

**GEORGIA DOT RESEARCH PROJECT 16-28**

**FINAL REPORT**

**ENHANCEMENT OF THE COMPREHENSIVE RISK  
ASSESSMENT FOR TRANSPORTATION PROJECTS**



**OFFICE OF PERFORMANCE-BASED MANAGEMENT AND RESEARCH**

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**FOREST PARK, GA 30297-2534**

1. Report No.: FHWA-GA-18-1628		2. Government Accession No.:		3. Recipient's Catalog No.:	
4. Title and Subtitle: Enhancement of the Comprehensive Risk Assessment for Transportation Projects			5. Report Date: September 2018		
			6. Performing Organization Code:		
7. Author(s): Baabak Ashuri, Ph. D., DBIA, CCP, DRMP; Arash Moradi, M.S., MBA; Minsoo Baek, Ph.D.; Gordon Kingsley, Ph.D.; Hannah Yehyun An, Ph.D.; Limao Zhang, Ph.D.; Yunping Liang; and Shiva Bahrami			8. Performing Organ. Report No.:		
9. Performing Organization Name and Address: Economics of the Sustainable Built Environment (ESBE) Lab Georgia Institute of Technology 280 Ferst Drive, Atlanta, GA 30332-0680			10. Work Unit No.:		
			11. Contract or Grant No.: P.I NO. 0013731		
12. Sponsoring Agency Name and Address: Georgia Department of Transportation Office of Performance-based Management And Research 15 Kennedy Drive, Forest Park, Georgia 30297-2599			13. Type of Report and Period Covered: Final; July 2016–September 2018		
			14. Sponsoring Agency Code:		
15. Supplementary Notes:					
16. Abstract: Early involvement of subject-matter experts is critical for better understanding the existing conditions of a project that are useful in developing appropriate risk response planning for the project. Thus, Georgia Department of Transportation (GDOT) has decided to engage subject-matter experts early on during GDOT's plan development process (PDP) to evaluate existing project conditions and identify issues (i.e., risk factors) that must be considered for timely delivery of the project. The overarching objective of this research is to develop a comprehensive set of identified risk factors for functional offices involved in the early phases of the PDP. Through an extensive literature review and interviews with subject-matter experts in different functional groups in GDOT and the project management team in the Office of Program Delivery, the total of 21 major areas of project issues were determined for the 5 major offices (i.e., Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design) and 125 risk factors were identified for the major areas of the project issues. The findings of the research report provide a searchable and customizable risk identification that can aid project managers in evaluating the existing conditions and related issues of the project early in the concept- and scope-development phases of the PDP. The primary contribution of this research is to enhance the ability of state transportation agencies to understand existing project conditions and potential project risks that adversely affect the smooth delivery of the project.					
17. Key Words: Risk Management, Risk Identification, Plan Development Process, PDP, Program Delivery			18. Distribution Statement:		
19. Security Classification (of this report): Unclassified		20. Security Classification (of this page): Unclassified		21. Number of Pages: 143	22. Price:

GDOT Research Project No. 16-28

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Contract with

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In cooperation with

U.S. Department of Transportation  
Federal Highway Administration

September 2018

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Georgia Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

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## EXECUTIVE SUMMARY

Schedule and scope changes throughout the pre-construction phases are critical barriers to developing projects in the United States transportation industry. As highway projects are exposed to a broader range of risks, changes in project schedule and scope during project development can result from several factors (i.e., risks). These risks that negatively impact the state transportation agency's objectives for the project are attributed to major areas of project development, such as environmental analysis, right-of-way (ROW) acquisition, utilities coordination, bridge design, and third-party communications. To manage project risks, state transportation agencies should have a capability to understand and identify the sources and natures of risks early in the concept- and scope-development phases. As subject-matter experts inside state transportation agencies provide critical knowledge in identifying risks related to their functional area (e.g., environmental services, ROW, utilities relocation, bridge design, and communication), early involvement of subject-matter experts is critical to better understanding the existing conditions of the project that are useful in developing appropriate risk response planning for the project. Therefore, Georgia Department of Transportation (GDOT) has decided to engage subject-matter experts early during GDOT's plan development process (PDP) to evaluate existing project conditions and



identify issues (i.e., risk factors) that must be considered for timely delivery of the project. This research aims to extract knowledge from subject-matter experts to identify appropriate risk factors presenting various functional issues affecting the timely delivery of the highway project.

The overarching objective of this research is to develop a comprehensive set of identified risk factors for functional offices involved in the early phases of the PDP. To achieve the research objective, the academic/professional literature was reviewed to determine major areas of project issues that might potentially impact the smooth delivery of highway projects. Moreover, the research team reviewed the current state of the practice in risk identification among leading state DOTs. Risk factors that might adversely affect the smooth delivery of the project were identified and categorized into major areas of project issues. Extensive interviews with subject-matter experts in different functional offices at GDOT and the project management team in the Office of Program Delivery were conducted to review and refine the identified risk factors. After developing draft risk factors for the functional offices, follow-up interviews with subject-matter experts and the project management team were conducted to validate the list of risk factors and refine the list based on their feedback and comments. The finding of the research is a searchable and customizable risk identification that can be used by project managers to evaluate the existing conditions and related issues of the project.

Through the literature review and interviews with subject-matter experts, the total of 21 major areas of project issues for the five major offices (i.e., Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design) were determined as the following:

- Office of Environmental Services
  - Ecology-related issues that can be reasonably identified before the environmental survey
  - Ecology-related issues that may arise after the survey is complete
  - Cultural resources and National Environmental Policy Act (NEPA) issues that can be reasonably identified before the environmental survey
  - Non-environmental offices issues that can affect the environmental process
- Office of Right-of-Way
  - Parcels issues
  - Access issues
  - Constructability issues
  - Issues related to procedural errors, external changes, unknown conditions, etc.

- Office of Strategic Communication
  - Issues with the Office of Strategic Communication
  - Issues with the Office of Environmental Services
  - Issues related to general project management
  
- Office of Utilities
  - Railroad factors
  - Electric distribution/transmission factors
  - Telecom factors
  - Water/sanitary sewer factors
  - Petroleum pipeline/natural gas factors
  - Other factors
  
- Office of Bridge Design
  - Environmental issues
  - Constructability issues
  - Structural or foundation issues
  - Hydraulic issues

## **ACKNOWLEDGMENTS**

The research reported herein was sponsored by the Georgia Department of Transportation through Research Project Number 16-28. The authors acknowledge and appreciate the help of Mr. Albert Shelby, GDOT Director of Program Delivery, and Mrs. Supriya Kamatkar, GDOT Research Program Manager.

## LIST OF ABBREVIATIONS

APRA	Advance Planning Risk Analysis	EPM	Environmental Procedures Manual
BA	Biological Assessment	ERSR	Ecology Resources Survey Report
BIA	Bureau of Indian Affairs	ESA	Endangered Species Act
BLM	Bureau of Land Management	ESBE	Economics of the Sustainable Built Environment
BMP	Best Management Practice	FEIS	Final Environmental Impact Statement
Caltrans	California Department of Transportation	FEMA	Federal Emergency Management Agency
CE	Categorical Exclusion	FERC	Federal Energy Regulatory Commission
CEQ	Council on Environmental Quality	FFPR	Final Field Plan Review
CFR	Code of Federal Regulations	FHWA	Federal Highway Administration
CMPA	Coastal Marshlands Protection Act	FONSI	Finding of No Significant Impact
CRAFT	Comprehensive Risk Assessment for Transportation	GDOT	Georgia Department of Transportation
CWA	Clean Water Act	GeoPI	Geographical Project Information
DNR	Department of Natural Resources	GEPA	Georgia Environmental Protection Agency
DOT	Department of Transportation	GPS	Global Positioning System
DUE	District Utilities Engineer	IP	Individual Permit
DUO	District Utilities Office	MARTA	Metropolitan Atlanta Rapid Transit Authority
EFH	Essential Fish Habitat		
EO	Executive Order		
EPD	Environmental Protection Division		

MS4	Municipal Separate Storm Sewer System	PM	Project Manager
MSE	Mechanically Stabilized Earth	PoCI	Projects of Corporate Interest
NCHRP	National Cooperative Highway Research Program	PoDI	Projects of Division Interest
NEPA	National Environmental Policy Act	PSC	Prestressed Concrete
NFIP	National Flood Insurance Program	R09	Managing Risk in Rapid Renewal Projects
NHL	National Historic Landmark	ROD	Record of Decision
NMFS	National Marine Fisheries Service	ROW	Right-of-Way
NRHP	National Register of Historic Places	RP	Regional Permit
NWP	Nationwide Permit	RR	Railroad
NYSDOT	New York State Department of Transportation	SAAG	Special Assistant Attorney General
O.C.G.A.	Official Code of Georgia Annotated	SHRP-2	Strategic Highway Research Program
OES	Office of Environmental Services	SLC	Subscriber Line Carrier
OLE	Outfall Level Exclusion	SME	Subject-Matter Expert
OSC	Office of Strategic Communication	SSUE	State Subsurface Utility Engineer
OTO	Office of Traffic Operations	SUA	Standard Utility Agreement
PAR	Practical Alternatives Review	SUE	Surface Utility Engineering
PDP	Plan Development Process	T&E	Threatened and Endangered
PFPR	Preliminary Field Plan Review	UIA	Utility Impact Analysis
PID	Public Interest Determination	USACE	U.S. Army Corps of Engineers
PLE	Project Level Exclusion	USC	U.S. Code
		USCG	U.S. Coast Guard
		USEPA	United States Environmental Protection Agency
		USFWS	U.S. Fish and Wildlife Service

USNMFS U.S. National Marine  
Fisheries Service

WMA Wetlands Minimization  
Alternative

WSDOT Washington State DOT

# Chapter 1 Introduction

State departments of transportation (DOTs) in the United States are struggling with schedule and scope changes throughout the pre-construction phase of the project-development process. Schedule and scope changes for a highway project can be triggered by several factors (i.e., risks). These risks that negatively impact the agency's objectives for the project are attributed to major areas of project development, such as environmental analysis, bridge design, right-of-way (ROW) acquisition, utilities coordination, and third-party communications. To manage risk factors while minimizing scope and schedule changes during the project development process, efforts must be made to ensure that risk factors are proactively identified, assessed, and mitigated appropriately.

Project managers (PMs) in the Georgia Department of Transportation (GDOT) Office of Program Delivery face several issues throughout different stages of the plan development process (PDP). There is a need to assist GDOT PMs, especially less-experienced ones, to enhance their understandings regarding the source and nature of the project issues early on in the concept- and scope-development phases of the project development. Enhanced understanding of the risk factors is critical for identifying risks at their sources and assessing their impacts on project outcomes. Key bottlenecks throughout the project delivery should be identified and their impacts on the budget, scope, and schedule need to be examined. The most challenging risks that can negatively affect the project outcomes must be addressed in the early phases before they become unmanageable. If the major



risk factors can be recognized early in the process, there is a good possibility that their negative consequences can be mitigated.

It is critical for GDOT project managers to structure a meaningful dialogue with subject-matter experts (SMEs) in other GDOT offices to elicit their knowledge about the issues that may adversely affect the project development process. Project managers, especially less-experienced and newly hired ones, may not know where to start looking, which offices to contact, or what issues to study when they face a concern in the project development process. Appropriate identification of risk factors, including a set of possible issues that may affect the highway project development process, can be helpful for project managers in identifying project issues early in the project development.

According to the Federal Highway Administration (FHWA 2012), identifying risk factors enhances the ability of state DOTs to make more informed and better decisions regarding investment of resources in the project development process. The second Strategic Highway Research Program (SHRP 2) research report, “Guide for the Process of Managing Risk in Rapid Renewal Projects (R09),” discussed the significance of risk identification for optimizing project performance (e.g., schedule and cost) (Molenaar et al. 2014). In addition, the FHWA (Molenaar et al. 2006) emphasized that risk identification should be continuous and new risks should constantly be identified in the process of project development. Moreover, there is a need for tools and techniques in supporting the risk-identification process for the success of the process. The American Association of State Highway and Transportation Officials’ (AASHTO) *Guide for Enterprise Risk Management* (2016) argued that casting a wide net for identifying the

threats, opportunities, and uncertainties is essential for managing risks, reducing threats, and increasing the likelihood of project success.

Significant efforts have been made by highway organizations to develop proper risk identification methods. For instance, National Cooperative Highway Research Program (NCHRP) Report 658 found that risk identification should be applied to each phase of project development (Molenaar 2010). NCHRP Report 658 indicated that: (1) during the planning phase of the project, state highway agencies should focus on red-flag issues, such as environmental and engineering issues; (2) during the programming phase, state highway agencies should focus on project-specific issues, such as alternative design concepts, procurement issues, and technical uncertainties; and (3) during the final design and construction phases, state highway agencies should concentrate on detailed project scope and technical issues and their corresponding cost and schedule consequences. In addition, NCHRP Report 658 emphasized the importance of expertise in environmental planning, funding, and operations for identifying risks at the early stage of a project.

The FHWA's *Guide to Risk Assessment and Allocation for Highway Construction Management* described a risk-identification process to identify, categorize, and document risks that could affect the project. The risk-identification process includes: (1) examining issues and concerns by looking at resources created by the project-development team (e.g., the project description, work breakdown structure, cost estimate, design and construction schedule, procurement plan, or general risk checklists); (2) reducing issues and concerns to a level of detail that permits an evaluator to understand the significance of any risk and identify its causes; and (3) classifying risks for easier management of the risks in later phases of the risk-analysis process (Molenaar et al. 2006).

Several studies have focused on risk identification by developing tools and identifying important risk factors for highway projects. For instance, Le et al. (2009) proposed the advance-planning risk analysis (APRA) tool to identify risks and proactively manage them during the project-development process. The APRA tool can be applied at various phases of project development and includes a comprehensive list of risk elements that the project needs to address during the project development. The risk factors consist of 59 elements, which were categorized into 12 categories and further grouped into 3 major sections (i.e., basis of project decision, basis of design, and execution approach). The major benefit of the APRA tool is an integrated checklist of risk elements for identifying risk sources for a project. Vishwakarma et al. (2016) identified various risks for highway projects and determined the relative importance of risk factors through a questionnaire survey. They first classified risk factors into the following categories: (1) construction risks, (2) design risks, (3) political risks, (4) organizational risks, (5) accidental risks, (6) uncertain market conditions, (7) uncertain market conditions, (8) time/funds, and (9) utilities. They identified several important risk factors for highway projects, such as uncertain land acquisition cost and schedule, utilities not relocated on time, and issues related to obtaining government permits. Another study, conducted by El-Sayegh and Mansour (2015), identified risk factors through a literature review, including technical factors, site factors, commercial factors, political factors, environmental factors, and socioeconomic factors. The authors identified several important factors that affect highway projects, such as inefficient planning, unexpected underground utilities, quality and integrity of design, and delays in the approval of submittals.

Several state DOTs have invested significantly in the identification of risk factors in the process of project development. For instance, New York State Department of Transportation (NYSDOT) developed capital risk–management guidance to provide project teams with appropriate methods and techniques that are used for risk management decision-making and effective management of project risks (NYSDOT 2008). NYSDOT recommends early identification of risks to help project managers evaluate and determine possible measures to mitigate and avoid adverse impacts of the risk. In addition, NYSDOT proposed three major processes for risk identification, including exploring, distinguishing, and categorizing any project risks. It also emphasized that tools and techniques, such as brainstorming, scenario planning, and expert interviews, should support risk identification to ascertain risks throughout the project development.

California Department of Transportation (Caltrans) (2007) developed a project risk management handbook to enable the project team to identify, analyze, and develop appropriate responses for monitoring and managing project risks as the project advances throughout different phases of project delivery. In the Caltrans’s project risk management handbook, a list of project risks is provided. The project risks are categorized into eight categories: (1) design risks, (2) external risks, (3) environmental risks, (4) organizational risks, (5) project management risks, (6) right-of-way risks, (7) construction risks, and (8) engineering services risks. Caltrans asserted that project risk management should be implemented early in the life of the project to be more effective in managing project risks (Caltrans 2007).

In the new version of Caltrans’s project risk management handbook (Caltrans 2012), an emphasis was made on developing a risk register as an important tool for identifying and

communicating project risks and understanding the status of the risks from the project initiation to completion. In addition, Caltrans indicated that the potential risks can be identified by conducting the following process (Caltrans 2012):

- Brainstorming
- Challenging assumptions
- Looking for “newness” (e.g., new materials, technology, or processes)
- Project team’s knowledge of the project or similar projects
- Consultation with others who have significant knowledge of the project or its environment
- Consultation with others who have significant knowledge of similar projects
- Experience of project stakeholders or others in the organization

Washington State Department of Transportation (WSDOT) developed a project risk-management guide for providing consistent practices of risk management and enabling project teams to understand project risks (WSDOT 2014). WSDOT emphasizes that risk identification should occur through each phase of project development. In addition, WSDOT provides risk identification tools and techniques such as documentation reviews and information gathering. Documentation reviews are peer-level reviews of project documentation, studies, reports, preliminary plans, estimates, and schedules. Information gathering consists of brainstorming with project team members (i.e., specialty groups, stakeholders, and regulatory agency representatives), lessons-learned database, and other methods (e.g., questionnaires, surveys, interviews, and checklists). Moreover, WSDOT

stressed that implementing risk management early in project development is critical to identify, assess/analyze, and respond to project risks (WSDOT 2014).

The literature reveals that risk identification should be implemented early in the project-development process and a risk checklist that casts a wide net for identifying risks for a project should be prepared to assist project teams in identifying project risks. Subject-matter experts inside state transportation agencies provide critical knowledge in identifying risks related to their functional areas, such as environmental services, ROW, communication, utilities relocation, and bridge design. Early involvement of SMEs is critical to better understanding the existing conditions of the project that are useful in developing the appropriate risk response planning for the project. Therefore, the Georgia Department of Transportation has decided to engage subject-matter experts early during GDOT's plan development process (PDP) to evaluate existing project conditions and identify issues (i.e., risk factors) that must be considered for timely delivery of the project.

This research aims to extract knowledge from SMEs to identify appropriate risk factors presenting various functional issues affecting the timely delivery of the highway project. The overarching objective of this research is to develop a comprehensive set of identified risk factors for functional offices involved in the early phases of the PDP. Information about existing project conditions and possible issues with potentially adverse effects on project scope, schedule, and cost is retrieved from SMEs in several functional offices in GDOT, such as the Office of Environmental Services (OES), Office of Right-of-Way, Office of Strategic Communication (OSC), Office of Utilities, and Office of Bridge Design.

The list of risk factors is developed in collaboration with subject-matter experts in these offices and under the guidance of the Office of Program Delivery at GDOT. The identified risk factors are customizable to accommodate future updates and the addition of new risk factors. The identified risk factors are described as a knowledge repository that can be used by project managers to distinguish, identify, and eventually address the project risks efficiently and in a timely manner.

Development of the risk factors provides a formal and logical procedure that will help GDOT identify, analyze, and respond to risk events in the development of transportation projects. Major project risks during the concept- and scope-development processes are presented as sources (or causes) of schedule delay and scope change. The practical risk factors are easy to understand and implement and can be utilized by GDOT in streamlining highway projects delivery. The research deliverable could be implemented in the Office of Program Delivery to improve its existing procedures for the development of project documents, and the smooth and prompt development of transportation projects.

It is anticipated that the developed risk factors for each office can help project managers better understand project issues from the perspective of subject-matter experts in the GDOT offices. The developed risk factors can be used to establish a platform for systematic communication between the project management team and subject-matter experts in different offices in the early phases of the PDP.

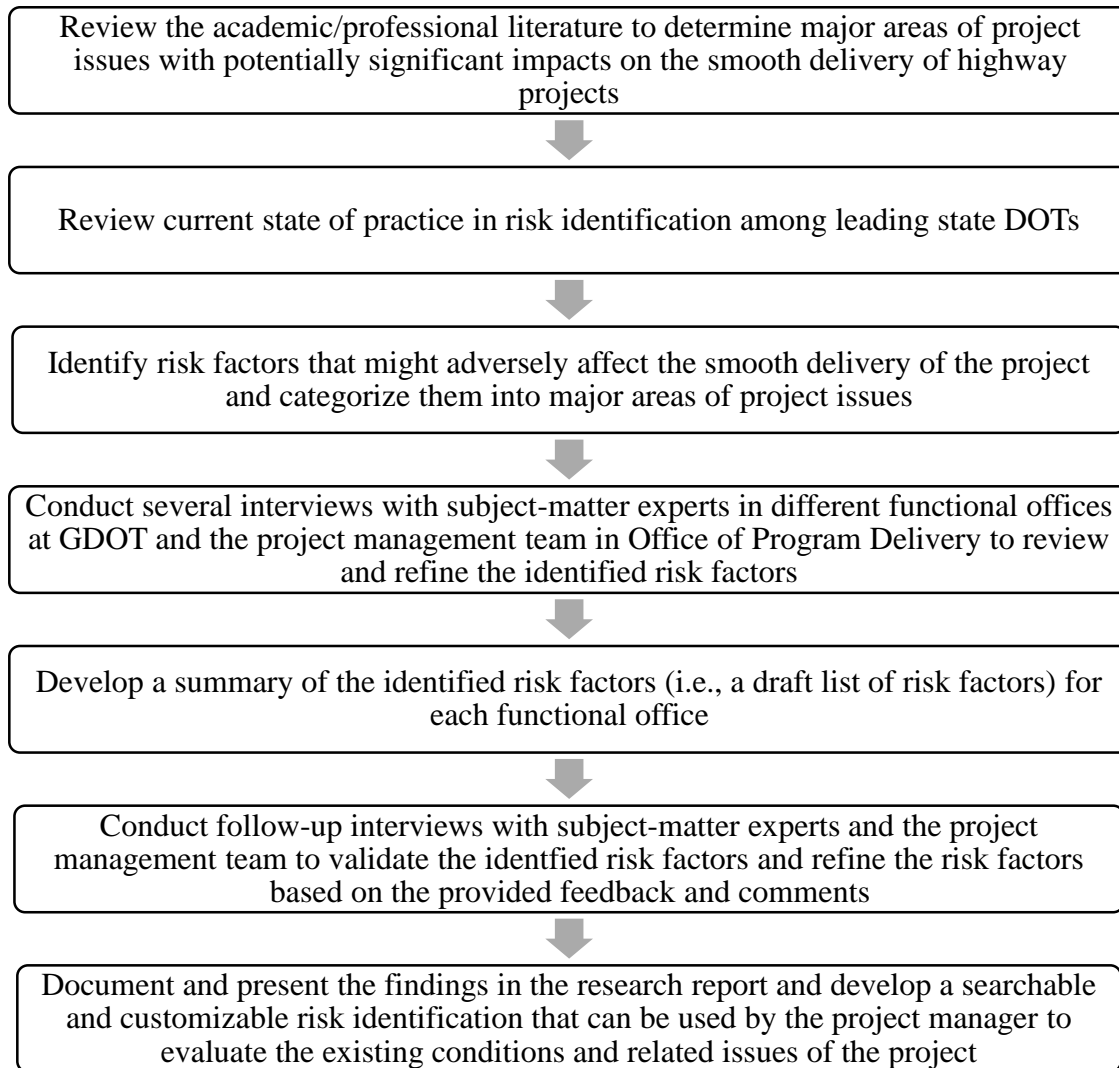
## Chapter 2 Research Methodology

The research methodology contained an extensive literature review, content analysis, and interviews with subject-matter experts in GDOT. The research team conducted several tasks to complete the objectives of this research (see Figure 1):

1. Review the academic/professional literature to determine major areas of project issues with potentially significant impacts on the smooth delivery of highway projects
2. Review the current state of the practice in risk identification among leading state DOTs
3. Identify risk factors that might adversely affect the smooth delivery of the project and categorize them into major areas of project issues (i.e., organized based on GDOT's functional offices, such as Offices of Environmental Services, ROW, Strategic Communication, Utilities, and Bridge Design)
4. Conduct several interviews with subject-matter experts in different functional offices at GDOT and the project management team in the Office of Program Delivery to review and refine the identified risk factors
5. Develop a summary of the identified risk factors (i.e., a draft list of risk factors) for each functional office
6. Conduct follow-up interviews with subject-matter experts and the project management team to validate the identified risk factors and refine the risk factors based on the provided feedback and comments



7. Document and present the findings in the research report and develop a searchable and customizable risk identification that can be used by the project manager to evaluate the existing conditions and related issues of the project



**Figure 1 An Overview of the Research Methodology for Risk Identification**

# **Chapter 3 Risk Identification for Functional Offices**

## **3.1. Office of Environmental Services**

### **3.1.1. Introduction**

The plan development process establishes the method by which a project advances from concept development through final design. Environmental resource identification is needed for the concept-development phase. It begins in the concept development, during preliminary design and before final design, to reduce the impact of environmental factors on the schedule. Environmental activities are reviewed and approved during Phase I Preliminary Engineering, but just a few projects go through two-phase preliminary engineering. Phase II Preliminary Engineering will consist of all activities after concept approval or environmental approval, as applicable, to include the development and approval of right-of-way plans and final design.

