GEORGIA DOT RESEARCH PROJECT RP 16-40

FINAL REPORT

RISK MITIGATION STRATEGIES TO ENHANCE THE DELIVERY OF HIGHWAY PROJECTS

OFFICE OF PERFORMANCE-BASED MANAGEMENT AND RESEARCH

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State departments of transportation (DOTs) face the challenges of identifying project issues, understanding the nature of project risks, and mitigating the risks early in the concept- and scope-development phases of a project. Subject-matter experts of functional groups in the state transportation agency have critical knowledge in identifying potential project risks and developing risk response plans. Thus, Georgia Department of Transportation (GDOT) has decided to engage subject-matter experts early on during GDOT’s plan development process (PDP) to identify major risk factors and develop appropriate strategies to handle the risks. This research aims to extract knowledge from subject-matter experts to develop appropriate risk mitigation strategies presenting various functional issues. The overarching objective of this research is to develop a comprehensive set of risk mitigation strategies 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, a comprehensive set of strategies was identified for mitigating project risks in the early phases of the PDP. The identified risk mitigation strategies were classified in the major areas of project issues and grouped into GDOT’s functional groups, including the Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design. The findings of this research help project managers have a better understanding of project issues from the perspective of subject-matter experts in the different functional offices. Furthermore, the developed risk-mitigation strategies enable the project management team to establish a platform for systematic communication with subject-matter experts in different offices in the early phases of the PDP.</td></tr>
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GDOT Research Project No. 16-40

Final Report

RISK MITIGATION STRATEGIES TO ENHANCE THE DELIVERY OF HIGHWAY PROJECTS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

There is a considerable level of uncertainties and risks early in the concept- and scope-development phases of highway project development. These risks that adversely affect the smooth delivery of highway projects are attributed to the major areas of project development, such as environmental analysis, right-of-way (ROW) acquisition, utilities coordination, and third-party communications. A lack of consideration of the major project risks can cause significant scope change, schedule delay, and cost overrun during the project development process. To minimize the negative impact of project risks, the nature of those project risks should be understood, and proper risk response plans should be developed early in the project development. Consequently, the Georgia Department of Transportation (GDOT) has decided to engage subject-matter experts early on during GDOT's plan development process (PDP) to identify major risk factors and develop appropriate strategies to handle the risks. This research aims to extract knowledge from subject-matter experts to develop appropriate risk mitigation strategies 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 risk mitigation strategies for functional offices that are involved in the early phases of the PDP. To achieve the research objective, the academic/professional literature was

reviewed to determine major strategies to respond to and mitigate the project risks. The current state of the practice in risk mitigation among leading state DOTs was also reviewed. Through these reviews, risk mitigation strategies that can help state DOTs respond to project issues were identified and categorized into major areas of project issues. The identified risk mitigation strategies were organized based on GDOT's functional groups, including the Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design. Extensive interviews were conducted with subject-matter experts in different functional offices at GDOT, as well as the project management team in the Office of Program Delivery, to review and refine the identified risk mitigation strategies for project risks. After developing draft risk mitigation strategies for each functional office, follow-up interviews with subject-matter experts and the project management team were conducted for validating the risk mitigation strategies and refining the strategies based on their feedback and comments. The finding of the research report is searchable and customizable risk mitigation strategies that can be used by project managers to better understand how to respond to related project issues in the concept and scope development of the project.

Through the 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, a set of risk mitigation strategies was developed for aiding project

managers in responding to and mitigating project issues during the concept- and scope-development phases of the PDP. The identified risk mitigation strategies were grouped into 21 major areas of project issues within the functional groups (i.e., Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design) as follows:

- Office of Environmental Services
    - Ecology-related issues that can be reasonably identified before environmental survey
    - Ecology-related issues that may arise after surveys are complete
    - Cultural resources and National Environmental Policy Act (NEPA) issues that can be reasonably identified before environmental surveys
    - Non-environmental office 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 Office of Strategic Communication
    - Issues with Office of Environmental Services
    - Issues related to general project management
- Office of Utilities
    - Railroad issues
    - Electric distribution/transmission issues
    - Telecom issues
    - Water/sanitary sewer issues
    - Petroleum pipeline/natural gas issues
    - Other factors
- Office of Bridge Design
    - Environmental issues
    - Constructability issues
    - Structural or foundation issues
    - Hydraulic issues

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LIST OF ABBREVIATIONS

AASHTO	American Association of State Highway and Transportation Officials
ARPA	Archaeological Resource Protection Act
ATMS	Advanced Traffic Management System
BLM	Bureau of Land Management
BMP	Best Management Practice
Caltrans	California Department of Transportation
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CID	Community Improvement District
CLOMR	Conditional Letter of Map Revision
CMPA	Coastal Marshlands Protection Act
CRA/CEVP	Cost Risk Analysis/Cost Estimate Valuation Process
DNR	Department of Natural Resources
DOT	Department of Transportation
DUE	District Utilities Engineer
DUO	District Utilities Office
EAOE	Ecology Assessment of Effect
ECOS	Environmental Conservation Online System
EFH	Essential Fish Habitat
EPD	Environmental Protection Division
EPM	Environmental Procedures Manual
ERSR	Ecology Resources Survey Report
ESBE	Economics of the Sustainable Built Environment
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FFPR	Final Field Plan Review
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
GDOT	Georgia Department of Transportation

GeoPI	Geographical Project Information
GEPA	Georgia Environmental Protection Agency
GP	General Permit
GPS	Global Positioning System
HA	Highway Account
HEC-RAS	Hydrologic Engineering Center's River Analysis System
HED	Highway Easement Deed
IP	Individual Permit
ITS	Intelligent Transportation System
LG	Local Government
MARTA	Metropolitan Atlanta Rapid Transit Authority
MOA	Memorandum of Agreement
MPO	Metropolitan Planning Organization
MS4	Municipal Separate Storm Sewer System
NAACP	National Association for the Advancement of Colored People
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHI	National Highway Institute
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NP	National Permit
NPS	National Park Service
NYSDOT	New York State Department of Transportation
O.C.G.A.	Official Code of Georgia Annotated
OES	Office of Environmental Services
OLE	Outfall Level Exclusion
OMAT	Office of Materials and Testing
OPD	Office of Program Delivery
OSC	Office of Strategic Communication
OTO	Office of Traffic Operations
P3	Public-Private Partnerships
PAR	Practical Alternatives Review
PDP	Plan Development Process
PE	Preliminary Engineering

PFPR	Preliminary Field Plan Review
PHOH	Public Hearing Open House
PIA	Public Involvement Activities
PID	Public Interest Determination
PIOH	Public Information Open House
PIP	Public Involvement Plan for NEPA Projects 2016
PLE	Project Level Exclusion
PM	Project Manager
PoDI	Projects of Division Interest
PPG	Plan Presentation Guide
PSC	Prestressed Concrete
PTA	Parent–Teacher Association
R09	Managing Risk in Rapid Renewal Projects
RFP	Request for Proposal
ROD	Record of Decision
ROW	Right-of-Way
RP	Regional Permit
RR	Railroad
SAAG	Special Assistant Attorney General
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act
SHRP-2	Strategic Highway Research Program
SLC	Subscriber Loop Carrier
SME	Subject-Matter Expert
SRH	Sedimentation and River Hydraulics
STIP	Statewide Transportation Improvement Plan
SUE	Surface Utility Engineering
SWTP	Statewide Transportation Plan
T&E	Threatened and Endangered
TMA	Transportation Management Association
TPRO	Transportation Project
TRB	Transportation Research Board
UAM	Utility Accommodation Policy and Standards Manual
UAS	Utility Adjustment Schedule
UIA	Utility Impact Analysis
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service

USNMFS	U.S. National Marine Fisheries Service
VR	Virtual Reality
WSDOT	Washington State Department of Transportation
WSPRO	Water Surface Profile

Chapter 1 Introduction

Understanding and managing project risks are critical challenges for state departments of transportation (DOTs) because of the complex nature of highway projects. The failure to manage project risks leads to significant scope change, schedule delay, and cost overrun for a project (Creedy et al. 2010; Hanna et al. 2015; and Wang and Yuan 2016). According to the National Cooperative Highway Research Program (NCHRP) Report 821, a lack of consideration of potential risks, such as utilities, communities, and the environment, can cause significant scope growth and related problems (Anderson et al. 2016). To properly manage project risks, state DOTs should integrate rigorous risks assessment and mitigation processes into their project management practice. According to the Federal Highway Administration's (FHWA) *Guide to Risk Assessment and Allocation for Highway Construction Management*, integrating risk assessment and allocation processes into project management provides highway agencies with a more transparent and informed allocation of project risks (Molenaar et al. 2006).

Several highway agencies put significant efforts into developing a systematic process for managing and controlling project risks. For instance, the FHWA's *Guide to Risk Assessment and Allocation for Highway Construction Management* provides guidance to project teams with a risk management process for managing project risk for highway projects (Molenaar et al. 2006). This guidance follows the five imperative steps for managing project risks: (1) risk identification, (2) risk assessment, (3) risk mitigation, (4) risk allocation, and (5) risk monitoring and updating. In addition, the FHWA insisted that formalizing risk mitigation and planning enhances the agency's ability to manage

project risks (Molenaar et al. 2006). The NCHRP Report 658 also outlines a process for conducting risk mitigation and planning that should be incorporated into the project-development process. This process includes exploring risk response strategies for high-risk items and identifying and assigning parties to take responsibility for each risk response (Molenaar 2010). In addition, the second Strategic Highway Research Program (SHRP 2) research report, *Managing Risk in Rapid Renewal Projects (R09)*, proposes a risk management plan to optimize project performance consisting of three main elements: (1) plans for individual risk reduction actions, (2) protocols for contingency management, and (3) protocols for recovery plans (Molenaar et al. 2014). The risk management plan should be documented and adjusted as the project develops.

Several studies are devoted to developing a risk management process to control risks for highway projects. For instance, Damnjanovic et al. (2009) identified root causes of cost escalation and proposed mitigation strategies for addressing these risk factors during project development. They conducted brainstorming sessions to develop appropriate mitigation strategies for addressing the risk factors. The identified strategies are classified into the following categories: (1) business operation, procedure, and policies strategy; (2) material management strategy; (3) design and value management strategy; (4) contract management and project delivery strategy; (5) information and training strategy; (6) project marketing and advertising strategy; and (7) additional methods proposed by experts (Damnjanovic et al. 2009). Through conducting a survey of consultants and contractors, El-Sayegh and Mansour (2015) identified several risk factors that affect highway construction projects, including technical factors, site factors, commercial factors, political factors, environmental factors, and socioeconomic factors.

The authors also identified several pitfalls in existing risk mitigation plans that should be improved in responding to the identified risk factors, including inefficient planning, unexpected ground utilities, quality and integrity of design, delays in approvals, and delays in expropriations.

Several state DOTs have invested significantly in developing a systematic risk management process. For instance, New York State Department of Transportation (NYSDOT) developed capital risk management guidance to provide project teams with appropriate methods and techniques for managing project risks (NYSDOT 2008). The risk management process of NYSDOT consists of the following major components: awareness and comprehension; identification, assessment, and analysis; mitigation planning; allocation; and active monitoring and control. NYSDOT also suggested that projects risks should be allocated or delegated to those (e.g., agency planner, project manager, engineer, and environmental specialist) who can best manage and deal with such risks, depending on the stage of project development.

The California Department of Transportation (Caltrans 2012) developed a risk management process to help project managers and team members manage project risks over the life cycle of a project. The risk management process involves responding to the following questions to identify the major risk factors and find solutions to respond to the identified risks:

- What risks might negatively (threats) or positively (opportunities) affect achieving the project objectives? Which of these are most important?

- How could these affect the overall outcome of the project in probabilistic terms of cost and schedule?
- What can be done about it?
- Having acted, how did the responses affect change, and where is the project now?
- Who needs to know about this?

Caltrans also provided the following risk response strategies to reduce threats to the project's objectives:

- Avoid: Removing the cause of the risk or executing the project in a different way
- Transfer: Finding another party who is willing to take responsibility for its management
- Mitigate: Reducing the probability and/or impact of an adverse risk event to an acceptable threshold
- Acceptance: Agreeing to address the risk if and when it occurs

Caltrans recommends continuous risk monitoring as an essential step for detecting and managing new risk factors and effectively implementing risk response actions (Caltrans 2012).

Washington State Department of Transportation (WSDOT) developed a project risk management guide for providing consistent practices of risk management that enable the project team to better understand project risks (WSDOT 2014). WSDOT recommends several critical steps to involve risk management in the project management plans, including: (1) determine the level of risks assessment for the project; (2) incorporate risk management activities into the project schedule; (3) make risk management an agenda

item for regularly scheduled project meeting; (4) communicate the importance of risk management to the entire project team; and (5) establish the expectation that risk will be managed, documented, and reported. Moreover, WSDOT established a consistent risk assessment and risk-based estimating process (i.e., cost risk analysis/cost estimate valuation process [CRA/CEVP] workshop) to provide the project team with actionable information items to respond to the identified risks.

This literature review reveals that risk mitigation should be implemented early in the project development process to assist project teams in responding to a wide range of project issues. Subject-matter experts inside state transportation agencies provide critical knowledge in developing risk response plans related to their functional areas, such as environmental services, ROW, utilities relocation, communication, and bridge design. Early involvement of subject-matter experts is critical to developing appropriate risk response planning for the project. Therefore, Georgia Department of Transportation (GDOT) has decided to engage subject-matter experts early on during GDOT's plan development process (PDP) to identify major risk factors and develop appropriate strategies to handle the risks. This research aims to extract knowledge from subject-matter experts to develop appropriate risk mitigation strategies 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 risk mitigation strategies for functional offices involved in early phases of the PDP. Information about possible risk response plans to handle the project issues is retrieved from subject-matter experts in several functional offices in GDOT, including the Offices of Environmental Services (OES), Utilities, Right-of-Way (ROW), Strategic Communication (OSC), and Bridge

Design. It is anticipated that the developed risk mitigation strategies for each office can help project managers better understand project issues from the perspective of subject-matter experts in the offices. The developed risk mitigation strategies 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 within GDOT. The research team conducted several tasks to complete the objectives of this research. This set of tasks is listed below and shown in Figure 1.

1. Review the academic/professional literature to determine major strategies to respond to and mitigate the project risks
2. Review current state of the practice in risk mitigation among leading state DOTs
3. Identify risk mitigation strategies that can help state DOTs respond to project issues with potentially adverse effects on 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 the Offices of Environmental Services, Utilities, ROW, Strategic Communications, 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 mitigation strategies
5. Develop a summary of the identified risk mitigation strategies (i.e., draft risk mitigation strategies) for each functional office
6. Conduct follow-up interviews with subject-matter experts and the project management team to validate the risk mitigation strategies and refine the strategies based on the provided feedback and comments

7. Document and present the findings in the research report and develop searchable and customizable risk mitigation strategies that can be used by the project manager (PM) to respond to related project issues

Figure 1 An Overview of the Research Methodology for Risk Mitigation Strategy

Chapter 3 Risk Mitigation for Functional Offices

3.1. Office of Environmental Services (OES)

3.1.1. Introduction

The plan development process establishes the process by which a project advances from concept development through the final design. Environmental resource identification is needed for the concept-development phase. It begins in the concept development, as well as being part of the preliminary design phase 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) expedites 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 (T&E) 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**, 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 the assessment reports, and 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, Section 7 consultation should be complete prior to the preliminary field plan review (PFPR).

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

Therefore, it is significantly important to determine the environmental categories to decide on 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 2017a, PDP, 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 [PIP]*)
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 2017a, Plan Development Process, p. 3-1)*

(2) Georgia Environmental Policy Act of 1991 (GEPA):

The Georgia Environmental Policy Act 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. GEPA must be complied with for state-aid projects. Several federal environmental laws concern federal actions (and not merely federal funds). Therefore, the project manager and local

government sponsors should consult 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 2017a, Plan Development Process, Rev 2.16, 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

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 Species, Essential Fish Habitat (EFH), and Anadromous Fish

- Project managers should be broadly familiar with U.S. National Marine Fisheries Service (USNMFS) regulations and follow up with the GDOT Office of Environmental Services to understand whether any possible EFH, T&E species, or anadromous fish would be impacted by the proposed project.
- Project managers need to be aware that ecologists must ensure that the impacts to EFH are considered in accordance with the Magnuson–Stevens Fishery Conservation and Management Act. Further information can be retrieved from: http://www.nmfs.noaa.gov/sfa/laws_policies/msa/
- Project managers should follow up to make sure if habitat for federal- or state-protected species is identified in the survey area, and a protected species survey needs to be scheduled and conducted as per the approved survey schedule and methodology. Following the protected species survey, a Protected Species Survey Report will be written. Populations of protected species (and suitable habitat) will be delineated based on GPS (Global Positioning System) data and labeled as Environmentally Sensitive Areas. These delineations will be transmitted to the

PM immediately for placement on the plans. The Protected Species Survey Reports will be transmitted to the agencies as an appendix to the Ecology Assessment of Effects (EAOE) Report. Once the preliminary design is complete, impacts to resources will be calculated. These calculations will be described in the EAOE Report.

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

- Project managers should be familiar with the related regulations and examples of Individual Permit projects in the Savannah District. Figure 2 shows the Savannah District on the map. The Savannah District currently has three General Permits (GPs): Nationwide Permits (NPs), Regional Permits (RPs), and Programmatic General Permits, and two types of IPs: Letter of Permission and Standard Permit. Further information can be retrieved from: http://www.sas.usace.army.mil/Missions/Regulatory/Permitting.aspx

Figure 2 Savannah District
(Copyright from U.S. Army Corps of Engineers)

3.1.2.3. Salt marsh or tidal mitigation

- Project managers should know that if there is going to be any construction or activity in or near any salt marsh in the State of Georgia, then Georgia's Coastal

Resources Division can be contacted for a jurisdictional determination on whether a Coastal Marshlands Protection Act (CMPA) permit is needed for the project.

- Project managers need to coordinate with the Habitat Conservation Division Office of the USNMFS early on to prevent any schedule delay if a project is proposed in coastal counties or estuarine systems (i.e., tidal or salt water marsh).
- Project managers need to know that the Southeast Regional Office of the USNMFS should take actions early on to prevent any schedule delay if a project is proposed in coastal counties or estuarine systems (tidal or salt water marsh) and marine species are listed in the county.

3.1.2.4. Trout waters

- Project managers should always keep in mind whether a proposed action will significantly impact freshwater aquatic life or not. Primary and secondary streams should be protected because the freshwater fisheries are important for the total food chain. More information can be retrieved from the *Environmental Procedures Manual* (GDOT 2012, Section 24, p. 251).
- Project managers should always be prepared to identify any areas of primary and secondary trout streams in the proposed project site. For a list of trout stream designations by county, see the address below: https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/Trout_Stream_Designations_by_County_March_2014.pdf

3.1.2.5. Seasonal surveys (Identifies Threatened and Endangered species)

- The environmental survey phase leader (GDOT or consultant) needs to notify the project manager when surveys are to begin and carry copies of the previously sent notification letter for distribution, if necessary. The PM is responsible to follow up with the phase leader to make sure the surveys are done, and their reports are gathered.
- Project managers should follow up to ensure that ecologists create a list of possible effects of a proposed project on the land, protected species, their habitats, streams, and wetlands. Based on this list and the anticipated negative effects, ecologists determine the need for any additional surveys that may affect the project schedule.

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)

- Project managers should follow up to make sure that GDOT ecologists transmit the Formal Section 7 Package to the lead federal agency—U.S. Fish and Wildlife Service (USFWS) and/or USNMFS—and Georgia Department of Natural Resources (DNR) on time to avoid any delay.
- Project managers should take the formal consultation period into consideration when scheduling. The USFWS and other federal agencies share information about the proposed project and the species likely to be affected, and formal consultation

may last up to 90 days. Afterward, the USFWS will prepare a biological opinion on whether the proposed activity will jeopardize the continued existence of a listed species. For Formal Section 7, additional days should be added to the project schedule to be most realistic. The portion of the *Environmental Procedures Manual* regarding this process can be retrieved from: https://www.fws.gov/midwest/endangered/section7/section7.html

3.1.3.2. Major bat colonies

- Project managers should coordinate to plan avoidance of all unnecessary impact and minimization of any unavoidable impact on the roosts of bat colonies.

