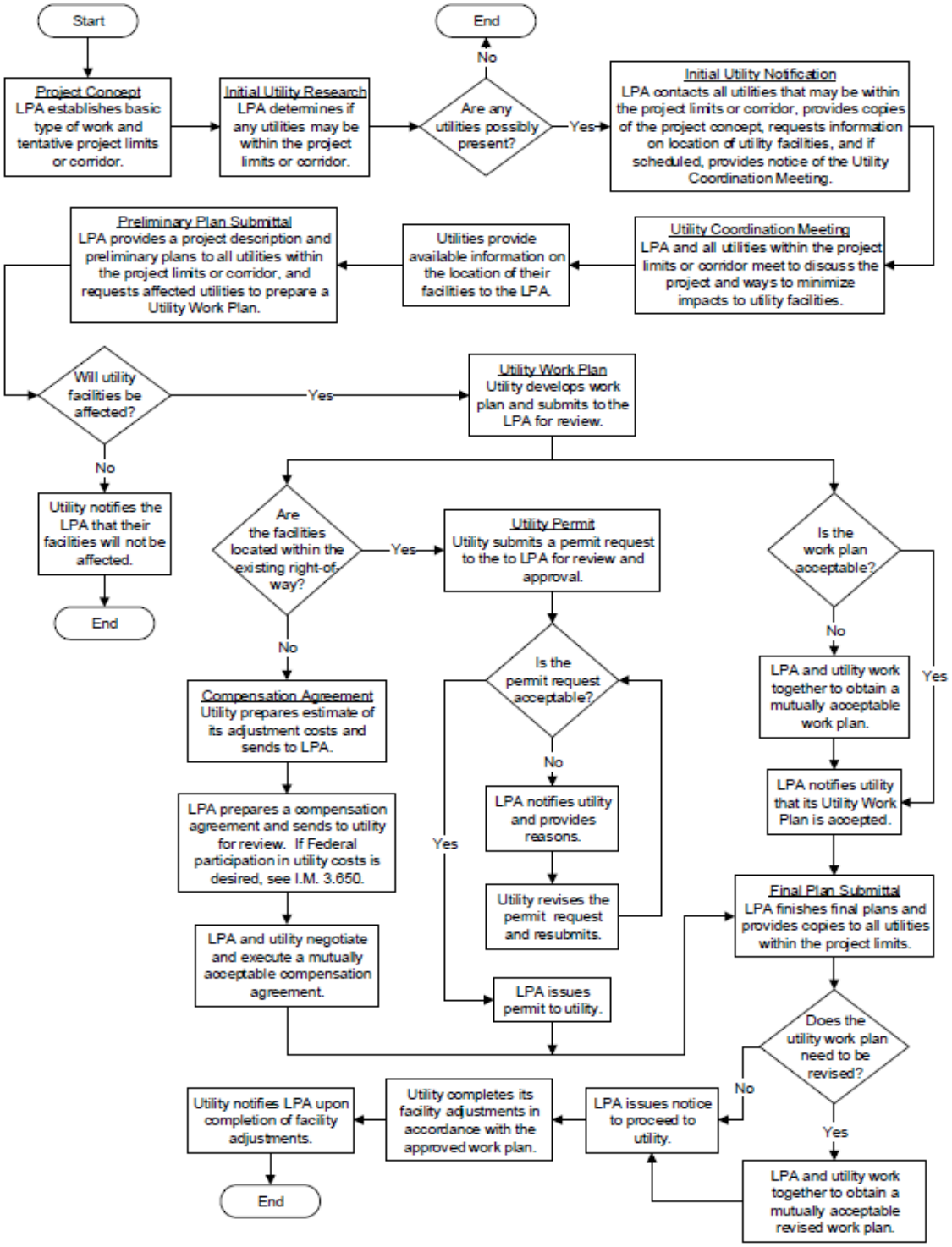
Regarding the clarity of roles and responsibilities within the utility coordination process, survey findings indicate that 48% of participants believe the Iowa DOT has clearly defined the roles and responsibilities of all project parties that participate in this process. However, 40% identified room for improvement. This recognition emphasizes an opportunity for the Iowa DOT to review and enhance the definition of these roles and responsibilities. By doing so, clarity can be established, ensuring that each party involved understands the expectations placed upon them in the utility coordination process.



