



UTILITY COMPANY PRACTICES TO EXPEDITE UTILITY ADJUSTMENTS ON HIGHWAY PROJECTS

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Abstract: The relocation and adjustment of utilities have been reported to cause delays to the completion of roadway projects and increase their total costs. In recent years, departments and ministries of transportation have implemented a number of Best Management Practices (BMPs) and incentives in an effort to mitigate these delays and their associated costs. This paper presents the findings of a recent study that evaluated the performance of utility adjustment Best Management Practices and incentives. The study conducted a comprehensive survey of utility company representatives to gather and analyze their experiences in implementing 45 BMPs in utility adjustment projects. A total of 90 utility company representatives participated in the survey representing all types of utilities, including water, gas, electricity, telecommunications, cable television, sewer, petroleum, high pressure pipelines, hazardous liquids, fiber optics, government entities and internet service providers. The survey was designed to evaluate the performance of these 45 BMPs and incentives including the frequency of their use, their effectiveness in accelerating utility adjustment, and problems and challenges encountered as a result of their implementation. The findings of this study should prove useful to researchers and decision makers in transportation authorities and will contribute to improving the selection and use of the BMPs in an effort to mitigate utility adjustment delays and accelerate utility adjustment projects.

1 Introduction

Utility relocation and adjustment have been reported to cause delays to roadway construction projects and increase their total costs (TAC 2008, and Ellis and Thomas 2002). In recent years, departments and ministries of transportation have implemented a number of Best Management Practices (BMPs) and incentives in an effort to mitigate these delays and their associated costs (FHWA 2002, NCHRP 2010). A number of studies have been conducted to evaluate the feasibility of using these BMPs and incentives to facilitate utility adjustment projects (Scott 2011, and TAC 2008). These studies identified 45 BMPs and incentives that can be used to accelerate utility adjustments (FHWA 2002, NCHRP 2010). These 45 identified BMPs were grouped into two main categories: practices requiring cost to implement, and no-cost practices (Scott 2011). Practices requiring cost include 16 identified BMPs that require additional fees from the transportation authority to implement. No-cost practices include 29 BMPs and incentives that do not require additional funding from the transportation authority to implement and administer. Despite the significance of these studies in identifying these 45 BMPs and incentives, they did not analyze their performance on completed utility adjustment projects. To overcome this limitation, this study conducts a comprehensive analysis to evaluate the frequency of using these 45 BMPs by utility companies, their effectiveness in accelerating utility adjustment, and problems and challenges encountered as a result of their implementation.

2 Scope of Survey

The survey was designed to identify the Best Management Practices and incentives utilized by departments and ministries of transportation on their utility adjustment projects. The survey was conducted using an online surveying website (SurveyGizmo, <https://www.surveygizmo.com/>) to facilitate distribution, and collection of survey data. The survey was designed in collaboration with transportation authority officials to collect feedback from utility company representatives on their prior experiences with utility adjustment BMPs and incentives. The survey was distributed to a contact list provided by the transportation authority officials consisting of utility company representatives from all types of utilities. Survey recipients were given an adequate and flexible time frame of two months for survey completion. The survey included 10 questions that were grouped and organized into 4 sections. The survey gathered feedback and data from utility company representatives on (1) respondent information; (2) use and effectiveness of utility adjustment BMPs and incentives; (3) implementation problems associated with each BMP, and; (4) scheduling of utility adjustment projects, as shown in Table 1.

Table 1: Organization of Utility Company Survey Questions

Section	Question
S1. Respondent Information	Q1. What is your name?
	Q2. What is your current job title?
	Q3. What utility company do you represent?
	Q4. What type of utility company do you represent?
S2. Use and effectiveness of utility adjustment BMPs and incentives	Q5. Which Practices Requiring Cost have been used on your utility adjustment projects?
	Q6. Which No-Cost Practices have been used on utility adjustment projects?
	Q7. Please rank the effectiveness of each BMP in accelerating utility adjustment on a scale from 1 to 5.
S3. Problems and challenges	Q8. Please list any problems that were encountered as a result of utilizing these BMPs and incentives.
S4. Scheduling of utility adjustment projects	Q9. What is the average duration of you utility adjustment project?
	Q10. How far in advance does your utility company schedule utility adjustment projects?