Use of the Environmental Procedures Manual (GDOT 2012) should expedite projects from preliminary engineering through construction by providing guidance for sound practices, procedures, and decisions. The manual approaches the environmental process through an interdisciplinary team approach as required by the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ).

During concept development, environmental resources should be identified. These include:

- Historic resources and their boundaries
- Non-historic Section 4(f) resource boundaries (i.e., publicly owned parks, recreation areas, and wildlife and waterfowl refuges)
- Jurisdictional waters of the U.S. (i.e., wetlands, streams, and open waters)
- Vegetative buffers (i.e., 25 feet for warm water streams and state waters, 50 feet for cold-water trout streams)
- Cemeteries
- Threatened and endangered species and their habitat
- Community facilities

A public involvement strategy also should be developed during the concept phase to ensure that the public, including environmental justice communities, are appropriately engaged during the decision-making process. Public involvement is critical as decisions are made concerning the expenditure of public funds. Major projects may require a stand-alone Public Involvement Plan.

Environmental risk factors are divided into four categories:

- **First**, ecology-related issues that can be reasonably identified *before* environmental surveys. The ecology-oriented risks must be identified before the concept team meeting.
- **Second**, there are ecology-related issues that may arise *after* surveys are complete. These risks can be identified after the concept meeting. Surveys must be complete prior to assessment reports—several tasks occur between the two (e.g., proving delineations to design so that an avoidance/minimization discussion

can occur, and a less damaging alternative can be developed). Also, per the baseline schedules, Formal Section 7 Consultation (Endangered Species Act) should be complete prior to the Preliminary Field Plan Review (PFPR).

- **Third**, cultural resources and NEPA issues that can be reasonably predicted before environmental surveys; these risks can be identified before the concept meeting.
- **Lastly**, there are non-environmental-office issues that can affect the environmental process, and these risks can be identified before the concept meeting.

Therefore, it is significantly important to distinguish the environmental categories to decide about the approach and whether it is ecology-related, cultural-related, and/or if it is identified before or after the environmental surveys. This is something that needs to be determined early on to move forward with the project.

Generally, there are two policy acts that need to be followed by project managers regarding environmental procedures. Understanding these two environmental policy acts is necessary for project managers as required background information for identifying environmental risks and finding mitigation strategies.

### **(1) National Environmental Policy Act of 1969**

There are a variety of federal environmental laws that must be met by any federally funded action that might affect the environment. The information about these effects needs to be available to the public before any decision is made.

*“The National Environmental Policy Act (NEPA) requires the public disclosure of environmental impacts before project decisions are made. Thus, the environmental process is an integral part of the decision making. Environmental resources must be identified early and given consideration throughout project development. According to 23CFR paragraph 771.113, final design activities, property acquisition (except for hardship and protective buying), purchase of construction materials or rolling stock, or project construction will not proceed until the following have been completed:*

- The action has been classified as a Categorical Exclusion (CE), or*
- A Finding of No Significant Impact (FONSI) for an Environmental Assessment document has been approved, or*
- A Final Environmental Impact Statement (FEIS) has been approved and available for the prescribed period and a Record of Decision (ROD) has been signed.” (GDOT 2017, Plan Development Process, p. 3-1)*

Taking the NEPA into consideration is significant in every project to measure the impact on the environment. Prior to approval of the NEPA document, GDOT must engage the public [at a level appropriate for the project] and evaluate impacts on the environment.

Note:

- (1) The Department needs to take into consideration that all decisions, final construction plans, or right-of-way plans cannot begin until the completion of an

appropriate public involvement process including environmental document approval. (GDOT 2016b, *Public Involvement Plan for NEPA Projects 2016*)

- (2) The Department should not contact any property owner before right-of-way plans are approved and the environmental document has been approved or reevaluated as needed.

*“In rare and unusual circumstances, there is an exception to these rules called ‘Protective Buying or Advanced Acquisition’. This request is reviewed and approved as appropriate on a case-by-case basis following all Federal and State guidelines.” (GDOT 2017, Plan Development Process, p. 3-1)*

## **(2) Georgia Environmental Policy Act of 1991 (GEPA)**

GEPA requires that state agencies assign an official to determine if a proposed governmental action could adversely affect the quality of the environment. Both GEPA and NEPA are designed to facilitate informed decision-making and environmental review. The Georgia Environmental Policy Act must be complied with for state-aid projects. Several federal environmental laws concern federal actions (and not merely federal funds). Therefore, the PM and local government sponsors should check with the Office of Environmental Services to determine which federal requirements apply to state-funded projects.

*“This act (Senate Bill 97) passed during the 1991 session of the Georgia Legislature, requires the evaluation and disclosure of environmental effects of proposed state (funded) actions. In general, a proposed action by a government*

*agency must be assessed by the responsible official (the Commissioner is the responsible GDOT official) of that agency to determine and document whether the proposed action may significantly affect the quality of the environment. In the event of a determination of a significant adverse effect, the act requires an evaluation of the pros and cons of alternatives that would avoid the adverse impact as well as measures to minimize harm.” (GDOT 2017, Plan Development Process, p. xx)*

Where a proposed action is subject to NEPA, a government agency will be deemed to have complied with GEPA if a NEPA document is prepared and federally approved. As a result, the GEPA process does not apply to a proposed action that requires NEPA compliance.

There is a fact sheet that provides basic information to help federal NEPA practitioners understand GEPA and to facilitate discussion with Georgia Environmental Protection Division (EPD) staff. This information will be useful where governmental actions have been subject to GEPA and can inform NEPA reviews (e.g., cumulative impacts analysis). This fact sheet is available at: [https://ceq.doe.gov/docs/laws-regulations/state\\_information/GA\\_NEPA\\_Comparison\\_23Nov2015.pdf](https://ceq.doe.gov/docs/laws-regulations/state_information/GA_NEPA_Comparison_23Nov2015.pdf)

### **3.1.2. Ecology-related issues that can be reasonably identified before environmental surveys**

The following risk factors must be identified before the concept meeting.

***3.1.2.1. National Marine Fisheries Service: Threatened and Endangered (T&E) Species, Essential Fish Habitat (EFH), and Anadromous Fish***

The United States National Marine Fisheries Service (USNMFS) is a federal agency, responsible for the stewardship of national marine resources. The USNMFS has jurisdiction over essential fish habitat (EFH) and threatened and endangered (T&E) species, including anadromous fish.

It is vital to avoid impacts to EFH because marine species' lifecycle, including their spawning, breeding, feeding, or growth into maturity, will all be threatened in consequence. In Georgia, EFH can be found in the following counties: Camden, Glynn, McIntosh, Liberty, Bryan, and Chatham. Project managers should keep in mind that there is a need for further EFH assessment if the project is in one of these counties. EFH information can be retrieved from: [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov).

T&E species include those that are threatened, or endangered and/or species of management concern formally listed by county by the U.S. Fish and Wildlife Service (USFWS) relative to the Endangered Species Act (ESA). Approximately 2300 species are listed as endangered or threatened under the ESA. About 675 are foreign species, found only in areas outside of the U.S. and its waters. (<http://www.nmfs.noaa.gov/pr/laws/esa/>)

Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn. NMFS has jurisdiction over most marine and anadromous fish. The current list of anadromous fish under NMFS's jurisdiction can be retrieved from: <http://www.nmfs.noaa.gov/pr/species/esa/listed.htm#fish>



An Ecology Resources Survey Report (ERSR) is required for all ecological resources, including EFH. The location of protected species, and associated habitats will be transmitted to the PM for delineation on the survey area layout.

### ***3.1.2.2. Practical Alternatives Review (PAR)/Individual Permit (IP)***

If a project has impacts to a U.S. Army Corps of Engineers (USACE) site or to the U.S. Waters that exceed the requirements of a Nationwide Permit (NWP) or Regional Permit (RP), an Individual Permit (IP) will be required pursuant to Section 404 of the Clean Water Act (CWA) that can be retrieved from: <https://www.epa.gov/cwa-404/section-404-permit-program>

If the proposed project requires an IP, designers prepare the Practical Alternatives Review with input from ecologists. The PAR is a review providing an analysis of alternatives to avoid and to minimize harm to U.S. Waters. The purpose of the PAR is to obtain resource agency input on project alternatives, as well as to gather information for the continued project review.

A PAR is forwarded to all agencies involved: GDOT, USACE, FHWA, USEPA, USFWS, USNMFS, Department of Natural Resources (DNR) (including EPD), and any other appropriate commenting agency.

The PAR report includes two alignments for every project: (1) the Wetlands Minimization Alternative (WMA) that avoids all wetlands, and (2) the Best Fit Alternative that balances the avoidance of all types of resources. More information can be

obtained from the *Environmental Procedures Manual* (GDOT 2012, p. 31). The PAR must be concluded during the concept phase.

### ***3.1.2.3. Salt marsh or tidal mitigation***

The Coastal Marshlands Protection Act (CMPA) protects the marsh and estuarine areas and regulates the activities within these public trust lands that are held for the citizens of Georgia. Bridge projects require a CMPA permit.

### ***3.1.2.4. Trout waters***

Streams designated as *primary trout waters* are waters supporting a self-sustaining population of rainbow, brown, or brook trout. Streams designated as *secondary trout streams* are those with no evidence of natural trout reproduction but are capable of supporting trout throughout the year. An ecologist can distinguish the classification of a stream per the definition in the Georgia Water Quality Control Act to see if it is a cold-water trout stream or a warm-water trout stream.

A list of designated cold-water trout streams can be found in Section 15 at:

<http://www.dot.ga.gov/PartnerSmart/DesignManuals/Environmental/GDOT-EPM.pdf>  
(GDOT 2012, *Environmental Procedures Manual*, p. 167, last paragraph)

### ***3.1.2.5. Seasonal surveys (Identifies Threatened and Endangered species)***

Seasonal surveys are required when a project is anticipated to cause any type of land disturbance. Seasonal surveys are specified for threatened and endangered species. It is

necessary to know and consider seasonal surveys in scheduling projects. Information for technical study procedures can be found in Chapter V of the *Environmental Procedures Manual* (GDOT 2012, p. 245).

Seasonal surveys for environmental resources have the greatest potential to affect alignment decisions that should be performed during concept development. The survey consists of:

*“Threatened & Endangered species and their habitat. Appropriate agency consultations concerning resource identification also should be conducted at this time.” (GDOT 2012, Environmental Procedures Manual, Section 4.0, p. 51)*

The PM needs to gather the survey reports from the environmental team and then show the environmental resources on all project layouts and plans.

### **3.1.3. Ecology-related issues that may arise after surveys are complete**

The following risk factors must be identified after the concept team meeting.

#### ***3.1.3.1. Formal Section 7 (Endangered Species Act)***

Formal Section 7 (Endangered Species Act) is a detailed consultation process with the USFWS whenever protected species or suitable habitats for a protected species are identified on a proposed project.

If a “may affect, likely to adversely affect” determination (potential habitat and species found) is made in the Ecological Assessment of Effects (EAOE) for a federally listed

T&E species, a Biological Assessment (BA) report and a coordination cover letter requesting the initiation of Formal Section 7 Consultation should be prepared. This letter will be written for the projects that need coordination under Section 7.

*“Biological Assessment (BA) is a document prepared in compliance with formal Section 7 of the Endangered Species Act (ESA) and submitted to US Fish and Wildlife Service (USFWS) discussing potential impacts to protected species.” (GDOT 2012, Environmental Procedures Manual, p. 17)*

If Section 7 Consultation is being initiated for marine species such as the short nose sturgeon, a protected sea turtle, a whale species, or essential fish habitat, a coordination letter must be addressed to NMFS and copied/furnished to the lead agency.

If Section 7 Consultation is being initiated for any nonmarine species, the letter will be addressed to the lead federal agency and a copy will be furnished to the USFWS and Georgia DNR.

#### ***3.1.3.2. Major bat colonies***

Bat colonies could be in any dark corner, and it is vital to identify them around the proposed project area before any action is taken. Signs of bat roosts include visible and audible identification, presence of guano, or staining from guano or body oils.

### **3.1.4. Cultural resources and NEPA issues that can be reasonably identified before environmental surveys**

The risk factors in the following subsections must be identified before the concept meeting.

#### ***3.1.4.1. Non-historic 4(f) (publicly owned parks, recreation, wildlife & waterfowl refuges)***

During concept development, non-historic Section 4(f) resource boundaries should be identified. Parks, recreation areas, and refuges are three common types of properties protected by Section 4(f).

*“Section 4(f) (USDOT Act of 1966) (49 USC 303) – Requires that before land from a significant publicly owned park, recreation area, national wildlife or waterfowl refuge; or any significant historic site (regardless of ownership) can be converted to a transportation use, it must be demonstrated that there is no prudent or feasible alternative to that use and that the project includes all possible planning to minimize harm.” (GDOT 2012, Environmental Procedures Manual, p. 34)*

If the project site includes a property that is publicly owned, open to the public, and significant as a park, recreation area, or refuge, Section 4(f) may apply to the property. Section 4(f) applies to projects that receive funding from or require approval by an agency of the U.S. DOT. More information can be retrieved from:

[https://www.environment.fhwa.dot.gov/section4f/properties\\_parks.aspx](https://www.environment.fhwa.dot.gov/section4f/properties_parks.aspx)

#### ***3.1.4.2. National Register–listed properties including National Historic Landmarks***

National Historic Landmarks (NHLs) are nationally significant historic places designated by the Secretary of the Interior. NHLs come in many forms: buildings, sites, structures, objects, and districts. All NHLs are also listed in the National Register of Historic Places (NRHP). National Register–listed properties can be known in advance before the survey. NHLs are designated because they are: (1) sites where events of national historical significance occurred, (2) places where prominent persons lived or worked, (3) icons of ideals that shaped the nation, (4) outstanding examples of design or construction, (5) places characterizing a way of life, or (6) archeological sites able to yield information. (Retrieved from: <https://www.nps.gov/nhl/learn/intro.htm>)

#### ***3.1.4.3. Phase II archaeology***

The Phase I survey identifies all potentially eligible sites within a project area. It is not known if Phase II is needed until Phase I is complete. Limited test excavations typically associated with Phase II surveys may only be required after the Phase I survey is conducted and has determined that the Phase II survey is required. The main risk here is the time that is needed for this process. The results of the Phase I investigation are presented in a report that fulfills the criteria set forth below.

The report must contain evaluations of NRHP eligibility when sufficient documentation of significance is available. Phase II archaeological testing is the process of determining whether identified archaeology sites meet defined criteria for inclusion on the National Register of Historic Places, as set forth in 36 CFR Part 60. This phase is warranted when

a site has been identified that may be eligible for the NRHP, but not enough is known about it to make a recommendation about its eligibility. This phase of investigation involves a complete subsurface survey and testing of identified sites sufficient to determine their horizontal and vertical boundaries, their cultural and scientific importance, and the sites' eligibility for listing on the NRHP. Upon completion of the fieldwork, all sites must be assessed as "eligible" or "not eligible." Terms such as "potentially eligible" are not acceptable at the completion of Phase II investigations. (Retrieved from: <http://ssl.doas.state.ga.us/PRSapp/bid-documents/1764750IF-006-2017R209341.pdf>)

*"The archaeologist will perform all data collection in accordance with the following:*

- a. A testing program of potentially eligible NR archaeological sites will be conducted. Consultants will develop the testing strategy for each site in consultation with GDOT's archaeologist.*
- b. All discovered archaeological features will be recorded as to width, length, depth, and nature of fill.*
- c. All excavated soil will be screened through 0.25-inch mesh hardware cloth." (GDOT 2012, Environmental Procedures Manual, p. 112)*

### **3.1.5. Non-environmental office issues that can affect environmental process**

The following risk factors must be identified before the concept meeting.

### ***3.1.5.1. Federal lands present (Includes Section 408 of the U.S. Code)***

Georgia DOT projects occasionally require land owned by a federal agency. Projects that require land owned by a federal agency can affect environmental review. Examples of federal lands are national parks, national forests, military bases, and the U.S. Army Corps of Engineers lake property throughout the property.

### ***3.1.5.2. Parcels with restrictive covenants***

Restrictive covenants are like easements and equitable servitudes that may be required as part of the property title to place limits on property transfer and to establish conditions for future invasive work.



## **3.2. Office of Right-of-Way**

Office of Right-of-Way risks are categorized under four main areas, including parcel issues; access issues; constructability issues; and the issues related to procedural errors, external changes, and unknown conditions.

### **3.2.1. Parcels issues**

#### ***3.2.1.1. Number of required ROW parcels (High or Low)***

GDOT has the absolute prerogative on the determination of the number of parcels to be appraised. The Office of ROW (Right-of-Way) assists the project manager through a preliminary right-of-way estimate for the proposed project. A high number of required ROW parcels could indicate that the project is of sufficient complexity, though what is considered high in rural areas is different from what is considered high in urban areas. As a result, more attention should be paid in scheduling, and more time is needed to acquire the high number of required parcels.

#### ***3.2.1.2. Value of required ROW parcels exceed \$250,000***

Value of the required ROW parcels needs to be determined for every project before acquisition. If the total value of the parcels exceeds \$250,000 for acquisition of uncomplicated parcels, it is critical to ensure an appraisal is done.

### ***3.2.1.3. U.S. Army Corps of Engineers parcels identified by ROW included in the project***

The Department needs to file an application for lands or interests in lands needed for highway purposes and owned by the United States. The mentioned application should be filed with the Federal Highway Administration pursuant to 23 CFR. An exception to this directive will be made for lands or interests that are managed or controlled by the Army, Air Force, Navy, Veterans Administration, or Bureau of Indian Affairs. In the case of USACE lands, the application should be submitted directly to the installation commander and the appropriate district engineer of the U.S. Army Corps of Engineers.

### ***3.2.1.4. Local government–owned parcels adjacent to project***

Local government-owned parcels are those that are under the control, use, and benefit of local government/agencies. If a local government owns a parcel adjacent to a project, the procedure to acquire the right-of-way would be as follows: after funding authorization and appraisal of the parcel, contacting the Land Division and then making an offer and finally requesting a donation from public for acquisition purpose should be done. Finally, the acquisition manager receives the project assignment from the General Office Acquisition Unit.

### ***3.2.1.5. State government–owned parcels adjacent to project***

State lands are those that are under the control, use, and benefit of state agencies. If the state government owns a parcel adjacent to a project, a systematic procedure should be followed to acquire the right-of-way. After funding authorization is finalized, it is critical

to contact and coordinate with the General Office State government coordinator for the acquisition.

#### ***3.2.1.6. Federal government–owned parcels adjacent to project***

All lands controlled by and of the federal government agencies such as the U.S. military, Veteran’s Administration, the U.S. Postal Services, and the Bureau of Indian Affairs are considered federal lands. The controlling agency should be identified with jurisdiction over federal lands. The identification should be done as early as possible in the project development process. Once the agency is identified, the controlling agency should be notified of the potential need to use the land for the project.

#### ***3.2.1.7. Easement parcels***

Easement parcels are non-possessory rights to cross or use a parcel of properties of others without possessing it. Easements are generally divided into two categories:

##### **(1) Permanent easement:**

*“A permanent, non-possessory property interest which one entity (person, partnership or corporation) has in land owned by another entitling the holder of the interest to limited use or enjoyment of the other’s land (i.e. easement for construction and maintenance of slopes or permanent drainage easement).”*  
*(GDOT 2015, External Right of Way Manual, Section 4.4.11)*

**(2) Temporary easement:**

*“A temporary, non-possessory property interest which one entity (person, partnership, or corporation) has in land owned by another entitling the holder of the interest to limited use or enjoyment of the other's land for a specified period of time (i.e. temporary construction easement for sediment control for a pond).” (GDOT 2015, External Right of Way Manual, Section 4.4.12)*

Property managers are usually the ones who identify the area required for building demolition. This area will be added to the plans by design. This easement will be paid for as a temporary easement for a determined duration to be specified by the acquisition manager. This should be done early in the project during the project inspection to prevent any delay in schedule.

