GEORGIA DOT RESEARCH PROJECT 17-03

FINAL REPORT

STRATEGIES FOR COMMUNICATING QUALITY EXPECTATIONS FOR ENVIRONMENTAL SERVICE CONTRACTS PHASE II

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This study explores the communication and coordination practices between project team members contributing to the Plan Development Process of the Georgia Department of Transportation (GDOT). This study builds on Phase I of this project, published as GDOT Report No. FHWA-GA-17-1506. The overarching goal of this research is to improve quality and efficiency in the environmental review process, understanding environmental work within the context of the entire GDOT process and integrating the role of project managers (PMs) and other project team personnel into the analysis.
This research involves three tasks. In task 1, we (the research team) conduct a survey of state departments of transportation (DOTs) in order to benchmark strategies and practices by: (a) identifying alternative strategies for communications and performance monitoring, (b) reviewing state DOT processes, and (c) identifying best practices. In task 2, we investigate ongoing communication innovations at GDOT to assess the impacts of those innovations on project success. Finally, in task 3 we conduct focus groups with GDOT and consultant PMs to: (a) identify prevailing communication practices, (b) examine challenges associated with generating high-quality products, and (c) identify best practices for PMs.
Evidence from these tasks demonstrates that communication and coordination are important elements in the review process and highlights three general strategies for improving communications across project teams at GDOT. Recommendations for communication and coordination improvements focus on each of the following strategies: (1) strengthening project teams through clear leadership roles; (2) prioritizing early communication between Office of Environmental Services staff, project managers, and consultants; and (3) investing in knowledge curation.</td></tr>
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GDOT Research Project No. 17-03

Final Report

STRATEGIES FOR COMMUNICATING QUALITY EXPECTATIONS FOR ENVIRONMENTAL SERVICE CONTRACTS PHASE II

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Executive Summary

Efficient completion of the environmental review processes associated with the National Environmental Policy Act (NEPA) is a critical step toward the effective delivery of infrastructure projects by state departments of transportation (DOTs). Over the past 20 years there have been numerous executive orders, laws, and federal programs initiated aimed at streamlining the processes associated with environmental review (see Chapter 1). Most of these considerable federal efforts focus on streamlining formal organization structures and processes. Less attention has been devoted to the informal organization and the associated practices of communication within project teams, across organizational units, and between agency personnel and the consultants with whom they work to deliver projects. The Office of Environmental Services (OES) at the Georgia Department of Transportation (GDOT) commissioned this research to explore the neglected role that communication and coordination practices play in streamlining environmental review as a means of improving project performance.

In this project, we (the research team) investigate the influence of organizational communication and coordination on the environmental review process and project outcomes, identifying strategies for improving performance at GDOT. Phase I (final report published in 2017) examined communication between the OES at GDOT and the consultants to which it outsources work on projects. This study (Phase II of the project) expands the scope of that investigation to the entire project team. Here, we investigate communication and coordination across the entire project team at GDOT with a focus on understanding project manager (PM) perspectives on coordination with project delivery.

We center our analysis on two distinct lines of inquiry. First, we compare OES strategies and practices to those in other state DOT environmental departments across the United States.

Second, we examine interactions between OES staff, consultants, and PMs, as well as other members of the project team, to identify key relationships driving performance in the environmental process.

Our research design employs three interrelated tasks. In task 1, we compare communication practices and performance across the environmental review programs at U.S. state DOTs in order to: (a) identify performance monitoring strategies, (b) review communication practices and procedures, and (c) identify alternative best practices. We survey the population of U.S. state DOTs, gathering perspectives from environmental leadership and subject matter experts. In task 2, we develop case studies of OES innovations in communication practices and investigate whether they are working effectively. Each case study highlights a distinctive communication practice, some using formal channels and others using informal channels, connecting OES staff with environmental consultants. In task 3, we integrate the perspectives of PMs into our review of communication and coordination processes. We employ two focus groups: one with GDOT PMs and the other with consultant PMs. By comparing focus group responses, we are able to: (a) investigate communication practices commonly used by managers, (b) examine challenges associated with balancing project efficiency and quality, and (c) identify best practices for managing the environmental review process.

Figure ES-1 illustrates the different forms of communication that occur throughout the project process and describes the primary communication channels used in each stage. We observe that in the background of all project-level communication is a system of *general communications* between environmental consultants, OES staff, and other federal and state regulatory authorities. Environmental consultants regularly engage in general communications with OES, as well as the federal and state regulatory authorities associated with the NEPA process. Firms coordinate with OES regardless of their contract status by attending quarterly meetings,

monitoring updates from OES and resource agencies, and accessing OES resources online. For environmental consulting firms, general communications serve as a form of monitoring developments in the science, technology, regulations, and administrative processes, and the personnel associated with environmental review. For agencies, general communications are a way to make announcements and to provide explanations of preferred practices. Firms consider this a normal cost of doing business, allowing them to stay up to date. We also note that firms that do not participate in general communications are at risk for lower performance.