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

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

3.1.4.1. Non-historic 4(f) (publicly owned parks, recreation, wildlife, and waterfowl refugees)

- Section 4(f) properties should be avoided, and the project should include all possible plans to minimize the harm to Section 4(f) properties.
- Before approving a project that uses Section 4(f) property, project managers should follow up to make sure that there is not any feasible or prudent alternative. Projects only can have a de minimis impact on the Section 4(f) property activities, features, or attributes. Additional information can be retrieved from: https://www.environment.fhwa.dot.gov/section4f/properties_parks.aspx

"De minimis are a provision in the transportation bill enacted in August 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) which states that the requirements of Section 4(f) will be satisfied if the Section 4(f) protected resource will not be adversely affected by the proposed action." (GDOT 2012, Environmental Procedures Manual, p. 19)

3.1.4.2. National Register–listed properties including National Historic Landmarks (NHLs)

- GDOT Office of Environmental Services and consultant cultural resource staff should conduct the required field work to prepare cultural resource technical documents. The National Historic Preservation Act (NHPA) directed the federal government to accelerate its historic preservation programs and activities to enhance the project delivery.

  "Federal Government should accelerate its historic preservation programs and activities, to give maximum encouragement to agencies and individuals undertaking preservation by private means, and to assist State and local governments and the National Trust for Historic Preservation in the United States to expand and accelerate their historic preservation programs and activities." (NHPA, Appendix A, Section 7)

- Project managers can refer to the address below for the list of Georgia's National Historic Landmarks: https://www.nps.gov/nhl/find/statelists/ga/GA.pdf. The

Secretary of the Interior must receive a copy of the Notification if an adverse effect is anticipated to an NHL.

3.1.4.3. Phase II archaeology

- Project managers should notice that risk mitigation can be accomplished by identifying the risk early on, so the project can be designed around the significant resource. Where eligible archaeological sites cannot be avoided, mitigation can be accomplished through Phase II data recovery, which is time consuming and expensive.

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 408)

- Project managers, right-of-way staff, environmental subject-matter experts and environmental analysts must coordinate with federal agencies early in the project development phase to identify any federal land near the proposed project. These steps assume that this federal land has been identified in the initial planning and environmental analysis process at the earliest possible stage of the project. For example, if there is a National Park Service (NPS) around a project area, there are major steps involved in requests to transfer lands for highway purposes. NPS involvement should start when GDOT/FHWA begins looking at the possibility of any activity that may impact NPS lands. Following are the steps:

1. Initial notification
2. Preliminary evaluation prior to official request
3. Official request by FHWA for NPS land
4. The highway easement deed (HED)

Federal agencies often have specific NEPA requirements to be implemented on their lands; therefore, PMs should ensure these needs are discussed early in the project development to prevent any schedule delay.

- Project managers need to know that ARPA (Archaeological Resource Protection Act Permit, 16 USC 470Hh, passed in 1979 and its 1988 amendments) prohibits the professional excavation and removal of archaeological resources on federal and tribal lands without a permit issued by relevant land management agencies. Permits for excavation and removal are site-specific and require approval of a technical research design or treatment plan prepared by a qualified applicant. Also, the PM should notice that the time for acquisition of this approval might be lengthy and affect the project schedule.

3.1.5.2. Parcels with restrictive covenants

- Project managers should coordinate with the District Environmental Office to determine if there are any restrictive covenants near the proposed project. If there are, the PM must ascertain what the restrictions are and the best way to deal with them.
- Project managers should consider this risk factor while scheduling the project because it might be a factor that causes delay to the project progress

3.2. Office of Right-of-Way

3.2.1. Parcels issues

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

- Project managers should consider the time required to handle the numerous parcels in the schedule. It is a lengthy process and therefore might affect the schedule if enough time is not allocated.
- Project managers should follow up to make sure the number of required ROW parcels is identified early in the process to prevent a delay in the ROW schedule.
- There is a timeline chart (see Figure 3) provided by GDOT's Office of Right-of-Way to help with scheduling the projects that require a high number of parcels acquisition. This chart is based on the number of needed parcels and some other factors including:
    - Whether the project is simple
    - Whether the project is in a rural area or is a bridge project
    - Whether there is any improvement in the project
    - Whether there are any consequential damages in the project
    - Whether there are any government-owned parcels
- Project managers should follow up to ensure that plan revisions are submitted before authorization. If they are submitted after authorization there is a potential to negatively impact the schedule up to six months.

Figure 3 Timeline for Acquisitions

3.2.1.2. Value of required ROW parcels exceeds $250,000

- Project managers are responsible to follow up and make sure the second-opinion appraisal is performed for projects that have a parcel value of $250,000 or more. The review appraiser and District ROW Acquisition are the ones who should request a second-opinion appraisal.
- Project managers should make sure that the second-opinion appraisal is procured from a different Master Prime Valuation Services contractor, and make sure that this process is considered for scheduling the project.
- Project managers should note that the second-opinion specialty reports will be procured just on the identified parcels, rather than all the parcels, in order to save time and not further impact the schedule.

3.2.1.3. U.S. Army Corps of Engineers (USACE) parcels identified by ROW included in the project?

- Project managers need to emphasize that the ROW acquisition process should be engaged early in the schedule to prevent any potential delay in the project.
- Project managers should make sure that a realistic and appropriate timeframe and costs for ROW acquisition activities are allocated.
- Project managers should consider that a successful mitigation for the disturbance of wetlands or streams attributed to projects initiated by the Department is the policy of the Right-of-Way and Office of Environmental Services' Wetland Program. Mitigation may be accomplished by acquiring individual wetland sites identified by the Department, which meet the approval of the U.S. Army Corps of Engineers, and other federal- or state-related agencies. Additionally, mitigation may be accomplished by acquiring wetland sites, stream sites, or wetland or stream credits previously approved by the USACE. The acquisition of such sites must adhere to the policies and procedures established in Chapter 5 of the *External Right of Way Manual*.

3.2.1.4. Local government–owned parcels adjacent to project

- Project managers should work closely with the state local-government coordinator for handling ROW issues statewide.

> *"The State Local Government Coordinator that is located in the General Office, manages and coordinates the activities of all District*

Local Government Right of Way Coordinators statewide." (GDOT 2015a, External Right-of-Way Manual, Section 4.5.H)

- If a local government or an agency 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, contact the Land Division, then make an offer, and, finally, request a donation from the public for acquisition purposes. The acquisition manager receives the project assignment from the General Office Acquisition Unit.

3.2.1.5. State government–owned parcels adjacent to project

- Project managers are responsible for notifying the General Office state local-government coordinator immediately after identifying any acquisition from a state government agency. The adjacent state-owned parcels should be identified in the preliminary field plan review.
- 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 local-government coordinator for the acquisition (23 CFR 710.601).

"Once the acquisition has been identified, the District Right of Way Team Manager should send an e-mail to State Local Government Right of Way Coordinator identifying all State parcels in order to allow for early notification of project involvement." (GDOT 2015a, External Right of Way Manual, Section 8.8.1)

It is the project manager's responsibility to follow up and make sure this e-mail is sent and seen, and that early notification of project involvement is permitted.

> *"A copy of the title report, five copies of the legal description, five coloreds 8½ × 11 plats and location map are to be sent to the State Local Government Coordinator for acquisition." (GDOT 2015a, External Right of Way Manual, Section 8.8.1)*

3.2.1.6. Federal government–owned parcels adjacent to project

- Project managers need to identify the controlling agency with jurisdiction over federal lands. This 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.

  > *"It should be notified of the project's potential use of its land and should be invited to be a cooperating agency in the environmental process." (GDOT 2015a, External Right of Way Manual, Section 8.9.C)*

  The Department then needs to file an application with the Federal Highway Administration pursuant to 23 CFR for lands or interests in lands for highway purpose *(*GDOT 2015a, *External Right of Way Manual*, Section 8.9.D*)*.

- Project managers should understand that a different process will be followed for application for some federal agencies, as described below.

"An exception to the following 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 those cases, the application shall be made as follows:

1. *Army or Air Force: The application should be submitted directly to the Installation commander and the appropriate District Engineer, Corps of Engineers, Department of the Army.*
2. *Navy: The application should be submitted directly to the District Public Works Officer of the Naval District involved.*
3. *Veterans Administration: The application should be submitted directly to the Director, Veterans Administration, in Washington, D.C.*
4. *The Bureau of Indian Affairs: Application should be submitted directly to the Bureau of Indian Affairs, Washington, D.C., for right of way across tribal lands or individually owned lands held in trust by the United States or encumbered by Federal restrictions. All other lands held by the Bureau of Indian Affairs are transferred under 23 U.S.C. 107(d); 23 U.S.C. 317." (GDOT 2015a, External Right of Way Manual, Section 8.9.D)*

3.2.1.7. Easement parcels

- Project managers should consider that a systematic process should be followed to acquire an encroachment easement for the demolition of the property that is located partially in the acquisition and partially on the remainder. The PM needs to follow up to ensure the below procedure is accomplished:

  > *"During the project inspection, the Review Appraiser and District Right of Way Acquisition or Consultant Right of Way Project Manager will identify any parcels that have buildings located partially in the acquisition and partially on the remainder. These parcels will require an encroachment easement for the demolition of the building. Property Management will identify the area required for building demolition. This 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." (GDOT 2015a, External Right of Way Manual, Section 4.7.D)*

3.2.1.8. Prior right

- Project managers should ensure that the coordination meeting is held in advance of riding the project with the review appraiser, so the utility owners can claim prior rights before the appraisal and negotiation process begins. This is for the purpose of not affecting the schedule.

- Project managers should follow up and make sure that all prior rights claimed by utility owners are discussed and addressed in the coordination meeting.
- Project managers need to coordinate with the right-of-way acquisition manager to make sure that he/she collaborates with the District Utilities Office (DUO) to assure that the specific prior rights cases are taken into account in the acquisition strategy.

  > *"When Prior Rights are confirmed to legally lie within the required right of way or when lying partially within the existing right of way and partially within the required right of way, the Right of Way Acquisition Manager should coordinate with the District Utilities Office to assure the specific prior rights situation is handled appropriately." (GDOT 2015a, External Right of Way Manual, Section 13.4.A)*

- Project managers need to know that there are several options that can be utilized by the DUO to handle the required easement for the utility companies as follows:

  > *"The District Utilities Office may desire to handle the situation by utilizing the Easement Limited Agreement (ELA); or may ask the Right of Way Acquisition Manager to acquire a replacement easement(s); or may allow the utility company to acquire their own replacement easement(s)." (GDOT 2015a, External Right of Way Manual, Section 13.4.A)*

The best decision will be made by the Department on a case-by-case basis depending on the cost estimate and time for the proposed approaches. The project manager should facilitate the decision-making process by acquiring the detailed cost estimate and providing it to both the state Office of Utilities and the Office of Right-of-Way.

> *"A detailed cost should be submitted by the utility company and the Department will determine the most cost effective and timely approach to pursue." (GDOT 2015a, External Right of Way Manual, Section 13.4.A)*

3.2.1.9. Tribal lands identified by federal maps and websites

- Project managers need to understand the lengthy and detailed process that should be followed to acquire tribal lands as identified below; otherwise, it will cause delay in the schedule and could force some parts of the project to stop in order to acquire the tribal lands.

> *"An application should be submitted directly to the Bureau of Indian Affairs, Washington, D.C., for right of way across tribal lands or individually owned lands held in trust by the United States or encumbered by Federal restrictions. All other lands held by the Bureau of Indian Affairs are transferred under 23 U.S.C. 107(d); 23 U.S.C. 317." (GDOT 2015a, External Right of Way Manual, Section 8.9.D.4)*

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

- Project managers should note that if one or more descriptions in a deed cannot be identified, the document should be coded against the public interest determination (PID) designated for this purpose (the Dummy PID) for the county, indicating the description numbers.
- Project managers should include at least 30 days on the schedule for SAAG negotiations after the document has been reviewed.
- Project managers should follow up to learn when the Assessed Account is identified. The project manager should, then, send the relevant information to the Assessment Office for manual ownership change.
- Project managers should make sure the Condemnation Valuation Expert Witness Procurement Process is followed as below:

    1. *"If the determination is yes for any specific service provider, SAAG will request updated report(s). The request should include a Scope of Work Agreement and should include an estimate for the anticipated number of hours for meetings, depositions, trial preparation, and testimony, etc., as determined by the SAAG." (GDOT 2015a, External Right of Way Manual, Section 5.10.I)*
    2. *"If the determination is no and a different service provider is desired, the SAAG should send a recommendation letter to the Right of Way Administrator outlining the following:*

- *Reason(s) why a different or additional appraiser or other specialty service provider is necessary; and*
- *List three (3) recommendations for the service provider desired in specific area of expertise." (GDOT 2015a, External Right of Way Manual, Section 5.10.I)*

3. *"The Right of Way Administrator will prepare a letter of concurrence or provide additional information that could include alternative suggestions. If necessary, Right of Way Administrator will contact the SAAG for further discussions." (GDOT 2015a, External Right of Way Manual, Section 5.10.I)*
4. *"Upon receipt of concurrence or receipt of other possible suggestions from the Right of Way Administrator, SAAG will send request for fee quote for services to the three (3) alternate service providers." (GDOT 2015a, External Right of Way Manual, Section 5.10.I)*
5. *"Upon receipt of quotes SAAG will submit to Condemnation Coordinator along with their recommendation of which parties to engage for services." (GDOT 2015a, External Right of Way Manual, Section 5.10.I)*

3.2.1.11. Displacements anticipated

- Project managers should follow up and ensure that GDOT's annual property acquisition and displacement report is prepared in a timely manner and is available for public access. This enables the PM to plan in advance for displacement to prevent or at least lighten the effect of displacement on the schedule.

  > *"GDOT will submit a report of its real property acquisition and displacement activities annually. This report will be prepared by the General Office and will be submitted to Federal Highway Administration. The annual period will begin with the report for the period covering from October 1 to September 30 (example: October 1, 2008 till September 30, 2009)." (GDOT 2015a, External Right of Way Manual, Section 11.36.D.1)*

- Project managers should take it into consideration that sometimes in displacement situations GDOT should consider purchasing the entire residential property even if a fraction of the property is needed as the ROW for the project.

  > *"If the partial acquisition of a residential property causes the displacement of the owner occupant and the remainder is buildable residential lot, GDOT may elect to offer to purchase the entire property. If an offer is made and the owner refuses to sell the remainder, then the fair market value of the remainder will be added to the acquisition price of the subject parcel for purposes of computing*

the replacement housing payment." (GDOT 2015a, External Right of Way Manual, Section 11.12.B.3)

3.2.2. Access issues

3.2.2.1. Limited-access highway

- Project managers should know that every limited-access highway project should follow the following code:

  "condemnor now taken by condemnor for public use as right of way for a Limited Access Highway as defined under the Official Code of Georgia Annotated sections 32-6-110 thru 32-6-119 is as follows: Fee simple title to all the above described lands as shown colored yellow on the plat marked in Annex 1-A of the External Right-of-Way Manual and such access rights as may be required between the condemnees remaining real property and existing roads, streets or highways, intersecting or adjacent to the Limited Access Highway such access rights and lands being specifically delineated on Department of Transportation plats." (GDOT 2015a, External Right of Way Manual, Section 5.14.D.4.A)

3.2.2.2. Changed access for any parcels

- Project managers should be mindful of the scheduling requirements for handling changes in the ROW plans as summarized in the following areas.

1. Changes in the ROW width in interstate projects require prior FHWA authorization.

> *"Changes in the right of way affecting right of way width on Interstate projects, which have been previously approved, will require prior Federal Highway Administration authorization." (GDOT 2015a, External Right of Way Manual, Section 7.4.B)*

2. Changes in the ROW width of projects developed under certification acceptance require prior General Office approval.

> *"Changes to the right of way plans affecting right of way width of projects developed under Certification Acceptance require prior General Office approval. Such revisions on project developed under Certification Acceptance must have prior General Office approval." (GDOT 2015a, External Right of Way Manual, Section 7.4.B)*

3. Minor changes, such as changes in the names of property owners, still require sending notification to the FHWA.

> *"If only minor changes are made such as correcting an owner's name, the revised right of way plans should be forwarded to the Right of Way Plans and Engineering Unit for further handling. On Interstate projects, such minor changes will be forwarded to the Federal Highway Administration with the*

final submission." (GDOT 2015a, External Right of Way Manual, Section 7.4.B)

4. ROW changes will be added to the ROW plans but will need to be approved until the project certification is issued.

"On Certification Acceptance projects, they will be added to the right of way plans as received but will not be approved until the final project certification is issued." (GDOT 2015a, External Right of Way Manual, Section 7.4.B)

3.2.3. Constructability issues

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

- Project managers should visit the job site and list the above/underground obstructions in order to follow up with their owners to remove or relocate them from the right-of-way. The PM needs to consider that this might affect the schedule, so some time should be dedicated to it in the schedule.

"A Notice of Removal of Improvements will be issued if there are structures located within the required ROW." (GDOT 2015a, External Right of Way Manual, Section 5.12)

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

- Project managers should become familiar with the Department's Post-Construction Storm Water Design Guidelines on Drainage Design for Highways. The design efforts are led by the design phase leader.
- Project managers need to be in close contact with the design phase leader who prepares a Post-Construction Storm Water Report for submission to the Office of Design Policy and Support for review. The report should be provided after completing the preliminary drainage design and no later than submission with the request for PFPR.

> *"The Design Phase Leader should follow the Department's Post Construction Storm Water Design Guidelines as outlined in Chapter 10 of GDOT's Manual on Drainage Design for Highways and as shown in the MS4 PDP Process Chart. The Design Phase Leader will evaluate the project outfalls, determine any Outfall Level Exclusions (OLEs), analyze the feasibility of BMPs, sizing the BMPs, and prepare a Post-Construction Storm Water Report for submission to the Office of Design Policy and Support for review as soon as possible after completing the preliminary drainage design and no later than submission with the request for PFPR." (GDOT 2015a, External Right of Way Manual, Section 6.4)*

3.2.3.3. Safety risk related to easement during the construction phase

- Project managers should consider that prior to requesting the PFPR, preliminary ROW and easements must be set for the footprint of the project so that the project can be built and maintained to provide a safe roadside, such as the clear zone or intersection sight distance, and as applicable for utility relocation.

  > *"Initially, all easements will be designated as permanent (except for driveway easement). In rural areas or when the roadway construction requires high cut or fill, ROW and easement are generally set 10 feet outside of construction limits. In urban or other developed areas, ROW and easements will be set so that the project can be constructed while keeping impacts to properties (infrastructure) and environmental resources to a minimum. ROW plan data such as property owner's name, stations and offsets to property and ROW lines, required areas of need, and remainder for ROW and easements are not required at PFPR." (GDOT 2015a, External Right of Way Manual, Section 6.4.1)*

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

- Project managers need to follow up to determine whether a ROW is required for placement of traffic-control equipment and sight-distance triangles.

- Project managers should make sure that the acquisition process is considered for scheduling the project. Due to the possible complicated acquisition (coordination) process in this case, it might take longer than normal and will affect the schedule.

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

- Project managers should take steps to ensure that the design phase leader makes the best effort to design the project in a way to accommodate all new structures in the existing ROW for the utilities to prevent any additional easement.
- Project managers should review the utility plans to make sure all required easements are acquired.

  > *"The utility plans are used as the primary tool to identify and resolve utility related conflicts/issues prior to beginning the construction of projects." (GDOT 2015a, External Right of Way Manual, Section 6.4.3)*

- Project managers also need to review the right-of-way plans to ensure all required easements are acquired.