**3.2.1.8. Prior right**

Utility owners claim prior rights. Prior rights should be addressed by identifying them at the coordination meeting held with the District Utilities Office (DUO) and verifying with the assigned project title attorney. The PM should know that prior rights claims can be made on any of the following three cases:

1. *“Within existing right of way;*
2. *Within required right of way;*
3. *Within both existing and required right of way.” (GDOT 2015, External Right of Way Manual, Section 13.4.A)*

### ***3.2.1.9. Tribal lands identified by federal maps and websites***

Regarding tribal lands, responsibility is in hands of the Bureau of Indian Affairs (BIA), which is an agency of the federal government under the U.S. Department of the Interior. The agency is responsible for administrating and managing 55,700,000 acres (225,000 km<sup>2</sup>) of land held in trust by the U.S. for Native Americans in the United States, Native American Tribes, and Alaska Natives. Since tribal lands acquisition could become complicated, the process could take an extended time and it is recommended that the PM plan in advance to reduce the effect on the schedule.

### ***3.2.1.10. Unidentified parcel ownership in Special Assistant Attorney General (SAAG)***

SAAG aims to evaluate the scope of work to ensure the team agrees with it, and that it is consistent with the initial scope. It is necessary to identify the ownership of all the parcels. If the identification of the parcel(s) cannot be made, the documents need to be coded against the public interest determination (PID) designated for this purpose for the county. Further processing of this document will be deferred pending file improvement projects.

### ***3.2.1.11. Displacements anticipated***

Displacement happens when a personal property owned or leased by a business must be moved to accommodate the project needs. There will be displacement charges related to expenses that the business owner must incur during the move when the business vacates or relocates from its displacement site. Any lack of coordination between the ROW office and the business owner can also cause schedule delay. This type of acquisition requires

additional time in the schedule to acquire and relocate the property owner and is a risk to the schedule.

### **3.2.2. Access issues**

#### ***3.2.2.1. Limited-access highway***

A limited-access highway is defined as a highway that cannot be accessed directly by adjacent roads and driveways except at specific areas determined by the public authority having jurisdiction over the roadway. The process of dealing with ROW issues of limited-access highways can be extensive and might affect the schedule. It is crucial to try to identify limited-access highway in the early stages and take it into account for scheduling the project.

#### ***3.2.2.2. Changed access for any parcels***

Changes in access for parcels need prior authorization or approval, which will affect the ROW cost and schedule.

*“When major changes in access are made on Interstate projects, which could affect right of way cost, but do not change the area of taking, prior Federal Highway Administration authorization must be secured.” (GDOT 2015, External Right of Way Manual, Section 7.4.B)*

Requesting prior authorization and approval is a process that takes time and can affect the project schedule.

### **3.2.3. Constructability issues**

#### ***3.2.3.1. All ROW cleared and free of above/underground obstructions***

Right-of-way should be cleared and free of any above- or underground blockage. All structures and above/underground obstructions within the ROW must be cleared prior to letting the project. Any remaining structures and obstructions within the ROW can significantly delay the process of ROW acquisition, which is a critical path activity in the project schedule.

#### ***3.2.3.2. All drainage outfall structures and permanent best management practices (BMPs) on ROW***

Post-construction storm water is an integral part of the project design that the design phase leader always considers. The project outfalls are evaluated, any outfall-level exclusions (OLEs) are determined, the feasibility of BMPs are analyzed, the BMPs are sized, and a Post-Construction Storm Water Report is prepared. The PM needs to coordinate with the design phase leader to understand how drainage outfall structures and permanent BMPs will demand any special ROW or easement requirements. The main risk is when the concerns related to post-construction storm water are not considered for developing an appropriate schedule for project ROW and easement in the planning phase.

#### ***3.2.3.3. Safety risk related to easement during the construction phase***

Right-of-way or easements are set to keep projects safe during the construction phase. They accommodate construction limits, driveway locations, access controls, roadway drainage structures and outfalls to be maintained by GDOT, erosion control devices, sign

and signal strain poles, environmental mitigation sites, and the location of bridges and retaining and noise walls. They are used to minimize the effect of the project on environmental resources and other infrastructure. Thus, any required easement should be considered in the initial plans to be acquired; otherwise, it will negatively affect the project by schedule delay and budget overrun.

#### ***3.2.3.4. ROW acquired at intersections for placement of traffic-control equipment and sight-distance triangles***

There could be the need to acquire ROW at intersections for placement of traffic-control equipment and sight-distance triangles. The PM should note that the process can be prolonged since the ROW at intersections could require a complex coordination process among multiple property owners. The complexity in the ROW acquisition affects the project schedule and project cost.

#### ***3.2.3.5. Aerial/underground easements required for structures (i.e., bridges and retaining walls)***

Requiring aerial/underground easements for structures in a project requires a complex coordination process among multiple parties involved in the project, including the Offices of Right-of-Way, Bridge Design, and Utilities, and various district offices. The lengthy process affects the ROW cost and schedule.

*“By Georgia statutes, utilities whether public or privately owned, aerial or underground, are permitted by GDOT and local governments to be accommodated within the public ROW. To this end, the Design Phase Leader should make every effort to design a project that will accommodate (and*



*minimize impacts to) all existing utilities and new utilities to be constructed concurrently with the project.” (GDOT 2015, External Right of Way Manual, Section 6.4.3)*

### **3.2.4. Issues related to procedural errors, external changes, unknown conditions, etc.**

#### ***3.2.4.1. Coordination delay***

ROW involves significant coordination with other offices, particularly among the Office of ROW, the District Utilities Offices, and the Office of Environmental Services. Delay in project management and pre-acquisition coordination, and utility coordination extends a large risk to the entire project schedule.

#### ***3.2.4.2. Late data/deliverables***

Providing late data or deliverables (e.g., general project information, land sales, appraisal reports, parcel numbers, and value of parcels) causes delay in the entire project schedule. This delay can sometimes be uncontrollable, so it is important to consider this risk while scheduling the project.

#### ***3.2.4.3. Inaccurate/incomplete data***

Providing inaccurate or incomplete data (e.g., incomplete reports, unknown ROW owner, and wrong number of parcels required) will cause confusion and error in the project-development activities. Eventually, errors will become too costly and will demand going

back and revising the data to get as much accurate data as possible. Errors and omissions in the required data delay the project development.

#### ***3.2.4.4. Unrealistic projected date for completion of right-of-way acquisition (in Preliminary Field Plan Review)***

If the projected date for completion of right-of-way acquisition is unrealistic, the completion of other processes will be affected to a large extent. It is important that a representative of the ROW acquisition team participates in the PFPR meeting. The representative is responsible to address the projected date of completion of ROW acquisition and identify potential risk to the schedule. Not having realistic date will delay the project schedule.

#### ***3.2.4.5. Delay in acquisition due to design change***

Any significant changes in the project design trigger delay in receiving the NEPA certificate for the project. Changes in the ROW plans can trigger changes in the planned or the already-acquired NEPA certificate. The delay in acquisition because of a design change will result in a delay in receiving the NEPA certification, which will significantly impact the schedule target for the project.

The PM should be aware of recommendations that no design changes be made after completion of the environmental document. (GDOT 2015, *External Right of Way Manual*, Section 6.4.1)

#### ***3.2.4.6. Delay in condemnation process***

The *External Right of Way Manual* (GDOT 2015) offers a set of procedures to ensure that the condemnation actions proceed in a timely manner within the control of GDOT, considering the framework of applicable law and in coordination with the State Law Department of the Attorney General's office. The condemnation coordinators act as the statewide coordinator for all pending condemnation cases by being the connector between the property owners' attorneys, GDOT, and the Attorney General's office. The condemnation coordinators also represent the Department in courts for all actions.

The condemnation process is a lengthy process that requires reviews by several entities inside and outside the agency. The PM needs to understand the standard condemnation process and the complexity that it introduces to the project schedule.

#### ***3.2.4.7. Expired temporary construction easements***

Temporary construction easement is a temporary right acquired by the Office of ROW to use or control the property belonging to an owner for the purpose of construction. If the easement expires before the completion of the project, the ROW office needs to re-negotiate with the real estate property owner, which might delay the schedule.

#### ***3.2.4.8. Project funding and donations available***

Requesting and monitoring of funding authorizations for project right-of-way are ruled by the official Code of Federal Regulations 23 CFR 710.203 to ensure availability of funds for the cost of right-of-way acquisition activities, including cost to acquire real

property, incidental expenses, appraisals, title work, legal settlements, court awards, and similar right-of-way-related work. The Local Government Section of the General Office will provide guidance to district local government coordinators and other General Office managers when determining appropriate right-of-way procedures to be followed by local public agencies as a condition of obtaining funds through the various transportation-funding programs administered by the Department. In a buying procedure, the acquisition manager will prepare a detailed cost estimate and make a request for funding to the General Office after all requirements have been met. Upon authorization of funding, the acquisition manager will be authorized to proceed with the offer.

### **3.3. Office of Strategic Communication**

#### **3.3.1. Introduction**

It is GDOT's policy to fully engage the public and appropriately address citizen concerns during various stages of project development. In the public involvement, an adequate level of public outreach is expected through several venues, such as citizen committees, public-information meetings, public hearings, and detour meetings. There are several factors that must be considered by a project manager in dealing with communication issues in the project. Identified communication risk factors can stem from the Office of Strategic Communication and other offices exposed to potential communication risks.

#### **3.3.2. Issues with Office of Strategic Communication**

##### ***3.3.2.1. Occurrence of a communication crisis***

Delivering projects on time and on budget is paramount to the success of the transportation agency. Strictly carrying out the project plan as initially scheduled facilitates achieving project goals in terms of budget and schedule. However, any failures in establishing effective communication among key stakeholders may adversely affect the anticipated project plan. Any misunderstandings and failure in effective information exchange between residents and businesses (namely the customers of GDOT), and offices inside GDOT and governmental agencies involved in the project development process may trigger stack in workflow, exerting negative effects on plan execution.

Communication crisis typically arises in circumstances in which the project is lagging under pressure from residents' complaints. Communication crisis could be due to delay in

obtaining required approvals from other agencies (e.g., approvals related to utilities relocation or approvals related to environmental assessment). The PM needs to take the risk of a communication crisis seriously. If the crisis runs its course, GDOT may not only fail to achieve the scheduled milestones and stay within budget, but also lose the public trust, which may damage its image in the public space.

### ***3.3.2.2. Information not delivered to the targeted audiences***

GDOT hopes the released information is delivered correctly and timely to the target audience. If the news is sent to the wrong recipients or is sent to the correct recipients in either an unnoticeable or untimely way, the news dissemination task fails.

Communication failure wastes time and efforts without any positive contributions to the project. Failure in communication is a risk factor that may result in project duration extension and budget overrun. Reaching out to the right audience is challenging since: (1) there are several stakeholders in a project and each news release platform has its range of application (e.g., social media may be more influential among the young people); and (2) it is difficult to establish proper contacts with traditionally underserved communities (e.g., limited English proficiency, disabled, and low-income).

### ***3.3.2.3. Distribution of inaccurate information about the project to the public***

Project managers should ensure that the information provided to the public is recently updated, reasonably accurate, and available to all in an easy-to-access platform. This task is occasionally more difficult than expected because: (1) accurate release of official news requires systematic training; (2) there are normally more than one information source,

which may contradict with each other; and (3) some topics, such as environmental assessment, heavily rely on professional knowledge, which makes it difficult for the public to correctly understand. Either distributing inaccurate information or generating misunderstanding could backfire in the community, which may evolve to a risk for the project. Misinformation of the actual condition may undermine the benefits of the project and delay its development process.

#### ***3.3.2.4. Stakeholders' complaints***

The process of soliciting, listening to, and responding to citizens' and customers' inputs about a public agency's plans for a project is lengthy and could be complicated and challenging for all stakeholders. However, seeking meaningful public involvement helps GDOT clearly understand the cultural values, opinions, and needs of a diverse group of citizens. Receiving feedback from all stakeholders helps GDOT better understand how different communities use the transportation system. Most importantly, the feedback process helps GDOT better identify the unique needs of the community that should be attended to in the project. It is critical that the benefits of the project as perceived by the community match what the agency hopes to deliver by implementing the project. An effective outreach process helps GDOT become aware of any stakeholders' major concerns about the project early in the project development process before an issue evolves into a potential source of complaints from the community. Stakeholders' complaints have the potential to evolve into catalysts of larger public protests, which may thwart the construction process or even abort the project.

### ***3.3.2.5. Scope change***

The project scope may change for several reasons and can be classified into two groups: (1) scope change due to the community's request and/or complaint; and (2) scope change due to evolving design concept and other critical project parameters, such as budget and other project issues, e.g., concerns in dealing with utilities and railroad (RR) operations.

Any scope changes may result in extra work beyond the contract to respond sufficiently to the requests made by the community and/or to address the conflict with the key stakeholders. The process introduces extra cost and time to the project.

### ***3.3.2.6. Having one message/voice (no distraction)***

As a trusted state agency, GDOT should have one voice to deliver its messages. It is highly desirable to have one voice from the agency to explain the project plan and to describe the project's influence on the surrounding environment. OSC is in charge of helping various offices effectively communicate project news with the public to avoid any discrepancies regarding the project information. Communication risk appears when there are contradictions in news coming from different offices in the agency and coming from multiple looks to collateral pieces. These contradictions have negative impacts on the project success. Introducing confusion to the public may tremendously hinder the project's progress and success. The PM is expected to identify the risk and to work closely with OSC to develop a collaboration plan for all offices involved in the project to ensure that there is a harmonized message addressing the conditions of the project.



### **3.3.3. Issues with Office of Environmental Services**

#### ***3.3.3.1. Anticipated long off-site detours***

Off-site detour changes limit the access to certain properties. The longer off-site detours exist, the more inconvenience the traveling public will feel. Off-site detour needs are a big challenge to the project, as an adequate public outreach is required prior to the approval of NEPA reevaluation. Key stakeholders, including local residents, businesses, schools, hospitals, and transit agencies should be informed in a timely manner about the need of detours in anticipation of the closure of relevant roadways and bridges during construction. The viability of proposed detours needs to be evaluated based on the feedback received from the affected community. Any critical feedback from the community during the detour discussion may affect the approval of the NEPA reevaluation process, which in turn may affect the entire project schedule.

#### ***3.3.3.2. Issues related to lane closure, especially in areas close to government facilities and emergency responders***

Construction in the areas close to important local, state, or federal government facilities, and courthouses presents a high risk for the execution of the project. Construction in the areas that affect the operations of first responders (e.g., areas near hospitals, police stations, and fire departments) also presents a high risk for the project. Any lane closures or changes in the traffic patterns in these high-risk areas should be communicated efficiently with key stakeholders to avoid generating any major difficulties for critical public operations. Any decisions on lane closures in governmental administrative areas caused by construction should be negotiated with local or federal government prior to

execution to make time for news releases, detour plans, and any other solutions to handle the traffic issues. Absence in communication or inefficient communication with local or federal governments and first responders is a major risk for the smooth execution of construction of the project. Construction will be exposed to the risk of disruption and shutdown because of public complaints, especially in cases where the access to emergency-response facilities is severely affected.

#### ***3.3.3.3. Issues related to the effects of construction equipment on the traveling public***

Providing adequate access for large construction equipment presents a major safety risk during the execution of the project. If sufficient road width and turning radius are not provided for locating construction equipment, significant safety risk will be introduced for the traveling public, which can affect the smooth execution of the project. Any incidents and critical complaints from major stakeholders may delay the project or even shut down the construction.

#### **3.3.4. Issues related to general project management**

##### ***3.3.4.1. Noise-related issues***

Construction activities inevitably generate noise, which is sometimes harsh and grating and may disturb daily life and work of neighborhoods, schools, churches, hospitals, and other facilities. There are existing local ordinances governing construction activities and levels of acceptable noise in construction areas. Any discrepancies between the schedule of construction activities and the city's ordinance need to be resolved before they cause

issues for the project. The project team should consider listening to stakeholders' concerns and trying to accommodate them as much as possible. The risk is that a small complaint, if left unanswered, may come to a pressing issue for the project in the form of public protest and possible lawsuit.

***3.3.4.2. Any work-hour limitations/special provisions required due to railroad operations***

If facilities associated with railroad operations are within the scope of construction work, the working-hour plan needs to accommodate all special provisions of the railroad stakeholder. Any conflict between the construction schedule and the railroad-operation timeline could be a major risk for the smooth execution of the construction. (GDOT 2008, "Utility Permit Special Provision for Protection of Railway Interests")

## **3.4. Office of Utilities**

### **3.4.1. Introduction**

Identifying utility facilities in a project zone is an important task. Generally, one of the crucial responsibilities of project managers is to equip the subject-matter experts with adequate resources and information so they can identify the utility facilities in the project vicinity. Several resources are summarized below to help PMs identify the existing utilities around the project areas early in the project initiation phase:

1. Field Visit

A field visit is the very first step in determining what utilities exist in the project zone. The PM and the design phase leader will always reassess a project for possible property divisions, real-estate developments, and utility installations or adjustments that need to be incorporated into the survey database. This can be accomplished by periodic field visits.

2. Geographical Project Information (GeoPI), a Project Search System

(Material in this section is retrieved from: <http://www.dot.ga.gov/DS/Maps/geopi>, accessed on 12/07/17):

GeoPI's Search function is designed to help locate any GDOT-related data or documentation, such as ROW plans, possible permits, etc. Also, its Bridges tab is a valuable resource for finding information about bridge attachments from just the bridge ID number.

More information about GeoPI and the instructions on how to use this tool can be derived from the Quick Reference Document:

<http://www.dot.ga.gov/applications/geopi/Documents/GeoPI/GEOPI%20QUICK%20REFERENCE%20DOCUMENT.PDF>

### 3. District Utilities Office

The District Utilities Office may have information about previous projects in the district that can be an excellent resource for future projects. It is recommended that PMs contact the DUO SMEs to get their advice, request a list of utility owners within the project limits, and ask for any further information that will assist in the project development.

### 4. ROW–Utilities Meeting

It is very important that personnel from the Offices of ROW and Utilities have a coordination meeting before the ROW appraisal phase to coordinate the required ROW and easements and determine if there is any utility located in the ROW.

This coordination meeting could conserve money and time by providing the facts upfront instead of facing them later in the process. The Office of ROW is required to take a lead and initiate the meeting because it is in its risk plan.

### 5. Prior Right

Another general mitigation strategy that may apply to almost every risk is to always acquire the prior right in the event it is needed. Prior right is a stage in utility coordination and preliminary design. As the preliminary design moves forward, utility locations/relocations should be coordinated with the design phase

leader, the District Utilities Office, the specific utility owner, and the project team. When utility owners show documented prior rights to ROW or easement, they need to coordinate with the Office of Right-of-Way for the acquisition of the ROW or easement for the utility.

## 6. Utility Owner

A final task is identifying the utility owner and following up with it throughout the process. A utility owner may include an individual owning property on both sides of a roadway with a water service, irrigation line, or communication cable crossing the road. The PM should work with subject-matter experts in the Office of Utilities to submit the request for utility relocation plans and utility adjustment schedules, and a second submission for utility plans (or similar with the correct person/entity doing the action) to the respective utility owners for the utilities' use in verifying the location of their existing facilities and incorporation of the final utility relocation information. The District Utilities Office should have enough preliminary information to determine if a utility agreement will be required on a project after receipt of the first submission of roadway plans. Once there is an indication that such agreements will be required, the district utilities engineer (DUE) will coordinate with the PM and the State Utilities Office early in the preliminary design stage to ascertain the information required to be furnished to the utility owner so that utility agreements can be negotiated. All utility agreements must be approved and signed before a project can be certified for letting. Therefore, the utility owner has to be involved with all preliminary stages of the project to prevent any delay and cost overrun.

The above six resources are just the starting points for a PM to help with identifying risk issues in the Office of Utilities and mitigating them. There could be many types of risks involved in every project. In this report, major risks have been identified and several strategies have been suggested to mitigate the risk impacts on the project. These risks are described in detail to help PMs understand what the possible risks are that might arise in a project. Also, a set of mitigation strategies has been suggested for each risk factor to help PMs handle them.

Table 1 shows the identified risk factors for the GDOT Office of Utilities. Risk factors are categorized under seven categories: railroad, electric distribution/transmission, telecom, water/sanitary sewer, petroleum pipelines/natural gas, and other factors. In addition, the possibility of each risk factor’s impact on project scope, schedule, and budget is determined and shown in the table. The classification of the risk factors with considerations of scope, schedule, and budget enables PMs to efficiently examine and identify risks and minimize redundancy in their risk-management process.

**Table 1 Utility Risk Factors**

<b>Utility Category</b>	<b>Risk Factors</b>	<b>Scope</b>	<b>Schedule</b>	<b>Budget</b>
<b>Railroad Issues</b>	Project in proximity to active or inactive Class I/short line RR property	*	*	*
	RR owner identified	*		
	RR work windows/restrictions/curfew times	*	*	*
	High-volume train traffic (day & night)	*	*	

<b>Utility Category</b>	<b>Risk Factors</b>	<b>Scope</b>	<b>Schedule</b>	<b>Budget</b>
	Is a special provision/special design required to accommodate RR features	*		*
	At-grade crossing	*		
	Underpass (road under RR)	*	*	*
	Overpass (road over RR)	*	*	*
	Adjacent (RR adjacent to property)	*	*	*
	Error in cost estimates			*
	Delay in agreement		*	
<b>Electric Distribution/ Transmission Issues</b>	Relocation required	*	*	*
	Seasonal outage window required	*	*	
	Substation	*	*	*
	Easement/private easement	*	*	*
	Duct banks/vaults/manholes	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	Service points	*	*	*
	Lighting	*	*	*
	PID	*	*	*
<b>Telecom Issues</b>	Relocation required	*	*	*
	Subscriber loop carrier/cable/TV	*		
	Fiber optic	*		
	Antennas			
	Duct banks/vaults/manholes	*	*	*
	Easement/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*



<b>Utility Category</b>	<b>Risk Factors</b>	<b>Scope</b>	<b>Schedule</b>	<b>Budget</b>
	PID	*	*	*
<b>Water/ Sanitary Sewer Issues</b>	Relocation required	*	*	*
	Vaults/manholes	*	*	*
	Pumping station/lift station	*	*	*
	Easement/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	PID	*	*	*
	Utility aid (To fund Utility Owners in Special Projects)	*	*	*
<b>Petroleum Pipelines/Natural Gas Issues</b>	Major lines present/natural gas	*	*	*
	Easement/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	PID	*	*	*
<b>Other Factors</b>	High probability for major utility conflicts	*		
	Coordination for joint-use poles	*	*	*
	High estimation for utility relocation costs			*
	High probability of retention of existing facilities	*		
	Late data/deliverables		*	
	Delay in utility impact analysis (UIA)		*	*
	Error in utility plan	*	*	*
	Surface utility engineering (SUE)	*	*	*
	Plan revision/notify owner	*	*	*

### **3.4.2. Railroad issues**

#### ***3.4.2.1. Project in proximity to active or inactive Class I/short line RR property***

The project manager should consider that the railroad owner has full authority to determine whether to inactivate the railroad for utilities relocation and GDOT has the responsibility for reasonable regulation of utilities around active or inactive railroads.