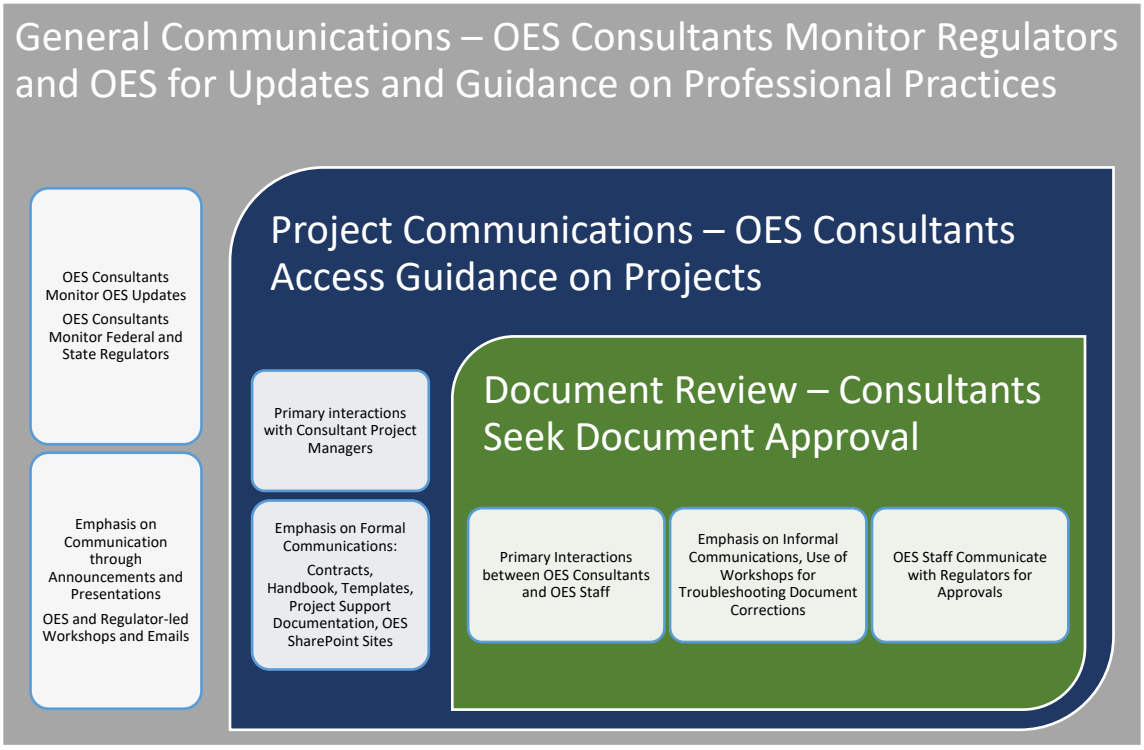

Figure ES-1: Communication Patterns in Environmental Review

When environmental consultants begin the process of working with OES, they enter into the system of *project communications.* OES rules and procedures guide the consultants in performing the technical studies needed in the environmental review process. This process begins when OES staff communicate with the Office of Procurement to help specify the scope of the environmental work for a transportation project. OES staff and GDOT PMs similarly report

communication challenges associated with the procurement process: both lack influence over the final consultant selection and do not have a satisfactory way of giving feedback on consultants' quality to the office of procurement.

Once a project has been outsourced and consultants are performing environmental work, consultants engage with OES and GDOT PMs through a variety of formal communication channels. These channels convey project templates for technical studies, the *Environmental Procedures Manual,* project resource documents providing site and technical specifications of the project, and updates on OES and regulatory rules and procedures. However, consultants rarely use other direct, informal channels of communication during this phase of work. Consultant PMs and environmental consultants emphasized the need for more informal communication channels during the life of a project.

After the technical studies are complete, projects enter the *document review* phase, during which consultants submit work to OES for review. Unfortunately, poor-quality work is often submitted, requiring documents to bounce back and forth between OES reviewers and consultants over multiple rounds of review. This requires consultants and OES specialists to interact with each other and places increased emphasis on informal communications and workshops for troubleshooting issues. Finally, once OES approves the documents, it sends them to the Federal Highway Administration (FHWA) for review. During this phase, OES staff communicate with external regulatory agencies in order to move the project toward approval.

We observe distinctive communication channels in use in each project phase. However, the majority of direct, informal communication between OES staff and environmental consultants takes place during the document review phase. OES staff strive to be hands-off on projects in order to manage high levels of workload. Formal channels dominate communication in all other phases of project delivery. The resulting communication patterns are reflective of bureaucratic

coordination practices rather than a strategy of program delivery through project teams. GDOT PMs experience significant challenges with “silo thinking” amongst project team members. This means project team members focus more on their area of subject expertise than on the needs of a particular project.