  > *"Right of Way Plans provide a direct vertical/aerial view, and include the existing right of way, proposed required right of way, and/or easement areas, as well as other pertinent information." (GDOT 2015a, External Right of Way Manual, Section 4.8.E)*

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

3.2.4.1. Coordination delay

- Project management and pre-acquisition coordination: When the acquisition manager receives the project assignment from the General Office Acquisition Unit, the Office of ROW needs to follow up with several activities for coordination. During project management and pre-acquisition coordination, the Office of ROW should follow up with an outline of major pre-negotiation activities, including: (1) preparing a detailed cost estimate for funding, (2) meeting with the project attorney, (3) providing an Ownership Verification Form, (4) signing the required ROW plans, (5) conducting the Owner Information Meeting, (6) requesting a cost estimate review with the review appraiser, (7) conducting a Pre-Bid Meeting with the appraisers, (8) taking care of relocation/property management, (9) reviewing ROW plans prior to plan approval, and (10) identifying utilities and ensuring they are spotted on the ROW plans.
- During the utility coordination, both the Offices of Utilities and ROW should follow up with these listed procedures: (1) acquisition of parcels with prior rights, (2) acquisition of parcels with reserved rights, (3) acquisition of Georgia power company–owned parcels, (4) condemnation, and (5) ensuring the utilities are added to the easements on the ROW plans. The utilities and ROW coordination meeting are an appropriate strategy to resolve any outstanding issues that can delay the project.

"The Utilities and Right of Way Coordination Meeting is designed to help each section avoid costly and timely project delays. This meeting becomes most beneficial when held early in the pre-acquisition phase. All utility related issues should be identified and addressed at this time." (GDOT 2015a, External Right of Way Manual, Section 13.2).

"District Right of Way Office and the District Utility Office should hold a coordination meeting early in the pre-acquisition phase of a project; preferably before Preliminary Field Plan Review. All utility relocation and acquisition issues should be defined and coordinated at a District level prior to seeking assistance from the General Office. The disposition of existing utilities within the project limits should be defined in the pre-acquisition phase of a project." (GDOT 2015a, External Right of Way Manual, Section 13)

3.2.4.2. Late data/deliverables

- Project managers are responsible for leading efforts in the project development process. The PM needs to ensure that different parties do not use delay in receiving some input data as a common excuse for not completing their work on time. Whenever possible, work should be carried out on as many aspects of the task as possible, even though some information and data may not be available to complete the entire task. This issue is critical, especially in managing the consultant's and contractor's works. Essentially, the PM needs to strive to

minimize the ripple effect of the delay throughout the project development process.

> *"Delays in providing some of the data or information should NOT completely prohibit the production of reports. However, incomplete reports should not be submitted for review, unless approved by the Appraisal and Review Manager. If a contractor has completed a report except for certain information that has not been provided due to delays beyond their control, payment of invoices for work completed may be considered by the Appraisal and Review Manager." (GDOT 2015a, External Right of Way Manual, Section 4.8.G.1)*

- Project managers can expedite the coordination to make sure the data and deliverables are not submitted late.
- Project managers should make sure that the right-of-way coordination meeting is held regularly because it is designed to assist different parties to avoid timely and costly project delays. This meeting becomes most beneficial when held early in the pre-acquisition phase.

3.2.4.3. Inaccurate/incomplete data

- Project managers are responsible to update any comments regarding all project activities that are incomplete, late, and inaccurate. The project manager's review should be conducted three weeks prior to the district project review meeting (GDOT 2015a, *External Right of Way Manual,* Section 4.7.1).

- Complete data and documentation is especially needed to complete preliminary ROW cost estimates to ensure there are no funding delays at the time of ROW authorization.
- Project managers should be good gate keepers and not let delay in providing some information be used as the reason for not starting the production process of the report.

> *"Delays in providing some of the data should NOT completely prohibit the production of reports. However, incomplete reports should not be submitted for review." (GDOT 2015a, External Right of Way Manual, Section 4.7.1)*

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

- Project managers are responsible for contacting all involved parties to ensure that the necessary information and plans are received at least four weeks before the final field plan review (FFPR) date.

> *"Provide and ensure the appropriate sets of plans and special provisions are received by the FFPR Team at least four (4) weeks prior to the anticipated FFPR date." (GDOT 2015a, External Right of Way Manual, Section 7.5.3)*

- Project managers should follow up with the FFPR team to ensure that all meeting participants are thoroughly familiar with the project through reviewing the plans

and specifications and providing feedback on the accuracy of the data to the Office of Engineering Services prior to the FFPR date.

> *"FFPR Team members are expected to be familiar with the project, having reviewed the plans and specifications prior to the meeting, and are expected to provide meaningful written comments to the Office of Engineering Services no later than three (3) business days prior to the review. "(GDOT 2015a, External Right of Way Manual, Section 7.5.3)*

- Project managers should take the lead if it is recognized that there are any unrealistic projected dates for completion of the right-of-way acquisition process. The PM should intervene early to avoid further complications.

> *"It is critical that all these remaining problems be identified and resolved early to avoid costly amendments during advertisement and supplemental agreements on construction." (GDOT 2015a, External Right of Way Manual, Section 7.5.3)*

- Project managers should have access to the latest status of ROW negotiations with property owners, including the signed options and commitments made to them.

> *"The ROW representative will discuss signed options, special conditions negotiated with the property owners, and commitments made to date. Commitments made to property owners and contained in the options will be addressed: including the disposition of privately owned utility facilities, septic tanks, drain fields, and well and water*

systems." (GDOT 2015a, External Right of Way Manual, Section 7.5.3)

- Project managers should identify the Office of ROW representative who should be considered as the focal point of contact regarding the latest status of the ROW process, as well as any problems related to meeting the anticipated completion dates for the ROW process.

  "The ROW representative will address the status of the acquisition, the projected date of completion of ROW acquisition, problems encountered during ROW acquisition, review the plans for inclusion of temporary easement expiration dates, and review the status of requested plan modifications and any condemnations." (GDOT 2015a, External Right of Way Manual, Section 7.5.3)

3.2.4.5. Delay in acquisition due to design change

- Project managers need to recognize that the ROW plans can be developed only after all the comments are addressed on the preliminary design.

  "After PFPR comments have been addressed and corrected on the preliminary design, ROW plans can be created using the criteria listed in the Plan Presentation Guide (PPG) for ROW plans." (GDOT 2015a, External Right of Way Manual, Section 6.4.1)

- Project managers need to ensure that the ROW plans are submitted to the Office of Environmental Services in a timely manner to prevent any delay in the project.

"ROW Plans should be submitted to the ROW office for review and approval and to the office of Environmental Services for NEPA certification early in order to prevent any delay in the project." (GDOT 2015a, External Right of Way Manual, Section 6.4.1)

- Project managers need to know that it is recommended that no design changes can be made in lieu of the completion of the environmental document.

  "No design changes should be made at that point in lieu of the completion of the environmental document." (GDOT 2015a, External Right of Way Manual, Section 6.4.1)

- Project managers should consider also that after the PFPR comments are addressed and corrected on the preliminary design, ROW plans can be created using the criteria listed in the *Plan Presentation Guide* (PPG) for ROW plans. (GDOT 2017b, Rev 2.8)

  "No design changes should be made at that point in lieu of the completion of the environmental document. ROW Plans should be submitted to the ROW Office for review and approval and to the Office of Environmental Services for NEPA certification." (GDOT 2015a, External Right of Way Manual, Section 6.4.1)

- Project managers should also consider that design changes may add additional time needed for acquisition and adjust the schedule accordingly.

3.2.4.6. Delay in condemnation process

- The project manager should be aware of the coordination needed to secure the different types of witnesses or experts needed to testify in court proceedings.
- The condemnation request is initiated by the district acquisition manager or the Department's consultant. Following the recommendation of the state ROW administrator, the commissioner formally approves the actual condemnation proceedings. The PM should be aware of multiple steps involved in the condemnation process as follows.

  > *"The District Acquisition Manager or Consultant formally recommends all condemnation proceedings to the General Office. If condemnation is determined advisable, they are submitted to the Condemnation Preparation Section for action. Actual condemnation proceedings must be formally approved by the Commissioner of the Department of Transportation on the recommendation of the State Right of Way Administrator." (GDOT 2015a, External Right of Way Manual, Section 5.14)*
  >
  > *"All direct condemnations by the Department are conducted by an Assistant Attorney General on the regular staff of the State Law Department or specially employed Assistant Attorney Generals who are contracted for and under the supervision of the State Law Department." (GDOT 2015a, External Right of Way Manual, Section 5.14)*

3.2.4.7. Expired temporary construction easements

There are several examples of language in clauses used for expiration of temporary easement that project managers need to pay attention to and be cautious about. Generally, the PM should be proactive and help the project avoid this issue. There are three types of temporary easement that should be effectively utilized in managing the easement issues during the construction phase of the project:

- Temporary Slope Easement:

  > *"A temporary easement is condemned for the right to construct a slope to connect the newly constructed road and right-of-way to the condemnees' remaining lands. Said easement will expire on and is shown colored green on the above-mentioned plat. Upon completion of the project, the condemnee shall have the right to use the slope easement area in accordance with applicable zoning restrictions, and the condemner will cease maintenance of the slope easement area." (GDOT 2015a, External Right of Way Manual, Section 5.14.E)*

- Temporary Driveway Easement:

  > *"A temporary easement is condemned for the right to construct a driveway to connect the newly constructed road and right of way to the condemners' remaining lands for driveway purposes. Said easement will expire on and is shown colored orange on the above-mentioned plat. Upon completion of the project, the driveway will*

remain in place for use by the condemnees." (GDOT 2015a, External Right of Way Manual, Section 5.14.E)

- Temporary Fence Easement:

  "A temporary easement is condemned for the right to construct a fence. Said easement will expire on and is shown colored green on the above-mentioned plat. Upon completion of the project, the condemnee shall have the right to use the easement area in accordance with the applicable zoning restrictions, and the condemner will cease maintenance of the easement area." (GDOT 2015a, External Right of Way Manual, Section 5.14.E)

3.2.4.8. Project funding and donations available

- Project managers should understand that on federal- and state-funded projects the donation from a property owner before the ROW funding authorization is completed can only be accepted if initiated by the property owner and not solicited by the Department.

  "If federal or state funds will be used to acquire or reimburse the cost of right of way, the Department and Local Government Agencies may accept donations from a property owner prior to Right of Way Funding Authorization only if the donation is initiated by the property owner and not solicited by the agency." (GDOT 2015a, External Right of Way Manual, Section 5.13.A)

- Project managers should consider that on federal- or state-funded projects the solicitation of property donations can be initiated after ROW funding authorization is finalized.

  "If federal or state funds will be used to acquire or reimburse the cost of right of way, the Department and Local Governmental Agencies may solicit and accept donations from a property owner after Right of Way Funding Authorization only if a preliminary project right of way cost estimate is completed and documented in the project file. A written appraisal is not required prior to the solicitation of property donations." (GDOT 2015a, External Right of Way Manual, Section 5.13. B)

- Project managers should note that on 100% locally funded projects the solicitation of donations can be initiated once environmental documents and right-of-way plans are completed.

  "If 100% local funds is used to acquire right of way with no federal or state reimbursement but Preliminary Engineering and/or Construction costs will be reimbursed by federal and/or state funds, the above conditions still apply. The solicitation of donations may be initiated following the approval of both the environmental document and the right of way plans." (GDOT 2015a, External Right of Way Manual, Section 5.13.C)

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 the 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. Office of Strategic Communication Issues

3.3.2.1. Occurrence of a communication crisis

- Many communication risks could be mitigated by direct communication with the target audience. Effective communication is an art as much it is a science. There are special considerations that are particularly useful for the project manager to understand and follow to ensure that language, culture, access, and economic barriers are addressed when project information exchange is needed with traditionally underserved (e.g., limited English proficiency, disabled, low-income) communities. For instance, the *Public Involvement Plan for NEPA Projects 2016* provides specific techniques to address English, culture, access, and economic barriers as follow:

> • *"Identify a few key community influencers who may be willing and able to partner in outreach efforts.*
>
> • *Partner with minority organizations/associations and Chambers of Commerce.*
>
> • *Adjust meeting dates, times and locations to fit the work schedules and/or cultural behaviors of the affected community. For example, be mindful of religious and other holidays and dress codes that would impact how successfully project information will be received."*
> *(GDOT 2016b, Public Involvement Plan, Section 6.6, Addressing Traditionally Underserved Communities, p. 45)*

- Most often, disputes are negotiable if proper strategies and tools are taken at appropriate points of time. It would be helpful for the PM to be aware of what techniques can be used and how to use them strategically at the appropriate time. General media outreach (e.g., radio, newspaper, television, etc.), public information materials (e.g., brochures, fact sheets, flyers, etc.), social media and official website (e.g., Facebook, Twitter, GDOT website, etc.), and visuals (e.g., PowerPoint presentations, animations, videos, virtual reality, etc.) are frequently used news dissemination methods. To maximize the effects of these tools and to receive as much public feedback as possible, the PM is advised to seek opportunities to strategically apply reasonable supporting methods, such as holding editorial board meetings with news reporters and editors before news release as a forum for reporters' questions and comments on issues of great interest and impact, and giving follow-up calls to reporters to ensure that they

received the release and to ensure that all their questions are answered after the meeting.

- The OSC oversees providing communication strategy and service by way of contacts with traditional media, running social media accounts, assisting with speeches and presentations, and giving tutoring lectures and brochures. Members of the communications team have their own specific communications obligations whose outcomes undergird core responsibilities of the corresponding office in the project development and delivery process. Relevant details are demonstrated in *PIP,* Section 3.3, "General Descriptions of Project Team Office Roles and Responsibilities in Public Involvement," p. 11–14, and are summarized as follows:
    - Office of Planning seeks extensive public involvement in the way of developing a public-accepted statewide and/or state transportation plan
    - Office of Planning creates initial schedules that include public meetings such as Public Information Open Houses (PIOH) and Public Hearing Open Houses (PHOH) for PMs to access feedback from the public
    - Office of Roadway Design/design phase leader develops project conceptual displays that are discussed at the concept team meetings, PIOHs, and PHOHs
    - Office of Program Delivery (OPD) coordinates project development and delivery with Department offices, metropolitan planning organizations (MPOs), local government, business and community stakeholders, and other state and federal agencies

- Office of Environmental Services provides professional support and expertise to GDOT project team members regarding NEPA and GEPA requirements in the process of public involvement
- Office of Innovative Delivery coordinates the respective innovative project development similar to OPD, and is in charge of similar communication issues as OPD
- Office of Right-of-Way is required to provide the information the public needs, and to respond to questions and concerns during the process
- District Planning and District Preconstruction staff help in communication by providing the public meetings with local community information and necessary services, such as language translation and documenting the number of attendees

These obligations illustrate that helping members in other offices effectively perform their public communication responsibilities is a method to proactively avoid communication crisis.

- As a coordinator, the project manager is advised to continually follow up on the project development, making every effort to prevent a communication crisis from happening. When crisis happens, familiarity of the PM with workflow and communication techniques becomes crucial. Particularly, it would be helpful for the PM to be familiar with: (a) specific obligation allocations among offices (as illustrated in the last bullet point summary); and (b) public involvement activities (PIA) by project development phases:

- Office of Planning works with federal and state agencies, MPOs, and local governments in the planning phase for public involvement for the Statewide Transportation Plan (SWTP), and public involvement for the Statewide Transportation Improvement Plan (STIP).
- During the design phase, GDOT's Division of Engineering conducts several public involvement activities and meetings with local governments and the general public to offer the public a forum to learn about and to get further involved in the project development process. PIA comprises initial concept meetings, context-sensitive design/solutions, identifying project stakeholders, Citizens Advisory Committee meetings, and creating visualizations.
- Public involvement activities are most extensive during the environmental assessment (i.e., NEPA) phase. Preparing environmental documents, determining an appropriate level of public involvement, creating project-specific PIP, and preparing and holding formal/informal public meetings (e.g., PIOH and PHOH) are components of OES's professional support to and expertise in GDOT's project team.
- The right-of-way phase is a critical time for effective public involvement, in which property owners must receive communication early and often in order to best convey their rights. The property owners' meeting is a common public involvement approach.
- Whenever a design–build or P3 method is applied, some meetings for reaching the public during preparation of the request for proposal (RFP)

package and during project delivery method may be held, such as a kickoff meeting, MPO meetings, industry forums, public information meetings, etc.

    - Cooperating with the district construction project engineer and others in the district, the project team holds transition meetings and preconstruction meetings to evaluate the construction's impact on utilities and traffic during the construction phase. Project team members should consider also being physically in the field to distribute flyers and receive public input face-to-face.

- In the phase of operation and maintenance, PIA includes the use of overhead roadway dynamic message systems (e.g., Real Time Traffic Information: NaviGAtor/511) and District Communications' press releases on upcoming lane closures. Extensive outreach such as holding community meetings and flyer distribution to the public in proximity to the project is occasionally necessary, e.g., when the Department installs new flashing yellow arrow signals statewide.

  Details of the bullet point summary are available in *PIP*, Chapter 4, "Georgia DOT's Public Involvement Activities by Development Phase," p. 15–38.

- Project managers are urged to work with the communications team continually to deliver consistent information, as well as to make full use of the resources of OSC. Furthermore, coordination with public involvement consultants is necessary to ensure that promotional materials produced on behalf of GDOT have high quality and appropriate design and meet the editorial standards of the agency.

- Depending on the size, scope, and complexity of the project, OES decides whether the project requires a stand-alone public involvement plan to reach out to all stakeholders and to address their input regarding the project development process.

> *"The size, scope and complexity of a project will guide OES in an early determination of whether a project will need a stand-alone PIP (Public Involvement Plan) to best reach and gather input from the project stakeholders and the general public." (GDOT 2016b, PIP, p. 22)*

3.3.2.2. Information not delivered to the targeted audiences

- The district communications officer needs to assist in determining the best ways to reach residents, businesses, commuters, school districts, first respondents, transit agencies, and other stakeholders that may be affected by the project development news. For example, news on a planned detour due to construction should be effectively released to the public prior to the road closure.
- The crux of strategies for effectively contacting the underserved community is showing respect and care in easily accepted ways for target communities. Face-to-face outreach and utilizing minority media are excellent solutions. The *PIP* touches on that on p. 45, as follows:

> *• "Targeted focus on minority media outlets, ensuring that they are receiving press releases and advisories in a timely manner, and will cover project activities;*

• Include minority media in the paid advertising schedule; …"

(GDOT 2016b, PIP, Section 6.6, Special Outreach Activities, p. 45)

- While an open house can be an effective format to obtain public input on upcoming projects, there may be other public outreach tools at the disposal of OSC that are more effective means of reaching the target audience. Normally, more than one involvement tool should be considered to achieve the widest possible outreach. The following tools and techniques are recommended to support federally required public outreach activities for GDOT projects:
    - General Media Outreach

      This outreach refers to disseminating information through general media across the state, including television, radio, newspapers, and their respective online presences. General media outreach provides the widest coverage with the highest cost and is especially effective in reaching senior citizens.

    - Public Information Materials

      Public information materials include brochures, fact sheets, and other professional documents that contain clear, nontechnical descriptions without jargon, providing summarized information on the project for the public. These materials provide "to-person" outreach, helping communication officers precisely grasp details on the amount and geographic distribution of information receivers. This communication

approach is not the most applicable method for large populations and is costly.

- GDOT Website and GDOT Social Media Channels

  GDOT should consider effectively utilizing its own website, www.dot.ga.gov, and its Facebook, Twitter, and YouTube channels for enhanced communication with the target audience. The GDOT website and its social media channels have powerful influences, especially when the monetary resource for communication is limited. The effectiveness of social media tools is a function of the attention that the GDOT official website/social media accounts have received; news on these media platforms spreads quickly and tends to be disseminated among acquaintances.

- Visuals

  Visual depictions such as maps, videos, and animations are powerful tools in gaining public understanding of complex and/or innovative projects. Visuals can be applicable in all three kinds of media, for example, it is helpful to add maps on print materials to illustrate the construction-affected region, or to upload animations to the Internet to explain the detour plan. Iowa DOT's use of virtual reality (VR) as a communication tool for informing stakeholders and community outreach on complex projects is another meaningful reference for GDOT.

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

- Three mitigation strategies are recommended to address this risk:

    1. Have one voice

       Whether each office is performing its own communication obligations or is centralizing public involvement tasks to OSC, members in departmental offices are suggested to closely work with staff in OSC to unify the statement, with the help of professional instruction and elaborated documentation. A similar suggestion is given to GDOT consultants. In the process of their interactions with the public, consultants are expected to provide appropriate design and promotional materials produced on GDOT's behalf in accordance with editorial standards.