*“When existing or proposed utility facilities occupy Railroad right-of-way, the Utility shall comply with the Department’s policies and standards for permits.”*  
*(Chapter 3 of GDOT 2016c, Utility Accommodation Policy and Standards, and the additional policies and standards referenced in this chapter and in the Utility Permit Special Provision for Protection of Railway Interests)*

Also, the railroad has the right to decide whether flagging is required to enhance the safe operations of the railroad. The following describes further requirements for flagging as determined by the railroad company.

*“In general, the requirements for flagging will be whenever the Utility’s personnel or equipment are, or are likely to be, working on the Department owned Railroad right-of-way, or within distances as may be specified by Railroad’s Representative, or across, over, adjacent to, or under a track, or when such work has disturbed or is likely to disturb a railroad structure or the railroad roadbed or surface and alignment of any track to such extent that the movement of trains must be controlled by flagging. These requirements include situations where a crane, or other piece of equipment, is located such that its*

*boom, or extremity, could move and pass within 15 feet of the centerline of a track or within a distance as may otherwise be specified by Railroad Representative. Normally the Railroad will assign one flagman to a project, but in some cases, more than one may be necessary.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 7.7.A)*

Scope, schedule, and budget considerations should be given to this factor. For instance, one of the main risks related to this factor is that, if not determined correctly, the location for utilities relocation might have a conflict with the railroad ROW.

#### ***3.4.2.2. RR owner identified***

The major risk of this factor causes scope changes of the work. The railway tracks are owned by the railroad companies. The federal government gives land grants to the railroads, but does not own or operate the railway system. Even the freight railroad companies are privately owned. The freight cars themselves are mostly owned by the shippers and car companies (whose cars are transported all over the country on freight trains). Identifying railroad owners before starting any project is critical to preventing any delay in the process of acquisition.

#### ***3.4.2.3. RR work windows/restrictions/curfew times***

Work windows, restrictions, and curfew times for any railroad should be taken into consideration when a new project is scheduled in proximity to the railroad. The project team should understand and follow all the restrictions related to the railroad companies when planning and scheduling for the project. Identification of the work window presents

an important risk for the project. Work windows related to railroads give considerations of scope, schedule, and budget to a project.

#### ***3.4.2.4. High-volume train traffic (day & night)***

If there are numerous trains (>50) operated near a project site, especially when railroads are owned by different entities, coordination with different owners can cause schedule delay for completing a railroad agreement for a project. For instance, having the owners inactivate their facilities for the same period is a complex issue to resolve. Therefore, scope and schedule considerations must be given to this factor.

#### ***3.4.2.5. Is a special provision/special design required to accommodate RR features?***

Sometimes, a special provision/special design may be required to accommodate unique needs of the railroad company or GDOT. For instance, a special provision associated with the railroad company is that:

*“when highway crosses railroads at grade or by grade separation structure either over or under the tracks, the Department has the right to use railroad right of way at no cost; no right of way acquisition is necessary” (GDOT 2015, External Right of Way Manual).*

The decision primarily depends on the project-specific operations environment that may enforce immediate or unusual provisions to keep the railroad operations as smooth as possible. The design requirement may be due to certain requirements from the railroad company or GDOT in operating facilities and working on properties. The utilities

companies should follow the special design provisions per instructions. Scope and budget considerations should be given to this risk because addressing the need of having a special provision/special design could require additional works and costs. Also, rework may be needed in some situations depending on how far the project has progressed. (GDOT 2008, “Utility Permit Special Provision for Protection of Railway Interests”)

#### ***3.4.2.6. At-grade crossing***

Railroads typically have prior rights for final approval authority over Department plans for developing a project at grade crossing. In some cases, projects require relocation of an existing crossing, which significantly affects the scope of the project.

Early coordination with railroad owners/companies is essential to avoid a lengthy process for the final approval authority. Utility companies need a separate permit to work on the railroad right-of-way. Therefore, scope consideration should be given to the railroad crossing along the project.

#### ***3.4.2.7. Underpass (road under RR)***

The typical issue for a road placed under a train bridge is the need of relocations and attachments of several structural pieces to the bridge over the railroad. There are several permits that need to be issued when an underpass or a road passes under a train bridge in the project site. Acquiring these permits presents a significant challenge for the project schedule that should be understood and managed by project managers. This risk issue may impact scope, schedule, and budget, so the PM should take considerations regarding each.

#### **3.4.2.8. Overpass (road over RR)**

If the project bridge crosses the railroad or if it is adjacent and parallel to the railroad crossing, the project becomes complex and requires significant coordination among the utilities and the railroad companies. The railroad collaboration procedure and the process to get railroad agreements can take several years. Any crossing of railroad in a project, e.g., parallel encroachments, should be recognized early in the process in order to start the collaboration process. There is also additional cost associated with installing surface upgrades and other new protective devices as addressed in the following:

*“The Office of Utilities must be notified immediately upon the recognition of any such railroad involvement.” (GDOT 2017, Plan Development Process, Section 6.4.4, p. 6-18)*

*“The responsibility for adjustments, surface upgrades or new protective devices required at railroad crossings will be the responsibility of the Department unless agreed otherwise in the project specific agreements. However, on projects funded through the Local Grants Office, the Local Government must bear these railroad costs.” (GDOT 2016c, Utility Accommodation Policy and Standards, p. 4-25)*

There could be various scenarios that require the Department to ask for railroad track relocation. The Office of ROW is responsible for the acquisition of properties for projects. Project managers are responsible for following up and coordinating with the Office of Right-of-Way in case of the need of a property acquisition for relocating a

railroad track. PMs should provide relocation assistance and incorporate the railroad track relocation tasks into the project schedule.

#### ***3.4.2.9. Adjacent (RR adjacent to property)***

It might be necessary to relocate railroad tracks due to their proximity to a proposed project, which may affect scope, schedule, and budget if not taken into consideration early in the project. Of note, the Office of ROW is responsible for the acquisition of properties for projects. Also, the existing condition diagram based on field observations shows the details of the physical layout, including such features as adjacent intersections, highway geometrics, traffic control, grades, channelization, sight-distance restrictions, nearby railroad crossings, and adjacent land use.

#### ***3.4.2.10. Error in cost estimates***

Errors in preliminary utility and railroad cost estimates are a major source of risk for the project. The primary reasons for the errors are: (1) plans may not be complete based on the most current changes, and (2) the estimator may be not fully aware of the scope of work and utility change plans. Fixing the errors is costly and adds time to the project schedule. Thus, budget consideration should be given to preliminary utility and railroad cost estimates.

#### ***3.4.2.11. Delay in agreement***

The utility agreement is an agreement for relocation or adjustment work to be done by the utility and/or its consultant or contractor, and modification of easement limited provisions

(see Section 4.1.C.5 of the *Utility Accommodation Policy and Standards*, GDOT 2016c), if applicable.

*“The GDOT Utility Office prepares and processes all Utility Agreements. “This agreement provides authorization for the Utility to incur reimbursable costs associated with subject Utility Agreements. Also acts as liaison between the District Utilities Office and the Utility and serves as central resource for utility issues. It also manages all Utility Agreement processes from project inception (planning/concept phase) to project construction phase through project completion and final audits.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.0.A.1.c, p. 4.1)*

Schedule consideration should be given to this risk factor. For instance, any delay in submission and approval of utility agreements negatively impacts the delivery schedule of the project.

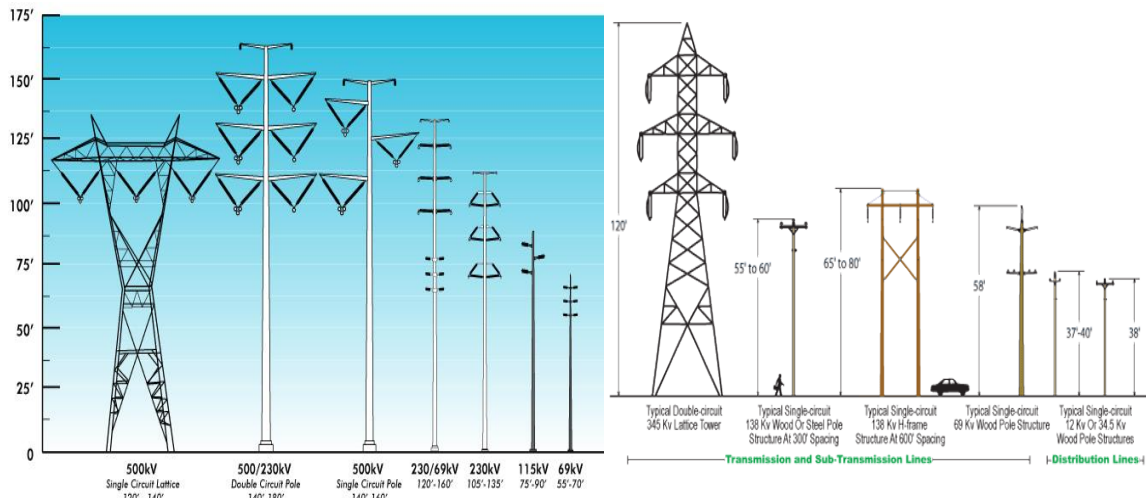
### **3.4.3. Electric distribution/transmission issues**

#### ***3.4.3.1. Electric distribution/transmission relocation***

Distribution and transmission poles and lines are usually located alongside streets, roads, and highways. Figure 2 shows different types of distribution and transmission poles. To use right-of-way for electric distribution/transmission relocation, GDOT’s relocation procedures outlined in Chapter 4 of the *Utilities Manual* (GDOT 2016c) must be followed and adopted. This is to prevent any adverse effects on the Department’s



Construction Work Program or the contractor’s construction process. This risk factor will impact project schedule, budget, and scope if the required considerations are not taken.



**Figure 2 Distribution and Transmission Poles**

Construction contracts usually include utility relocations to expedite the project process. Utility agreement clauses should be included for the electric distribution/transmission relocation in the written construction contracts to take advantage of the highway contractor’s resources and expertise to expedite the project process.

*“The Design Phase of the project begins at the onset of project Concept Report approval and is complete upon submission of final plans/contract documents for project Letting. The purpose of this phase is to develop the project plans, utility adjustment schedules/utility work plans, utility relocation plans, and associated agreements necessary to address all foreseeable utility impacts that might affect the project.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C)*

Project managers should follow up to make sure the utility relocation plans are prepared, which should be included in the construction contract, to expedite the overall project delivery.

*“The Standard Utility Agreement (SUA) is a legal agreement that is provided for relocation or adjustment work that is performed by the utility or any other parties. An SUA also may be needed for reimbursable relocation or adjustment work to be performed by the utility owner.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5).*

#### **3.4.3.2. Seasonal outage window for electric distribution/transmission**

There are always seasonal limits that should be taken into consideration while deciding when to let highway projects. The Federal Energy Regulatory Commission (FERC) recommends a timeline for electric distribution/transmission relocation that is March through May and September through November. Project scope and schedule could be affected by this specific risk factor, so project managers should pay special attention to seasonal limits in developing a project.

#### **3.4.3.3. Substation**

A substation is a part of an electrical generation, transmission, and distribution system that transforms voltage from high to low, and vice versa. Electric power flows through several substations at different voltage levels between generating stations and consumers. A substation typically includes transformers to change voltage levels between high transmission voltages and lower distribution voltages, or at the interconnection of two

different transmission voltages. The risk factor related to substations is that there is the possible need for relocating or probably removing the substation from the project area. The risk factor would cause substantial cost, relocation time, and scope change for a project. Therefore, more detailed information about the substation and the other substations around the project area are required.

#### ***3.4.3.4. Easement/private easement for electric distribution/transmission***

If the existing ROW is not adequate to perform the electric distribution/transmission relocation work, the need for ROW acquisition will arise that might cause a delay in the project schedule or might lead to additional costs for the acquisition of the new easement or private easement. It is the responsibility of GDOT to determine whether further right-of-way is required for any type of construction.

*“The District Utilities Engineer will coordinate with each Utility to request any special right-of-way requirements necessary for their facilities.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.a, p. 4-22)*

The district utilities engineer coordinates with the utility owner to approve such necessity and then writes a request to acquire such additional easement for electric distribution/transmission. Thus, scope, schedule, and budget considerations must be given to this factor. For instance, any change in the ROW plan after it is approved may lead to the need for additional right-of-way or easement, which should be avoided as much as possible as it is often costly and time consuming and may jeopardize good

working relationships with property owners due to multiple requests on the same project. Note that if condemnation is required, a minimum of 200 additional days is expected.

*“If the Utility insists on acquiring its own right-of-way or easement, the Utility shall notify the District Utilities Engineer in writing of such and shall include this acquisition in the Work Plan referenced in Section 4.1 of Utilities Manual.”*

*(GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.b, p. 4-22)*

Private utility easement includes any privately owned line, facility, or system for producing, distributing, or transmitting communications, cable, power, electricity, light, heat, gas, oil, water, waste, and storm water not connected with highway drainage, and other similar services. Typically, private lines serve only the owner (e.g., a farmer’s waterline or an industrial plant’s waste line, etc.) and not the public. All utilities, whether privately or publicly owned, will be required to comply with the policies and standards of the *Utility Accommodation Policy and Standards* (GDOT 2016c) when occupying or crossing any part of the right-of-way of the state highway system.

Private lines may cross the right-of-way by conforming to all other applicable requirements contained in the *Utility Accommodation Policy and Standards* (GDOT 2016c). Longitudinal installations of private lines are not permitted. Exceptions may be granted by the state utilities engineer where a public interest can be demonstrated.

#### ***3.4.3.5. Duct banks/vaults/manholes for electric distribution/transmission***

Duct banks for electric distribution/transmission are groups of conduits designed to protect and consolidate cabling to and from buildings. In a duct bank, data and electrical cables are laid out within conduits that are bundled together; these groupings of conduits are usually protected by concrete and metal casings. Duct banks are often buried, allowing contractors to consolidate the wiring for a road into centralized underground paths.

Duct banks for electric distribution/transmission are installed for big projects that require a substantial amount of wiring. Duct banks are used to protect the cabling outside of the roads and consolidate it to one area. Duct banks allow a property owner to conceal the cabling of a building underground. Bundling cabling together in buried duct banks makes future construction simpler, since the cables are centrally located. Duct banks are also useful for installing cabling underneath roads, parking lots, and other areas with existing structures. Moreover, duct banks allow property owners to replace, upgrade, or repair existing underground wiring without excavating the entire length of the lines.

The biggest challenge related to this risk factor is the need for relocation or removal of duct banks from the project area. Thus, scope, schedule, and budget consideration should be given to this factor. Since the duct banks are heavy, it is difficult to move them. In addition, it is a time-consuming process that needs to be taken into consideration in scheduling.

#### ***3.4.3.6. Reimbursement for electric distribution/transmission***

Whether a utility owner will receive reimbursement to relocate or adjust its facility is one of the significant utility risk factors. This risk factor should usually be taken into consideration prior to the project proceeding beyond the planning/concept phase of project development. There are 10 cases (listed in Chapter 4 of the *Utility Accommodation Policy and Standards*, GDOT 2016c) that qualify reimbursement of utility facilities located in the project area. In most cases of reimbursement, the utility owner has priority in occupancy right. The following are the 10 cases that qualify the utility owner for reimbursement:

1. When the utility has right of occupancy in its existing location by reason of holding a fee, an easement, or other property interest.
2. When any utility facilities owned by a municipality, county, or authority, without regard to whether such facilities were originally installed upon the public right-of-way, where such relocation or adjustment is necessary to clear proposed work on the state highway system.
3. When any utility facilities owned by a municipality, county, or authority are installed within the right-of-way of a street or road under the jurisdiction of the same municipality or county prior to the time such street or road becomes a part of the state highway system and which are subsequently required to be relocated or adjusted for construction on the state highway system or will become part of the permanent state highway system upon completion of the construction project.

4. When it is determined to be in the public interest to install, adjust, or occupy utility facilities so that the utility directly serves a transportation purpose and there will be costs to the utility that will be incurred solely for this purpose.
5. When a utility relocates its facility to improve the safety of the roadside under a cost-sharing agreement implemented specifically to address crash statistics.
6. When the advance installation of new utility facilities, crossing or otherwise occupying the proposed right-of-way of a future planned highway project, is either underway or scheduled to be underway.
7. When utility facilities, in their existing locations, are found outside the public right-of-way and are in physical conflict with a given project in such a way as to require their relocation, adjustment, or replacement to accommodate a Department construction project.
8. When it is determined to be in the public interest for the Department to pay the cost of removing, relocating, or making the adjustments to any utility facility owned by a public utility, without regard to whether such facilities were originally installed upon the right-of-way of the state highway system, a county road system, or a municipal street system.
9. When a utility relocates its facilities based upon final plans provided by the Department and is required to relocate or adjust its facilities a subsequent time due to a design change that is determined to be no fault of the utility (Note: Final plans are considered the plans issued to the utility by the Department at the time of the Notice to Proceed or Notice of Authorization).

10. When the Department determines that it is in the public interest to relocate existing overhead/aerial facilities to underground.

If GDOT determines that the reimbursement is in the best interest of the public and the Department needs to speed up the project, based on the Official Code of Georgia Annotated (O.C.G.A. §32-6-170), the Department may pay the cost of relocating, removing, or even making some adjustment to the affected electric distribution/transmission utility facility owned by the public without considering whether such facilities were basically installed on the right-of-way. In addition, the costs of relocation, removal, and any adjustment of such facilities may be included in the contract between the Department and the contractor who is doing the work for that associated project. Scope and budget considerations should be given to the reimbursement of electric distribution/transmission. The *Utility Accommodation Policy and Standards*, (GDOT 2016c), highlights that:

*“When it is necessary to adjust a utility facility, a portion of which was originally installed within existing public road or street right-of-way, and a portion of which is located on private property required to accommodate the proposed highway construction, the cost of accomplishing such adjustment will be reimbursed on a percentage basis. An exception may be made when the reimbursable and non-reimbursable work can be readily separated for recordkeeping purposes or the reimbursable portion is reimbursed on a lump sum basis.” (GDOT 2016c, Utility Accommodation Policy and Standards, Sections 4.2.A, 4.2.B, 4.2.C, 4.2.D).*



Therefore, the PM should take this point into consideration in developing an adequate budget for the project.

#### ***3.4.3.7. Early authorization for electric distribution/transmission***

Before installing and relocating any electric distributions/transmissions that occupy or encroach on the state highways, the utility owner needs to obtain a written authorization from the Department. Early authorization can be awarded in situations in which relocations of electric distributions/transmissions need to be expedited to prevent interference with highway construction; however, utility funding must be available. If the work is done in advance of highway construction, authorization will be given once the agreement is executed by both the utility and the Department. Also, funds need to be allocated and the date established for highway contract letting. In dealing with authorization for installing and relocating any electric distributions/transmissions, the PM should consider the impacts of scope, schedule, and budget on the project.

*“When necessary to expedite utility relocations and avoid interference with highway construction, early authorization or conditional authorization may be given provided the project’s utility funding is established. Unconditional authorization must be received by the Utility prior to billing for reimbursement.”*  
*(GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.3.A.1)*

#### ***3.4.3.8. Service Points***

The location and information regarding all existing service points are important to know in every project. Upon receipt of aerial photography, the Office of Traffic Operations

(OTO) design team leader will prepare a plot (in plan-sheet format) of the project database. This plot will include the location of proposed devices requiring electrical power and will be provided to the DUE for locating service points to all proposed devices.

#### **3.4.3.9. Lighting**

Scope, budget, and schedule considerations arise when lighting is located within the scope of a project. Highway lighting can exist on any roadway project, as a stand-alone project, and/or as a utility permit. PMs need to know whether lighting should be within the scope of the new proposed project and understand whether lighting should even be considered in the project and how funding will be provided for the lighting. PMs should follow up to ensure that the permitting process is being done and is on track.

*“Local Governments may desire to provide lighting at selected locations along an interchange, intersection, or roadway corridor within their jurisdiction. This lighting may be conventional roadway lighting or high mast tower lighting, as the location dictates. If the project meets established criteria, then the Department may participate in the costs associated with such work.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.6.A)*

#### **3.4.3.10. PID for electric distribution/transmission**

Public interest determination is an important element in relocating existing electric distributions/transmissions and requires sufficient consideration because it might impact project scope, schedule, and budget if not taken into consideration. A project is

determined a public interest when it is shown to be in the best interest of the public to expedite the project delivery. It is necessary to show that the benefit of the project improvement for the public is worth accepting the additional cost of the relocation of electric distributions/transmissions. Hence, the Department will take care of the cost associated with removal, relocation, or adjustment by bringing these costs into its contract with the Department's contractor for the desired project. For further information, the "Public Interest Determination Policy" can be a useful resource and can be accessed at: <http://mydocs.dot.ga.gov/info/gdotpubs/Publications/3E-1.pdf> (GDOT 3E-1 Public Interest Determination Policy, p. 1). The following briefly describes the concept of PID:

*"The Public Interest Determination Policy and Procedure is the Department's formal procedure to comply with O.C.G.A. 32-6-170 and 32-6-171. Under these Code Sections, the Department has the authority to pay or participate in the costs of utility relocation work provided it is in the public interest, expedites staging, and the utility relocation work is put into the construction project for the contractor to perform." (PDP, Revision 2.11, published on 10/20/2016, p. xxv)*

For instance, state law allows the Department to attend or pay the costs related to the removal, relocation, or adjustment of electric distributions/transmissions needed to accommodate the construction or maintenance of a public road by the Department. This applies to any utility facility that is publicly, privately, or cooperatively owned without regard to whether such facilities were originally installed upon rights-of-way of the state highway system, a county road system, or a municipal street system.