3 Results and Analysis

A total of 90 responses were received from utility company representatives. The roles of the participating utility company representatives include: commissioners, coordinators, directors, engineers, foremen, managers, superintendents, supervisors, and technicians of utilities. These utility company representatives reported that they have experience implementing and managing BMPs and incentives on transportation authority utility adjustments projects. These 90 unique responses include several responses from utility

company representatives who reported that their company performs multiple types of utility work. Accordingly, these 90 unique responses represented a total of 130 responses from different types of utilities including 40 water companies, 32 sewer companies, 13 gas utilities, 12 telecommunication companies, 11 electric companies, 10 pipeline companies, 6 municipal utility companies, 3 cable television providers, 2 fiber optic companies, and 1 internet service provider. The survey results and analysis are summarized in the following three sections that report the main findings of the survey on the: (1) utilization and effectiveness of utility adjustment BMPs; (2) implementation problems associated with each BMP; and (3) scheduling of utility adjustment projects.

4 Utilization and Effectiveness of BMPs

The survey respondents were asked to identify the best management practices that have been utilized on their transportation authority utility adjustment projects from a comprehensive list of 45 best management practices and incentives. Survey respondents were also provided the option to list additional BMPs not included in the list. The reported utilization rates of these 45 BMPs by participating utility companies are listed in Table 2 for BMPs that require cost, and Table 3 for no-cost BMPs. Figure 1 also shows the top 20 most utilized BMPs based on their reported utilization rates by participating utility companies. Figure 1 illustrates that five BMPs are utilized by more than 50% of surveyed utility companies: (1) coordination, cooperation, communication; (2) one call systems; (3) cost sharing; (4) utility coordination during construction; and (5) trenchless technology.

Table 2: Survey Results of BMPs Requiring Cost by Participating Utility Company Respondents

Best Management Practices Requiring Cost	Utilization Percent	User Effectiveness	Problems & Challenges
Cash Bonuses	2.94%	4.00	0.00%
Incentives/Disincentives (I/D)	2.94%	4.00	0.00%
Cost Sharing	64.71%	3.30	9.09%
No Excuse Incentives	11.76%	2.50	0.00%
Contractor-Provided Financial Incentives	11.76%	3.00	0.00%
Gainshare-Painshare	5.88%	4.00	0.00%
Utility Cost Database	1.67%	5.00	0.00%
Electronic Utility Permits	26.67%	4.31	12.50%
Utility Coordination Web sites	20.00%	3.67	8.33%
Electronic Document Delivery	38.33%	4.29	26.09%
Subsurface Utility Engineering (SUE)	28.33%	4.25	35.29%
Clearing, Grubbing, Staking, Grading	26.67%	3.86	12.50%
Utility Relocation Safety Program	13.33%	3.25	0.00%
Removal of abandoned utilities	20.00%	2.80	25.00%
Trenchless Technology	60.00%	4.24	19.44%
Utility Tunnels	3.33%	3.50	0.00%

Table 3: Survey Results of No-Cost BMPs by Participating Utility Company Respondents