    2. Train the spokesperson

       GDOT's *PIP* provides very useful training material (GDOT 2016b). In addition, FHWA, the National Highway Institute (NHI), the Transportation Research Board (TRB), and other agencies/organizations provide an abundance of resources for public involvement practitioners.

    3. Grasp major concerns of stakeholders

       With a mass of information to be released, only that associated with the core interest and major concern of the target audience plays the most critical, decisive role in effective communication. Early in the project planning phase, the project team should consider identifying: (1) who

would be part of public involvement, (2) what are their respective roles in the process, (3) what is the extent of the public participation, and (4) what are the core concerns of different public participants. The expectation at the early project development phase may differ from actual conditions, so timely update is necessary.

- Evaluating public involvement based on the completion ratio of objectives and feedback from the public helps the communication team detect misinformation that may require that officers spend more time to remedy it. GDOT uses both quantitative and qualitative methods to evaluate the effectiveness of public involvements:

    - *"Quantitative Measures*

        1. *Attendance, including number attended and number in attendance previously at this location (if applicable).*
        2. *Requests to* add *to mailing list.*
        3. *Calls to toll free number.*
        4. *Website hits, Facebook and Twitter followers.*
        5. *Evaluation of advertising participation and responses—legal notice, press release, flyers, newsletters, invitations, road signs, surveys.*
        6. *Listing of articles and the various publications where they appeared.*

• *Qualitative Measures*

7. *Survey participants on their preferences concerning:*

    • *Overall anecdotal thoughts of the activity.*

    • *Timing of public involvement.*

    • *Method and how often contact is made.*

    • *Public's opinion on whether or not their involvement was meaningful.*

    • *Meeting convenience: time, place, transit accessible.*

    • *Meeting format and effectiveness of communication tools.*

    • *What improvements could be made?*

8. *Survey selected staff concerning:*

    • *Impressions of questions/comments on event location and timing.*

    • *Impressions on attendance.*

    • *Impressions on tone of the meeting:*

        - *Did the format meet expectations?*

        - *Were questions/comments relevant/focused?*

        - *Was outreach tailored to specific community needs?*

        - *Were participants able to overcome their self-interest and work toward an overall solution?*

9. *Demonstrate integration of concerns and document where public involvement impacts the project.*
10. *Document all feedback and identify issues for future meetings." (GDOT 2016b, PIP, p. 48)*

3.3.2.4. Stakeholders' complaints

- Project managers should learn to understand the public opinion/public sentiment beforehand, using proactive planning to facilitate more opportunities to encourage the public, especially those traditionally underserved Georgians in identifying and addressing transportation issues. These endeavors foster improved two-way communication and trust between GDOT and its customers and help to develop better products and services that not only address problems but also promote a better quality of life in Georgia.
- Reaction to disputes should be strategic. Collecting and analyzing complaints, replying to the public, and follow-ups are important activities that are recommended to be performed to address the risk of stakeholders' complaints.
- The *PIP* introduces practice-confirmed, effective tools for collecting feedback on information dissemination on p. 43–46, including traditional media, public information materials, animations and videos, online resources, and some emerging technologies:

  "Electronic town hall meetings allow large amounts of people to participate from their homes. Typically done through a local cable channel broadcast a presentation and a panel is available to answer

questions that the community will submit by phone or web." (GDOT 2016b, PIP, p. 46)

The *PIP* also includes associated communication strategies such as preparation for the public meetings, and how to overcome lack of trust:

"Consider that Project Teams may have to address and overcome some lack of trust—and even fear—as it relates to government representatives during ROW discussions. Continuity and regard for cultural differences and communication in the appropriate language will help in these difficult situations." (GDOT 2016b, PIP, p. 45)

3.3.2.5. Scope change

- Despite efforts to keep the original project scope, there might be some factors, such as funding issues and design revisions that can trigger changes in the project scope. Project managers should be as much familiar as possible with the GDOT *PIP* to effectively introduce the change in project scope to the public (GDOT 2016b). In this way, the PM may be able to quickly design a public engagement action plan to respond to unavoidable scope changes. Timely introduction of the adjusted scope to the community is a proactive strategy to establish a productive relationship with key stakeholders that leads to less conflicts and complaints.
- An effective communication plan facilitates receiving the community's feedback on the project and is helpful to avoid later scope changes caused by failure in reaching alignment. The PM is strongly advised to be familiar with the following steps in a systematic public involvement process as outlined in the *PIP*:

- Identify goals

  "Each PIP should have goals identified allowing the Department to measure outcomes against stated objectives and goals. Identify achievable goals to either inform and educate; reach consensus or participate in decision-making process." (GDOT 2016b, PIP, p. 39)

- Identify stakeholders

  The *PIP* offers a list of common stakeholders, a list of resources to help identify uncommon stakeholders, a list of significant stakeholder agencies and organizations, and a list of basic factors to inform public involvement strategies to be considered for project-specific databases in (GDOT 2016b, *PIP*, p. 39–40).

- Define basic information items to inform the public

  Introduction of adequate information on the project to the public is an effective strategy to avoid any misrepresentations of project goals by non-official parties. The GDOT project manager needs to ensure that all the latest information about the project is effectively transmitted to the public and all questions from the community are addressed with enough details.

- Identify community concerns

  "These concerns about a proposed project can be generally categorized as:

• Potential negative environmental impacts, including concerns about increased traffic and air quality;

• Potential negative social impacts, including concerns about the integrity of existing community, cultural or recreational sites;

• Potential community conflict over the detriments/benefits of the project, like roadways medians; and/or

• Complex, unfamiliar projects like roundabouts, that are a barrier to informed public participation."

(GDOT 2016b, PIP, p. 41)

3.3.2.6. Having one message/voice (No distraction)

When project managers are closely coordinating with different offices, they will have an opportunity to better understand the importance of adhering to the single-voice communication policy. Each office should have a seat at the table to address challenging communication issues, as their inputs are critical for transmitting proper messages to the public. The best people to communicate with the public on a specific issue, e.g., a utility or a railroad (RR) issue, are officers with relevant expertise from corresponding offices. It is recommended that each office nominate and authorize staff acting as spokesperson(s). The PM should consider setting up and facilitating the selection of the spokespersons for different offices. This strategy is a good measure to help decrease discrepancies in project news release.

- The appointed spokespersons are expected to be familiar with both actual project conditions and regulatory rules of GDOT regarding news release. All public news release in whatever format should be recorded and filed. Appointed spokespersons are expected to work with the OSC on necessary training, and there are other training opportunities provided by FHWA, the NHI, the TRB, and other agencies/organizations. These training classes provide information on the most comprehensive and updated approaches to achieve meaningful public involvement, such as “Hear Every Voice!” and “Serve Every Customer!” Workshop and Resources.
- Identified spokespersons should consider the opportunity of addressing risk by working with OSC on new GDOT-branded collaterals. Brand collateral is the collection of media used to promote the brand and support the sales and marketing of a product or service. It is the tangible evidence of the brand, designed congruent with the brand’s core values and personality.

3.3.3. Office of Environmental Services Communication Issues

3.3.3.1. Anticipated long off-site detours

- An appropriate public outreach provides opportunities to learn about specific public concerns regarding the proposed detours for the project. Each collected concern should be incorporated as a part of assessing the viability of the proposed detour. The project manager is expected to prepare a notice of detour open house for the district office to be advertised in the local newspaper to inform the public at least 30 days prior to the road closure. Once the detour open house is held, the

PM should consider preparing a detour report, including information and recommendations on:

  - needs for the detour;
  - a cost comparison between an off-site detour versus an on-site detour; and
  - a summary of the results of the public information meeting.

- While an open house can be effective to obtain public response to detours, the district communications officer may help to identify other public outreach tools at the disposal of the OSC. The PM should take advantage of all tools in the communication toolbox to enhance the effectiveness of reaching the target audiences.

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

- Construction cannot be started unless there is a practical alternative described in the road-closure plan for the project. The lane-closure plan should be negotiated with stakeholders and especially providers of mission-critical public services. The final plan should be reasonable and understood by the service providers to avoid any major difficulty during the construction execution.
- Project managers should work with the project team early in the planning and design phase to eliminate hidden risks of arriving at an unreasonable alternative plan for handling lane-closure issues. If the plan is reasonable, the PM should consider reaching out to the local traffic administration office to inform the office about potential upcoming closures in the area. The PM should consider providing

a rough plan to the local traffic administration office to facilitate discussion and to receive comments and feedback from the community.

- As the project develops further, the project manager is expected to always keep local traffic administration offices informed with the latest updated information regarding the lane closure and alternative traffic plan. Once the final closure is prepared, the PM should consider contacting local traffic offices with detailed plan description, technical support information, suggested solutions for possible problems, and all required materials for detour approval and help with news release. The PM is advised to allocate enough time in the project schedule to complete all coordination tasks prior to the scheduled closure date.
- Project managers are expected to develop a good understanding of local traffic administration office operations on a day-to-day basis. The Georgia NaviGAtor/511 intelligent transportation system (ITS) is an effective tool that the PM could take advantage of in keeping the public informed about construction activities.

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

- Project managers should consider cooperating with local traffic administration agencies to provide a smooth traffic access to the construction site with sufficient road width and turning radius for safe operations and movements of large construction equipment. The PM should also consult with the Office of Construction to address any safety issues related to the project. Temporary traffic

guidance signs and traffic drums should be assigned when the road section is busy or has limited traveling space.

- Project managers should consider cooperating with local traffic administration agencies to establish an effective communication process to inform the public about necessary changes in traffic patterns. The earlier the coordination is started, the better the anticipated results could be. The Georgia NaviGAtor/511 ITS is an effective tool to inform the traveling public about construction-related news that affects the traffic patterns in project areas.

3.3.4. General Project Management Communication Issues

3.3.4.1. Noise-related issues

- Project managers should consider conducting an analysis with the project team to examine the necessity of building a noise barrier. If a noise barrier is determined to be needed, OES will conduct a noise barrier PIOH. The analysis also gives recommendations on participants to be invited, namely the residents and businesses impacted by project-generated noise. The process is in response to the federal regulation 23 CFR 772. For detailed information on 23 CFR 772, visit the website (FHWA 2010): https://www.ecfr.gov/cgi-bin/text-idx?SID=a521e833080ca6a18b6b4f7d7e82ae9e&mc=true&node=pt23.1.772&rgn=div5

  Project managers are recommended to reach out to identify participants (i.e., "benefited receptors") to invite them to the open house individually. Other

citizens attending the meeting may occasionally remark, yet the intent of these meetings is solely to collect inputs on decision-making from the benefited receptors. The *PIP* describes the responsibility of the project team in establishing necessary communications with the stakeholders affected by the noise during project construction:

> *"…prepared to provide information on the project in general in addition to the proposed location(s), height(s), and on occasion, the look and materials of the noise barriers. The date and time of the meeting will be scheduled to allow maximum participation. Information will be presented on aerial plots at a scale that readily conveys project details that are included in a meeting handout." (GDOT 2016b, PIP, p. 28)*

- In the execution of the project, project managers are expected to urge on-site teams to strictly obey relevant regulations and are expected to always be aware of local stakeholders' response to noise. The PM should consider holding a formal open house (with minutes) to collect input from the public and work together toward mitigating the problem, if necessary.

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

- Project managers should consider negotiating with the related railroad stakeholders to achieve an agreement on the work-hour plan. The PM can use the opportunity to meet with railroad officials to better understand the special

provisions required by railroad operations on dates and hours of construction work. Early engagement with the railroad corporation facilitates effective communication among the project team and railroad stakeholders.

- Project managers should be aware that sometimes the railroad stakeholders may recommend nighttime construction to avoid potential conflicts with railroad operations. This suggestion may be a good mitigation for handling railroad issues, but it may be not acceptable for other stakeholders, such as local businesses and residents, and hospitals, in terms of their concerns on noise. The PM should consider establishing a productive communication platform to achieve the best communication outcome during construction.

The *PIP* provides an assistance resource list to help identify stakeholders that are not easily pinpointed at first (e.g., the residents involved in this railroad operation problem):

> *"Resources to help identify stakeholders that are not common to every project which may include:*
>
> - *Environmental group organized*
> - *Groups in opposition to project*
> - *Online petition groups*
> - *Minority associations*
> - *Homeowners' associations*
> - *Local chambers of commerce and/or business groups*

- *Transportation Management Areas (TMAs) and/or Community Improvement Districts (CIDs)*
- *Tourism bureaus and/or local development authority*
- *Schools and colleges, including PTAs (parent-teacher associations) and alumni chapters*
- *Urban League chapters*
- *National Association for the Advancement of Colored People (NAACP) chapters*
- *Sororities, fraternities*
- *Social service agencies for the disabled, elderly, children, unemployed, etc.*
- *Asian American Resource Center*
- *Latin American Association*
- *Native American tribes*
- *Civic group chapters like Rotary, Kiwanis, Lions Club, Civitan Clubs" (GDOT 2016b, PDP, p, 39)*

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 (SMEs) with adequate resources and information so they can identify the utility facilities in the project vicinity. Several resources are summarized here to help PMs identify the existing utilities around the project areas early in the project initiation phase:

(1) Field Visit

The field visit is the very first step to learn what utilities exist in the project zone. Indeed, the project manager and the design phase leader will continually 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[1]

A GeoPI search is designed to help with locating any GDOT-related data or documentation, such as ROW plans, possible permits, etc. Also, its bridge tab is a helpful resource for finding information about bridge attachments by just having the bridge ID number.

[1] Materials in this section were retrieved from: http://www.dot.ga.gov/DS/Maps/geopi, accessed on 12/07/17.

More information about GeoPI and the instructions on how to use this tool can be derived from the Quick Reference Document at this address: 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 a great resource for future projects. It is recommended that the project manager contact the DUO subject-matter experts 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–Utility Meeting

A coordination meeting including Office of ROW and office of utilities personnel before the ROW appraisal phase is vital to coordinate the required ROW and easements and determine if there is any utility located in the ROW. This coordination meeting could save money and time by providing facts upfront instead of facing them later in the process. The Office of Right-of-Way is required to take a lead here 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 case 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 for 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

The final task here is identifying the utility owner and following up with them throughout the entire process. Note that 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 project manager and the GDOT Utilities Office early in the preliminary design stage to ascertain the required information to furnish the utility owner in order 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 must be involved

with all preliminary stages of the project in order to prevent any delay and cost overrun.

The above six resources are just the starting points to assist project managers with identifying risk issues and mitigating them. There could be many types of risks involved in every project. In this report, major risks are identified, and several strategies are 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 in dealing with them.

Table 1 shows the identified risk factors for GDOT Utilities Offices. Risk factors are categorized under six 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 shown in the table. This 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

Utility Category	Risk Factors	Scope	Schedule	Budget
Railroad Issues	Project in proximity to active or inactive Class I/short line RR property	*	*	*
	RR owner identified	*		
	RR work windows/restrictions/curfew times	*	*	*

Utility Category	Risk Factors	Scope	Schedule	Budget
Railroad Issues	High-volume train traffic (day & night)	*	*	
	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		*	
Electric Distribution/ Transmission Issues	Relocation required	*	*	*
	Seasonal outage window required	*	*	
	Substation	*	*	*
	Easements/private easement	*	*	*
	Duct bank/vaults/manholes	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	Service points	*	*	*
	Lighting	*	*	*
	PID	*	*	*
Telecom Issues	Relocation required	*	*	*
	Subscriber loop carrier/cable/TV	*		
	Fiber optic	*		
	Antennas			
	Duct bank/vaults/manholes	*	*	*
	Easement/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*

Utility Category	Risk Factors	Scope	Schedule	Budget
Telecom Issues	PID	*	*	*
Water/Sanitary Sewer Issues	Relocation required	*	*	*
	Vaults/manholes	*	*	*
	Pumping station/lift station	*	*	*
	Easements/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	PID	*	*	*
	Utility aid (To fund Utility Owners in Special Projects)	*	*	*
Petroleum Pipelines/Natural Gas Issues	Major lines present/natural gas	*	*	*
	Easements/private easement	*	*	*
	Reimbursement	*		*
	Early authorization	*	*	*
	PID	*	*	*
Other Factors	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

- Project managers can consult with the District Utilities Office liaison engineer and crossing manager to get preliminary utilities/railroad cost estimates to decide whether they should activate or inactivate a Class I/short line railroad.

  > *"The District Utilities Office Railroad Liaison Engineer and Railroad Crossing Manager will also update this cost estimate into the required field in TPRO." (GDOT 2016a, PDP, p. 5-14, 4th paragraph)*

- Project managers need to coordinate with the railroads and the utilities companies to get the latest information about their plans to make future improvements on their facilities. This knowledge is critical for PMs to avoid any conflict in scheduling the project sequence.

  > *"It would be desirable to know at this time if any of the utilities or railroad owners plan to install any new or upgrades to their facilities/railways within the life of the project." (GDOT 2016a, PDP, p. 5-14, 4th paragraph)*

- Project managers should coordinate with utilities and offices of right-of-way to determine if there is any need to identify Class I/short line railroads.
- Project managers should consult with the DUO to identify the best possible mitigation strategies.

3.4.2.2. RR owner identified

- Project managers should consult with the DUO, railroad liaison engineer, or railroad crossing manager to find the owner of the RR.
- Project managers can refer to the previous projects' documents to identify the RR owner. The cost estimates provided by the railroad crossing manager and office liaison engineer should include the names of all the utility companies and railroad owners, both public and private.

3.4.2.3. RR work windows/restrictions/curfew times

- Project managers should consult and coordinate with the railroad's representative to see if there are any work windows, restrictions, or curfew times.
- Project managers should follow up with the Office of Utilities' subject-matter experts to make sure they arrange and perform the work in a way that there will be no interference between railroad operation timeframes, including train, signal, and communication services, or damage to the facilities or tenants on the Department-owned railroad right-of-way.
- Whenever work is likely to affect the operation timeframe, the method of doing such work should first be submitted to the railroad representative for review and approval, but this type of approval should not relieve the utility from liability.
- Project managers should understand that the utility works will be delayed if the required flagging and inspection are not provided at the job site. This is a significant risk that should be mitigated with appropriate planning before the execution of the work.

"Any work to be performed by the Utility, which requires flagging and inspection by the Railroad shall be deferred by the Utility until the flagging and inspection required by the Railroad is available at the job site." (GDOT 2016c, Utility Accommodation Policy and Standards manual [UAM], Section 7.7.C)

3.4.2.4. High-volume train traffic (day and night)

- To start the process, project managers should visit the site and review the existing documents to verify the number of trains existing around the project area to be able to plan how many train owners are involved.
- Project managers should follow up and ensure that consideration has been given in the schedule for the case where the number of trains is higher than normal. In that scenario, the process of dealing with train traffic could be hectic and may impact the schedule.

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

- Project managers should visit the job site and coordinate with the DUO to determine whether a special provision is needed. For example, any special provisions that address any unique or unusual features related to the proposed required ROW, utility plans, or environmental issues, such as any experimental items or approved proprietary items, will be included. Failure to develop the proper special provisions related to the ROW, utilities, and railroads can cause

conflicts/issues prior to beginning the construction of a project (GDOT 2017a, *PDP*).

- There might be a situation in which a special provision was required and has been done but there is still a need to revise or add to it. Any additional expenses for design and construction are solely the responsibility of the utility companies and not the railroad or the state DOT.