*“A public interest determination might be justified from the standpoint of highway safety, aesthetics, economic development, community health, reduced network outages, scenic, environmental, historical and other such concerns as specified in Section 2.10 of Utilities Manual.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 2.10)*

PMs work with the utility’s SMEs to understand whether the project is eligible for PID or not. If it is eligible, that would provide flexibility in the project schedule that would help expedite the project. If it is not determined clearly upfront to be eligible, then that may have negative effects on the project schedule once the utility’s SMEs bring it to the attention of the PM.

#### **3.4.4. Telecom issues**

##### ***3.4.4.1. Telecom relocation***

Communication facilities contain the aggregate of equipment, such as telephones, facsimile equipment, conduits, cables, fiber optic cables, and other electronic equipment, used for various modes of transmission, such as light, digital data, audio signals, and image and video signals. All utilities that are using the right-of-way must follow GDOT’s relocation procedures, as outlined in Chapter 4 of the *Utility Accommodation Policy and Standards* (GDOT 2016c), to not adversely impact the Department’s Construction Work Program or the contractor’s construction process. Construction contracts usually include utility relocations to expedite the project process. Utility agreement clauses should be

included in the written construction contract to take advantage of the highway contractor's resources and expertise to expedite the project process.

*“The Design Phase of the project begins at the onset of project Concept Report approval and is complete upon submission of final plans/contract documents for project Letting. The purpose of this phase is to develop the project plans, utility adjustment schedules/utility work plans, utility relocation plans, and associated agreements necessary to address all foreseeable utility impacts that might affect the project.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C)*

PMs are responsible for preparing utility relocation plans for telecom, which should be included in the construction contract, to expedite the overall project delivery.

*“SUA is a legal agreement that is provided for relocation or adjustment work that is performed by the utility or any other parties.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5).*

Scope, schedule, and budget consideration should be given to relocation of a communication facility.

#### **3.4.4.2. SLC sites/cable/TV**

A subscriber loop carrier or subscriber line carrier (SLC) provides telephone-exchange and interface functionalities. Figure 3 depicts an SLC. An SLC remote terminal is usually located in an area with a high density of telephone subscribers, such as a residential neighborhood.

Cable and television lines might be found under- or aboveground. Identifying the exact location of cables or TV wires depends on several factors, such as type of road, type of soil, and width of right-of-way. If cables and wires are underground, it is possible and recommended to dig into the ground or go into manholes or create a new manhole to access the cables.

*“The minimum vertical clearance above the roadway is 18 feet for communication and cable television lines. These clearances may be greater, as required by the National Electric Safety Code (NESC) and governing laws.”*  
*(GDOT 2016c, Utility Accommodation Policy and Standards, Section 5.6.B.2, p. 5-48)*

One common issue and risk could be the need to have a cable relocated or removed. Scope consideration is necessary for this factor because it will change the project scope if any of these utility facilities exist in the proposed project area.



**Figure 3 Subscriber Loop Carrier (Provided by GDOT Utilities Office)**

#### **3.4.4.3. *Fiber optic***

Fiber optic cable around the project area needs to be identified and its location should be pinpointed early on. The major risk of having fiber optic in the project area is the need to relocate or remove it, which impacts the project scope.

#### **3.4.4.4. *Antennas***

An antenna is the interface between radio waves propagating through space and electric currents moving in metal conductors, used with a transmitter or receiver. An antenna counterpoise, or ground plane, is a structure of conductive material that improves or substitutes for the ground. It may be connected to or insulated from the natural ground. There are policy guides and procedures in Chapter 5, Section 11 of the *Utility Accommodation Policy and Standards* (GDOT 2016c) that discuss accommodating and controlling access of wireless telecommunications facilities and mini-cell antennas on the highway right-of-way and other non-highway real property owned by the Department. Antenna could either be attached to existing utility poles or to certain Department facilities (i.e., signal and strain poles only).

#### **3.4.4.5. *Duct banks/vaults/manholes for telecom***

Duct banks for telecommunication facilities are groups of conduits designed to protect and consolidate cabling to and from buildings. In a duct bank, data and electrical lines/cables are laid out within conduits that are bundled together; these groupings of conduit are usually protected by concrete and metal casings. Duct banks are often buried,

allowing contractors to consolidate the wiring for a road into centralized underground paths.

Duct banks for telecommunication facilities are installed for big projects that require a substantial amount of wiring. Duct banks are used to protect the cabling outside of the roads and consolidate it into one area. Duct banks allow a property owner to conceal the cabling of a building underground. Bundling cabling together in buried duct banks makes future construction simpler, since the cables are centrally located. Duct banks are also useful for installing cabling underneath roads, parking lots, and other areas with existing structures. Moreover, duct banks allow property owners to replace, upgrade, or repair existing underground wiring without excavating the entire length of the lines.

The biggest challenge related to this risk factor is the need for relocation or removal of duct banks from the project area. Thus, scope, schedule, and budget consideration should be given to the presence of duct bank/vaults/manholes for telecommunication facilities. Since the duct banks are heavy, it is difficult to move them. In addition, it is a time-consuming process that needs to be taken into consideration in scheduling.

#### ***3.4.4.6. Easement/private easement for telecom***

If the existing ROW is not adequate to perform relocation works for telecommunication facilities, the need for ROW acquisition will arise and could cause delay in the project or lead to additional costs for the acquisition of new right-of-way or easement. It is the responsibility of GDOT to determine whether additional right-of-way is required for any type of construction.



*“The District Utilities Engineer will coordinate with each Utility to request any special right-of-way requirements necessary for their facilities.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.a, p. 4-22)*

The DUE coordinates with the utility owner to approve necessary right-of-way and then writes a request to acquire such additional easement.

*“If the Utility insists on acquiring its own right-of-way or easement, the Utility shall notify the District Utilities Engineer in writing of such and shall include this acquisition in the Work Plan referenced in Section 4.1 of Utilities Manual.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.b, p. 4-22)*

Private utility easement includes any privately-owned line, facility, or system for producing, distributing, or transmitting communications, cable, power, electricity, light, heat, gas, oil, water, waste, and storm water not connected with highway drainage, and similar services. Typically, private lines serve only the owner (e.g., farmer’s waterline or an industrial plant’s waste line, etc.) and not the public. All utilities, whether privately or publicly owned, will be required to comply with the policies and standards of the *Utility Accommodation Policy and Standards* (GDOT 2016c) when occupying or crossing any part of the right-of-way of the state highway system.

Private lines may cross the right-of-way by conforming to all other applicable requirements contained in that manual. Longitudinal installations of private lines are not permitted. Exceptions may be granted by the SUE where a public interest can be demonstrated.

Scope, schedule, and budget considerations must be given to this factor. For instance, any change in the ROW plans after it is approved may lead to the need for additional right-of-way or easement, which should be avoided whenever possible as it is often costly and time consuming and may jeopardize good working relationships with property owners with multiple requests on the same project. Note that if condemnation is required, a minimum of 200 additional days is expected.

#### ***3.4.4.7. Reimbursement for telecom***

Whether a telecom project is qualified for reimbursement is one of the most significant risk factors that needs to be taken into consideration for every highway project. Usually this should be done prior to the project proceeding beyond the planning/concept phase of project development. There are 10 cases (listed in Chapter 4 of the *Utility Accommodation Policy and Standards*, GDOT 2016c) that qualify projects for reimbursement of utility facilities located in the project area. In most cases of reimbursement, the utility owner has priority in occupancy right. Below are the 10 cases that qualify the utility owner for reimbursement:

1. When the utility has right of occupancy in its existing location by reason of holding a fee, an easement, or other property interest.
2. When any utility facilities are owned by a municipality, county, or authority, without regard to whether such facilities were originally installed upon the public right-of-way, where such relocation or adjustment is necessary to clear proposed work on the state highway system.

3. When any utility facilities owned by a municipality, county, or authority are installed within the right-of-way of a street or road under the jurisdiction of the same municipality or county prior to the time such street or road becomes a part of the state highway system and which are subsequently required to be relocated or adjusted for construction on the state highway system or will become part of the permanent state highway system upon completion of the construction project.
4. When it is determined to be in the public interest to install, adjust, or occupy utility facilities so that the utility directly serves a transportation purpose and there will be costs to the utility that will be incurred solely for this purpose.
5. When a utility relocates its facility to improve the safety of the roadside under a cost-sharing agreement implemented specifically to address crash statistics.
6. When the advance installation of new utility facilities, crossing or otherwise occupying the proposed right-of-way of a future planned highway project, is either underway or scheduled to be underway.
7. When utility facilities, in their existing locations, are found outside the public right-of-way and are in physical conflict with a given project in such a way as to require their relocation, adjustment, or replacement to accommodate a Department construction project.
8. When it is determined to be in the public interest for the Department to pay the cost of removing, relocating, or making the adjustments to any utility facility owned by a public utility, without regard to whether such facilities were originally installed upon the right-of-way of the state highway system, a county road system, or a municipal street system.

9. When a utility relocates its facilities based upon final plans provided by the Department and is required to relocate or adjust its facilities a subsequent time due to a design change that is determined to be no fault of the utility (Note: Final plans are considered the plans issued to the utility by the Department at the time of the Notice to Proceed or Notice of Authorization).
10. When the Department determines that it is in the public interest to relocate existing overhead/aerial facilities to underground.

If GDOT determines that the reimbursement for telecommunication facilities is in the best interest of the public and the Department needs to speed up the project, then based on the O.C.G.A. §32-6-170, the Department may pay the cost of relocating, removing, or even making some adjustment to utility facilities owned by the public without considering whether such facilities were basically installed on the right-of-way. In addition, the costs of relocation, removal, and any adjustment of such facilities may be included in the contract between the Department and the contractor doing the work for that associated project. Scope and budget considerations should be given to the reimbursement of telecommunication facilities.

#### ***3.4.4.8. Early authorization for telecom***

Before installing and relocating any telecommunication facilities that occupy or encroach on the state highways, the utility owner needs to obtain a written authorization from the Department. Early authorization can be awarded in situations in which the relocation of telecommunication facilities needs to be expedited to prevent interference with highway construction; however, utility funding must be available. If the work is done in advance

of highway construction, authorization will be given once the agreement is executed by both the utility and the Department. Also, funds need to be allocated and the date established for highway contract letting. In dealing with authorization for installing and relocating any telecommunication facilities, PMs should consider the impact of the scope, schedule, and budget on the project.

*“Additionally, right-of-way/environmental clearances are required to be granted for the areas where the reimbursable utility work is proposed. Such clearances must be obtained from the Department’s State Environmental Engineer and State Right-of-Way Administrator. Where the utility work is contingent on work by the highway Contractor, authorization will be withheld until the highway contract is awarded. When necessary to expedite utility relocations and avoid interference with highway construction, early authorization or conditional authorization may be given provided the project’s utility funding is established. Unconditional authorization must be received by the Utility prior to billing for reimbursement.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.3.A.1)*

#### **3.4.4.9. PID for telecom**

Public interest determination is an important element in relocating existing telecommunication facilities and requires sufficient consideration of scope, schedule, and budget. A project is determined to be a public interest when it is shown to be in the best interest of the public to expedite the project delivery. It is necessary to demonstrate that the benefit of the project improvement for the public is worth accepting the additional

cost of the utilities relocation. Hence, the Department will take care of the cost associated with removal, relocation, or adjustment by bringing these costs into its contract with the contractor for the sought-after project. For further information, the “Public Interest Determination Policy” can be a useful source of information:

<http://mydocs.dot.ga.gov/info/gdotpubs/Publications/3E-1.pdf>. (GDOT 3E-1 Public Interest Determination Policy, p. 1)

The following briefly describes the concept of PID:

*“The Public Interest Determination Policy and Procedure is the Department’s formal procedure to comply with O.C.G.A. 32-6-170 and 32-6-171. Under these Code Sections, the Department has the authority to pay or participate in the costs of utility relocation work provided it is in the public interest, expedites staging, and the utility relocation work is put into the construction project for the contractor to perform.” (PDP, Revision 2.11, published on 10/20/2016, p. xxv)*

For instance, state law allows the Department to attend to or pay the costs related to the removal, relocation, or adjustment of utility facilities needed to accommodate the construction or maintenance of a public road by the Department. This applies to any utility facility that is publicly, privately, or cooperatively owned without regard to if such facilities were originally installed upon rights-of-way of the state highway system, a county road system, or a municipal street system.

*“A public interest determination might be justified from the standpoint of highway safety, aesthetics, economic development, community health, reduced*

*network outages, scenic, environmental, historical and other such concerns as specified in Section 2.10 of Utilities Manual.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 2.10)*

The PM works with the utilities’ SMEs to understand whether the project is eligible for PID or not. If it is determined to be eligible, that would provide flexibility in the project schedule that would help expedite the project. However, if eligibility is not determined clearly upfront, then that may have negative effects on the project schedule once the utilities’ SMEs bring it to the attention of the PM.

### **3.4.5. Water/sanitary sewer issues**

#### ***3.4.5.1. Water/sanitary relocation***

Water lines and pipelines can be a source of schedule delays if they are to be relocated or, in some cases, removed due to proximity to the proposed project. The status of the line is important (i.e., a main line versus a local one); relocating or removing these water lines is difficult and needs coordination with several offices in GDOT and also at the district level, including cooperation with the Offices of Utilities, ROW, and Environmental Services. This collaboration includes asking for previous project information to locate the lines and getting the required permits to access and relocate them. Project managers should ensure sufficient consideration of scope, schedule, and budget when there is a need for relocation of water/sanitary sewer facilities.

The sanitary sewer is a system of underground pipes that carries sewage to a wastewater treatment plant where it is filtered, treated, and discharged. The typical risk related to

sanitary sewer is the need for relocating the whole sewer system or the need for relocating or sometimes removing the underground pipelines in order to prepare the field. Most of these lines are gravity lines and some are force mains. Lift stations would be involved with force mains.

#### ***3.4.5.2. Vaults/manholes***

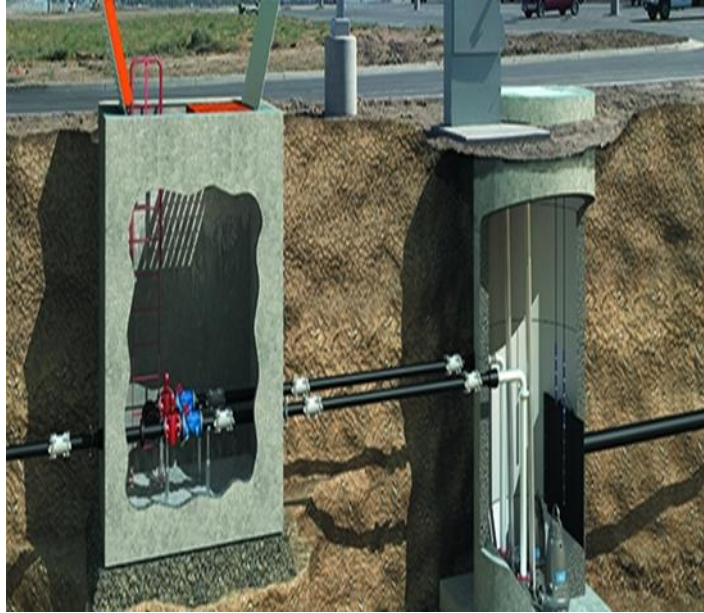
Vaults and manholes are openings in the underground system that are entered by workers or others for making installations, inspections, repairs, connections, tests, etc. PMs should be aware of manholes because they will need to be relocated outside the limits of the new pavement whenever practical. As relocating or removing the manholes from the project area negatively impacts the project schedule, the presence of manholes in the project area should be clearly identified in the preparation of the field for a new project. Thus, scope, schedule, and budget considerations should be given to this factor.

#### ***3.4.5.3. Pumping/lift stations***

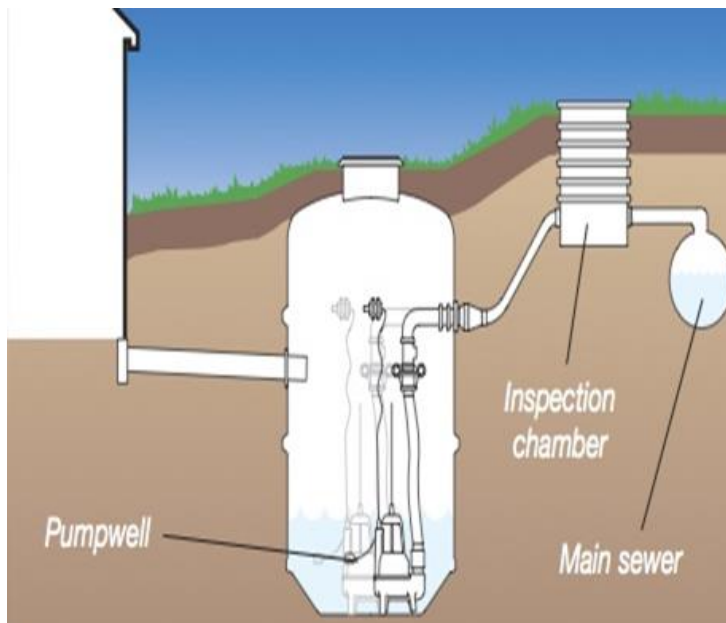
Pumping/lift stations are facilities to pump fluids from one place to another. They are used for a variety of infrastructure systems such as the supply of water to canals, the drainage of low-lying land, and the removal of sewage to processing sites. Sewer pumping stations, also known as sewer lift stations, are designed to receive, temporarily store, and move wastewater (raw sewage) when it cannot be moved by gravity lines. Figures 4 and 5 show a type of pumping station and a sewage lift station. There might be situations in which pumping/lift stations need to be relocated; in these cases, it is important to recognize the stations' current locations and consider the potential future



locations. If relocation of a pumping/lift station is needed in a project, the PM should consider the effects on the project scope, schedule, and budget.



**Figure 4 Pumping Station**



**Figure 5 Sewage Lift Station**

#### ***3.4.5.4. Easement/private easement for water/sanitary sewer***

If the existing ROW is not adequate to perform the relocation of water/sanitary sewer, the need for ROW acquisition will arise, which might cause delay in the project or might lead to additional costs for the acquisition of new right-of-way or easement. It is the responsibility of GDOT to determine whether further right-of-way is required for any type of construction.

*“The District Utilities Engineer will coordinate with each Utility to request any special right-of-way requirements necessary for their facilities.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.a, p. 4-22)*

The DUE coordinates with the utility owner to approve such necessity and then writes a request to acquire such additional easement for water/sanitary sewer.

*“If the Utility insists on acquiring its own right-of-way or easement, the Utility shall notify the District Utilities Engineer in writing of such and shall include this acquisition in the Work Plan referenced in Section 4.1 of Utilities Manual.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.b, p. 4-22)*

Private utility easement includes any privately-owned line, facility, or system for producing, distributing, or transmitting communications, cable, power, electricity, light, heat, gas, oil, water, waste, and storm water not connected with highway drainage, and other similar services. Typically, private lines serve only the owner (e.g., farmer’s waterline or an industrial plant’s waste line, etc.) and not the public. All utilities, whether

privately or publicly owned, will be required to comply with the policies and standards of the *Utility Accommodation Policy and Standards* (GDOT 2016c) when occupying or crossing any part of the right-of-way of the state highway system.

Private lines may cross the right-of-way by conforming to all other applicable requirements contained in the *Utility Accommodation Policy and Standards*. Longitudinal installations of private lines are not permitted. Exceptions may be granted by the state utilities engineer where a public interest can be demonstrated.

Scope, schedule, and budget considerations must be given to this factor. For instance, any change in the ROW plans after it is approved may lead to the need of additional right-of-way or easement, which should be avoided as much as possible as it is often costly and time consuming and may jeopardize good working relationships with property owners through multiple requests on the same project. Note that if condemnation is required, a minimum of 200 additional days is expected.

#### ***3.4.5.5. Reimbursement for water/sanitary sewer***

Reimbursement qualification is an important risk factor for every water/sanitary sewer project. Usually, this factor will be brought up prior to the project proceeding beyond the planning/concept phase of the project development. There are 10 cases (listed in Chapter 4 of the *Utility Accommodation Policy and Standards*, GDOT 2016c) that qualify the reimbursement of utility facilities located in the project area. In most cases of reimbursement, the utility owner has priority in occupancy right. Below are the 10 cases that qualify the utility owner for reimbursement:

1. When the utility has right of occupancy in its existing location by reason of holding a fee, an easement, or other property interest.
2. When any utility facilities are owned by a municipality, county, or authority, without regard to whether such facilities were originally installed upon the public right-of-way, where such relocation or adjustment is necessary to clear proposed work on the state highway system.
3. When any utility facilities owned by a municipality, county, or authority, are installed within the right-of-way of a street or road under the jurisdiction of the same municipality or county prior to the time such street or road becomes a part of the state highway system and which are subsequently required to be relocated or adjusted for construction on the state highway system or will become part of the permanent state highway system upon completion of the construction project.
4. When it is determined to be in the public interest to install, adjust, or occupy utility facilities so that the utility directly serves a transportation purpose and there will be costs to the utility that will be incurred solely for this purpose.
5. When a utility relocates its facility to improve the safety of the roadside under a cost-sharing agreement implemented specifically to address crash statistics.
6. When the advance installation of new utility facilities, crossing or otherwise occupying the proposed right-of-way of a future planned highway project, is either underway or scheduled to be underway.
7. When utility facilities, in their existing locations, are found outside the public right-of-way and are in physical conflict with a given project in such a way as to

- require their relocation, adjustment, or replacement to accommodate a Department construction project.
8. When it is determined to be in the public interest for the Department to pay the cost of removing, relocating, or adjusting any utility facility owned by a public utility, without regard to whether such facilities were originally installed upon the right-of-way of the state highway system, a county road system, or a municipal street system.
  9. When a utility relocates its facilities based upon final plans provided by the Department and is required to relocate or adjust its facilities a subsequent time due to a design change that is determined to be no fault of the utility (Note: Final plans are the plans issued to the utility by the Department at the time of the Notice to Proceed or Notice of Authorization).
  10. When the Department determines that it is in the public interest to relocate existing overhead/aerial facilities to underground.