Insights were gathered regarding utility companies' perceptions of consultant-led utility coordination compared to coordination performed by the DOT, revealing a range of perspectives: 48% rated it as "same," 30% as "better," and 22% as "worse." Noteworthy comments from respondents further illuminate the nuances of these perspectives. One participant who rated it as "better" highlighted consultants' understanding of the importance of early identification of utility conflicts. Another participant, perceiving it as the same, noted that consultant performance varies, with some excelling and others having room for improvement, depending on the company and entity they represent. Meanwhile, a participant rating it as worse expressed the view that third-party involvement just makes things more complicated. Additionally, a respondent highlighted that both the Iowa DOT and consultants face challenges with utility companies following through on early plans. Another comment suggested that hiring a consultant slows down communication between parties.



APPENDIX E. UTILITY COORDINATION FLOWCHART FOR NON-PRIMARY HIGHWAY TRANSPORTATION



APPENDIX F. OTHERS

Example from the Iowa DOT – FEIS:

3.19 Utilities

3.19.1 Affected Environment

The following utilities are present in the Study Area:

- Overhead and underground electric
- Cable
- Natural gas
- Water
- Sanitary sewer
- Telephone
- Fiber optic lines

Both overhead and underground electrical, telephone, and cable lines provide service in and adjacent to the Study Area. Natural gas, fiber optic, water, and sanitary sewer lines are buried underground. Both above- and belowground utilities are located in the Eastern Hills Drive ROW.

3.19.2 Environmental Consequences

3.19.2.1 No-Build Alternative

The No-Build Alternative would not impact any utilities in the Study Area. However, future development independent of the proposed project could occur and result in utility impacts.

3.19.2.2 Preferred Alternative

Temporary impacts in service to utility customers could occur during the utility relocation process and construction of the Preferred Alternative. Coordination with both public and private utility companies would need to occur to establish a construction and utility relocation plan that would minimize disruption of service during construction of the proposed project.

Public and private property owners subject to utility easements for either above- or belowground utilities on their property would be restricted from certain uses on that portion of property. Prior written consent from the easement grantee would be required in order to place temporary or permanent buildings, structures, or other improvements, or to make terrain alterations. The easement grantee would also retain the right of access to that portion of property. It is not expected that any property owners would be denied reasonable economic use of their property as a result of utility easements.

3.19.3 Utilities Mitigation

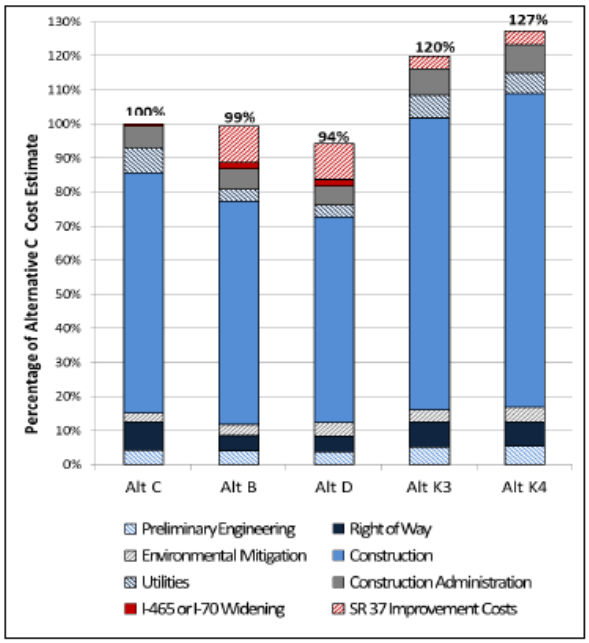
Coordination with utility providers would begin early and continue throughout the design process and construction of the proposed project; this is to ensure ample time to develop utility relocation plans as needed.

Example from INDOT – FEIS:

3.4.2.2 Relative Cost

At the preliminary alternative stage, project details were not developed sufficiently to provide reliable construction cost estimates, so relative cost was used for screening. Representative costs were estimated for major components of construction, right of way (including relocations), major utilities, environmental mitigation, and improvements required on other routes. Relative cost estimates for Alternatives B, D, K3, and K4 were expressed as a percentage, with Alternative C providing the 100 percent baseline. The results are shown in **Figure 3-7**.