No-Cost Best Management Practices	Utilization Percent	User Effectiveness	Problems & Challenges
Coordination, Cooperation, Communication	77.01%	4.03	20.90%
Utility Coordination Councils	13.79%	3.55	25.00%
Designated Utility Coordinator	40.23%	4.22	14.29%
Multi-Level Memorandums of Understanding	13.79%	3.75	25.00%
Utility Coordination during Construction	63.22%	4.11	16.36%
Utility Work by Highway Contractor	24.32%	3.77	22.22%
A+B Bidding	6.76%	4.25	40.00%
Lane Rental	0.00%	0.00	0.00%
Design-Build	6.76%	3.20	0.00%
Unit Cost	17.57%	3.36	30.77%
Combined Utility Segments	1.35%	4.00	0.00%
Highway Contract Facilitating Language	6.76%	3.40	0.00%
Lump Sum Agreements	25.68%	4.06	31.58%
Right-of-Way (RoW) Acquisition	33.78%	4.42	32.00%
Utility Corridors	17.57%	3.64	15.38%
Locate next to RoW line	35.14%	4.00	19.23%
Use of Existing Tunnels for Utilities	2.70%	3.00	0.00%
One Call Systems	74.32%	4.19	20.00%
Utility Conflict Matrix	12.16%	4.11	33.33%
Advance relocation of utility work	45.95%	4.26	29.41%
Utility Training Classes	9.46%	3.00	0.00%
Standardized Estimate/Bid Forms	16.22%	3.58	0.00%
Standardized Invoice Submissions	9.46%	3.14	28.57%
Value Engineering for Utilities	10.81%	3.63	12.50%
Avoidance of Utility Relocation	29.73%	4.05	13.64%
Modernization of Utility Processes	1.35%	4.00	0.00%
Utility Manuals	16.22%	3.27	8.33%
Context Sensitive Design	8.11%	3.40	0.00%
Simplified Permit Approvals for Utilities	20.27%	4.00	0.00%

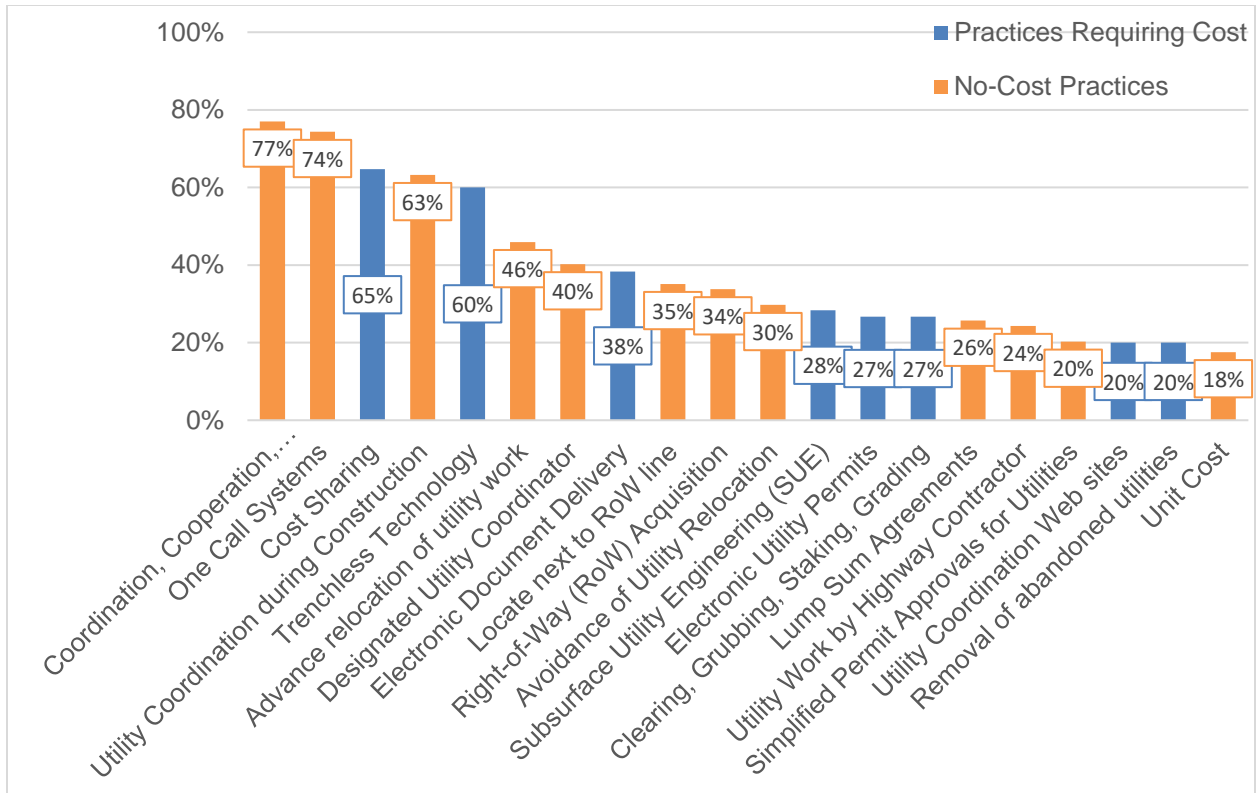


Figure 1: Top 20 Most Utilized BMPs and Incentives by Participating Utility Companies