If GDOT determines that the reimbursement is in the best interest of the public and needs to speed up the project, based on the O.C.G.A. §32-6-170, the Department may pay the cost of relocating, removing, or even making some adjustment to utility facilities owned by the public without considering whether such facilities were basically installed on the right-of-way. In addition, the costs of relocation, removal, and any adjustment of such facilities may be included in the contract between the Department and the contractor who is doing the work for that associated project. Scope and budget considerations should be given to the reimbursement of water/sanitary utility facilities.

#### **3.4.5.6. Early authorization for water/sanitary sewer**

Before installing and relocating water/sanitary sewer lines that occupy or encroach on the state highways, the utility owner needs to obtain a written authorization from the Department. Early authorization can be awarded in situations in which the relocations of water/sanitary sewer need to be expedited to prevent interference with highway construction; however, utility funding must be available. If the work is done in advance of highway construction, authorization will be given once the agreement is executed by both the utility and the Department. Also, funds need to be allocated and the date established for highway contract letting. In dealing with authorization for installing and relocating any utility facilities, PMs should take into account the impact on the scope, schedule, and budget of the project.

*“Additionally, right-of-way/environmental clearances are required to be granted for the areas where the reimbursable utility work is proposed. Such clearances must be obtained from the Department’s State Environmental Engineer and State Right-of-Way Administrator. Where the utility work is contingent on work by the highway Contractor, authorization will be withheld until the highway contract is awarded. When necessary to expedite utility relocations and avoid interference with highway construction, early authorization or conditional authorization may be given provided the project’s utility funding is established. Unconditional authorization must be received by the Utility prior to billing for reimbursement.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.3.A.1)*

### ***3.4.5.7. PID for water/sanitary sewer***

Public interest determination is an important element in relocating existing water/sanitary sewer and requires sufficient considerations of scope, schedule, and budget. A project is designated a public interest when it is shown to be in the best interest of the public to expedite the project delivery. It is necessary to show that the benefit of the project improvement for the public is worth accepting the additional cost of the utilities relocation. Hence, the Department will cover the costs associated with removal, relocation, or adjustment by bringing these costs into their contract with the contractor for the desired project. For further information, “Public Interest Determination Policy” can be a useful source of information and can be accessed at:

<http://mydocs.dot.ga.gov/info/gdotpubs/Publications/3E-1.pdf> (GDOT 3E-1 “Public Interest Determination Policy,” p. 1). The following briefly describes the concept of PID:

*“The Public Interest Determination Policy and Procedure is the Department’s formal procedure to comply with O.C.G.A. 32-6-170 and 32-6-171. Under these Code Sections, the Department has the authority to pay or participate in the costs of utility relocation work provided it is in the public interest, expedites staging, and the utility relocation work is put into the construction project for the contractor to perform.” (PDP, Revision 2.11, published on 10/20/2016, p. xxv)*

For instance, state law allows the Department to attend to or pay the costs related to the removal, relocation, or adjustment of water/sanitary sewer needed to accommodate the construction or maintenance of a public road by the Department. This applies to any

utility facility that is publicly, privately, or cooperatively owned without regard to if such facilities were originally installed upon rights-of-way of the state highway system, a county road system, or a municipal street system.

PMs work with the utilities' SMEs to understand whether the project is eligible for PID or not. If it is determined to be eligible, that would provide flexibility in the project schedule that would help expedite the project. However, if eligibility is not determined clearly upfront, then that may have negative effects on the project schedule once the utilities' SMEs bring it to the attention of the PM.

#### ***3.4.5.8. Utility aid (To fund Utility Owners in Special Projects)***

As the law under the O.C.G.A. §32-6-170 authorizes, a utility owner can request aid for utility costs that are related to a specific project. Initially, the District Utilities Office needs to submit a request to the state utilities engineer to review for completeness, and then the district utilities engineer can submit that to the State Utilities Office.

Below are two possible cases that might qualify for utility aid:

- Extreme hardship cases where costs are both (1) unusually high in comparison with the utility owner's operating budget, and (2) unforeseen, therefore creating an extreme financial burden
- Major project design or schedule changes late in the plan development process, which substantially increase the funds needed with little time remaining to budget the funds



Project managers should consider the scope, schedule, and budget for utility aid. To do so, PMs need to evaluate the project conditions and work closely with the DUO to identify whether an aid request is anticipated for the project. If PMs do not consider such a possibility, there is a chance that the request will be made late and cannot be accepted within the determined estimate for the project cost, or it may require adding time to the project schedule to secure additional funding.

### **3.4.6. Petroleum pipelines/natural gas issues**

#### ***3.4.6.1. Major gas lines present***

The presence of energy pipelines around the proposed project area might cause a significant challenge if they need to be removed or relocated. Removing or relocating an energy pipeline requires shutting off the energy line for a period of a project, which could be a significant issue for the users and may affect project schedule, scope, and budget.

Figure 6 shows two major energy pipelines.

Regarding bridge and deck replacement construction projects, PMs should recognize certain kinds of energy lines (e.g., gas) that are not permitted for bridge attachment unless there is no other feasible location for them.

*“Gas lines exceeding 300 psi pressure will not be approved for bridge attachment. However, where other locations for a utility line to span an obstruction prove to be extremely difficult and unreasonably costly, consideration may be given for attaching the utility line to a bridge structure by a method acceptable to the Department. Such methods should conform to*

*engineering considerations for preserving the highway and its safe operation, maintenance and appearance.” (GDOT 2016c, Utility Accommodation Policy and Standards, Chapter 5, Section 5.7.A)*

Thus, PMs should understand this restriction, as well as the concern of the utilities team when they mention this limitation. This risk needs to be understood by all parties and should be mitigated through collaborative efforts among several participants in the project development process. Consequently, scope, schedule, and budget considerations should be given to this factor when this risk exists.



**Figure 6 Major Energy Pipelines**

#### ***3.4.6.2. Easement/private easement for petroleum pipelines/natural gas***

If the existing ROW is not adequate to perform the relocation of petroleum pipelines, the need for ROW acquisition will arise, which could cause delay in the project or lead to additional costs for the acquisition of new right-of-way or easement. It is the responsibility of GDOT to determine whether further right-of-way for petroleum pipelines/natural gas is required for any type of construction.

*“The District Utilities Engineer will coordinate with each Utility to request any special right-of-way requirements necessary for their facilities.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.a, p. 4-22)*

The DUE coordinates with the utility owner to approve such necessity and then writes a request to acquire such additional easement for petroleum pipelines/natural gas.

*“If the Utility insists on acquiring its own right-of-way or easement, the Utility shall notify the District Utilities Engineer in writing of such and shall include this acquisition in the Work Plan referenced in Section 4.1 of Utilities Manual.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.1.C.5.b, p. 4-22)*

Private utility easement includes any privately owned line, facility, or system for producing, distributing, or transmitting communications, cable, power, electricity, light, heat, gas, oil, water, waste and storm water not connected with highway drainage, and other similar services. Typically, private lines serve only the owner (e.g., farmer’s waterline or an industrial plant’s waste line, etc.) and not the public. All utilities, whether privately or publicly owned, will be required to comply with the policies and standards of the *Utility Accommodation Policy and Standards* (GDOT 2016c) when occupying or crossing any part of the right-of-way of the state highway system.

Private lines may cross the right-of-way by conforming to all other applicable requirements contained in the *Utility Accommodation Policy and Standards*. Longitudinal installations of private lines are not permitted. Exceptions may be granted by the state utilities engineer where a public interest can be demonstrated.

For instance, any change in ROW plans after their approval may lead to the need for additional right-of-way or easement, which should be avoided as much as possible as it is often costly and time consuming and may jeopardize good working relationships with property owners due to multiple requests on the same project. Note that if condemnation is required, a minimum of 200 additional days is expected. Scope, schedule, and budget considerations must be given to this factor.

#### ***3.4.6.3. Reimbursement for petroleum pipelines/natural gas***

One of the most significant risk factors is the existence of petroleum pipelines/natural gas in the proposed project area. The concern would be whether the owner would receive reimbursement to relocate or adjust the pipelines. There are 10 cases (listed in Chapter 4 of the *Utility Accommodation Policy and Standards*, GDOT 2016c) that qualify the reimbursement of utility facilities located in the project area. In most cases of reimbursement, the utility owner has priority in occupancy right. Below are the 10 cases that qualify the utility owner for reimbursement:

1. When the utility has right of occupancy in its existing location by reason of holding a fee, an easement, or other property interest.
2. When any utility facilities are owned by a municipality, county, or authority, without regard to whether such facilities were originally installed upon the public right-of-way, where such relocation or adjustment is necessary to clear proposed work on the state highway system.
3. When any utility facilities owned by a municipality, county, or authority are installed within the right-of-way of a street or road under the jurisdiction of the

- same municipality or county prior to the time such street or road becomes a part of the state highway system and which are subsequently required to be relocated or adjusted for construction on the state highway system or will become part of the permanent state highway system upon completion of the construction project.
4. When it is determined to be in the public interest to install, adjust, or occupy utility facilities so that the utility directly serves a transportation purpose and there will be costs to the utility that will be incurred solely for this purpose.
  5. When a utility relocates its facility to improve the safety of the roadside under a cost-sharing agreement implemented specifically to address crash statistics.
  6. When the advance installation of new utility facilities, crossing or otherwise occupying the proposed right-of-way of a future planned highway project, is either underway or scheduled to be underway.
  7. When utility facilities, in their existing locations, are found outside the public right-of-way and are in physical conflict with a given project in such a way as to require their relocation, adjustment, or replacement to accommodate a Department construction project.
  8. When it is determined to be in the public interest for the Department to pay the cost of removing, relocating, or making the adjustments to any utility facility owned by a public utility, without regard to whether such facilities were originally installed upon the right-of-way of the state highway system, a county road system, or a municipal street system.
  9. When a utility relocates its facilities based upon final plans provided by the Department and is required to relocate or adjust its facilities a subsequent time

due to a design change that is determined to be no fault of the utility (Note: Final plans are the plans issued to the utility by the Department at the time of the Notice to Proceed or Notice of Authorization).

10. When the Department determines that it is in the public interest to relocate existing overhead/aerial facilities to underground.

If GDOT determines that the reimbursement is in the best interest of the public and needs to speed up the project, based on the O.C.G.A. §32-6-170, the Department may pay the cost of relocating, removing, or even making some adjustment to publicly owned utility facilities without considering whether such facilities were basically installed on the right-of-way. In addition, the costs of relocation, removal, and any adjustment of such facilities may be included in the contract between the Department and the contractor who is doing the work for that associated project. Scope and budget considerations should be given to the reimbursement of utility facilities.

#### ***3.4.6.4. Early authorization for petroleum pipelines/natural gas***

Before installing and relocating any petroleum pipelines/natural gas that occupy or encroach on the state highways, the utility owner needs to obtain a written authorization from the Department. Early authorization for petroleum pipelines/natural gas can be awarded in situations where utility relocations need to be expedited in order to prevent interference with highway construction; however, utility funding must be available. If the work is done in advance of highway construction, authorization will be given once the agreement is executed by both the utility and the Department. Also, funds need to be allocated and the date established for highway contract letting. In dealing with

authorization for installing and relocating petroleum pipelines/natural gas, PMs should consider the impact on the scope, schedule, and budget of the project.

*“Additionally, right-of-way/environmental clearances are required to be granted for the areas where the reimbursable utility work is proposed. Such clearances must be obtained from the Department’s State Environmental Engineer and State Right-of-Way Administrator. Where the utility work is contingent on work by the highway Contractor, authorization will be withheld until the highway contract is awarded. When necessary to expedite utility relocations and avoid interference with highway construction, early authorization or conditional authorization may be given provided the project’s utility funding is established. Unconditional authorization must be received by the Utility prior to billing for reimbursement.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 4.3.A.1)*

#### **3.4.6.5. PID for petroleum pipelines/natural gas**

Public interest determination is an important element in relocating existing petroleum pipelines/natural gas and requires sufficient considerations of scope, schedule, and budget. A project is determined to be a public interest when it is shown to be in the best interest of the public to expedite the project delivery. It is necessary to show that the benefit of the project improvement for the public is worth accepting the additional cost of the utilities relocation. Hence, the Department will take care of the cost associated with removal, relocation, or adjustment by bringing these costs into their contract with the contractor for the desired project. For further information, “Public Interest Determination

Policy” can be a useful source of information. (GDOT 3E-1 Public Interest Determination Policy, p. 1). The following briefly describes the concept of PID:

*“The Public Interest Determination Policy and Procedure is the Department’s formal procedure to comply with O.C.G.A. 32-6-170 and 32-6-171. Under these Code Sections, the Department has the authority to pay or participate in the costs of utility relocation work provided it is in the public interest, expedites staging, and the utility relocation work is put into the construction project for the contractor to perform.” (PDP, Revision 2.11, published on 10/20/2016, p. xxv)*

For instance, state law allows the Department to attend to or pay the costs related to the removal, relocation, or adjustment of petroleum pipelines/natural gas needed to accommodate the construction or maintenance of a public road by the Department. This applies to any utility facility that is publicly, privately, or cooperatively owned without regard to if such facilities were originally installed upon rights-of-way of the state highway system, a county road system, or a municipal street system.

PMs work with the utilities’ SMEs to understand whether the project is eligible for PID or not. If it is determined to be eligible, that would provide flexibility in the project schedule that would help expedite the project. However, if eligibility is not determined clearly upfront, then that may have negative effects on the project schedule once the utilities’ SMEs bring it to the attention of the PM.



### **3.4.7. Other factors**

#### ***3.4.7.1. High probability for major utility conflicts***

Utility conflicts occur when a utility facility requires relocation or adjustment to avoid damage or disruption, or to comply with the regulations and requirements to accommodate construction, maintenance, operation, or other alteration of projects.

Generally, GDOT will review the construction work program to determine whether the proposed installation is in conflict with another work or project. The permit is only issued when the Department determines that there is no conflict with other works in the area.

*“A permit shall be issued if it is determined that there is no conflict. The Utility shall clearly show on the plans the minimum vertical clearance above the roadway.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 5.6.B.4, p. 5-60)*

If it is determined that there are conflicts with another active project, the utility should agree to install its facilities beyond the limits of the additional right-of-way required for that active project.

*“It would be in the best interest of both parties as well as the public for the utility to locate their facilities in such a manner that will avoid conflicts and eliminate the need for additional costs due to the planned project. A permit will be issued if the utility demonstrates that they can install their facilities in such a manner that will avoid conflicts with the active project.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 5.6.B.4, p. 5-60)*

PMs should pay close attention to the design development as the evolution of the preliminary design may reveal potential conflicts with the existing utilities. PMs should assess the likelihood of conflicts throughout the design development process to avoid scope changes in the project. Thus, scope consideration should be given to this factor.

#### ***3.4.7.2. Coordination for joint-use poles***

Joint use of utility facilities enables expedited project delivery by encouraging coordination among the owners of multiple facilities occupying or attaching to a utility pole(s). The other benefit of encouraging the joint use of facilities is minimizing obstructions in the right-of-way for projects. Scope, schedule, and budget considerations should be given to joint-use poles.

#### ***3.4.7.3. High estimation for utility relocation costs***

A project manager should put forth his/her best efforts to prepare a reasonably accurate and reliable estimate for utility relocation expenses. Unusually high estimation of utility relocation costs creates problems in securing funding for the project that is critical for timely compensation of the utility owners' expenses. For example, an unusually high cost estimate can cause the project to not be qualified for cost reimbursement that consequently leads to a conflict between GDOT and the utility owner. Any conflicts affect the smoothness of the project progress, which is problematic for developing a reliable project schedule. Budget considerations should be given to estimation of utility relocation costs.

*“It is the intent of the Department that Utilities be reimbursed for actual costs incurred for the items, specified in Section 4.2.C of Utilities Manual, in connection with any utility relocation or adjustment. Such costs shall be supported by adequate accounting records in the Utility’s files and shall be subject to audit by the State, and the Federal Highway Administration (FHWA) when federal funds are involved for a period of 3 years from the date the final payment has been received by the utility (23 CFR 645.117i).” (GDOT 2016c, Utility Accommodation Policy and Standards Manual, Section 4.5.A.1, p. 4-48)*

#### **3.4.7.4. High probability of retention of existing facilities**

GDOT’s general policy is that utility facilities must be relocated when they are under pavement on a project, including acceleration/deceleration lanes when required at side streets or commercial driveways. However, in some cases GDOT can make an exception to this general policy. Retaining facilities under the pavement requires a process for granting the exception. The approval depends on several factors, as described below.

*“Exceptions may be granted by the State Utilities Engineer on a case by case basis. Retention requests, such as driveway permits, not in excess of 500 feet may be granted by the District Utilities Engineer when certain retention request criteria are met as identified in Section 5.3. All alternatives must be considered and proven impractical prior to requesting permission to retain facilities under the pavements on projects.” (GDOT 2016c, Utility Accommodation Policy and Standards, Section 2.8.B, p. 2-11)*

With the exception to GDOT's general policy, sufficient scope considerations should be given to this risk factor.

#### ***3.4.7.5. Late data/deliverables***

Schedule considerations should be given to late data/deliverables. Any data and deliverables related to a project are needed in a time frame that is determined by the GDOT PDP. Late data and deliverables impact the smooth progress of the project.

#### ***3.4.7.6. Delay in utility impact analysis***

A utility impact analysis or utility conflict matrix is for identifying potential utility conflicts through the preliminary design phase. This analysis is performed by a SUE consultant from GDOT's SUE program who recommends solutions or mitigation plans on the project. There is a recommended time frame for the UIA report to be completed before the final design begins to address all remaining conflicts from the PFPR comments. Below are provided some of the time limits for the UIA. Schedule and budget considerations should be given to conducting a UIA because any delay in conducting this analysis can lead to added costs and/or delay the whole project.

If the utility conflicts occur in the late stage of design development, there is a significant negative impact on the project schedule.

*“On most projects where SUE has been employed, Utility Impact Analysis (Utility Conflict Matrix) will be implemented as soon as preliminary drainage (plan view), and any other applicable proposed design information is available.*

*This analysis is generated by a SUE Consultant through the GDOT's SUE program to identify all potential utility conflicts and recommend resolutions on the project. This analysis is provided to the Design Phase leader and the District Utilities Office after utility owners have provided their preliminary relocation plans before the PFPR.” (PDP, Revision 2.11, published on 10/20/2016, p. 6-17, 2<sup>nd</sup> paragraph)*

#### **3.4.7.7. Error in utility plan**

Any type of error in the utility plan could be costly and could delay the entire project schedule. The deadline for the final utility plan submission is a major milestone in the project schedule. Therefore, scope, schedule, and budget considerations should be given to this factor because a utility plan contains critical information about the locations of existing utility facilities in the project site.

*“It is the District Utilities Engineer’s responsibility to track a project’s schedule and notify the affected utilities if the deadline dates have changed.”*  
*(GDOT 2016c, Utility Accommodation Policy and Standards, p. 4-17)*

PMs will have the final utility plans and utility adjustment schedules no later than three months before the Final Field Plan Review (FFPR). Several offices depend on the timely delivery of the final utility plans as described below:

*“Upon receipt of the utility relocation plans, the Design Phase Leader will send a copy of the utility relocation plans to the Office of Environmental Services if they cause any additional ROW, easements, or land disturbance outside of the*

*construction limits already cleared environmentally or impact additional wetlands or streams. These utility relocation plans will also be provided to the Office of Bridge Design for their review and resolving any remaining conflicts. A supplemental second submission of utility plans may be required if there is a change in design that affects the utilities, as determined by the District Utilities Office. The request for utility relocation plans and utility adjustment schedules, second submission for utility plans, must go to the respective utility owners for the utilities' use in verifying the location of their existing facilities and incorporation of the final utility relocation information.” (PDP, Revision 2.11, published on 10/20/2016, Section 7.4.1, p. 7-6)*

#### **3.4.7.8. Surface utility engineering**

A surface utility engineering (SUE) investigation is an engineering practice for managing utility- related risks in projects through utility mapping, utility coordination, and utility condition assessment. Figure 7 shows two examples of geophysical location-finding methods (i.e., SUE). SUE may need to be performed in road improvement, widening projects, and new construction. To determine if a SUE investigation is needed or not, PMs need to consult with the District Utilities Office, as the DUO has the latest maps and documents for the project site on record. The PM, the DUE, and the state subsurface utility engineer (SSUE) need to work together to prepare and submit a request for SUE to the Office of Utilities. The “SUE Utility Impact Rating & Request Form” (see Appendix A) is used to determine a project’s suitability for SUE and request SUE services. Also, a template letter for requesting project SUE information to utilities for review and

preliminary relocation submission is provided in Appendix B. A SUE report is prepared for documenting and recording the exact location of underground utilities of a project. Test pits are not needed for locating every utility and should only be used to locate utilities that have a potential conflict.

PMs should give sufficient scope, schedule, and budget considerations to utilizing SUE investigation for managing utility-related risks in a project.



**Figure 7 Geophysical Location Methods (Quality Level B)  
(Provided by GDOT Utilities Office)**

#### ***3.4.7.9. Plan revision/notify owner***

Plans can be revised after they have been signed by the chief engineer or her/his designee. This revision will be posted to the plans as the plan revisions. PMs will send the plan revisions to contractors with copies provided to the applicable offices (“Use on Construction Revision – Example Letter” can be accessed in Appendix H of the *PDP* manual). District Utilities Offices will forward the copies of revisions to all the affected

utility companies and ensure utility work plans will be revised accordingly. The plan revisions and cover letter containing information on how to access the plan revisions electronically should be sent via the Standard Distribution List. Late plan revisions are often costly and delay the project schedule.



### **3.5. Office of Bridge Design**

Office of Bridge Design risk factors are categorized under four different areas, including environmental issues, constructability issues, structural issues, and hydraulic issues. The following subsections discuss the risk factors under each area.