  > *"If in the judgment of the Railroad railroad issues ative, or in his absence, the Department's Inspector/Area Engineer, such provision is insufficient, either may require or make revised or additional provisions, as he deems necessary. In any event, such revised or additional provisions shall be at the Utility's expense and without cost to the Railroad or the Department." (GDOT 2016c, UAM, Section 7.7.C)*

- Project managers should refer to "Utility Permit Special Provision for Protection of Railway Interests" (GDOT 2008) for assistance in finding special provisions that could help in projects; it can be retrieved from: http://www.dot.ga.gov/PartnerSmart/utilities/Documents/Utility%20Accommodation%20on%20DOT%20Owned%20Railroad%20RW.pdf.
- The project manager should consider that:

  > *"The Department's Standard Specifications, Section 647.3.03 Preparation, shall be followed. If there is a redesign in the plans or changes made by the Contractor, the Utility Owners will have 30 days for reengineering purposes. The Utility Owner shall submit a revised*

Work Plan (Utility Adjustment Schedule) in accordance with Section 4.4.B of Utilities Manual. Make-Ready worksheets may be used in conjunction with the UAS if warranted by the scope of the project." (GDOT 2016c, UAM, Section 4.7.C, p. 4-53)

3.4.2.6. At-grade crossing

- Project managers should coordinate with the railroad owner to prepare approval authority for working on the railroad crossing.
- The state utilities RR engineer may submit crossing safety projects where the conditions meet the criteria for programming. The PM should remember that railroad–highway crossing safety projects do not require concept meetings or reports except as necessary to document complexity.
- Project managers may request to review the appropriate items if the project is in proximity to (i.e., <200 feet) the existing crossing and impacts railroads and railroad right-of-way.
- To develop a meaningful concept, and reduce the need for later concept rework, any at-grade crossings may be incorporated into the concept layout and Concept Report. A valid concept addressing horizontal and vertical alignments is required in these cases.
- The District Utilities Office railroad liaison engineer and railroad crossing manager will assist the project manager by furnishing preliminary utilities/railroad cost estimates for the proposed project. These cost estimates should include the names of all the utility companies and railroad owners, both

public and private, having facilities/railways along or crossing the project and the type of facility present.

3.4.2.7. Underpass (road under RR)

- Project managers should visit the site and coordinate with the DUO and the Office of Bridge Design to determine whether there is an underpass in the project zone and, if so, what is the best solution and preferred location for relocation.
- Project managers need to coordinate with the District Utilities Office and Office of Bridge Design for obtaining agreements with the railroad company to have the right to use railroad right-of-way.
- Project managers need to know when an attachment is going to be made to the bridges over a railroad. The utility company is responsible for obtaining a written agreement from the railroad before the Department gives out an approval permit.

> *"Permit applications for any installation which will involve excavation within 10 feet of structures or walls or attachments to bridges shall be submitted to the appropriate District Utilities Office for review and recommendation. If recommended, the permit must have the approval of the State Bridge Office. Upon approval of the State Bridge Office, the permit will be forwarded to the District Engineer or State Utilities Engineer for final approval. When attachments are to be made to bridges over a railroad, the Utility shall obtain written concurrence from the Railroad before the Department will release an approved permit. See Section 5.7.C for additional*

information concerning controls for utilities near highway structures." (GDOT 2016c, UAM, Section 3.2.B.1, p. 3-4)

3.4.2.8. Overpass (road over RR)

- Project managers should visit the site and collaborate with the Office of Bridge Design to determine whether there is any RR crossing or parallel adjacent to the project area.
- Project managers should coordinate with the DUO for obtaining any permit that might be required for relocation or any other changes.
- Project managers are responsible for submitting the first plan submission to the Office of Utilities state railroad liaison to be utilized for railroad coordination as soon as preliminary bridge plans are complete.

  "Generally, this would be following the corrected PFPR plans." (GDOT 2016a, PDP, Section 6.4.4, p. 6-18)

- Project managers and the design phase leader should refer to the State Utilities Office website for the required Railroad Submittal checklist. It can be retrieved from: http://www.dot.ga.gov/PartnerSmart/utilities/Documents/Railroad/RailroadPlanSubmittalChecklist.pdf

  "It's required to be completed and included with all railroad coordination submittals." (GDOT 2016a, PDP, Section 6.4.4, p. 6-18)

- Project managers should address the first railroad submittal comments and submit the second plan to the Office of Utilities state railroad liaison to be utilized for railroad coordination as soon as final bridge plans are complete.

  > *"In no case will the second plan submission be performed before addressing the first railroad submittal comments." (GDOT 2016a, PDP, Section 7.4.4, p. 7-7)*

- Project managers should consider that in case of the need to cross the railroad, they can initiate an agreement with the railroad to establish the costs to get permission for crossing. Bridging over is another possible mitigation strategy. Changing the design to avoid crossing the RR is the last resort to be considered as an approach to deal with this risk so as to not impact the schedule and save money.
- Project managers should give priority attention to provide the preliminary roadway plans to the Office of Bridge Design for projects that involve any bridging of a railroad or a railroad bridge.

  > *"This is since the process of obtaining railroad approval of preliminary layouts impacting their facilities requires a long lead time." (GDOT 2016a, PDP, p. 6-22, 3rd paragraph)*

3.4.2.9. Adjacent (RR adjacent to property)

- Project managers are responsible for following up and coordinating with the Office of Right-of-Way if a property needs to be acquired for relocating a railroad track.
- Project managers should provide relocation assistance and incorporate the railroad track relocation tasks into the project schedule.

3.4.2.10. Error in cost estimates

- Project managers are responsible for creating and maintaining the project estimate file and notifying appropriate SMEs (roadway, bridge, or consultant) that pay items, quantities and unit costs need to be added or updated.

  > *"If an estimate file was not previously created by the Office of Planning during the initial programming of the project or during concept development, the Project Manager will create the project estimate file and notify the appropriate SME (roadway, bridge, or consultant) that pay items, quantities and unit costs need to be added or updated. The SME will enter the appropriate pay items, quantities and unit costs into the tool and return ownership to the Project Manager for submission to the Office of Engineering Services."*
  > *(GDOT 2016a, PDP, p. 6-25)*

- Project managers are responsible for requesting an updated utility cost estimate from the district utilities engineer.

"Whenever preliminary utility relocations are included in the design, updated plans should be submitted with the yearly requests." (GDOT 2016a, PDP, p. 6-25)

- Project managers should always contact each utility prior to the concept team meeting to ensure that each is aware of the general scope and nature of the Department project.

  "Project manager should also request that each submit a written response which includes a cost estimate and comments concerning potential impact to their facilities." (GDOT 2016c, UAM, p. 4-10)

- During the concept team meeting, project managers should present all utility impacts and respective cost estimates known to date.

  "Record any new impacts or project changes that may affect utilities." (GDOT 2016c, UAM, p. 4-1)

- Project managers should contact all of the involved utilities based on the outcome of the concept team meeting to update each one on the scope of work after the concept team meeting.

  "And also request that each submit a revised cost estimate and comments concerning potential impact to their facilities." (GDOT 2016c, UAM, p. 4-11)

3.4.2.11. Delay in agreement

- Project managers should consult and coordinate with District Utilities Office engineers to make sure that the utilities agreement is submitted on time with no delay to affect the project schedule.
- Project managers should anticipate the need for a utility agreement to avoid delaying the project.

> *"Utility Agreements are required on projects that involve a utility easement, utility ROW, or conflict with a utility that is claiming reimbursement via Prior Rights." (GDOT 2016a, PDP, Section 7.4.3, p. 7-7)*

- The district utilities engineer should coordinate with project managers and the State Utilities Office in the preliminary design stage to ensure the needed information is available to start negotiations for the utility agreement once there is an indication that such agreements are required.

> *"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. All utility agreements must be approved and signed before a project can be certified for letting." (GDOT 2016a, PDP, Section 7.4.3, p. 7-7)*

3.4.3. Electric distribution/transmission issues

3.4.3.1. Electric distribution/transmission relocation

- Project managers need to ask for crash assessment reports and an assessment of the risk for the utilities relocations from the GDOT utilities office. The PM should take the safety issue into account by looking at these historical crash records in the zone that the specific pole is located. The PM also must take into consideration that the relocation process should be reviewed by the District Utilities Office. This will only apply when poles are planned to stay, and a design variance/exception is being pursued.
- Project managers are responsible for following up with the design lead to make sure that the electric distribution/transmission relocations are included in the construction contracts. PMs should monitor the design progress to inform the design team about any changes that should be made relevant to the utility relocation plan.
- Project managers should consider the following possible solutions to this risk factor: widening the road to one side versus symmetrical, using joint traffic signal poles, and using curb and gutter to be able to reduce clear zone requirements.

3.4.3.2. Seasonal outage window for electric distribution/transmission

- Project managers should coordinate with project team members to determine the impacts of this electric distribution/transmission relocation on the proposed project schedule and scope.

- Project managers should coordinate with the District Utilities Office, Office of Right-of-Way, and Office of Environmental Services to discuss the opportunity to do an early authorization to allow this work to take place prior to the letting of the project or capitalize on the best seasonal outage timeframe. This coordination for identifying seasonal limits for utilities should be completed before the second submission plan.

3.4.3.3. Substation

- Project managers should conduct a "windshield review" and visit the site to determine if there is a substation around the project area. If there is, changing the road or project design is probably the best option to contend with this risk because it is almost impossible to move or remove a substation due to its high cost and required time.
- Project managers should coordinate with the District Utilities Office to acquire detailed information about the existing substation. This will help the Department to produce a better solution to mitigate the risk of this substation based on its features. The PM should remember that this information will be required only if the site will be impacted.
- Project managers should find the substation owner after the substation is identified. Substations may be owned and operated by an electrical utility or may be owned by a large industrial or commercial customer.
- If a substation is near the proposed project in a widening situation, the best option is to widen the road from the opposite side of the substation to avoid getting

closer to the substation. This could save time and money and keep safety in high regard.

3.4.3.4. Easement/private easement for electric distribution/transmission

- If additional ROW is needed to accommodate the need for electric distribution/transmission relocation work, project managers should know whether the utility intends to acquire its own ROW or easement or ask the Department to acquire the extra ROW. Each case has its own scheduling implications that should be considered by the PM.
- Project managers should make sure that the district utilities engineer is in close contact with the utilities owners regarding the acquisition of additional ROW to perform relocation tasks. The latest status of the ROW acquisition report should be communicated with the utilities owners monthly to inform them about when they can begin acquiring their own ROW or easement for their relocation works.

> *"If the Utility intends to acquire its own right-of-way or easement, it shall be the District Utilities Engineer's responsibility to ensure that the Department's monthly Right-of-Way Status Acquisition Reports be forwarded to such Utility as received from the State Right-of-Way Office. These reports are critical to ensure that the Utility can begin acquiring their required right-of-way or easement soon after the Department has completed its negotiations with each affected property owner." (GDOT 2016c, UAM, Section 4.1.C.5, p. 4-23)*

- Project managers should recognize that the cost of acquiring new right-of-way is substantially high. Therefore, an emphasis should be made on gaining maximum capacity and usage from existing highway corridors.
- Project managers should visit the job site to establish the necessity of additional easement by considering the type and size of utility work.
- Project managers need to coordinate with the DUO and Office of ROW to come to a decision on if additional easement is required for the proposed electrical distribution/transmission relocation and, if so, if it is temporary, permanent, or private easement. This should be done through the preliminary relocation plan phase and right-of-way utility meetings that occur before appraisals.

3.4.3.5. Duct bank/vaults/manholes for electric distribution/transmission

- Project managers should identify the presence of duct banks around the project area and verify whether the duct banks need to be relocated or removed from the project area. As removing or relocating a duct bank is a lengthy job, it should be considered in the schedule. In addition, finding a new line for the duct bank could be another challenge that impacts the schedule.
- Project managers should visit the site to verify if any duct bank is present. If there is difficulty in identifying the presence of duct banks, the PM needs to conduct a SUE investigation to find their exact location.

3.4.3.6. Reimbursement for electric distribution/transmission

- Project managers should be familiar with whether the electric distribution/transmission utility facility work is reimbursable or not. If the utilities are not reimbursable, they have a significant impact on the project budget. The conflict between the utility and the Department might be a lengthy process.
- Project managers should consider that if a claim is made for reimbursement, a Certificate of Eligibility for Utility Reimbursement must be completed. The PM needs to be aware of the requirements and the time commitments for the process. A utility reimbursement certificate can facilitate scheduling for the project that the PM should take advantage of to minimize the delay in the schedule.

  > *"The Utility will complete those portions which identify the specific facilities for which the claim is made and the date and circumstances under which the facilities were installed. Upon review and verification of the information provided by the Utility, the Department will assign the Case Number under which eligibility is established. This Certificate will be attached to and incorporated into the Utility Agreement executed for such reimbursement." (GDOT 2016c, UAM, Section 4.2.A.2)*

- If an electric distribution/transmission is eligible for reimbursement for the cost of relocation, project managers should make sure that appropriate coordination is in place with the utilities to avoid any delay in the acquisition of the required ROW and/or easement. Frequent and separate negotiations with property owners regarding the ROW issues can introduce a significant delay for the project. It is

critical from the scheduling standpoint that all the required ROW negotiations take place at the same time to avoid further disturbance to property owners and avoid any delay to the project schedule.

> *"When the Utility is entitled to reimbursement for the cost of acquisition of replacement right-of-way or easements, the Department will request permission from the Utility, which must be obtained in writing, to acquire necessary utility right-of-way or easements concurrently with its acquisition of the normal highway right-of-way." (GDOT 2016c, UAM, Section 4.1.C.6)*

- Project managers are responsible for verifying that the contracting of the reimbursable work adheres to GDOT's requirements, such as the methods of accomplishing the work.

> *"The contracting of reimbursable work by the Utility shall follow the requirements included in Section 4.2.D of Utilities Manual and in 23 CFR 645, Subpart A, and shall be adhered to for all State projects regardless of funding source. If reimbursable by the Department, the method of accomplishing the work will be stated in the estimate supporting the agreement and written approval of the Department's State Utilities Engineer will be required for any change thereof." (GDOT 2016c, UAM, Section 4.0.A.3)*

- Project managers should ensure that the necessary utility agreements are in place for projects that involve a utility easement, utility ROW, or conflict with a utility

that might claim reimbursement through "prior rights." Without the required agreements there is a high probability of significant delay in the project schedule.

> *"The need for a utility agreement must be anticipated to avoid delaying the project." (GDOT 2016a, PDP, Section 7.4.3)*

- Project managers should note that the work may begin on a project only after GDOT has fully executed all applicable agreements with the local government. The PM also needs to know that any work performed before the FHWA official authorization date does not qualify for reimbursement. Progress invoices are submitted as follows:

> *"1. The Local Government (LG)begins work on the first phase of the project.*
>
> *2. The LG submits a request for accrued cost payment to the GDOT in accordance with applicable agreements. The LG will indicate on each request the total accrued cost paid and the amount of accrued cost paid as the LG non-Federal share match.*
>
> *3. Reimbursement requests are processed by GDOT using standard procedures. The LG will be paid the Federal-aid share of accrued cost invoiced." (GDOT 2016c, UAM, Section 6.2)*

- Project managers should note 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, UAM, Sections 4.2.A, 4.2.B, 4.2.C, 4.2.D)

3.4.3.7. Early authorization for electric distribution/transmission

- Project managers should consult with the DUO and District Right-of-Way Office to find whether early authorization should be utilized. The effect of early authorization should be considered on the project schedule.
- Project managers should consider that payment will not be made to any utility work or expenses incurred prior to written authorization to proceed from the state Office of Utilities.

  "For preliminary engineering, this authorization will be included in the request for plans and estimates. Construction authorization will normally be given after the Utility Agreement has been fully executed and after the highway contract is awarded." (GDOT 2016c, UAM, Section 4.3.A.1)

3.4.3.8. Service points

- The district utilities engineer should provide a plot to the utilities owners for "marking up" the location of existing utilities, if the utilities are not furnished by a SUE investigation.
- The existing service points information will be needed prior to the concept team meeting. Any existing utility's information will also be needed in the preliminary design phase.
- When the preliminary plans have been sufficiently completed, an in-house preliminary plan review will be held. The preliminary design review package should be distributed three weeks prior to the in-house review meeting and includes the information about service points.
- The lighting designer should work directly with the utility to determine the appropriate type of service, service points, and if there needs to be any pre-work done by the utility to bring electrical service to the lights.

3.4.3.9. Lighting

- Project managers should understand all lighting requirements for either existing or future systems with the GDOT Design Policy and Support (DPS) lighting group and with the appropriate District Utilities Office.
- Project managers can refer to the *Utilities Manual* if needed (GDOT 2016c, *UAM*), as well as the *Design Policy Manual* (GDOT 2018c).

"Utilities Manual covers items not included in the AASHTO guide and/or to provide further clarification on utility lighting permits based on the GDOT Design Policy Manual." (GDOT 2018c, Design Policy Manual)

"For a complete copy of all lighting policies and procedures, design requirements, permits, lighting standards or pole locations, and luminary heights, refer to Chapters 5 and 14 of the GDOT Design Policy Manual." (GDOT 2016c, UAM, Section 5.10)

- Timing of decision-making about lighting design is important too. Project managers should understand that the project design continuously evolves throughout the preliminary project design. Lighting design should be delayed until after the roadway plan is finalized after all the preliminary field plan review comments are incorporated into the design.

  "Lighting design usually begins after preliminary roadway plans are developed. The preparation of lighting plans that are to be included in a parent set of roadway or maintenance plans should not be started until after the PFPR comments have been incorporated into the roadway plans." (GDOT 2016a, PDP, Section 6.4.5, p. 6-18)

- Project managers should consider the following recommendations for lighting:

  "The lighting requirements, funding methods, and agreements are specified in Chapter 14 of the GDOT Design Policy Manual, the Lighting Design Process chart, and Section 5.10 of the Utility

Accommodation Policy and Standards manual. In the PDP, it is best that lighting requirements be initially coordinated at the concept stage." (GDOT 2017a, PDP, Section 5.10)

3.4.3.10. Public interest determination (PID) for electric distribution/transmission

- Project managers should coordinate with the Office of Utilities and the Office of Right-of-Way to reach a decision regarding if the project can be considered a PID case.
- Project managers need to coordinate with the district utilities engineer to make sure the Public Interest Determination Policy and Procedure is reviewed and, if needed, performed for the project in question. If required,

  "the DUE will coordinate with the Project Manager to conduct preparatory work, leading the Concept Team to the procedure and finalize and document Concept Team recommendations." (GDOT 2016a, PDP, p. 5-14)

- Project managers should refer to policies 3E-1 and 6863-12 Public Interest Determination from the GDOT Publications, Policies, and Procedures for the projects that are applicable to note if the Public Interest Determination Policy and Procedure is to be used and, if so, what Utility Risk Management Plan was recommended.

3.4.4. Telecom issues

3.4.4.1. Telecom relocation

- Project managers are responsible for following up with the design lead to ensure that telecom relocations are included in the construction contracts. The PM should monitor the design progress to inform the design team about any changes that are necessary relative to the utility relocation plan.

> *"Utility locations/relocations should be coordinated with the Design Phase Leader, the District Utility office, the specific utility owner and project team such as the environmental team leader to ensure the environmental analysis included in the NEPA document, permits and variances consider utility requirements within existing and proposed ROW or when the utility relocation is included in the GDOT construction contract." (GDOT 2016a, PDP, Section 6.4.3, p. 6-16)*

3.4.4.2. SLC sites/cable/TV

- Project managers should conduct a "windshield review" and visit the site to determine if there is any subscriber loop carrier (SLC), cable, or TV facility in the project area.
- Project managers should coordinate with the DUO to get further information about the existing SLC, cable, and TV facility. They need to consult about the probable risk mitigation strategies, as well.

- Relocating an SLC, cable, or TV facility can cost about $250,000,000 and takes as long as 12 to 18 months. Therefore, the best mitigation strategy to minimize the impact, if it can be done safely, is to redesign the road project to miss the utility facility instead of involving it.

3.4.4.3. Fiber optic

- Risk Mitigation: Usually these facilities cannot be mitigated if they exist in the proposed project area.

3.4.4.4. Antennas

- Project managers should note that in no case will wireless telecommunications facilities and/or antennas be allowed or permitted on limited-access or Interstate rights-of-way. Additionally, the installation of new pole(s) or pole lines, cell towers, and/or monopoles will not be allowed within highway right-of-way or on surplus property owned by the Department.
- Project managers should know that the Department will permit the applicant to place antennas and other associated equipment on existing poles, not owned by the Department, within the Department's right-of-way;
- Project managers should notice that the operation and maintenance of antennas (the "Antenna Space") and associated communication equipment, whether on existing poles or ground mounted, are subject to permit requirements set forth in Section 5.11.D of the *Utilities Manual* (GDOT 2016c, *UAM*).