Particularly striking about this finding is the widespread agreement across GDOT PMs, consultant PMs, OES staff, and environmental consultants regarding the high variability of project team communication. When project teams report effective communication patterns amongst team members, it is most frequently the result of the leadership of consultant PMs taking on this role. Project performance tends to be strong when project team communications are strong. However, most GDOT projects do not exhibit strong project team communications. Many of our recommendations focus on strategies for strengthening and enhancing communication within project teams.

Figure ES-2 illustrates key findings from each of the three research tasks in Phase II that we used to develop our recommendations. We describe three general strategies for enhancing communication performance in project teams. First, GDOT should strengthen team communication through greater role clarity in team leadership and better onboarding of new team members. Second, GDOT should emphasize early communication and create points of continuity between different project phases. Third, OES should consider greater investments in knowledge curation practices designed to facilitate the work of consultants and project team communication.

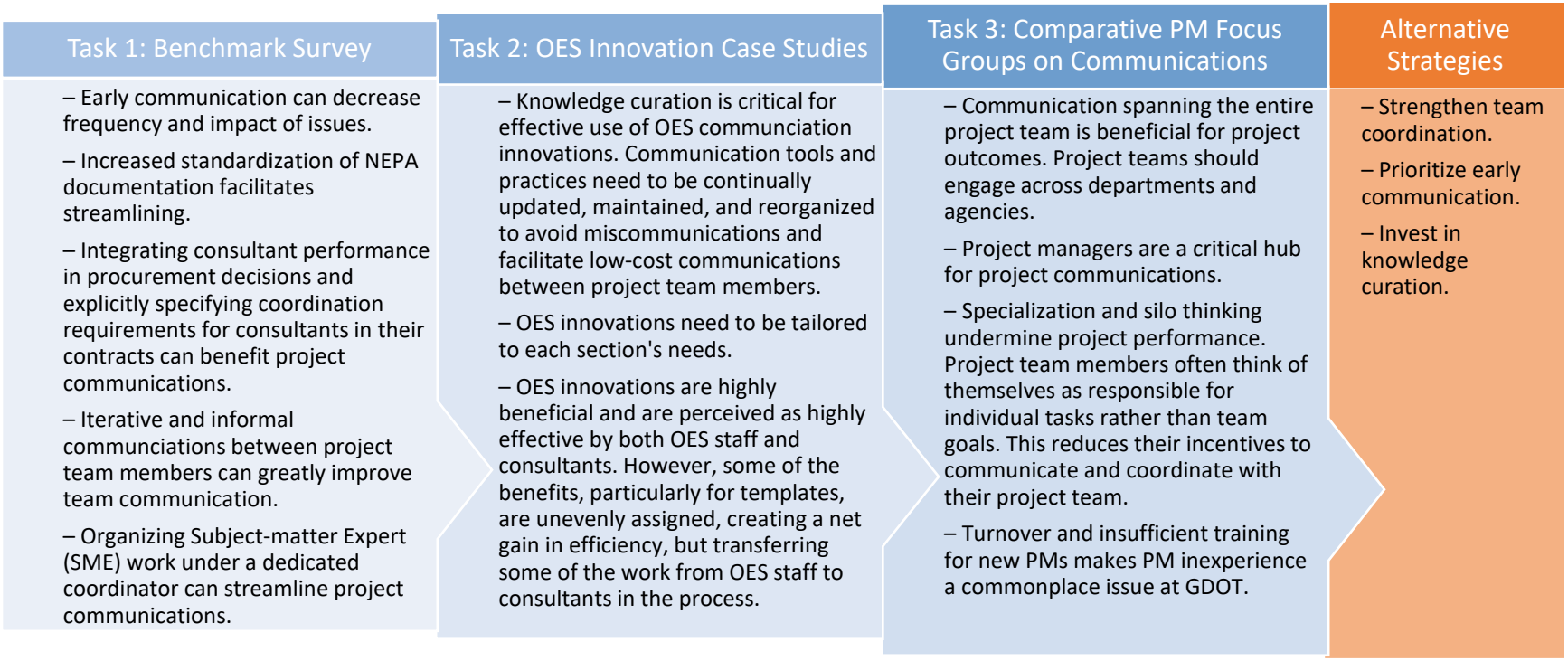

Figure ES-2: Findings and Recommendations

Key findings from our benchmarking study of state DOTs (task 1) include a number of insights about communications. Evidence from other state DOTs shows that communication and coordination during the environmental review process are critical. Early communication, during the project scoping, preliminary engineering, fieldwork, and technical reporting phases, is particularly important for securing positive outcomes. Emphasizing communication during these phases can increase performance by both decreasing the frequency with which issues arise in the project process and mitigating their impact if, and when, they do.