In addition to the use of BMPs and incentives on transportation authority projects, survey respondents were asked to rank the effectiveness of their implemented best management practices using a five-point scale: very effective, effective, moderately effective, slightly effective, and not effective. The reported effectiveness ratings of these 45 BMPs by participating utility companies are listed in Table 2 for BMPs that require cost and Table 3 for no-cost BMPs. Figure 2 also shows the top 20 most effective BMPs based on their reported average effectiveness rating by participating utility companies. Figure 2 illustrates that the top five most effective best management practices and incentives are (1) utility cost database; (2) right-of-way acquisition; (3) electronic utility permits; (4) electronic document delivery; and (5) advance relocation of utility work.

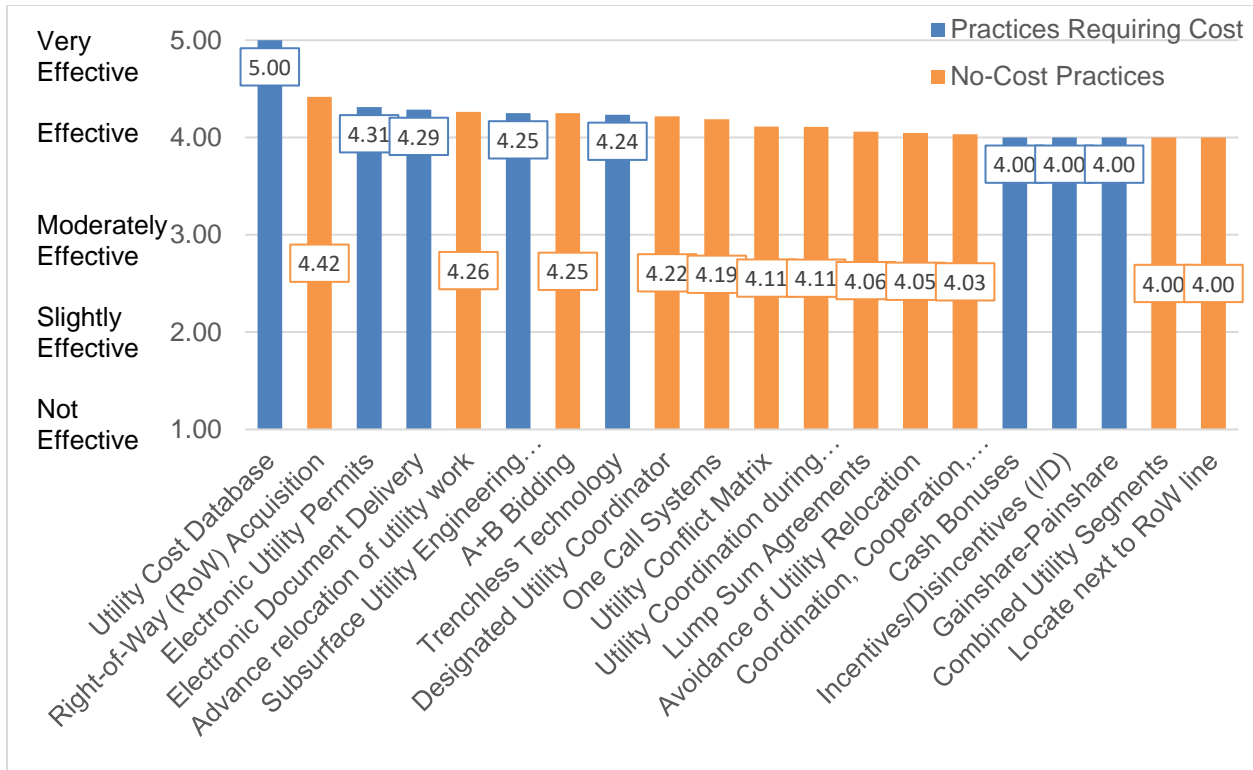


Figure 2: Top 20 Most Effective BMPs and Incentives by Participating Utility Companies