- Project managers should know that the Department will permit the applicant to place antennas and other associated equipment on existing signal and strain poles, owned by the Department, within the Department's right-of-way.
- Project managers should note that the operation and maintenance of antennas (the "Antenna Space") and associated communication equipment, whether on existing Department-owned poles or ground-mounted, are subject to permit requirements set forth in Section 5.11.D of the *Utilities Manual* (GDOT 2016c, *UAM*).

3.4.4.5. Duct bank/vaults/manholes for telecom

- Project managers should identify the presence of duct banks for telecommunication facilities around the project area and verify whether the duct banks need to be relocated or removed from the project area. As removing or relocating a duct bank is a lengthy job, it should be considered in the schedule. In addition, finding a new line for the duct bank could be another challenge that impacts the schedule.
- Project managers should visit the site to verify if any duct bank is present. If there is difficulty in identifying the presence of duct banks, the PM needs to conduct a SUE investigation to find their exact locations.

3.4.4.6. Easement/private easement for telecom

- If additional ROW is required to accommodate the need for utility relocation work, project managers should know whether the utility intends to acquire its own

ROW or easement or ask the Department to acquire the extra ROW. Each case has its own scheduling implications that should be considered by the PM.

- Project managers should make sure that the district utilities engineer is in close contact with the utilities owners regarding the acquisition of additional ROW to perform relocation tasks. The latest status of the ROW acquisition report should be communicated with the utilities owners monthly to inform them about when they can begin acquiring their own ROW or easement for their relocation works.

> *"If the Utility intends to acquire its own right-of-way or easement, it shall be the District Utilities Engineer's responsibility to ensure that the Department's monthly Right-of-Way Status Acquisition Reports be forwarded to such Utility as received from the State Right-of-Way Office. These reports are critical to ensure that the Utility can begin acquiring their required right-of-way or easement soon after the Department has completed its negotiations with each affected property owner." (GDOT 2016c, UAM, Section 4.1.C.5, p. 4-23)*

- Project managers should recognize that the cost of acquiring new right-of-way is substantially high. Therefore, an emphasis should be made on gaining maximum capacity and usage from existing highway corridors.
- Project managers need to coordinate with the DUO and Office of ROW to come to a decision on if additional easement is required and, if so, if it is temporary, permanent, or private easement. This should be done through the preliminary relocation plan phase and right-of-way utility meetings that occur before appraisals.

3.4.4.7. Reimbursement for telecom

- Project managers should be familiar with whether the utilities qualify for reimbursement or not. If the utilities are not reimbursable, they have a significant impact on the schedule because a conflict between the utility and the Department might be a lengthy process.
- Project managers should consider that if a claim is made for reimbursement, a Certificate of Eligibility for Utility Reimbursement must be completed. The PM needs to be aware of the requirements and the time commitments for the process. A utility reimbursement certificate can facilitate scheduling for the project that the PM should take advantage of to minimize the delay in the schedule.

  > *"The Utility will complete those portions which identify the specific facilities for which the claim is made and the date and circumstances under which the facilities were installed. Upon review and verification of the information provided by the Utility, the Department will assign the Case Number (See 4.2.A.2) under which eligibility is established. This Certificate will be attached to and incorporated into the Utility Agreement executed for such reimbursement." (GDOT 2016c, UAM, Section 4.2.A.2)*

- When the utility is eligible for reimbursement for the cost of relocation, project managers should make sure that appropriate coordination is in place with the utilities to avoid any delay in the acquisition of the required ROW and/or easement. Frequent and separate negotiations with property owners regarding the ROW issues can introduce a significant delay for the project. It is critical from the

scheduling standpoint that all the required ROW negotiations take place at the same time to avoid further disturbance to property owners and avoid any delay to the project schedule.

> *"When the Utility is entitled to reimbursement for the cost of acquisition of replacement right-of-way or easements, the Department will request permission from the Utility, which must be obtained in writing, to acquire necessary utility right-of-way or easements concurrently with its acquisition of the normal highway right-of-way." (GDOT 2016c, UAM, Section 4.1.C.6)*

- Project managers are responsible for verifying that the contracting of the reimbursable work adheres to GDOT's requirements, such as the methods of accomplishing the work.

> *"The contracting of reimbursable work by the Utility shall follow the requirements included in Section 4.2.D of Utilities Manual and in 23 CFR 645, Subpart A, and shall be adhered to for all State projects regardless of funding source. If reimbursable by the Department, the method of accomplishing the work will be stated in the estimate supporting the agreement and written approval of the Department's State Utilities Engineer will be required for any change thereof." (GDOT 2016c, UAM, Section 4.2.D)*

- Project managers should ensure that the necessary utility agreements are in place for projects that involve a utility easement, utility ROW, or conflict with a utility

which might claim reimbursement through "prior rights." Without required agreements there is a high probability of significant delay in the project schedule.

> *"The need for a utility agreement must be anticipated to avoid delaying the project." (GDOT 2016a, PDP, Section 7.4.3)*

- Project managers should note that the work may begin on a project just after GDOT has fully executed all applicable agreements with the local government. The PM also needs to know that any work performed before the FHWA official authorization date does not qualify for reimbursement. Progress invoices are submitted as follows:

> *"1. The LG begins work on the first phase of the project.*
>
> *2. The LG submits a request for accrued cost payment to the GDOT in accordance with applicable agreements. The LG will indicate on each request the total accrued cost paid and the amount of accrued cost paid as the LG non-Federal share match.*
>
> *3. Reimbursement requests are processed by GDOT using standard procedures. The LG will be paid the Federal-aid share of accrued cost invoiced." (GDOT 2016c, UAM, Section 6.2)*

- Project managers should note 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, UAM, Sections 4.2.A, 4.2.B, 4.2.C, 4.2.D)

3.4.4.8. Early authorization for telecom

- Project managers should consult with the DUO and District Right-of-Way Office to find whether early authorization should be utilized. The effect of early authorization should be considered on the project schedule.
- Project managers should consider that payment will not be made to any utility work or expenses incurred prior to written authorization to proceed from the GDOT Utilities Office.

  "For preliminary engineering, this authorization will be included in the request for plans and estimates. Construction authorization will normally be given after the Utility Agreement has been fully executed and after the highway contract is awarded." (GDOT 2016c, UAM, Section 4.3.A.1)

3.4.4.9. Public interest determination for telecom

- Project managers should coordinate with Office of Utilities and Office of Right-of-Way to reach a decision regarding if the project can be considered a PID case.

- Project managers need to coordinate with the DUE to make sure the Public Interest Determination Policy and Procedure is reviewed and, if needed, performed for the project in question. If required,

  > *"the DUE will coordinate with the Project Manager to conduct preparatory work, leading the Concept Team to the procedure and finalize and document Concept Team recommendations." (GDOT 2016a, PDP, p. 5-14)*

- Project managers should refer to policies 3E-1 and 6863-12 Public Interest Determination from the GDOT Publications, Policies, and Procedures for the projects that are applicable to note if the Public Interest Determination Procedure is to be used and, if so, what Utility Risk Management Plan was recommended.

  > *"This will document the decision of whether the Department should accept or avoid the risk associated with third party utility relocation." (GDOT 2016a, PDP, p. 6-16)*

3.4.5. Water/sanitary sewer issues

3.4.5.1. Water/sanitary relocation

- Risk mitigation could be to:
  - obtain depths of the water line and adjust the storm drain and profiles to minimize the impacts; or
  - adjust the drainage system and/or profiles to miss these lines.

Risk mitigation typically does not present itself until sanitary design has started.

3.4.5.2. Vaults/manholes

- Project managers should know that every vault and manhole that is going to be retained in the pavement must be approved by the State Utilities Engineer. Therefore, the PM should coordinate with the DUO to verify the presence of manholes in the project area.
- Risk mitigation could be to
    - get depths of the water line and adjust storm drain and profiles to minimize the impacts, or
    - adjust drainage system and/or profiles to miss these lines.

Risk mitigation typically does not present itself until sanitary design has started.

3.4.5.3. Pumping/lift stations

- Project managers should recognize that the size of pumping stations is important when deciding about their relocation or removal. In most cases, pumping stations are large and are expensive to relocate, so it is better to make changes in the project design to avoid major impact on the schedule.
- Project managers should visit the site to verify if a sewer lift station is present. The location of sewer lift stations should be carefully examined and a mitigation strategy for relocating or removing the station should be considered. The PM should coordinate with the DUO if needed.

- Project managers should verify the proper location of a pumping station through a comprehensive study of the area to be served to ensure that the entire area can be adequately drained.

3.4.5.4. Easement/private easement for water/sanitary sewer

- If additional ROW is needed to accommodate the need for water/sanitary sewer relocation work, project managers should know whether the utility intends to acquire its own ROW or easement or ask the Department to acquire the extra ROW. Each case has its own scheduling implications that should be considered by the PM.

  > *"If there is not sufficient space for the utility within the right-of-way or easement which will be required for the construction of the project, the District Utilities Engineer will coordinate with the Utility to verify such circumstance and will obtain a written statement as to whether the Utility desires that the Department acquire such additional rights-of-way or easement as may be required for utility relocation under the provisions of the O.C.G.A. § 32-6-172. 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, UAM, Section 4.1.C.5.b, p. 4-22)*

- Project managers should make sure that the district utilities engineer is in close contact with the utilities owners regarding the acquisition of additional ROW to

perform relocation tasks. The latest status of the ROW acquisition report should be communicated with the utilities owners monthly to inform them about when they can begin acquiring their own ROW or easement for their relocation works.

> *"If the Utility intends to acquire its own right-of-way or easement, it shall be the District Utilities Engineer's responsibility to ensure that the Department's monthly Right-of-Way Status Acquisition Reports be forwarded to such Utility as received from the State Right-of-Way Office. These reports are critical to ensure that the Utility can begin acquiring their required right-of-way or easement soon after the Department has completed its negotiations with each affected property owner." (GDOT 2016c, UAM, Section 4.1.C.5, p. 4-23)*

- Project managers should recognize that the cost of acquiring new right-of-way is substantially high. Therefore, an emphasis should be made on gaining maximum capacity and usage from existing highway corridors.

3.4.5.5. Reimbursement for water/sanitary sewer

- Project managers should be familiar with whether the water/sanitary sewer project is reimbursable or not. If the utilities are not reimbursable, they have a significant impact on the schedule because a conflict between the utility and the Department might be a lengthy process.
- Project managers should consider that if a claim is made for reimbursement, a Certificate of Eligibility for Utility Reimbursement must be completed. The PM needs to be aware of the requirements and the time commitments for the process.

A utility reimbursement certificate can facilitate scheduling for the project that the PM should take advantage of to minimize the delay in the schedule.

> *"The Utility will complete those portions which identify the specific facilities for which the claim is made and the date and circumstances under which the facilities were installed. Upon review and verification of the information provided by the Utility, the Department will assign the Case Number (See 4.2.A.2) under which eligibility is established. This Certificate will be attached to and incorporated into the Utility Agreement executed for such reimbursement." (GDOT 2016c, UAM, Section 4.2.A.2)*

- When the utility is eligible for reimbursement for the cost of relocation, project managers should make sure that appropriate coordination is in place with the utilities to avoid any delay in the acquisition of the required ROW and/or easement. Frequent and separate negotiations with property owners regarding the ROW issues can introduce a significant delay for the project. It is critical from the scheduling standpoint that all the required ROW negotiations take place at the same time to avoid further disturbance to property owners and avoid any delay to the project schedule.

  > *"When the Utility is entitled to reimbursement for the cost of acquisition of replacement right-of-way or easements, the Department will request permission from the Utility, which must be obtained in writing, to acquire necessary utility right-of-way or easements*

concurrently with its acquisition of the normal highway right-of-way." (GDOT 2016c, UAM, Section 4.1.C.6)

- Project managers are responsible for verifying that the contracting of the reimbursable work adheres to GDOT's requirements, such as the methods of accomplishing the work.

  "The contracting of reimbursable work by the Utility shall follow the requirements included in Section 4.2.D of Utilities Manual and in 23 CFR 645, Subpart A, and shall be adhered to for all State projects regardless of funding source. If reimbursable by the Department, the method of accomplishing the work will be stated in the estimate supporting the agreement and written approval of the Department's State Utilities Engineer will be required for any change thereof." (GDOT 2016c, UAM, Section 4.2.D)

- Project managers should ensure that the necessary utility agreements are in place for projects that involve a utility easement, utility ROW, or conflict with a utility that might claim reimbursement through "prior rights." Without required agreements there is a high probability of significant delay in the project schedule.

  "The need for a utility agreement must be anticipated to avoid delaying the project." (GDOT 2016a, PDP, Section 7.4.3)

- Project managers should note that the work may begin on a project just after GDOT has fully executed all applicable agreements with the local government. The PM also needs to know that any work performed before the FHWA official

authorization date does not qualify for reimbursement. Progress invoices are submitted as follows:

> *"1. The LG begins work on the first phase of the project.*
>
> *2. The LG submits a request for accrued cost payment to the GDOT in accordance with applicable agreements. The LG will indicate on each request the total accrued cost paid and the amount of accrued cost paid as the LG non-Federal share match.*
>
> *3. Reimbursement requests are processed by GDOT using standard procedures. The LG will be paid the Federal-aid share of accrued cost invoiced." (GDOT 2016c, UAM, Section 6.2)*

- Project managers should note 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, UAM, Sections 4.2.A, 4.2.B, 4.2.C, 4.2.D)*

3.4.5.6. Early authorization for water/sanitary sewer

- Project managers should consult with the DUO and District Right-of-Way Office to find whether early authorization should be utilized. The effect of early authorization should be considered on the project schedule.
- Project managers should consider that payment will not be made to any utility work or expenses incurred prior to written authorization to proceed from the GDOT Utilities Office.

> *"For preliminary engineering, this authorization will be included in the request for plans and estimates. Construction authorization will normally be given after the Utility Agreement has been fully executed and after the highway contract is awarded." (GDOT 2016c, UAM, Section 4.3.A.1)*

3.4.5.7. PID for water/sanitary sewer

- Project managers should coordinate with the Office of Utilities and the Office of Right-of-Way to reach a decision regarding if the proposed water/sanitary sewer project is considered a PID case.
- Project managers need to coordinate with the DUE to ensure the Public Interest Determination Policy and Procedure is reviewed and, if needed, performed for the project. If required,

> *"the DUE will coordinate with the Project Manager to conduct preparatory work, leading the Concept Team to the procedure and*

finalize and document Concept Team recommendations." (GDOT 2016a, PDP, p. 5-14)

- Project managers should refer to policies 3E-1 and 6863-12 Public Interest Determination from the GDOT Publications, Policies, and Procedures for the projects that are applicable to note if the Public Interest Determination Policy and Procedure is to be used and, if so, what Utility Risk Management Plan was recommended.

  "This will document the decision of whether the Department should accept or avoid the risk associated with third party utility relocation." (GDOT 2016a, PDP, p. 6-16)

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

- Project managers should follow up with the utility owner to see whether utility aid is needed to prevent any delay on project schedule.

  "It is vitally important for the Department's project delivery schedule and budget that utility aid requests are presented as early as possible after engineering analysis of the potential relocations and costs have been completed by the Utility Owner to provide a reasonable estimate of the project relocation costs. This request shall be made no later than six (6) months prior to the Final Field Plan Review (FFPR) being held. Approval of any utility will depend on the timeliness of the request, the project Sponsor, and satisfactory submission of

documentation to support a true hardship situation on behalf of the Utility Owner as outlined in this policy." (GDOT 2015c, "Utility Aid Guidelines," p. 1)

- Project managers need to understand the time required to be built into the project schedule to handle the utility aid request. Proper timing for handling the aid request is critical for securing the funding for the project without affecting the smooth delivery of the project.

3.4.6. Petroleum pipelines/natural gas issues

3.4.6.1. Major gas lines present

- Project managers should consider the seasonal usage when deciding a time to relocate or remove an energy pipeline. There are seasons when the usage is low and it is a better time to do the relocation or removal rather than when the usage is high (i.e., in the winter).
- Project managers should coordinate with the District Utilities and ROW Offices to acquire the former maps and drawings as a reference to establish the pipeline locations.
- Some other mitigation strategies are minimizing right-of-way, avoiding profile changes, and acquiring early authorization.
- If there is difficulty in identifying the presence of natural gas, project managers should conduct the SUE investigation to help identify the exact location of natural

gas. The investigation could be a lengthy process in itself, and the presence of natural gas will negatively impact the project schedule, as well.

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

- If additional ROW is required to accommodate the need for utility relocation work, project managers should know whether the utility intends to acquire its own ROW or easement or ask the Department to acquire the extra ROW. Each of those cases has its own scheduling implications that should be considered by the PM.

  > *"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, UAM, Section 4.1.C.5.b, p. 4-22)*

- Project managers should ensure that the district utilities engineer is in close contact with the utilities owners regarding the acquisition of additional ROW to perform relocation tasks. The latest status of the ROW acquisition report should be communicated monthly with the utilities owners to inform them about when they can begin acquiring their own ROW or easement for their relocation works.

  > *"If the Utility intends to acquire its own right-of-way or easement, it shall be the District Utilities Engineer's responsibility to ensure that the Department's monthly Right-of-Way Status Acquisition Reports be forwarded to such Utility as received from the State Right-of-Way*

Office. These reports are critical to ensure that the Utility can begin acquiring their required right-of-way or easement soon after the Department has completed its negotiations with each affected property owner." (GDOT 2016c, UAM, Section 4.1.C.5, p. 4-23)

- Project managers should recognize that the cost of acquiring new right-of-way is substantially high. Therefore, an emphasis should be made on gaining maximum capacity and usage from existing highway corridors (GDOT 2016c, *UAM*, p. iii-I).
- Project managers should visit the job site to determine the need for additional easement by considering the type and size of utility work.

3.4.6.3. Reimbursement for petroleum pipelines/natural gas

- Project managers should be familiar with if the utilities are reimbursable or not. If the utilities are not reimbursable, they have a significant impact on the schedule. The conflict between the utility and the Department might be a lengthy process.
- Project managers should consider that if a claim is made for reimbursement, a Certificate of Eligibility for Utility Reimbursement must be completed. The PM needs to be aware of the requirements and the time commitments for the process. A utility reimbursement certificate can facilitate scheduling for the project that the PM should take advantage of to minimize delay in the schedule.

"The Utility will complete those portions which identify the specific facilities for which the claim is made and the date and circumstances under which the facilities were installed. Upon review and verification

of the information provided by the Utility, the Department will assign the Case Number (See 4.2.A.2) under which eligibility is established. This Certificate will be attached to and incorporated into the Utility Agreement executed for such reimbursement." (GDOT 2016c, UAM, Section 4.2.A.2)

- When the utility is eligible for reimbursement for the cost of relocation, project managers should make sure that appropriate coordination is in place with the utilities to avoid any delay in the acquisition of the required ROW and/or easement. Frequent and separate negotiations with property owners regarding the ROW issues can introduce a significant delay for the project. It is critical from the scheduling standpoint that all the required ROW negotiations take place at the same time to avoid further disturbance to property owners and avoid any delay to the project schedule.

  "When the Utility is entitled to reimbursement for the cost of acquisition of replacement right-of-way or easements, the Department will request permission from the Utility, which must be obtained in writing, to acquire necessary utility right-of-way or easements concurrently with its acquisition of the normal highway right-of-way." (GDOT 2016c, UAM, Section 4.1.C.6)

- Project managers are responsible for verifying that the contracting of the reimbursable work adheres to GDOT's requirements, such as the methods of accomplishing the work.

"The contracting of reimbursable work by the Utility shall follow the requirements included in Section 4.2.D of Utilities Manual and in 23 CFR 645, Subpart A, and shall be adhered to for all State projects regardless of funding source. If reimbursable by the Department, the method of accomplishing the work will be stated in the estimate supporting the agreement and written approval of the Department's State Utilities Engineer will be required for any change thereof." (GDOT, 2016, UAM, section 4.1.C.2)

- Project managers should ensure that the necessary utility agreements are in place for projects that involve a utility easement, utility ROW, or conflict with utilities that might claim reimbursement through "prior rights." Without required agreements there is a high probability of significant delay in the project schedule.