#### **3.5.1. Environmental issues**

##### ***3.5.1.1. MS4 compliance***

Municipal Separate Storm Sewer System (MS4) is an Environmental Protection Division permit, GAR041000, that regulates the discharges of storm water runoff from infrastructure owned and operated by GDOT within Georgia's MS4 areas as shown on the MS4 Compliance map (GDOT's MS4 National Pollutant Discharge Elimination System permit number GAR041000) (For more information see Chapter 10 of GDOT's *Manual on Drainage Design for Highways*). (GDOT 2017, *Plan Development Process*, pp. 24 and 65)

MS4 compliance is needed when the Office of Bridge Design must either manipulate the profile of the bridge to ensure that it can capture all the water from the bridge or put a deck drain system on the bridge. From the bridge point of view, MS4 compliance means that the Office of Bridge Design cannot duck the water down directly from the bridge. Therefore, either it must run off the bridge into the roadway's drainage structures or the Office of Bridge Design must develop a design solution for collecting the runoff water to take it to the roadway drainage structures. Developing the design solution requires more detailing time.

If a deck drain system is required, the design is going to be more complicated and time-consuming. The PM should be aware that the Office of Bridge Design does not know the level of MS4 compliance until it gets the plans.

If a project-level exclusion (PLE) applies, the entire project is exempt from complying with MS4-related post-construction storm water requirements (*Drainage Design for Highways Manual*, Revision 3.2, 2018, p. 268). Early determination of whether a PLE applies to the project is important. Initial steps in post-construction storm water management analysis and design play a significant role in the concept phase by providing an initial assessment of impacts to the project footprint, project costs, and impacts to environmental resources. (GDOT 2017, *Plan Development Process*, p. 65)

#### ***3.5.1.2. Threatened and endangered species***

Coordination with federal agencies, such as the FHWA and the U.S. National Marine Fisheries Service (USNMFS), is time consuming. The Office of Bridge Design coordinates with these agencies through the Office of Environmental Services if there is any chance that a proposed project is subject to an environmental risk, for instance, when a project site is in an area where there are federally listed animal or plant species that are counted as T&E species. The Bureau of Land Management's (BLM) Threatened and Endangered Species Program works to conserve and recover federally listed animal and plant species and their habitat on public lands. The program also shares cooperative responsibility with other BLM programs and partners for conservation of non-listed rare species with a goal of avoiding the need to list them in the future.

If the project is in one of the areas with these species, a delay to the project might occur since coordination with BLM and related agencies (especially when it comes to bridges over waters) might be required. For bridges near waterways or coastal areas, coordination with the U.S. National Marine Fisheries Service is required. USNMFS is a federal agency, responsible for the stewardship of national marine resources. The USNMFS has jurisdiction over essential fish habitat and T&E species, including anadromous fish. It is critical that EFH be protected from any impact because it deals with managing marine species' lifecycle, including their spawning, breeding, feeding, or growth into maturity. Information on EFH can be retrieved from: [www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)

T&E species include those that are threatened, or endangered and/or species of management concern formally listed by county by the USFWS relative to the Endangered Species Act. Approximately 2270 species are listed as endangered or threatened under the ESA. This list can be retrieved from: <http://www.nmfs.noaa.gov/pr/laws/esa/>

Anadromous fish are born in fresh water, migrate to the ocean to grow into adults, and then return to fresh water to spawn. NMFS has jurisdiction over most marine and anadromous fish. The current list of anadromous fish under NMFS' jurisdiction can be retrieved from: <http://www.nmfs.noaa.gov/pr/species/esa/listed.htm#fish>

EFH is designated for all federally managed marine fish. In Georgia, EFH can be found in the following counties: Camden, Glynn, McIntosh, Liberty, Bryan, and Chatham. PMs should bear in mind that bridge projects in one of these counties have a need for further EFH assessment.

If EFH or suitable habitat for federally protected marine species is identified within the survey area, the Ecology Resources Survey Report will be required. The location of protected species (if located), associated habitats, and an approved methodology will be transmitted to the PM for delineation on the survey area layout.

GDOT ecologists will transmit the ERSR to: (1) USACE to request Jurisdictional Determinations for all streams, wetlands, and open waters; (2) EPD to request buffered state waters determinations for all streams, wetlands, and open waters; and (3) FHWA to request further information. If habitat for protected species is identified, the report will be transmitted to (4) USFWS, (5) USNMFS (for marine species), and (6) Department of Natural Resources.

### ***3.5.1.3. Bents in stream***

A bent is a substructure unit made up of one or more columns or column-like members connected at their top-most ends by a cap, holding them in their correct positions (*Bridge Structure Maintenance and Rehabilitation Repair Manual*, version 06.01.12, 2012, p. 8).

When the water stream is substantially wide, the Office of Bridge Design needs to consider designing the bridge with bents (e.g., piles, columns, and other sub-structure) in the waterway. The Office of Bridge Design prefers to expand the span of the bridge to avoid building anything in the water since there is a need to apply for environmental permits for placing bents in the waterway.

Even in bridge replacement projects, the Office of Bridge Design may anticipate bents in the stream, especially when the size of the stream is significantly large. Therefore,

coordination with the Office of Environmental Services is key for submitting applications for permits to build any structures in the stream in a timely manner.

If there are T&E species in the area, coordination should be made with the Office of Environmental Services to check the impact of the structure that is being built in the waterways and the disturbance it causes in the area.

The Office of Bridge Design should collaborate with the Office of Environmental Services when there are changes in the design because of constructability review, e.g., adding additional substructure in the stream that requires readjusting the permit. The Office of Bridge Design should be prepared that the Office of Environmental Services will also contact the bridge design team if there are any needs for readjusting the permit due to significant changes in the initial design.

The risk of change in the design and/or issues with the original design will remain with the Department. Any problems with the design and any changes in the plans will introduce additional time and cost for the project to accommodate the contractor's change orders.

#### ***3.5.1.4. Measures to avoid resources***

GDOT always strives to avoid impacting environmental resources unless there is no other option to build the project. Concept decisions are sensitive to environmental resources. Indeed, environmental resources should be avoided if possible, but only where avoidance is not prudent, the impacts and effects are to be minimized and mitigated.

For example, when bents are identified in the drawings to be built in the stream, special attention needs to be given to the season that the construction can be carried out since there might be restrictions on when to build the bents (i.e., certain species have specific breeding/spawning seasons that should be considered in scheduling construction activities). This time constraint will affect the design and introduce limitation in finalizing the design to make it ready for on-time start of the construction process.

### **3.5.2. Constructability issues**

#### ***3.5.2.1. Is access for bridge removal/construction anticipated to present an issue?***

##### **3.5.2.1.1. Enough ROW**

Bridge design and construction has unique ROW needs that differentiate it from roadway design and construction. The removal or the construction of a bridge requires more working area for mobilizing the site and piling up materials. It also needs more pathways for the crew and machinery to safely access the jobsite. Sufficient ROW should be obtained for these supporting areas before carrying out the project. Otherwise, the project schedule may be at risk of suspension due to interruption. A disrupted project process leads to potential cost overrun and extension of duration.

##### **3.2.2.1.2. Nearby utilities/natural or man-made obstacles to prevent access**

It is the owner's obligation to provide the contractor with necessary access to the removal/construction site. Existing utilities structures and natural or man-made obstacles may prevent safe and adequate access to the bridge site for the contractor. Any delay in

relocation of the utilities structures and conflict with the utilities during the construction phase can be a great risk for the project schedule. GDOT needs to accept the risk of delay and cost overrun if the contractor faces any difficulty in accessing the job site that impacts its production rate.

#### **3.5.2.1.3. How will traffic be routed during construction?**

In the process of bridge removal/construction, it may become unavoidable to reroute the traffic because of road closure. Detouring the traveling public is an inconvenient issue for residents and businesses and introduces a significant public outreach risk to the project. PMs should consider applying appropriate methods to achieve detour goals efficiently and economically.

### **3.5.3. Structural or foundation issues**

#### ***3.5.3.1. Bridge location***

The location of bridge construction or replacement can present a significant risk for the project, especially during the construction phase of the project. The more buildings that are adjacent to the bridge project site, the more difficult it becomes to manage traffic during the construction. In condensed areas, more collaboration is required with many stakeholders to manage the traffic and alternative routing during the construction phase.

When a bridge is in an urban area, the increased number of businesses and residences surrounding the project site will present more obstacles around the bridge location that can introduce challenges during the construction phase. Coordination with multiple

stakeholders (businesses and residences) makes staging, maintaining, and controlling the traffic more difficult. The number of obstacles might be different depending on the density of the buildings and structures. The situation is relatively easier in rural areas since there is less need for coordination with different businesses.

Coordination with businesses and residences takes significant time. Managing the construction of a detour bridge or realizing other ways that can eliminate the risks associated with construction is time-consuming and might delay the schedule of the project.

### ***3.5.3.2. RR coordination***

Bridge projects over railroads or those required for a railroad path are considered high-risk projects. The railroad beneath the bridge requires a complete survey for 500 feet left and right of the bridge. The PM should note that proper coordination with the railroad company is critical in handling bridge projects near railroad areas. It is important to send design drawings to the railroad company to receive its comments in a timely manner.

Revising the plans multiple times and resending them to the railroad company for review are time-consuming steps that should be considered in the project schedule.

Typically, railroad companies do not have a core engineering group on board for performing the review of the proposed bridge design plans. Every 2 to 3 years, a railroad company enters into a master contract with an engineering consulting firm that assists the company in technical reviews of the proposed bridge design plans. It is possible that a different consulting firm is selected each time the railroad company advertises for the



master contract. This frequent change in consulting firms can be a problem source for the bridge design project as it may slow down the project. It may take some time for the Office of Bridge Design to get acquainted with the new consulting firm and the nature of the technical comments raised by that firm.

There are some bridges that are owned by GDOT but are leased to railroad companies. The Office of Bridge Design must coordinate with the GDOT Office of Intermodal as the operator of those bridges. Drawings and plans for these bridges should be reviewed by the Office of Intermodal and the railroad company to which the bridge is leased. Coordination steps are fairly similar to regular bridge design review. Additional considerations should be made in scheduling bridge design and review for these projects.

If bridge project sites are near or over MARTA (Metropolitan Atlanta Rapid Transit Authority) tracks, the Office of Bridge Design has to coordinate with MARTA. Design plan review resembles the railroad coordination in these cases.

*“The railroad coordination and the processing of railroad agreements can take several years. It is imperative that the crossing of any railroad or railroad ROW, including parallel encroachments, be identified early and coordination begun. The Office of Utilities must be notified immediately upon the recognition of any such railroad involvement.” (GDOT 2017, Plan Development Process, Section 6.4.4)*

### ***3.5.3.3. Projects of Division Interest (PoDI) coordination***

Projects of Division Interest are those projects that have an elevated risk, contain elements of higher risk, or present a meaningful opportunity for FHWA involvement to enhance the likelihood of achieving project objectives. Each Division Office should identify those projects, within its limited resources, where the FHWA should assert a positive leadership influence to help assure a high level of public confidence that projects and programs are administered with integrity, follow applicable requirements, and yield maximum value for the public. (PoDI and PoCI Guidance, May 4, 2015)

There is a high probability that some of the most complex bridge projects will be selected by the FHWA as PoDI projects, as these bridge projects are typically complicated and expensive to design and build. Several bridge projects are selected every year as the agency's high-profile projects for the FHWA's detailed review and control. GDOT must send the drawings to the FHWA bridge division. The review process is conducted in both the preliminary and final plan phases. The FHWA's comments should be received and addressed in the revised design plans and drawings. The process of coordination with the FHWA can be time-consuming for PoDI projects, which can introduce some challenges for the project schedule.

### ***3.5.3.4. Difficult geometry present? (e.g., horizontal curve, vertical clearance, long spans, variable width, and significant skew)***

When the geometry of the project site is difficult, the design team needs additional time to prepare the bridge plans and drawings. With simple geometries, the design team can design one beam and then use it as a template for expanding the design/calculations to the

parallel beams. Often, prestressed concrete (PSC) is used for beams in the bridge construction. Prestressed beams are usually straight. However, the presence of a sharp horizontal curve in the route might limit the distance between bents in the bridge. One solution is to use parallel curves and connect them together, but the difficulty with this design is that the length of the beams that connect the curves and the spacing between them are not the same. This adds a level of complexity as far as detailing the bridge design plans.

Vertical clearance is needed in bridge reconstruction projects when reconstructing the bridge requires deeper beams or the bridge has a substandard clearance. Thus, the existing bridge should be elevated to keep the minimum vertical clearance. The main issue related to vertical clearance is the required ROW coordination. Keeping the vertical clearance can be problematic in an intersection, especially in heavy urban areas. The bridge designer should consider all the constraints and apply them in the required elevations. Coordination between the Offices of Bridge Design and ROW is needed to address the vertical clearance problem.

The bridge designer may want to push the limits on the depth of beams to provide shallower sections or use steel beams instead of PSC beams. The main design issue here is that PSC beams cannot be used with long spans. Therefore, steel beams should be used in these situations. Typically, the Office of Bridge Design utilizes design consulting firms for designing bridge projects. Most consulting firms have great expertise in design of PSC beams but may not be as experienced in designing steel beams. Therefore, design of steel beams takes a longer time, which should be considered in the project schedule.

The bridge project with significant skew presents complex bridge design and requires more time for the design. The sharper the skew, the more issues the designer will have with the settings in the beams.

#### ***3.5.3.5. Deep-water foundations***

When the bridge site is in deep water, significantly high columns are required to build the project. Detailed analysis and plan development take substantial time that can introduce challenges to the project schedule. There are three possible foundation types for concrete columns used in deep-water bridge construction: spread footing, pile footing, and drilled shaft. The Office of Bridge Design uses the results of the Bridge Foundation Investigations to select the most preferred foundation type. Factors such as environmental issues and cost efficiency are used as the basis of decision-making for selecting the preferred alternative. In the past, the Office of Bridge Design determined the preferred option and developed column design for only the preferred alternative. However, past experiences showed that proposing only one option may cause unfair bidding advantage for some contractors. There were several instances when contractors changed the foundation type after they won the bid. These contractors switched to the bridge design method that they are expert in after the project was awarded to them. This approach saved these contractors time and money and was one of the main issues damaging the fairness of the bidding process.

Most recently, the Office of Bridge Design has changed its approach and uses an alternate design (besides the preferred design) for bridge foundations in deep-water areas. The Office of Bridge Design develops foundation design details for both options and the

contractors must bid on either one of them. The difference is that the selected contractor has the right to only use its selected alternative and cannot switch its methods. This change has been reflected in the *Bridge Design Manual*.

#### **3.5.3.6. Widening and/or rehabilitation**

GDOT's replacement bridge projects and widening/rehabilitation projects are the subject in this risk factor. Adequate time for surveying should be considered in the project schedule for widening and rehabilitation projects, in order to truly assess the existing structural conditions of the bridge. Depending on the existing conditions of the bridge, sometimes it is more cost-effective to replace the bridge and not opt for widening. The decision is made during the concept-development phase, based on the recommendations by the Bridge Maintenance section of the Office of Bridge Design. If the bridge is sound, it might be more cost-efficient to keep the existing bridge. Designing a widening project can take significant time, as many structural tests should be performed on all the elements of the existing bridge to verify the existing structure can handle the extra load of the new project. Additional time for testing, analysis, and the verification process should be considered in the project schedule.

Bridge rehabilitation projects are considered a "minor project" in the GDOT PDP since, typically, these projects are considered a "categorical exclusion" as far as environmental analysis and do not require significant ROW acquisition. Thus, rehabilitation projects are generally low-risk projects. However, the process to decide whether a bridge project can be rehabilitated requires significant testing and validation to ensure that the existing structural conditions of the bridge are at an adequate level. Resources and time required

for performing tests and analyzing the results should be considered in the development of the bridge rehabilitation project. The Bridge Maintenance section of the Office of Bridge Design is responsible to conduct a condition assessment to determine the need for bridge rehabilitation and ensure that the rehabilitation is a preferred choice over replacement for the existing bridge project.

#### ***3.5.3.7. Utility attachments***

Utilities structures can be nearby or attached to the existing or the new bridge. Nearby utilities can introduce bridge constructability challenges, especially in urban areas. If the utilities structures are attached to an existing bridge it is highly likely that the utilities structures will be attached to the new bridge, as well. Attaching utilities to the bridge requires an extra level of detail in the design process since the designer must accommodate the utilities in different sections of the bridge. The designer should consider where to put the holes, where the utilities should connect to the deck, and other similar details. Developing design details for the attached utilities structure presents challenges to the design process and further complicates the design.

The main risk for designing bridges with numerous attached utilities is related to cooperation with the utility companies early in the design phase. Typically, utility companies prefer to come on board much later during the bridge design project to review the design details and request the utility additions. The major problem with the utility companies coming on board late is the possibility of design rework as the Office of Bridge Design may face a situation in which the developed design does not accommodate the requirements of the utility companies.

*“During the preliminary design phase, the designer should inform the District Utilities Engineer that the bridge is to be raised and that a field site inspection is needed to identify and locate the utilities in place. The findings should be reported to the Bridge Office. The District Utilities Engineer shall alert the impacted utility companies and remind them of their responsibilities for coordinating satisfactory utility realignment.” (Bridge and Structures Design Manual, p. 68)*

#### **3.5.3.8. Retaining Walls (Under the bridge or in the bridge construction process?)**

There might be a need to utilize retaining walls, such as mechanically stabilized earth (MSE), soil nail, and tieback walls in the design of the bridge. The Office of Bridge Design provides a description for the wall envelope that explains where the top and the bottom of the walls need to be and provides a typical section of the wall and some additional general notes. The described envelope is used by the contractor who would hire a wall construction company to design the wall. Some projects may need special design for cast-in-place walls. This is when the Office of Bridge Design requires more time for developing design drawings, which can be a relatively long process that should be considered in the project schedule.

### **3.5.4. Hydraulic issues**

#### **3.5.4.1. Hydraulic study**

If a vehicular bridge is over water, some form of hydraulic study is necessary.

*“Hydraulic analysis is a critical component for design of bridges that cross water courses. Hydraulic analysis is not required for overpass bridges or similar structures as they do not convey water.” (Hydraulic Guidelines for Bridge Design Projects, p. 1)*

Hydraulic studies are needed to: (1) determine the length of bridge required to avoid flooding by keeping backwater to acceptable limits, (2) avoid increasing velocities significantly to reduce scour, and (3) determine flood-stage elevations to provide freeboard.

#### **3.5.4.2. Navigable water/Coast Guard coordination**

*“Navigable waters of the US are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity.” (Regulatory Program of the US Army Corps of Engineers, p. 2)*



Identifying and knowing the navigable waters might be a challenge. Gaining the knowledge and becoming familiar with the regulations and how the coordination works, might be time-consuming for a PM. There are well-defined areas where a permit might be necessary. Once the Office of Bridge Design finishes the hydraulic studies, a preliminary plan will be developed to start coordinating with the U.S. Coast Guard (USCG). The FHWA Bridge Permit Questionnaire, including information about the bridge clearance and the project site information, will be sent to the FHWA. The FHWA determines whether the site is exempt from a USCG permit. The FHWA will follow up with the USCG for further coordination. If the area is exempt, then there is no further coordination required from GDOT. However, if no exemption is awarded, then the Office of Bridge Design sends the original information items to the USCG to determine whether the USCG may be able to find a good reason to provide an exemption for the project. If the exemption is not awarded, the Office of Bridge Design should apply for the USCG permit.

There are regulatory requirements that PMs should be aware of, for example, from the Water Permitting Manual:

*“Any individual, partnership, corporation, or local, state, or federal legislative body, agency, or authority planning to construct or modify a bridge or causeway across a navigable waterway of the United States must apply for a **Coast Guard bridge permit**. This includes all temporary bridges used for construction access or traffic detour.” (U.S. Coast Guard, Bridge Permit Application Guide, p. 3)*

If the project is in the coastal waters, the PM needs to be aware of which areas are included in coastal areas during the pre-construction phase to ensure that the required permits and designs are met. The challenge is the correct identification of the coastal areas, which may delay the pre-construction process.

*“Navigable waters for Coast Guard bridge permitting purposes are defined by 33 CFR § 2.36, unless specifically declared otherwise by Congress, to include:*

*a. Territorial seas of the United States;*

*b. Internal waters of the United States subject to tidal influence; and*

*c. Internal waters of the United States not subject to tidal influence that:*

*1) Are or have been used, or are or have been susceptible for use, by themselves or in connection with other waters, as highways for substantial interstate or foreign commerce, notwithstanding natural or man-made obstructions that require portage, or*

*2) A governmental or non-governmental body, having expertise in waterway improvement, determines to be capable of improvement at a reasonable cost (a favorable balance between cost and need) to provide, by themselves or in connection with other waters, as highways for substantial interstate or foreign commerce.” (U.S. Coast Guard, Bridge Permit Application Guide, p. 4)*

Coordination with the USCG is not a significant risk to the project schedule.

Coordination needs to be followed throughout the process and the only challenge is when the project schedule does not allocate adequate time to the USCG for reviewing the proposed design before accepting the bridge design. If the design shows the obstruction of the navigable waters, it needs to be revised. Also, the USCG needs to be involved in preparing the related environmental documents that can affect the environmental decisions. The USCG permit risk is typically very low for replacing existing bridges since there is already a bridge over the navigable water in the project area and, therefore, it is safe to assume that the permit will be issued by the USCG for the bridge replacement project.

The information in Table 2 is to be used as a guide in determining when a U.S. Coast Guard permit should be obtained.

**Table 2 U.S. Coast Guard Permit Guidelines**

<b><u>TIDAL WATER</u></b>	<b><u>REPLACE</u></b>	<b><u>REHABILITATE</u></b>
Water depth at site <5 ft (1.5 m) at low tide	<b>X</b>	<b>X</b>
Vertical clearance at <15 ft (4.5 m) at high tide	<b>X</b>	<b>X</b>
Water depth >5 ft (1.5 m) at low tide and vertical clearance >15 ft. (4.5 m) at high tide	<b>E</b>	<b>E</b>
Susceptible to Interstate or foreign commerce navigation by Federal Authorization only. Interstate or foreign commerce navigation in fact.	<b>P</b>	<b>E</b>
Interstate or foreign commerce navigation in fact	<b>P</b>	<b>P</b>
<b><u>NON-TIDAL WATER</u></b>	<b><u>REPLACE</u></b>	<b><u>REHABILITATE</u></b>
Susceptible to Interstate or foreign commerce navigation by Federal Authorization only. Interstate or foreign commerce navigation in fact.	<b>E</b>	<b>X</b>
Interstate or foreign commerce navigation in fact	<b>P</b>	<b>P</b>

Legend:

X = Site exempt from USCG permit.

P = Site requires application for USCG permit.

E = Site requires evaluation to determine status.