5 Implementation Problems

The survey respondents were asked to report any problems experienced during the implementation of the selected BMPs and incentives on their transportation authority utility adjustment projects. The utility company representatives reported 171 problems encountered due to the implementation of the 45 BMPs and incentives listed in the survey. The percentage of utility companies reporting problems with these 45 BMPs are listed in Table 2 for BMPs that require cost and Table 3 for no-cost BMPs. Figure 3 also shows the top 20 BMPs and incentives with the most reported problems by participating utility companies. Figure 3 illustrates that the top five BMPs with the most reported problems are (1) A+B bidding; (2) subsurface utility engineering (SUE); (3) utility conflict matrix; (4) right-of-way acquisition; and (5) lump sum agreements.

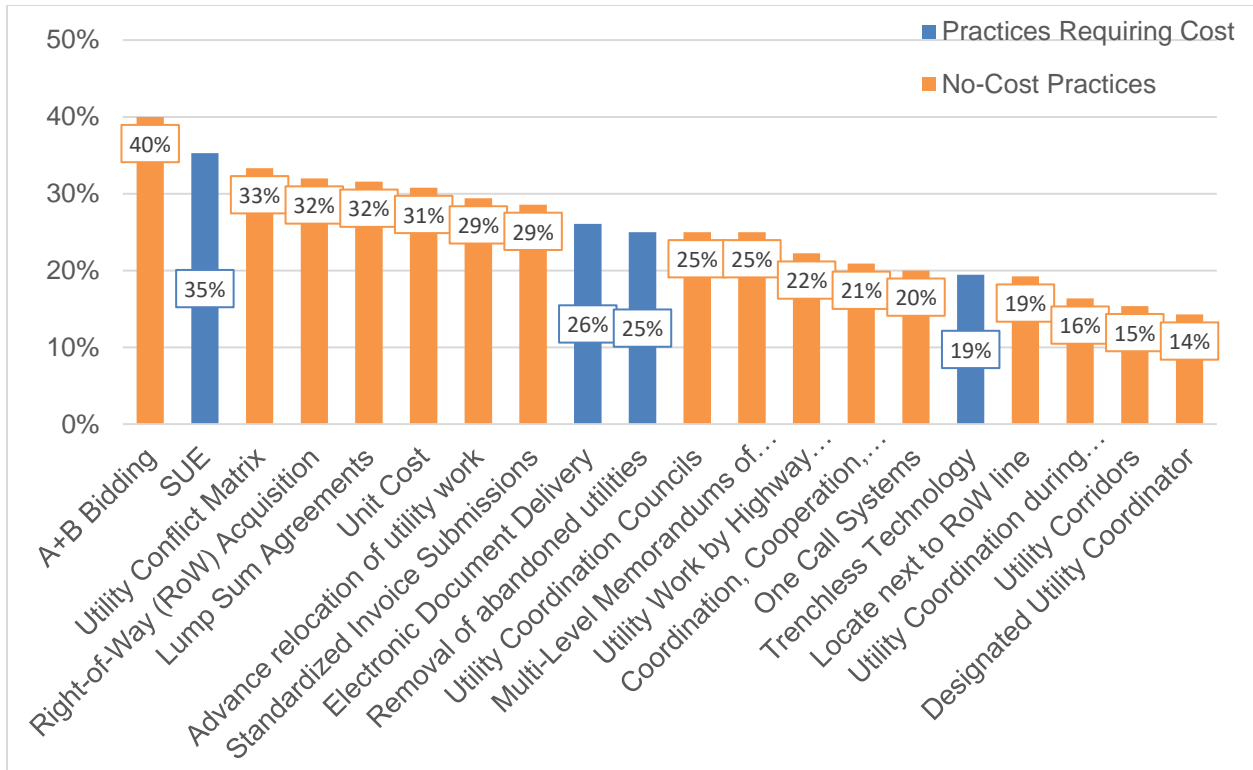


Figure 3: Top 20 BMPs and Incentives with Reported Problems by Participating Utility Companies

6 Scheduling of Utility Adjustments

This section describes the scheduling and programming practices of utility adjustment projects by participating utility companies. The survey respondents were asked to provide feedback on (1) the duration of their utility adjustment projects; and (2) their programming of utility adjustment projects.