  "The need for a utility agreement must be anticipated to avoid delaying the project." (GDOT 2016a, PDP, Section 7.4.3)

- Project managers should note that the work may begin on a project only after GDOT has fully executed all applicable agreements with the local government. The PM also needs to know that any work performed before the FHWA official authorization date does not qualify for reimbursement. Progress invoices are submitted as follows:

  "1. The LG begins work on the first phase of the project.

  2. The LG submits a request for accrued cost payment to the GDOT in accordance with applicable agreements. The LG will indicate on each

request the total accrued cost paid and the amount of accrued cost paid as the LG non-Federal share match.

3. Reimbursement requests are processed by GDOT using standard procedures. The LG will be paid the Federal-aid share of accrued cost invoiced." (GDOT 2016c, UAM, Section 6.2)

- Project managers should note 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, UAM, Sections 4.2.A, 4.2.B, 4.2.C, 4.2.D)

3.4.6.4. Early authorization for petroleum pipelines/natural gas

- Project managers should consult with the DUO and District Right-of-Way Office to find whether early authorization should be utilized. The effect of early authorization should be considered on the project schedule.

- Project managers should consider that payment will not be made to any utility work or expenses incurred prior to written authorization to proceed from the GDOT Utilities Office.

> *"For preliminary engineering, this authorization will be included in the request for plans and estimates. Construction authorization will normally be given after the Utility Agreement has been fully executed and after the highway contract is awarded." (GDOT 2016c, UAM, Section 4.3.A.1)*

3.4.6.5. Public interest determination for petroleum pipelines/natural gas

- Project managers should coordinate with the Office of Utilities and the Office of Right-of-Way to reach a decision regarding if the project can be considered a PID case.
- Project managers need to coordinate with the DUE to make sure the Public Interest Determination Policy and Procedure is reviewed and, if needed, performed for the project in question. If required,

> *"the DUE will coordinate with the Project Manager to conduct preparatory work, leading the Concept Team to the procedure and finalize and document Concept Team recommendations." (GDOT 2016a, PDP, p. 5-14)*

- Project managers should refer to policies 3E-1 and 6863-12 Public Interest Determination from the GDOT Publication, Policies, and Procedures for the

projects that are applicable to note if the Public Interest Determination Policy and Procedure is to be used and, if so, what Utility Risk Management Plan was recommended.

> *"This will document the decision of whether the Department should accept or avoid the risk associated with third party utility relocation." (GDOT 2016a, PDP, p. 6-16)*

3.4.7. Other factors

3.4.7.1. High probability for major utility conflicts

- Project managers should request a utility impact analysis to identify to what extent the proposed roadway improvements will impact the existing utilities. The UIA includes a conflict matrix that is utilized as a tool to determine the extent of impacts on the existing utilities. The conflict matrix is typically a spreadsheet report outlining avoidance alternates for relocations, adjustments, and cost estimates to implement the relocations. The UIA should be requested before the preliminary field plan review and can be requested again after the issues are resolved following the utility owners' reviews.

  > *"The UIA is typically recommended after Quality Level 'B' but prior to Quality Level 'A' (when there is enough proposed design information available) and is used to determine which Quality Level 'A' (Test Holes) may be performed. It is recommended that a UIA be requested right before the Preliminary Field Plan Review. However, a*

UIA is iterative and may also be requested and performed after 2nd submission to the Utility Owners to resolve any new or remaining utility conflicts." (GDOT 2016c, UAM, Section 4.0.C.1. p. 4-7, 3rd paragraph)

- In projects where SUE has been conducted, project managers should request the UIA as soon as the preliminary drainage (plan review) becomes available.

  "On most projects where SUE has been employed, a 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." (GDOT 2016a, PDP, p. 6-17)

- Project managers should request test holes after the PFPR plans are finalized. This approach helps resolve all remaining conflicts before the final design begins.

  "The Project Manager, Design Phase leader, District Utilities Office (may include affected utility owners), and State Subsurface Utilities Engineer will coordinate to identify locations of test holes (Quality Level A SUE) to obtain the vertical location of the utility for further conflict resolution. This request for test holes is recommended to

occur after the PFPR plans have been corrected addressing the PFPR comments to ensure that all remaining conflict areas are verified prior to the final design beginning." (GDOT 2016a, PDP, p. 6-17)

3.4.7.2. Coordination for joint-use poles

- Project managers should visit the site and coordinate with the DUO to find out if there is any possibility that traffic signals can be jointly used.
- There are several specific design recommendations that should be considered by the utilities to facilitate joint-use practices as much as possible. The following summarizes a recommended design strategy as an example:

  "Utility facilities installed aerially across right-of-way shall have a minimum vertical clearance of 25 feet above the rail elevation; preferably adjacent to intersecting roadways and as close to a 90-degree angle as possible. The Utility shall design the facility in such a manner to span the entire right-of-way and shall utilize joint-use practices whenever applicable." (GDOT 2016c, UAM, Section 7.3, p. 7-2)

- Anywhere applicable, the Department should try to clear roadside obstacles to enhance safety. The joint use of aerial facilities provides a significant opportunity for enhancing the safety of the roadway.

  "The Department's policy is to remove roadside obstacles where practical to increase safety for the motoring public. Implementation of

this policy will require that aerial facilities be joint-use and be placed outside the clear roadside area for new installations, upgrading of facilities as per Chapter 8 of this Manual, and relocations due to Department's construction or as part of a separate safety project." (GDOT 2016c, UAM, Section 3.6.A, p. 3-18, 4th paragraph)

- Project managers can coordinate with Office of Utilities personnel by calling Georgia 811 to get further information about the locations of traffic signals and potential opportunities for colocation and joint use of traffic signals.
- Project managers should make sure that every party that wants to attach anything to an existing pole coordinates all those attachments with the pole owner in a timely manner.

  "All GDOT attachments require the completion of a Pole Attachment Permit with the pole owner. Contact the District Utilities Engineer for the current copy of this form." (GDOT 2016c, UAM, Section 4.7.A, p. 4-54)

- Project managers should bear in mind that all coordination for any utilization of joint-use poles needs to begin during concept development and sometimes early in the preliminary design phase.

  "The District Utilities Engineer should provide guidance to the Team at a Kick Off/Concept Team Meeting, Utility Field Meeting and during the Preliminary and Final Design Phases. The Team may include but not be limited to Utility owners, Designers, GDOT Project Manager,

District Utility Office, District Traffic Operations Office and District Construction Office." (GDOT 2016c, UAM, Section 4.7.B, p. 4-51)

- Project managers can coordinate with the project engineer, contractor, and the utility owner to review the project for placement verification when joint-use poles are utilized.

3.4.7.3. High estimation for utility relocation costs

- Project managers should work closely with the DUO, District Right-of-Way Office and GDOT Office of Utilities SMEs to develop a justifiable cost estimate for the project. The following guideline helps the PM in the cost estimation process:

  "Guidelines for determining actual eligible costs shall be those contained in 23 CFR 645, Subpart A. The Department's form (currently 8465) has been adopted for this purpose, a copy of which is available on GDOT's Utilities web pages or can be provided by the Department's District Utilities Engineer." (GDOT 2016c, UAM, Section 4.5.A.1. p. 4-48)

3.4.7.4. High probability of retention of existing facilities

- Project managers should visit the site and coordinate with the DUO and the Office of ROW to assess the likelihood of retaining the existing utility installations under the pavement.

- Project managers should consider that any request to retain facilities under pavement needs to have detailed information, including construction plans, cross sections, drainages profiles, and a profile of existing facilities that are going to be retained.

  > *"Actual depth checks will be required at potential conflict points with an elevation to the top and/or bottom of the facility that is tied to the project survey control provided in the plans." (GDOT 2016c, UAM, Section 2.8.B, p. 2-11)*

- Project managers should be aware that any completed retention request form needs to objectively evaluate the request, along with certain assurances regarding the maintenance, operations, and upgrade of the facilities involved. A timely submission of the request is critical in maintaining the project schedule.

  > *"The request must be made promptly after the first plan submission stage of the Plan Development Process (PDP). A request that is made during the second plan submission stage may not be considered by the District Utilities Engineer." (GDOT 2016c, UAM, Section 2.8.B. p. 2-11)*

3.4.7.5. Late data/deliverables

- Project managers should follow up with the DUE to ensure that proper deadlines are given to the utility owners for providing data/deliverables in a timely manner to avoid any delay on the project schedule.

"It is the District Utilities Engineer's responsibility to review each project within their jurisdiction and provide the Utilities with a deadline for each deliverable needed in accordance with the Department's Plan Development Process (PDP) as well as the guidelines provided in the Utilities Manual." (GDOT 2016c, UAM, Section c, p. 4-16)

3.4.7.6. Delay in utility impact analysis

- Project managers should coordinate with the design phase leader, District Utilities Office (may include affected utility owners), and the state subsurface utilities engineer to identify locations of test holes (Quality Level A SUE) to obtain the vertical location of the utility for more conflict resolution.

  "This request for test holes is recommended to occur after the PFPR plans have been corrected addressing the PFPR comments to ensure that all remaining conflict areas are verified prior to the final design beginning." (GDOT 2016a, PDP, p. 6-17, 2nd paragraph)

- Project managers should consider that a utility impact analysis is to be requested right before the preliminary field plan review.

  "However, a UIA is iterative and may also be requested and performed after 2nd submission to the Utility Owners to resolve any new or remaining utility conflicts." (GDOT 2016c, UAM, Section 4.0.C.1, p. 4-7)

3.4.7.7. Error in utility plan

- Project managers should consult and coordinate with District Utilities Office engineers to make sure that the final utility plan is complete and submitted on time to avoid any delay in the project schedule.

  > *"In accordance with O.C.G.A. § 32-6-171, the Department is required to set deadlines for Utilities to comply with information submittals in order for the Department to meet its project delivery schedule. It is the District Utilities Engineer's responsibility to review each project within their jurisdiction and provide the Utilities with a deadline for each deliverable needed in accordance with the Department's Plan Development Process (PDP) as well as the guidelines provided in Utilities Manual." (GDOT 2016c, UAM), (GDOT, 2017, PDP)*

- Project managers should make sure that the DUE sets proper deadlines for the utilities to receive required information submittals in a timely manner. Confirming the deadlines for deliverables, including comments on the final utility plan, is necessary to meet the Department's project delivery goals.

  > *"After the District Utilities Engineer reviews a project's schedule, written correspondence shall be sent to the affected Utilities on each project along with a deadline for the Utility to submit the required information to the Department. The deadline shall be no less than 30 days and no more than 120 days; and the deadline should be set based on the complexity of the project and the amount of review the*

Utility has to perform." (GDOT 2016c, UAM, Section 4.1.C.1.c, p. 4-16)

- Project managers should make it clear for the utility owners that if they fail to submit the final utility plan on time, the Department may no longer reimburse the relocation costs.

  "The Department may no longer be required to reimburse the costs of removal, relocation, or adjustment required to accommodate the said project. Upon failure to meet the given deadline, the Utility will be notified by written notice by the District Utilities Engineer." (GDOT, 2016, UAM, Page 4-16)

- Project managers should consult and coordinate with the DUE and the design phase leader for updating the utility plan.
- During the initial preliminary design phase, project managers coordinate with the design phase leader and the DUE to determine which method to use if a decision was not already made during concept.

  "A 'SUE Utility Impact Rating and Request Form' and other information found on the Office of Utilities web page can be used to assist in making this determination. A project with an approved Public Interest Determination (PID) recommendation requires the use of SUE. If SUE is recommended, the form is submitted to the State Subsurface Utilities Engineer for approval or denial. Existing utility information provided on the utility plans is obtained from either an

Overhead/Subsurface Utility Engineering (SUE) investigation and/or directly from the affected utility owner (traditional method)." (GDOT 2016a, PDP, p. 6-6)

- Project managers should follow up with the design phase leader who will send the updated base plan sheets and electronic files to the DUE as soon as the existing utility information has been plotted and the project's footprint is verified.

  "This updated information will contain current construction plans with the plotted existing utility information, drainage plans (including longitudinal drainage and drainage profiles) and erosion control plans, stage construction plans, approved bridge layouts and wall locations with footing locations, ROW and easement lines, strain poles, overhead signs, and signal pole locations, cross sections, roadway profiles, lighting pole locations, ATMS/ITS plans, landscape plans, and construction limits as set following the PFPR." (GDOT 2016a, PDP, Section 7.4.1, p. 7-6)

- Project managers should know that:

  "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." (GDOT 2016a, PDP, Section 7.4.1, p. 7-6)

3.4.7.8. Surface utility engineering

- Project managers should visit the job site to figure out if SUE is required, and, if so, which level of SUE is recommended. It can easily be done by looking at the field. If the PM can identify the utility facilities without any special tool or technique, there is no need for SUE investigation, but if the PM speculates that there might be some underground/overhead utility infrastructure (after consultation with District Utilities Office personnel), he/she can initiate SUE.
- Project managers need to coordinate with the District Utilities Office to request for SUE through the state subsurface utilities engineer. If it is confirmed that SUE is needed, then the PM and the state subsurface utilities engineer will coordinate about the scope of work and the quality level needed.

> *"The assigned SUE Consultant's schedule will be set based upon the approved project schedule and the status of the project." (GDOT 2016a, PDP, p. 6-7)*

3.4.7.9. Plan revision/notify owner

- Project managers should ensure that the plan revision does not change the conditions of any permits because that will negatively impact the schedule and cost a lot to obtain the permits again.
- Project managers are also responsible for reviewing any proposed plan revision with the Office of Traffic Operations (OTO) systems engineer when a change condition to any ITS project is suspected.

- Project managers should review all proposed plan revisions with the District Utilities Office and the state utilities railroad liaison, whenever needed, to confirm any potential impacts to the affected utilities.
- Project managers also need to pay attention so that from the six-and-one-half (6½) week period to the letting, no plan changes will occur without the prior concurrence of the Office of Construction Bidding Administration and approval of the chief engineer.

> *"From the six and one half (6½) week period to the Letting, no plan changes will occur without the prior concurrence of the Office of Construction Bidding Administration and approval of the Chief Engineer. All approved changes will require an amendment to the proposal and may occur from the six and one half (6½) week/seven and one half (7½) week period to ten (10) calendar days prior to the Letting. Revision dates will be added to all revised sheets and each revision listed and described on the Revision Summary Sheet."*
> *(GDOT 2016a, PDP, Section 7.8.2, p. 7-15)*

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 hydraulics issues. The following subsections discuss the risk factors under each area.

3.5.1. Environmental issues

3.5.1.1. MS4 compliance

- If the project is located within a designated Municipal Separate Storm Sewer System (MS4) area, the project manager should work with the Office of Bridge Design and the Office of Environmental Services subject-matter experts to prepare required inputs for the conceptual project cost estimate for preliminary engineering (PE), right-of-way, utilities, construction, environmental mitigation, etc. that include preliminary, estimated costs for MS4 post-construction storm water best-management practices.

  If applicable, a concept-level hydrology study for MS4 permit should be prepared as part of attachments/supporting data that include the following: (*Drainage Design for Highways Manual*, Revision 3.2, 2018)

  - MS4 concept report summary
  - MS4 concept-level design spreadsheet
    - BMP locations
    - Required ROW for each BMP
    - Cost of BMP

- MS4 drainage area layout
- Cost estimate(s) (costs can be included in the detailed cost estimate items)

The GDOT external web page under *Partner Smart – Design Manuals – Manuals and Guides – Roadway – Category: Storm water permit (MS4)* has detailed information about the MS4 concept report summary and drainage area layout.

- Project managers should ensure that the design phase leader evaluates the project outfalls, determines any outfall level exclusions, analyzes the feasibility of BMPs and sizing the BMPs, and prepares a Post-Construction Storm Water Report for submission to the Office of Design Policy and Support for review as soon as possible after completing the preliminary drainage design and no later than submission with the request for PFPR. (GDOT 2017a, *PDP*, p. 90)
- Project managers should note that an MS4 Soils Report is required for projects in MS4 areas that do not have a PLE and will consider BMPs that rely on infiltration of existing soils. This testing can be requested at the same time as the Soil Survey Report. Acceptable testing methods are shown on the MS4 PDP Process Chart, and the preferred method is selected by the geotechnical engineer. (GDOT 2017a, *PDP*, p. 86)
- If more than two years have passed since the approval of the concept report and the beginning of the preliminary design, project managers should work with subject-matter experts in the Office of Bridge Design and the Office of Environmental Services to validate whether MS4 permit updates may add previously exempt areas that will impact the project scope. (GDOT 2017a, *PDP*,

p. 78) Any changes need to be communicated with all the offices as the stakeholders in the project.

- Project managers should facilitate coordination between the design phase leader and the GDOT Office of Maintenance/District Maintenance for a selected BMP. Each MS4 BMP requires unique maintenance to keep it functioning properly. See Maintenance Considerations listed for each BMP in Ch. 10.4 of GDOT's manual on *Drainage Design for Highways* (GDOT 2018b) and the *Storm Water System Inspection and Maintenance Manual* (GDOT 2015b). The design phase leader should discuss the maintenance plan, accessibility, and schedule with GDOT Maintenance/District Maintenance for a selected BMP. The consideration and use of local municipal maintenance forces and required agreements should also be discussed. Documentation of the results of this discussion should be included in the Post-Construction Storm Water Report. (GDOT 2017a, *PDP*, p. 99 and 90)

3.5.1.2. Threatened and endangered species

- Project managers should be familiar with the Bureau of Land Management's (BLM) regulations and lists of species and how to coordinate with them regarding the habitat of T&E species.
- Project managers should be familiar with National Marine Fisheries Service regulations, and be prepared to identify any areas of EFH, T&E, and anadromous fish that would be impacted by the proposed project.
- To identify a list of endangered species in counties in Georgia and to find out which species might exist in the proposed bridge project area, project managers

can visit USFWS's automated Information, Planning, and Conservation System, which can be retrieved from: https://ecos.fws.gov/ipac/

- Project managers should plan and schedule to conduct EFH surveys if the project is in Camden, Glynn, McIntosh, Liberty, Bryan, and Chatham counties; failure to do so will impact the project schedule.
- Project managers should know that they need to add extra days in the Concept Development period or Preliminary Design period for the Ecology Resources Survey Report (ERSR) if it is conducted concurrently with the Ecological Assessment of Effects Report; otherwise, it will impact the schedule later in the project.
- Project managers need to consider that the impacts to EFH are considered in accordance with the Magnuson–Stevens Fishery Conservation and Management Act. Further information can be retrieved from: http://www.nmfs.noaa.gov/sfa/laws_policies/msa/
- Project managers should follow up to make sure the impacts to EFH or suitable habitat of T&E are discussed in the EAOE Report that includes a list of the species for coordination, impacts, and strategies including avoidance, minimization, and mitigation measures. Coordination letters should be prepared by the ecologist responsible for preparing the ecology report. Information for Planning and Consultation, powered by ECOS (Environmental Conservation Online System), can be retrieved from: https://ecos.fws.gov/ipac/

3.5.1.3. Bents in stream

- Project managers should work closely with subject-matter experts in the Office of Bridge Design to understand the likelihood of the need for constructing bents in the stream. For bridge projects over a wide stream the risk is higher and, therefore, the PM should consider allocating more time for the design process to accommodate the application process for receiving environmental permits.

3.5.1.4. Measures to avoid resources

- Project managers should work closely with subject-matter experts in the Offices of Bridge Design and Environmental Services to understand any time constraints that may affect the design and construction schedule. Environmental-related issues should be reflected when developing a reliable schedule for designing and constructing bridge projects.

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

- Early in the design phase, project managers should consider performing several site visits accompanied with the lead design team to learn about the rough range of the potential site needed for construction. During constructability reviews and field plan reviews, existing and proposed ROW limits should be available on the plans so that access for bridge construction

and removal, as applicable, can be discussed to ensure adequate ROW is available. As the project design advances, the PM should check the ROW status from time to time, because the area of construction site, although generally about the same, is subject to change as a result of shifts in construction staging and work-performance methods.

- If enough ROW is not present for the project, there may be a need to change the original ROW plan. The PM should consider specific scheduling requirements for handling changes in the ROW plans as summarized in the following areas:
    - Changes in the ROW width of bridge removal/construction projects developed under certification acceptance require prior General Office approval.