Figure 3-7: Relative Cost of Preliminary Alternatives



As described in **Section 3.7**, Alternative C4 was developed following extensive review and comment on Alternatives C1, C2, and C3. Alternatives C1, C2, and C3 were presented to city and county engineers and planners, emergency service providers, government officials, resource agencies, Community Advisory Committee members, utility providers, and various stakeholder groups at the local level. They were also displayed at the I-69 Section 6 project office. Input was encouraged from all groups and individuals, and this input was used to develop Alternative C4 as a hybrid of selected components from the other alternatives.

Table 6-42: Estimated Cost by Cost Item ($ Millions)* for Alternatives C1 through C4 (DEIS)

Cost Item	Alt C1	Alt C2	Alt C3	Alt C4A	Alt C4B
Preliminary Engineering	$79.7	$63.9	$61.4	$65.8	$65.9
Right of Way	$173.5	$200.9	$187.1	$220.1	$201.2
Environmental Mitigation	$39.5	$37.6	$35.1	$40.8	$40.8
I-69 Construction	$984.8	$771.1	$729.0	$800.5	$801.6
I-465 Construction	$145.7	$134.8	$140.1	$134.8	$134.8
Utilities	$148.9	$157.3	$143.2	$157.6	$158.5
Construction Administration	$102.1	$81.8	$78.6	$84.7	$84.8
Total All Cost Items	**$1,674.2**	**$1,447.4**	**$1,374.5**	**$1,504.3**	**$1,487.6**

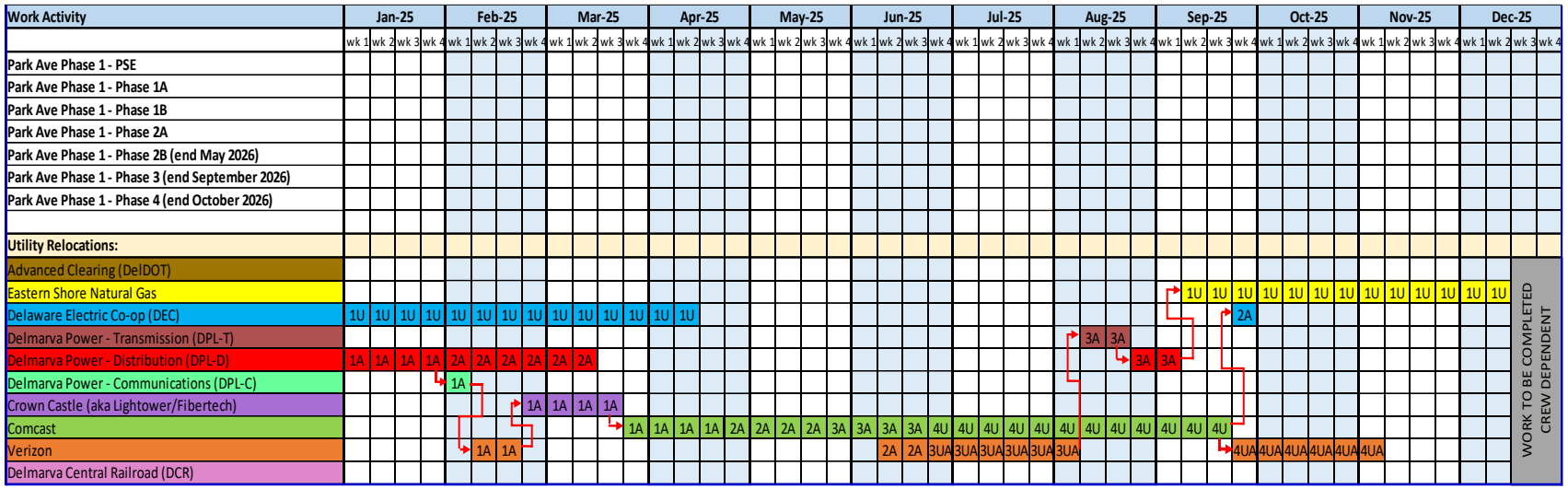
* Costs are year of expenditure dollars, assuming design-bid-build construction begins in 2020 and ends in 2026