(Table extracted from PDP, p. 197)

In summary, certain bridge projects are exempt from acquiring the U.S. Coast Guard permit. The following types of bridges constructed, reconstructed, rehabilitated, or replaced in tidal waters are exempt from the permit application per Section 144(h) of Title 23 U.S. Code (USC) as amended by the Highway Act of 1987:

- Not used and are not susceptible to use, in their natural condition or by reasonable improvement, to transport interstate or foreign commerce.
- Used only by recreational boating, fishing, and other small vessels less than 21 feet (6.4 m) in length.

Additionally, certain bridges in non-tidal waters are exempted from the USCG permit according to 23 CFR, Subpart H, Section 650.805.

#### ***3.5.4.3. FEMA (Federal Emergency Management Agency)/community coordination***

Effective coordination with FEMA is critical for the success of the project delivery. The regulatory floodway map (i.e., Federal Insurance Risk Maps) needs to be studied prior to design and construction of any bridge projects. If the bridge is considered over the waters that are mapped, early coordination should be conducted with FEMA. The bridge construction changes the characteristics of the water flow. The bridge acts as an obstruction to the original flow of the water that may make the elevation of the water rise in the area approaching the bridge. Any increases in the water elevation should be brought to the attention of FEMA for possible modification of the existing federal insurance maps. People living in the affected areas should also be informed of any possible changes in rising water elevations and the new path.

The National Flood Insurance Program (NFIP) is administered by FEMA and requires local communities to adopt and enforce minimum floodplain management regulations which should be considered in the proper scheduling of the project if the site of the project is in a floodplain area.

*“Federal Emergency Management Agency (FEMA) – The Federal agency in charge of the enforcement of Executive Order (EO) 11988. The primary function of the agency is to avoid long, and short term adverse impacts associated with the occupancy and modification of floodplains and to restore*

*and preserve the natural and beneficial values served by floodplains. The agency assesses floodplain hazards in all construction of Federal and Federally Aided buildings, structures, roads, or facilities, which encroach upon or affect the base floodplain.” (PDP, p. 21)*

The GDOT Office of Bridge Design strives to design the bridge structure such that it does not introduce any changes in the existing floodway map to avoid any additional coordination. However, sometimes the change in the water elevation cannot be avoided, which may introduce a moderate risk to the project schedule. If handled properly, coordination with FEMA regarding the change to the FEMA insurance map should not be a significant risk for the project schedule, but this is a step that needs to be taken into account in developing the project schedule. Also, community coordination may be needed for some local areas that have their own floodway rules, restrictions, and requirements. Zone A locations are areas that do not require FEMA or community coordination. Zone AE areas with floodway may require FEMA and local coordination or just local coordination. If a no-rise is achieved with the proposed design, GDOT coordinates with the community only to obtain a letter of concurrence from the community. If a rise in water surface elevation is unavoidable, GDOT must submit a Conditional Letter of Map Revisions (CLOMR) to FEMA and must coordinate with the community to obtain a letter of concurrence.

#### ***3.5.4.4. Special studies for tidal required?***

Areas near the coast are considered as tidal; however, there is not a unified map to exactly determine whether an area is tidal. Subject-matter experts in the Office of Bridge

Design can make a distinction based on their experience working on projects nearby or investigating the maintenance records of the bridges close to the project location.

Sometimes an actual survey is needed to make the distinction. New bridge construction or replacement projects over stream crossings located in the areas affected by daily storm tides should go through tidal studies. Not considering the need for tidal studies introduces a risk to the project schedule.

#### ***3.5.4.5. Multiple openings (1-D or 2-D)***

In designing the new bridge, if multiple openings are anticipated to allow water to pass through the bridge, a hydraulic study needs to be conducted to characterize the flow and velocity of water going through the bridge openings. The hydraulic study often needs to determine the wide floodplain to analyze the effects of the bridge construction on the upstream water and nearby bridges. Typical one-dimensional analysis using the Hydrologic Engineering Center's River Analysis System (HEC-RAS) developed for the USACE software may not be sufficient for defining the water surface elevations and distributing the flow among multiple bridges. A two-dimensional study may be a preferred method for modeling gradually varied flow conditions throughout the floodplain. The following description provides an overview of one- and two-dimensional studies and identifies bridge sites that are prime candidates for conducting two-dimensional studies.

*“Flow through bridges may be computed using a one-dimensional or a two-dimensional model. A one-dimensional approach determines the flow rate through the bridge based on the water surface elevations at the upstream and*

*downstream sides of the structure assuming steady, gradually varied flow conditions. In practice, most analyses are performed using one-dimensional methods. Although one-dimensional methods are adequate for most applications, these methods cannot always provide the most accurate determination across the floodplain of water surface elevations, flow velocities or flow distribution. Where conditions at the site depart significantly from steady, gradually varied flow conditions, a two-dimensional model should be considered. Candidate sites for a two-dimensional analysis include:*

- *Wide floodplains with multiple openings, particularly on skewed embankments;*
- *Floodplains with significant variations in roughness or complex geometry (e.g., Ineffective flow areas, flow around islands, multiple channels);*
- *Sites where more accurate flow patterns and velocities are needed to design more cost-effective countermeasures (e.g., riprap along embankments, abutments); and*
- *high-risk or sensitive locations where losses and liability costs are high.”*

*(South Dakota Drainage Manual, p. 33)*

A hydraulic study should also analyze scour that can occur at bridge piers and from the contraction of water flowing through the bridge openings. *Bridge scour* is the removal of sediment such as sand and gravel from around bridge abutments or piers. Scour, caused by swiftly moving water, can scoop out scour holes, compromising the integrity of a



structure. In the United States, bridge scour is one of the three main causes of bridge failure (the others being collision and overloading).

PMs should be aware that conducting a two-dimensional hydraulic study requires more resources and takes added time compared to conducting a one-dimensional hydraulic study. The risk is the added time and complexity that will be introduced to the project schedule in the event a two-dimensional study is required. The risk is usually low for a single bridge opening.

#### ***3.5.4.6. Abnormal stage***

Where a bridge site is located upstream from, but relatively close to, the confluence of two streams, high water in one stream can produce a backwater effect extending for some distance up the other stream. This is typically in the area where a creek runs into a larger river. This can cause the stage at a bridge site to be abnormal, meaning higher than would exist for the tributary alone. An abnormal stage may also be caused by a dam, another bridge, or some other constriction downstream. The water surface with abnormal stage is not parallel to the bed. (*Hydraulics of Bridge Waterways*, p. 22)

When there is the confluence of two water streams, the water surface elevation might rise higher than it would under normal flow conditions. In these conditions, the Office of Bridge Design must analyze the site in two ways: (1) ignore the larger stream and analyze the creek separately from the river, and (2) look at what will happen if there is a larger river downstream that affects the water surface elevation. Both conditions should be considered since the flood-stage elevations could be higher for the abnormal stage due to

the construction of the new bridge. The Office of Bridge Design typically uses HEC-RAS for the one-dimensional study and performs the analysis in the two ways described above.

#### ***3.5.4.7. Significant skew***

Skew refers to the angle at which the flow of stream approaches the existing road.

Significant skew appears where the stream approaches the bridge in a not-perpendicular way and at a sharp angle. Sharp angles are 50 degrees or less. The issue is the difference between HEC-RAS and the two-dimensional modeling in dealing with significant skew. PMs should note that if the skew is significant, it is better to conduct a two-dimensional study, instead of a one-dimensional study.

#### ***3.5.4.8. Upstream/downstream structures (survey)***

The Office of Bridge Design needs information about upstream and downstream structures to create reliable models for hydraulic studies. However, the main issue is that sometimes-required information is not readily available from regular data sources in the Department and district offices. Maintenance records for the existing bridges can be helpful sources of information as long as the information is not outdated. Lack of required information triggers a request for conducting the survey to investigate the upstream and downstream structures. Such a request for collecting additional information through the survey is time-consuming and may affect the project schedule as a risk factor. Two areas of information are of interest in performing the survey of upstream and downstream structures:

- Stability and type of bed material

- Any structures in the floodplain that have been flooded before or might be flooded in the future

Information is obtained from field surveys that include a stream traverse, flood of record elevations, and a cross section of the floodplain at the bridge site.

#### ***3.5.4.9. Summary of hydraulic issues***

In summary, reports and information from other sources such as the U.S. Army Corps of Engineers and the U.S. Geological Survey and Flood Insurance Studies should be incorporated into a high-quality hydraulic study. If the findings of the study disagree with reports on the area by other agencies, an attempt should be made to resolve the discrepancies. All of the above-mentioned information is then incorporated into a written “hydraulic and hydrological study” for the site, which is kept on record in the General Files and the Office of Bridges and Structures files for future reference (*PDP*, p. 195).

## Chapter 4 Conclusions

Understanding and identifying the sources and natures of risks early in the concept- and scope-development phases of the plan development process are critical for developing appropriate risk response planning for the project. GDOT has decided to engage subject-matter experts early on during the PDP to evaluate existing project conditions and identify issues (i.e., risk factors). This research aims to extract knowledge from subject-matter experts to develop appropriate risk factors presenting various functional issues affecting the timely delivery of the highway project. Therefore, the overarching objective of this research is to develop a comprehensive set of identified risk factors for functional offices involved in the early phases of the PDP.

Through an extensive literature review and interviews with subject-matter experts in various functional groups in GDOT and the project management team in the Office of Program Delivery, the total of 21 major areas of project issues were determined for the five main offices (i.e., Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design) and 125 risk factors were identified for the major areas of the project issues. For the Office of Environmental Services, 12 risk factors were identified and classified into four major areas of project issues, including: (1) ecology-related issues that can be reasonably identified before environmental surveys, (2) ecology-related issues that may arise after surveys are complete, (3) cultural resources and NEPA issues that can be reasonably identified before environmental surveys, and (4) non-environmental office issues that can affect the environmental process. Four major

areas of project issues for the Office of Right-of-Way were determined as follows:

(1) parcel issues; (2) access issues; (3) constructability issues; and (4) issues related to procedural errors, external changes, unknown conditions, etc. A total of 26 risk factors were identified for the Office of Right-of-Way. Furthermore, eleven risk factors were identified for the Office of Strategic Communication, categorized into three major areas of project issues, including: (1) issues with the Office of Strategic Communication, (2) issues with the Office of Environmental Services, and (3) issues related to general project management. For the Office of Utilities, 52 risk factors were determined within six major areas of project issues as follows: (1) railroad, (2) electric distribution/transmission, (3) telecom, (4) water/sanitary sewer, (5) petroleum pipeline/natural gas, and (6) other factors. For the Office of Bridge Design, 24 risk factors were categorized into four major areas: (1) environmental issues, (2) constructability issues, (3) structural or foundation issues, and (4) hydraulic issues.

The findings of the research report provide a searchable and customizable risk identification that aids project managers in evaluating the existing conditions and related issues of the project early in the concept- and scope-development phases of the PDP. The primary contribution of this research is to enhance the ability of state transportation agencies to understand existing project conditions and potential project risks that adversely affect the smooth delivery of the project.

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# Appendix A: SUE Utility Impact Rating & Request Form



## SUE Utility Impact Rating & Request Form

Revised 10-01-2013

Pl#:  Project Type:

While anyone can **identify** projects that would be good candidates for Overhead/Subsurface Utility Engineering (SUE), **ONLY** the GDOT Project Manager (GDOT PM), the District Utilities Engineer (DUE), and the State Subsurface Utility Engineer (SSUE) can **request** SUE. This form is to aid in determining a project's suitability for SUE and to request SUE services. Once completed, it will be reviewed by the SSUE who will make the final determination as to whether or not SUE should be employed on the project. **All SUE projects must be coordinated through the SSUE's Office.**

For projects following the GDOT PDP, SUE takes the place of 1st Submission to the Utility Owners. Currently SUE is a requirement for the majority of Design/Build projects. Therefore, for SUE implementation on Design/Build projects, only fill out the SUE Request Form on pages 3 and 4.

**NOTE:** The SSUE's Office is **only** involved with SUE performed on **GDOT Let Projects**. The SSUE **MUST** be notified prior to advertisement for all projects that involve SUE as Sub to a Prime and/or projects that involve Local PE funding and/or Local Design but are GDOT Let. Please see the Local Administered Project Manual (LAP) for guidance.

### Utility Impact Rating

**Instructions:** There are 10 questions in this section. Choose the rating that best fits your opinion of the issue.

Question	Rating		
1. How many utilities are expected to be encountered on this project?	<input type="radio"/> Low (0-2)	<input type="radio"/> Med (3-4)	<input type="radio"/> High (>4)
2. Generally, for the type of work proposed, what is the probability for utility conflicts to be encountered on construction for this project?	<input type="radio"/> Low	<input type="radio"/> Med	<input type="radio"/> High
3. Which best describes the traffic volume (ADT) on this route?	<input type="radio"/> Low (0-1500)	<input type="radio"/> Med (1501-6000)	<input type="radio"/> High (>6000)
4. How can the area where this project is proposed be best described?	<input type="radio"/> Low (Rural)	<input type="radio"/> Med (Rural but Urbanizing)	<input type="radio"/> High (Urban)
5. How would the number of parcels affected by this project, relative to the total project length, best be characterized?	<input type="radio"/> Low (Few)	<input type="radio"/> Med (Average)	<input type="radio"/> High (Numerous)
6. How often have the Utility Owners in this area provided timely/accurate information regarding their facilities on previous projects?	<input type="radio"/> Low (Almost Always)	<input type="radio"/> Med (Sometimes/Occasionally)	<input type="radio"/> High (Seldom)
7. Do you feel that the Utility Owners in this area will be able to accommodate the project's schedule in regards to accurately showing the location of the utility facilities on our plans (1st Submission)?	<input type="radio"/> Low (Pretty confident)	<input type="radio"/> Med (Unsure)	<input type="radio"/> High (Doubtful)
Sub Total - Number of Boxes Checked			



## SUE Utility Impact Rating & Request Form

Revised 10-01-2013

PI#:  Project Type:

Question	Rating		
8. Which best describes the estimated utility relocation costs for this project?	<input type="radio"/> Low (< \$100,000)	<input type="radio"/> Med (>\$100,000 and <\$500,000)	<input type="radio"/> High (>\$500,000)
9. What is the probability that existing utility installations can be retained to save relocation costs on this project?	<input type="radio"/> Low	<input type="radio"/> Med	<input type="radio"/> High
10. In the space below, please list any other special considerations (i.e.: major energy pipelines, fiber optic facilities, overhead transmission facilities, etc.) that may exist within the project's limits and check an appropriate Rating.	<input type="radio"/> Low	<input type="radio"/> Med	<input type="radio"/> High
Sub Total - Number of Boxes Checked			
Total - Number of Boxes Checked			
Utility Impact Score:	0		

Using the Utility Impact Score above, select the appropriate rating box to check:

**Rating**

- 1=Low
- 2=Med
- 3=High

**Impact**

- Project minimally impacted by utility issues
- Project moderately impacted by utility issues
- Project severely impacted by utility issues

Low
  Medium
 High

**NOTE:**

**Except for QL-D SUE, the GDOT PM must be able to provide all of the following items in order for SUE to be performed on any given GDOT project:**

<ul style="list-style-type: none"> <li>&gt; Survey Control (GA83E or GA83W zones only)</li> <li>&gt; Utility Plan Cut Sheets/Matchlines (Section 24)</li> <li>&gt; MAIN dgn</li> <li>&gt; TOPO dgn</li> </ul>	<ul style="list-style-type: none"> <li>&gt; PROP dgn</li> <li>&gt; REQD dgn (if applicable)</li> <li>&gt; LIMT dgn (if applicable)</li> </ul>
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# SUE Utility Impact Rating & Request Form

Revised 10-01-2013

PI#:  Project Type:

## SUE Request Information

Requesting Office (Use Acronym):  Date:

Person Requesting Service if Other Than the GDOT PM (Include Title):

GDOT PM:  GDOT PM Phone No.:

County(ies):  GDOT District(s):

Project Length (Total Mainline):  Project Length (Total Side Roads):

Route, Project Description (including Project Limits), Project Schedule/Milestone Dates (i.e. Mapping, PFPR, FFPR, Let Date, etc.):

Existing Utility Information: Please list possible utilities that may be encountered and provide contact names, if available.

<u>Electric:</u>	<input type="text"/>	<u>Telephone:</u>	<input type="text"/>
<u>Gas:</u>	<input type="text"/>	<u>Cable:</u>	<input type="text"/>
<u>Sanitary Sewer:</u>	<input type="text"/>	<u>Other:</u>	<input type="text"/>
<u>Water:</u>	<input type="text"/>		



## SUE Utility Impact Rating & Request Form

Revised 10-01-2013

PI#:  Project Type:

SUE Quality Levels (QL) of Service and Utility Impact Analysis (UIA): Choose one or more of the following:

- QL-D:** Applies when making broad decisions about route selection, purchasing right-of-way or producing a higher level of data. This level of information is typically recommended to be requested during a project's Concept Development.
- QL-C:** This QL of information is used to determine general utility conflict areas. It is typically recommended that this level of information be requested on rural projects or on projects where the Utility Impact Rating is Low. Usually, this QL is requested when preliminary design begins and project mapping and survey control have been established. *Please note that QL-C includes QL-D.*
- QL-B:** This QL of information is used by the Designer to make educated decisions on where to place storm drainage systems, footings & foundations, etc. to avoid conflicts with existing utility facilities. Due to the increased integrity of this level of information, it is recommended that it be requested on urban type projects or on projects where the Utility Impact Rating is Medium or High. Usually this level is requested when Preliminary Design begins and project mapping and survey control have been established. *Please note that QL-B includes QL-D & QL-C.*
- QL-A:** This QL of information provides 3-Dimensional (x,y, & z) mapping of specific conflict areas. This QL is needed for Final Design and utility placement decisions. It is recommended that this level of information be requested when there are specific conflict areas identified and it is determined that, by making adjustments in various design elements, drastic cost savings will be inured for the project. It is recommended that this level of information be requested after the Preliminary Field Plan Review to ensure that all potential conflicts are identified. Please attached a location sketch of specific test hole sites with this form. *Please note that QL-A is generally performed after QL-B and includes upgrading the QL-B investigation.*
- UIA:** It is recommended that this information be requested right before the Preliminary Field Plan Review. *Please note that the UIA is generally performed after QL-B and prior to QL-A (when there is enough proposed design information available).*

Special Requests (i.e. "Include all overhead point of attachments in SUE scope."):

Submit this form to (pdf preferred):

Raymond Chandler  
Office of Utilities  
State Subsurface Utilities Engineer  
Georgia Department of Transportation  
One Georgia Center, 10th Floor  
600 West Peachtree Street  
Atlanta, GA 30308  
rchandler@dot.ga.gov

# Appendix B: Template Letter for Requesting Project SUE Information to Utilities for Review and Preliminary Relocation Submission

Russell R. McMurry, P.E., Commissioner \_\_\_\_\_



GEORGIA DEPARTMENT OF TRANSPORTATION

One Georgia Center, 600 West Peachtree Street, NW  
Atlanta, Georgia 30308  
Telephone: (404) 631-1000

P.I. # \_\_\_\_\_, \_\_\_\_\_ County  
Project Description:

**Ref: OCGA 32-6-170 & 171 - Request for Project Information  
URPN #1a – Overhead/Subsurface Utilities Engineering (SUE) Information to Utilities for Review  
and Preliminary Relocation Submission**

Ladies and Gentlemen:

Electronic files of the accepted SUE plans for the above referenced project have been placed on the GDOT's Secure File Transfer Protocol (SFTP) site for your use. Please contact the District Utilities Office if you do not have access to the SFTP site. The existing utility facilities were marked for the Department by the SUE Firm \_\_\_\_\_. Hard copy plans will be provided when coordinated through the District Utilities Office. Once the plans have been downloaded from the SFTP or received through the mail, the Department requests acknowledgment of receipt of these plans (in writing) within 5 days via email or letter to the address shown on Page 2.

It is requested that you provide the Department with a complete package of all applicable items listed below. Please follow the "**Plans Transfer Procedures for Utility Submissions**" which can be found via:

<http://www.dot.ga.gov/PartnerSmart/utilities/Documents/EPT/PlanTransfer-ProceduresForUtilitySubmissions.pdf>

- **Check existing facilities** as shown on the SUE plans and confirm if there are no corrections to be made. See attached for GDOT SUE "Confirmation" Process.
- **Mark preliminary relocations** of facilities in conflict with the proposed design
  - Indicate material types
  - Indicate any proposed betterments
  - Indicate vertical position of proposed facilities on cross sections (if provided)
  - Provide approximate location of proposed facilities including proposed clear zone, proximity to right-of-way, and anticipated crossings
  - Indicate existing easements and/or additional easement requirements

A **preliminary relocation meeting** will be held on \_\_\_\_\_ at the District Office to discuss utility impacts on this project.

Please note that the requested preliminary relocation plan is non-binding and changes may be required or requested at a later date. The plan will be used to make initial decisions regarding right-of-way and environmental evaluation of the project.

- **Verify any Utility Easement(s)** currently owned OR any applicable Utility Easement(s) requested in writing for the Department to acquire on behalf of the Utility Company are appropriately shown on the plans.



*Note: If easements are not shown at all and/or incorrectly, please contact the District Utilities Engineer immediately for resolution.*

Unless otherwise indicated, the Department will assume a 30-foot clearing width for aerial facilities. If additional clearing widths are expected, please provide this information with the preliminary relocation plans.

- **Indicate if retention is anticipated for existing underground facilities** in the response for preliminary relocations. Include a retention request for the facilities identified.
  - Clearly identify facilities to be retained on the plans
  - Include the depth and condition of facilities to be retained if possible
- **Submit any applicable bridge space requirements** for your facilities in writing by the requested date below.
  - Indicate the size, weight, and location of the proposed facilities
  - Fully detail the method of attachment to the bridge
- **Submit any applicable letter or request** as outlined in the [Utility Accommodation Policy and Standards Manual](#), current edition
  - Letter of “NO COST”
  - Letter of “NO CONFLICT”
  - Request to include facilities in the Department’s Contract OR Cost Estimate
  - If claiming a compensable property interest/prior rights, provide supporting easement documentation

Please return the complete package no later than [ ] from the date of this letter to the following address:

Georgia Department of Transportation  
Attn:  
District Utilities Engineer,  
, GA  
Email:

If you have any questions or need additional information concerning this project, please contact:

at

Sincerely,

District Engineer

By:  
District Utilities Engineer