6.1 Duration of Utility Adjustment Project

Survey respondents were asked to estimate the average duration of their utility adjustment projects. The reported values were grouped into durations of (a) 2 months or less; (b) 2 to 4 months; (c) 4 to 6 months; (d) 6 to 12 months; and (e) more than 12 months, as shown in Figure 4. The majority of participating utility company representatives (59%) reported that the duration of their utility adjustment projects lasts 2 months or less.

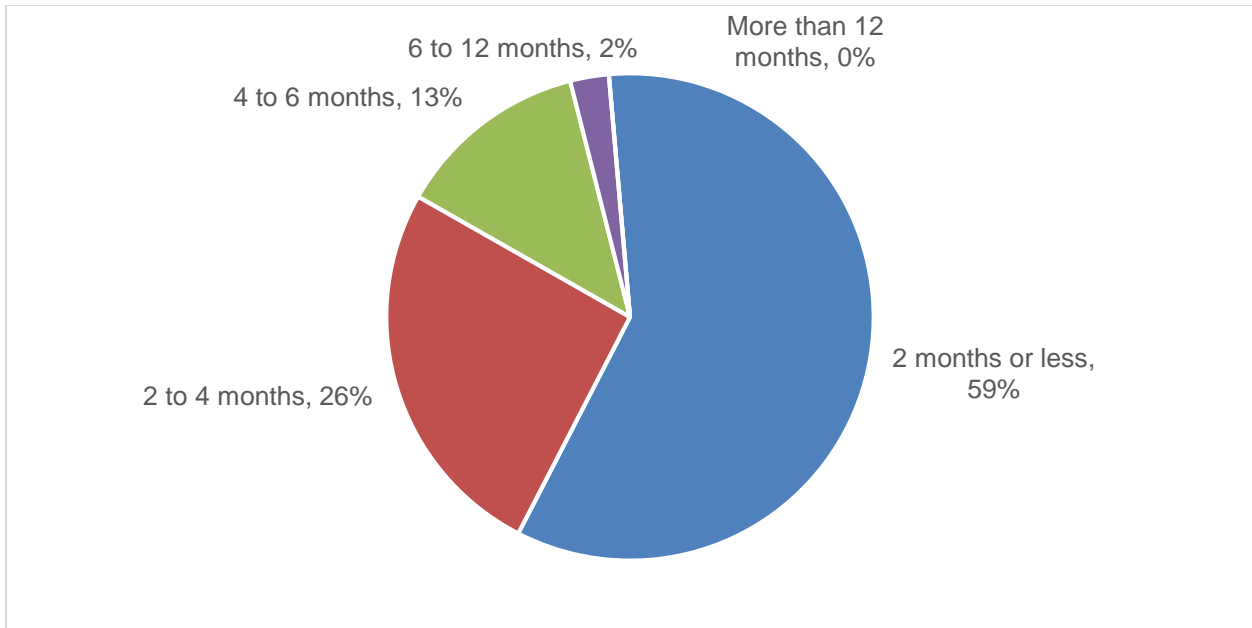


Figure 4: Reported Duration of Utility Adjustment Projects by Utility Companies

6.2 Programming of Utility Adjustments

The survey respondents were asked to estimate how far in advance their utility company schedules utility adjustment projects. The respondents were provided four duration options (a) 1 to 6 months in advance; (b) 6 to 12 months in advance; (c) 1 to 3 years in advance; and (d) 3+ years in advance, as shown in Figure 5. The survey results indicate that 48% of utility company respondents schedule their utility adjustment projects 1 to 6 months in advance of the project start date.