        "Changes to the right of way plans affecting right of way width of projects developed under Certification Acceptance require prior General Office approval. Such revisions on projects developed under Certification Acceptance must have prior General Office approval." (GDOT 2015a, External Right-of-Way Manual, Section 7.4.B)

    - ROW changes of bridge removal/construction projects will be added to the ROW plans but will not be approved until the project certification is issued.

        "On Certification Acceptance projects, they will be added to the right of way plans as received but will not be approved

until the final project certification is issued." (GDOT 2015a, External Right-of-Way Manual, Section 7.4.B)

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

- In the preliminary design phase, modification to bridge design/removal planning or obstacle/utility relocation may be a potential solution for utility conflicts that prevent access. Project managers need to stay at the forefront of the issue and should make a timely decision in collaboration with either the Office of Bridge Design, the Office of Utilities, or the owner/stakeholder/administrator of the obstacles to resolve any conflicts among the structures and move forward with the right plan of action.

  "When a utility conflict occurs, it must be resolved by bridge design modification or by utility relocation. It is not acceptable to notify the contractor that a conflict exists by a note in the plans." (GDOT 2018a, Bridge and Structures Design Manual, Section 3.14.1.2)

- Seeking early authorization is another way to expedite utility relocation in order to prevent interference with bridge removal/construction, but utility funding must be available. If the financing is finished in advance of performing the bridge project, authorization will be given once the relocation agreement is executed by both the utility and the Department. Also, funds need to be allocated and the date established for bridge contract letting.

"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, UAM, Section 4.3.A.1)

3.5.2.1.3. How will traffic be routed during construction?

There are three types of alternative detour plans that are typically used to provide access to the public during the construction phase of the project. Project managers are recommended to be familiar with these approaches and identify what approach is applicable to the bridge project. Advantages and disadvantages of these three methods are identified below.

- **New Location/Off-site Detour**: This strategy is a straightforward method, adding little fiscal burden and little risk to the project duration for handling the divergence of traffic volume to other roads nearby. This method only works when the influenced area has a relatively low traffic volume. This is a low-risk situation as not many pedestrians and vehicles are affected by the bridge project.
- **Detour Bridge**: This strategy uses the old bridge as a detour in a location that creates space to build the new bridge in a single phase as described in the following:

- Build temporary foundations and columns for detour bridge on one side of the old bridge
- Build temporary approach spans to connect the main spans
- Disconnect main span of the old bridge from top of supporting columns and place on rails connected to temporary columns
- Open the temporary detour bridge to traffic
- Construct main span of the new bridge and approach spans
- Move traffic to the new bridge and remove the old bridge and temporary connections

The detour bridge method applies in scenarios with medium traffic volume and has the following benefits:

- *Saving money and time*: A detour bridge allows the bridge construction to be finished in one phase, from which the overall cost/time savings far exceed the cost to build extra detour connections.
- *Improving safety during construction*: Separation of bridge users and construction crew will improve safety. Building the bridge in a single phase will reduce redundant structural elements and improve the appearance.

The main challenge of the detour bridge is that it may impact residents in adjacent neighborhoods in the form of noise coming from both building the temporary connection facilities and the passing traffic afterward. Project managers should work on assuring enough ROW and sufficient public outreach.

- **Staging**: Due to confinement by geographic/hydraulic conditions or heavy traffic volumes, sometimes the construction team may not able to separate the construction crew and bridge users completely and may have to keep them in a "common" area for some time. That requires the project team to come up with detailed construction and traffic divergence plans on a phase-by-phase basis. It is costly to build a new bridge in several phases in comparison with building a bridge in one phase, and it also requires more efforts in public outreach throughout the entire project. Project managers should take the responsibility as the project coordinator to make sure all technical solutions and public outreach efforts are effective, timely, and efficient.

3.5.3. Structural or foundation issues

3.5.3.1. Bridge location

- Project managers should be knowledgeable about the bridge project site, especially about where the project is located (e.g., rural or urban area, and the density of structures, infrastructures, and businesses around the project location).
- Project managers should coordinate with subject-matter experts in the Offices of Bridge Design and Construction to ensure that timely coordination will be made before the construction phase starts with those major stakeholders that will be affected by the project.

3.5.3.2. Railroad coordination

- Project managers should consult with subject-matter experts in the Office of Bridge Design to be aware of any issues related to working with the railroad company's consulting firm. Additional time should be considered in the project schedule if the consulting firm has been brought on board recently.
- Project managers should note the bridges that are owned by GDOT, as these bridge projects are typically easier to coordinate and involve fewer challenges in the project schedule.
- If needed, project managers should assist the Office of Bridge Design in coordinating with the Office of Intermodal. Additional time should be allocated to the project schedule for review and coordination if required.
- Overall, a better knowledge of the process of the coordination with railroad companies, MARTA, and the Office of Intermodal can prepare project managers to estimate the project schedule more accurately. The PM must understand all steps required to coordinate with all the stakeholders (e.g., send the plans and drawings, receive the comments, address the comments, and revise the plans to get approval).

The process of railroad coordination is explained with more details in the *PDP* document, from which the project manager should be aware of the following:

> *"The first plan submission to be used for railroad coordination should be submitted by the Project Manager to the Office of Utilities State Railroad Liaison, as soon as preliminary bridge plans and/or complete roadway,*

grading, drainage (including calculations) are available. Generally, this would be following the corrected Preliminary Field Plan Review (PFPR) plans. The Project Manager and Design Phase Leader should refer to the State Utilities Office website for the required Railroad Submittal checklist that needs to be completed and included with all railroad coordination submittals: http://www.dot.ga.gov/PartnerSmart/utilities/Documents/Railroad/RailroadPlanSubmittalChecklist.pdf." (GDOT, 2017, PDP, Section 6.4.6)

3.5.3.3. Projects of Division Interest (PoDI) coordination

- Project managers should be aware of the review and coordination process for the PoDI bridge projects. An appropriate collaborative environment should be established and maintained with the FHWA Division for timely review of the design plans and drawings for the PoDI bridge projects.

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

- Project managers need to communicate with subject-matter experts in the Office of Bridge Design to be notified when the bridge design is becoming complicated due to difficult geometry.
- Project managers should understand that addressing the vertical clearance issue requires significant time.

- Project managers need to know that design of steel beams takes longer than prestressed concrete (PSC) beams, and that should be considered in the project schedule.
- Project managers should allocate adequate time for designing bridge projects with significant skew.
- Project managers should strive to enhance the collaboration between the Offices of Bridge Design and ROW in addressing ROW issues for complicated bridge design projects.

3.5.3.5. Deep water foundations

- Once a project manager realizes that the project requires deep water foundations he/she should add time to the project schedule, as more effort is required to develop the two required alternatives for design methods that the contractors can use and bid.

3.5.3.6. Widening and/or rehabilitation

- Project managers should allocate adequate time to the project schedule for the Office of Bridge Design to assess the physical conditions of the existing bridge and provide a rigorous evaluation as the basis of making an informed decision about whether the bridge needs to be replaced, widened, or rehabilitated.
- Project managers should work closely with the Office of Bridge Design to ensure that subject-matter experts have adequate resources to conduct the bridge

condition survey in a timely manner. The sufficiency rating is used as the basis of making the decision about what should be done with the bridge.

> *"During Concept Development on all projects that include bridges, the Project Manager will request a Bridge Condition Survey from the Office of Bridges and Structures, Bridge Maintenance Section. The Office of Bridges and Structures, Bridge Maintenance Section will provide the Sufficiency Rating and a recommendation for removal and replacement, widening or rehabilitation on all bridge projects. If a bridge is recommended for widening or rehabilitation the Project Manager shall request a deck condition survey from OMAT." (GDOT 2017a, PDP, p. 65)*

> *"For projects including a bridge widening or rehabilitation, a Bridge Condition Survey should be completed by the Office of Bridge Design, Bridge Maintenance Section during Concept Development. If the Bridge Condition Survey is more than three years old and it recommended retaining the existing bridge, the Project Manager will request through the Office of Bridge Design verification of this recommendation. The Office of Bridge Design will coordinate with the Office of Materials and Testing (OMAT) Concrete Branch to verify the bridge deck condition. The Office of Bridge Design will consider OMAT Concrete Branch's recommendation and determine whether the bridge should continue to be rehabilitated and widened or replaced." (GDOT 2017a, PDP, p. 85)*

3.5.3.7. Utility attachments

- Project managers should work closely with the Office of Bridge Design to identify all owners of the utilities structures attached to the existing bridge.
- Project managers should facilitate coordination with the utility companies early on during the design to avoid any further delay in the project schedule. For more information, project managers can refer to the *Bridge and Structures Design Manual*:

  > *"Designation of Utility Owners on Bridge Plans*
  >
  > *All bridge plans shall have the caption, UTILITIES, added to the Preliminary Layout or General Notes sheet and list underneath the names of all owners of utilities that are located on the bridge. Do not list utilities which are near the bridge but are not located on the bridge. If a future installation is proposed, the designer shall indicate this by placing '(FUTURE)' after the name of the owner. If there are no utilities, it shall be indicated by placing 'NO UTILITIES ON BRIDGE' below the caption UTILITIES. These requirements are in addition to all details, dimensions, etc., necessary to locate and support the utility on the bridge." (GDOT 2018a, Bridge and Structures Design Manual, p. 133)*

3.5.3.8. Retaining walls (Under the bridge or in bridge construction process)

- Project managers should incorporate a wall foundation investigation as a task on the project schedule.

  > *"Upon completion of the preliminary wall layout the Office of Bridge Design or appropriate Consultant will request a wall foundation investigation to be completed for each wall on the project. If completed by a consultant, the investigation report and recommendations shall be submitted to OMAT for their comments or acceptance." (GDOT 2017a, PDP, p. 88)*

- Project managers should work closely with the Office of Bridge Design to be aware of the need for designing cast-in-place walls. Adequate time should be provided in the project schedule for design of cast-in-place walls.

3.5.4. Hydraulic Issues

3.5.4.1. Hydraulic study

- If there is no hydraulic study by the design team, the project manager should investigate the flooding history data of the area. Also, the PM should assess the size of the bridge relative to the waterway on which it is built. The larger the size of the bridge the more critical is the hydraulic study. The Hydrologic Engineering Center's River Analysis System (HEC-RAS) is the software typically used in the hydraulic studies. For streams regulated by the Federal Emergency Management Agency (FEMA), HEC-RAS, HEC-2, or a 2-D model approved by FEMA should

be utilized. Use of the two-dimensional hydraulic computer models is appropriate for critical projects as described in the following:

> *"Hydraulic studies will be done utilizing the WSPRO or HECRAS program unless a FEMA regulated stream is involved. FEMA requires the use of the HEC-2 and HECRAS programs. Therefore, hydraulic studies involving FEMA regulated streams will be done utilizing both WSPRO or HECRAS and HEC2. Two-dimensional hydraulic computer models can be used where appropriate. All stream involvements, temporary and permanent, will be coordinated with the Office of Environmental Services. Any impacts will be discussed in the appropriate environmental document and where required, mitigated." (GDOT 2017a, PDP, p. 100)*

- Whenever a hydraulic study is required for a bridge design, the best practice is to review any previous investigations that have been carried out on the bridge or any locations close to the project's site. The project manager might review the files and check whether any in-house studies have been conducted before. Next, if there is no information available about the hydraulic studies in the Office of Bridge Design, there might be some information available in district offices that can be conducted either in-house or by consultants.

3.5.4.2. Navigable water/coast guard coordination

- Project managers should be familiar with the overall process of acquiring the permit from the U.S. Coast Guard (USCG) allowing the clearance that GDOT is

providing. For bridge replacement projects, the PM should be aware that the coordination is often a straightforward process since a systematic procedure is in place. GDOT reaches out to the USCG and receives the required criteria for the bridge. Then, GDOT sends the permit to the FHWA first since the FHWA should determine the type of commerce that goes on the river and whether it is an appropriate waterway that can support the interstate trades.

- Additionally, there is a memorandum of agreement (MOA) between the USCG and the FHWA that aims to facilitate, expedite, and coordinate the planning, environmental review, and decision-making for bridge permits (FHWA 2014). Project managers should be aware of the MOA and its purpose:

  > *"Determining which bridge design concepts unreasonably obstruct navigation as soon as practicable and prior to or concurrent with The National Environmental Policy Act scoping process to inform project alternatives to be evaluated;*
  >
  > *Preparing a coordinated environmental document that satisfies both U.S. Coast Guard (USCG) and FHWA NEPA requirements and results in a shared, or joint environmental impact decision documents where practicable and concurrent environmental impact decision documents at all other times; and*
  >
  > *Concurrently conducting the environmental evaluation and processing of the Bridge Permit application materials, whenever possible." (FHWA 2014, Memorandum of Agreement between USCG and FHWA to Coordinate and Improve Bridge Planning and Permitting, p. 1)*

- Project managers should be aware of the above recommendations and need to take advantage of the MOA to speed up coordination between USCG and the state DOT in the planning stage:

> *"During the early planning stage, prior to the NEPA scoping process, establish an appropriate point of contact and notify USCG of projects on plan or State Transportation Improvement Program (STIP), if applicable, that may require a bridge permit and ensure that the State DOTs/HA notify the USCG during the planning phase of a project." (FHWA 2014, MOA between USCG and FHWA to Coordinate and Improve Bridge Planning and Permitting, p. 3)*

3.5.4.3. FEMA/community coordination

- Project managers should be informed about the project's site and whether or not Federal Emergency Management Agency coordination is required.
- Project managers should reach out to the hydraulic study group and the bridge engineer to become informed about the approximate amount of time that is required for a hydraulic study. The Office of Bridge Design runs hydraulic studies for measuring the water level and whether the water level rise is happening. Every bridge that is over a waterway must go through hydraulic studies. The study is done by the bridge engineer or his/her appointee. If the study is conducted in-house, somebody from the hydraulics group in the Office of Bridge Design will be in charge, whom the PM should get to know. If the study is assigned to a

consulting firm, the PM should become acquainted with that group, as well, to get updates about the progress.

The PM can check whether an area is a regulatory floodway or not through the following website: https://www.fema.gov/floodway. In case the area is in the regulatory floodway region, GDOT needs to conduct required FEMA coordination. If the bridge project is not in the regulatory floodway area, the main goal of the bridge design is to make sure that the bridge is sized appropriately for the water to go smoothly underneath it without any substantial changes in the water elevation approaching the bridge. If the hydraulic study concludes that there is no way to avoid the water rise, GDOT must write a Conditional Letter of Map Revision (CLOMR) and send it to FEMA to explain the rationale behind changes in the water elevation. The PM should allow for appropriate time in the project schedule for the required hydraulic studies and modeling.

- Project managers should contact residents in the area concerning any local flood problems that they have encountered. (GDOT 2017a, *PDP*, p. 195)
- Project managers should note that the highway design must adhere to the regulations in the areas located in the National Flood Insurance Program (NFIP) mapped floodplain.

> *"The coordination procedures established that NFIP standards are to be used in designing a highway in a NFIP mapped floodplain. Highways can normally be designed to be consistent with the NFIP standards because the standards provide for a 1-foot rise in the water surface elevation of the 100-year flood. This increase is included in*

most State and local floodplain regulations. Development, including highways, is permitted that does not cause backwater in excess of this increase." (FHWA 1986, Policy Memorandum)

3.5.4.4. Special studies for tidal

- Early on during project development, project managers should collaborate with the Office of Bridge Design and look into resources such as maintenance records and the state of nearby bridges to assess whether tidal studies are required for the project location.
- If the area is tidal, then it requires special hydraulic studies. Typically, for normal sites, GDOT conducts a steady-flow one-dimensional analysis. However, for a tidal site, an unsteady model that typically involves two-dimensional analysis is required. The Office of Bridge Design recommends utilizing 2D models for difficult sites. HEC-RAS is the typical hydraulic study software used by GDOT, but SRH-2d should be used for the tidal sites.

3.5.4.5. Multiple opening (1-D or 2-D)

- Project managers should work with subject-matter experts in the Office of Bridge Design to recognize whether a 2-D or 1-D hydraulic study is needed to be performed for the project. Two-dimensional modeling needs more time and additional data-gathering efforts that the PM should consider in developing the project schedule. The Office of Bridge Design has certain standard survey data that it gets for bridge replacement, but 2-D modeling should be supplemented

with other types of surface data and DEM (Digital Elevation Model). More time is needed to conduct further research on what might be available from the counties in the project area. Two-dimensional study needs more modeling efforts, which extend the duration of the project.

3.5.4.6. Abnormal stage

- Project managers should reach out to the hydraulics group early to determine if additional survey data are needed so that they can be collected while the rest of the survey is being done.
- There is more research involved in trying to find out the downstream boundary conditions to use for that abnormal stage. Hence, project managers should be informed about what conditions cause the abnormal stage and what are the consequences of an abnormal stage. For projects with abnormal flood conditions (i.e., creeks that flow into one of the state's major rivers), a floodplain cross section is required for the major river below the confluence with the creek (GDOT 2018a, *Bridge and Structures Design Manual*, p. 63).

3.5.4.7. Significant skew

- One-dimensional modeling is inherently limited in handling a significant skew. Velocity tends to be over-estimated when using one-dimensional modeling. With two-dimensional modeling, a better picture of how the velocity changes along openings is provided. Specification of the variability of the velocity profile is more precise in two-dimensional modeling. Project managers should work with

subject-matter experts in the Office of Bridge Design to identify whether there is significant skew on the bridge project and whether there is a need for conducting two-dimensional modeling, which is typically more time-consuming.

3.5.4.8. Upstream/downstream structures (survey)

- Project managers should invite a representative from the Office of Bridge Design to attend the concept meeting to explain the need for allocating budget and time for performing surveying activities.
- Project managers should note that there is a small risk that a request for additional surveying efforts might be made during the hydraulic study once the Office of Bridge Design realizes that required information and data about upstream and downstream structures cannot be found from regular sources. All efforts should be made to gather information from the survey of projects in nearby locations to facilitate the process of the hydraulic study.
- Project managers should work with the Office of Bridge Design to ensure that the selected bridge length will permit conveyance of the design flood and basic flood without increasing flood heights or velocities to an extent that would cause significant upstream or downstream damage to existing structures and reasonably anticipated future development. (GDOT 2017a, *PDP*, p. 195)

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 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 (GDOT 2017a, *PDP*, p. 195).

Chapter 4 Conclusions

Subject-matter experts of functional groups in the state transportation agency have critical knowledge in identifying potential project risks and developing risk response plans related to their functional areas, such as environmental services, ROW, utilities relocation, communication, and bridge design. Therefore, the Georgia Department of Transportation has decided to engage subject-matter experts early on during GDOT's plan development process to identify major risk factors and develop appropriate strategies to handle the risks. The primary objective of this research is to develop a comprehensive set of risk mitigation strategies for functional offices involved in the early phases of the PDP. Possible risk response plans for dealing with project issues were extracted from extensive interviews with subject-matter experts from several functional groups in GDOT and project management teams in the Office of Program Delivery.

The identified risk mitigation strategies for major areas of project issues were classified into the GDOT functional offices (i.e., Offices of Environmental Services, Right-of-Way, Strategic Communication, Utilities, and Bridge Design). For the Office of Environmental Services, a set of risk migration strategies was developed for helping project managers mitigate the identified risk factors in 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 environmental 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. Risk mitigation strategies were identified for mitigating the Office of Right-of-Way risk factors that were classified into four major areas of project issues, including: (1) parcels issues; (2) access issues; (3) constructability issues; and (4) issues related to procedural errors, external changes, unknown conditions, etc. Furthermore, the research team identified a set of risk mitigation strategies for managing the identified Office of Strategic Communication risk factors that were classified into three major areas of project issues: (1) issues with the Office of Strategic Communication, (2) issues with the Office of Environmental Services, and (3) issues related to general project management. Risk mitigation strategies were identified for responding to and mitigating the Office of Utilities risks, and classified into six major areas of project issues, including: (1) railroad issues, (2) electric distribution/transmission issues, (3) telecom issues, (4) water/sanitary sewer issues, (5) petroleum pipeline/natural gas issues, and (6) other factors. Finally, for the Office of Bridge Design, 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 this research help project managers better understand project issues from the perspective of subject-matter experts in the different functional offices. Moreover, the developed risk mitigation strategies 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 plan development process.

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