Table 3-10: Review Factors for Southport Road Options

Review Factor	Alternative C4A	Alternative C4B
Traffic Operations		
Ramp Terminals	No Significant Difference	No Significant Difference
Southport Road East	Less traffic due to fewer apartments	Must serve demand from apartments
Southport Road West	Must serve demand from businesses	Less traffic due to fewer businesses
Maintenance of Traffic	Facilitates I-69 construction, but Southport Road more difficult	Facilitates Southport Road construction, but I-69 more difficult
Utilities	Avoids high pressure gas line next to Belmont Avenue	Requires relocation of high pressure gas line next to Belmont Avenue

APPENDIX G. MASTER RELOCATION SCHEDULE

Example from DelDOT:



Work Activity	Jan-26				Feb-26				Mar-26				Apr-26				May-26				Jun-26				Jul-26				Aug-26				Sep-26				Oct-26				Nov-26				Dec-26			
	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4	wk 1	wk 2	wk 3	wk 4
Park Ave Phase 1 - PSE																																															
Park Ave Phase 1 - Phase 1A					Phase 1A																																										
Park Ave Phase 1 - Phase 1B															Phase 1B																																
Park Ave Phase 1 - Phase 2A																							Phase 2A																								
Park Ave Phase 1 - Phase 2B (end May 2026)																															Phase 2B																
Park Ave Phase 1 - Phase 3 (end September 2026)																																														
Park Ave Phase 1 - Phase 4 (end October 2026)																																														
Utility Relocations:																																														
Advanced Clearing (DelDOT)																																														
Eastern Shore Natural Gas	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U	1U																																			
Delaware Electric Co-op (DEC)																																														
Delmarva Power - Transmission (DPL-T)																																														
Delmarva Power - Distribution (DPL-D)																																														
Delmarva Power - Communications (DPL-C)																																														
Crown Castle (aka Lightower/Fibertech)																																														
Comcast																																														
Verizon																																														
Delmarva Central Railroad (DCR)																								1	1	1																						

WORK TO BE COMPLETED CREW DEPENDENT

TIMING REQUIREMENTS		NOTES
Completion prior to DPL-T aerial relocations	1	Clear select areas along Park Ave and US 9 for utility relocations
Following relocation of other utilities	1U	Relocate UG from north to south
Following R/W clear and DPL-D relocations	1U	Install underground and remove aerial lines
Following Com. detachment from old poles	2A	Remove old poles
Early Nov 2022 outage and R/W clear for impacted parcels	1A	Install foundations and set poles
Late April/early May 2023 outage	2A	Relocate aerial transmission
Following DPL-C. detachment from old poles	3A	Remove old DPL-T poles along US 9
Following completion of DPL-C relocation	1A	Relocate aerial distribution along Shingle Point Rd, US 9 & Park Ave from RR to US 9
Following R/W clear from Nanticoke Ave to RR	2A	Relocate aerial distribution from RR to Nanticoke Ave
Following DPL-C detachment from old poles	3A	Remove old DPL-D poles along US 9
Following completion of DPL-D relocation along US 9	1A	Install new aerial lines and remove old aerial lines
Following setting of Ver. poles	1A	Relocate aerial lines along US 9
Following DPL-C relocation	1A	Relocate aerial lines along US 9 and Shingle Point Rd
Following DPL-D setting new poles	2A	Install aerial from US 9 to RR
Following DPL-D setting new poles	3A	Install aerial from DE Coastal Business Park to Nanticoke Ave
Following DEC clearing southern limit	4U	Install underground and remove aerial lines from Nanticoke Ave to southern Park Ave limit
Following setting of DPL-D poles	1A	Set new poles along US 9
Following Com. Relocation along US 9	2A	Relocate aerial lines along US 9 and remove old Verizon poles
Following Com. clearing area	3UA	Relocate underground/aerial and remove DPL poles from US 9 to Nanticoke Ave
Following Com. clearing area	4UA	Relocate underground/aerial from Nanticoke Ave to southern Park Ave limit
Coordinated with detour during Phase 2A	1	Reconstruct existing RR crossing

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