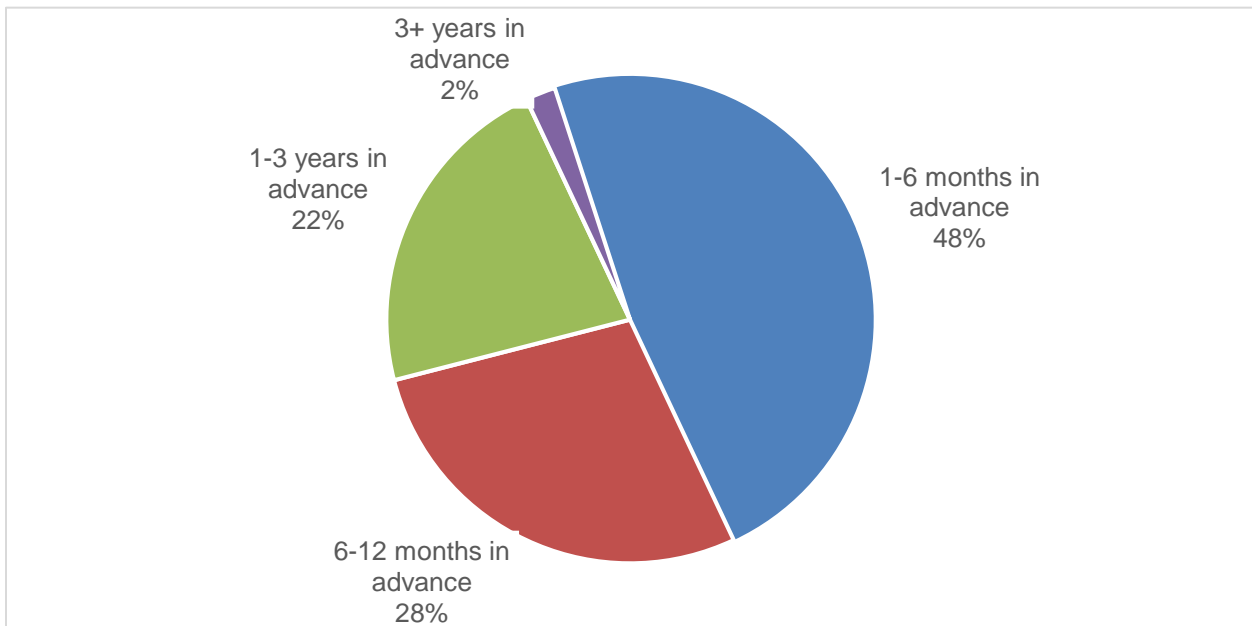


Figure 5: Reported Scheduling of Utility Adjustment Projects by Utility Companies

7 Summary and Conclusion

An online survey was conducted to gather feedback from utility company representatives on their experiences in implementing best management practices and incentives on utility adjustment projects. The survey findings were organized in three sections that focused on analyzing: (1) the use and effectiveness of 45 BMPs and incentives on utility adjustment projects; (2) problems experienced as a result of implementing these BMPs and incentives; and (3) the scheduling of utility adjustment projects. These survey results can enable decision makers to identify the most beneficial best management practices and incentives to minimize delays on utility adjustment projects.

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References

- Ellis, R., and Thomas, R. 2002. The Root Causes of Delays in Highway Construction. *82nd Annual Meeting of the Transportation Research Board*, Transportation Research Board, Washington, D.C., United States, 16 p. paper in CD-ROM proceedings.
- National Cooperative Highway Research Program (NCHRP). 2010. *Utility Location and Highway Design*. NCHRP Synthesis 405, Transportation Research Board, Washington, D.C.
- Transportation Association of Canada (TAC). 2008. "Management of Utilities in and Adjacent to the Public Right-of-Way: Survey Practices." Transportation Association of Canada.
- Scott, P. 2011. *Feasibility of Using Incentives to Facilitate Utility Relocations*. NCHRP Project 20-07, Task 269. National Cooperative Highway Research Program (NCHRP).
- Survey Gizmo. 2016. Accessed April 15, 2016. <https://www.surveygizmo.com/>
- United States Department of Transportation Federal Highway Administration (FHWA). 2002. "Avoiding Utility Relocation," Washington, DC: Federal Highway Administration.