Our analysis also indicates that increasing standardization and formalization of NEPA documentation can facilitate streamlining and improve project efficiency. Formalized checklist forms of documentation are used with great success at some other state DOTs. Many other DOTs also increase formalization in their outsourcing practices. Increasing contract specificity and feedbacks for consultant procurement can create benefits for project communications. Specifically, factoring past consultant performance into procurement decisions about who to award contracts can be a successful method of ensuring high-quality work. Additionally, clearly specifying the coordination responsibilities and communication requirements expected of consultants in their contracts can help formalize and facilitate communication on projects.

Task 1 results also demonstrate that iterative and informal team communication practices can greatly benefit coordination between project team members. Encouraging the use of impromptu team meetings, cooperative troubleshooting sessions between team members, and informal discourse can greatly improve team communication. These results also show that organizing the work of environmental specialists under a single coordinator can help facilitate expedient completion of the review process. Creating a dedicated coordinator for specialist work helps manage specialist tasks, organize project personnel, and make communication between project team members easier.

Our case study analysis of OES innovations (task 2) also provides insight into knowledge curation practices that influence the effectiveness of GDOT communications through both formal and informal channels. While current OES process innovations have produced improvements in performance, the on-going maintenance, management, and organization of the information and resources are critical to avoid miscommunication and ease the transaction costs involved in communication between project team members.

We find that OES innovations (e.g., Georgia Partnership for Transportation Quality [GPTQ] meetings, SharePoint sites, and templates) have been highly successful, but they need tailoring to each OES section's (i.e., Air & Noise, Cultural Resources, Ecology, Environmental Program [NEPA]) needs in order to yield the best performance. Furthermore, we find that although these innovations (particularly templates) create tangible performance benefits for the environmental process, the distribution of benefits between OES and consultants is uneven. Templates standardize documentation, streamlining document review and easing OES workload; however, the benefits that templates, and template updates, provide can come with steep learning curves for consultants. While they provide a net benefit, consultants perceive the majority of the benefits accruing to OES.

Finally, our investigation of project management and coordination with project delivery (task 3) provides some key insights. First, perspectives of project managers reveal that communications spanning the entire project team are beneficial for project outcomes. Every member of the project team should be engaged in communicating and coordinating across department and agency lines. This can both make teams more cohesive and give project personnel a more holistic perspective on the work they are doing. Our results further show that project managers are a crucial hub through which these project communications flow. Their role

as coordinators and liaisons between different groups of project personnel is critical for communication to function appropriately.

Project managers' perspectives also show that turnover and insufficient training for incoming project staff are key issues throughout GDOT. Projects regularly experience turnover of OES staff, leaving project teams ill-prepared to complete environmental reviews efficiently and effectively. These issues create ongoing problems with inexperience among GDOT PMs.

Our results furthermore demonstrate that specialization and silo thinking, where project team members act as task specialists rather than members of a collaborative team, undermine project performance. Project personnel need to recognize their position in the project team and within the larger context of the project they are working on in order to communicate effectively. When individuals focus on their specific tasks rather than GDOT's overall goals for the project, team coordination can break down, undermining project performance.

From these conclusions, we derive a series of recommendations for how to improve communication and coordination at GDOT. Chapter 5 provides a complete discussion of evidentiary basis for each of the recommendations. Here we provide a summary list of the key recommendations for each of the three strategies we recommend pursuing.

Strengthen Team Coordination

- Increase the authority of GDOT PMs. Increasing PM authority and control over contracts, personnel, and project processes can increase responsibility to the project team and provide more incentives for personnel to engage with each other and the PM cooperatively during the environmental review.
- Strengthen the role of NEPA subject-matter experts (SMEs) in OES on projects. Giving NEPA SMEs the responsibility of coordinating environmental SME work within OES will

meet the current expectations of many PMs. This change can unify project SMEs and give PMs a single point through which to access OES SMEs.

- Encourage more use of underutilized team practices at OES. Impromptu meetings and collaborative troubleshooting between project team members should be implemented more regularly on GDOT projects.
- Incorporate past performance of environmental consultants into procurement decisions.
- Explicitly specify consultants' coordination responsibilities in their contracts. Contracts should outline in detail the coordination responsibilities expected of the consultant, who is responsible for initiating communications, and how often consultants are expected to interact with the GDOT PM.

Prioritize Early Communication

- Emphasize project communication between team members during the project scoping, preliminary engineering, fieldwork, and technical reporting phases.
- Create a point of continuity for communicating information between project phases. Assign a project team member as a communication axis point on each project. This individual should be present at the project kickoff meeting and stay on throughout the project's life. That team member should be responsible for communicating project information between phases in the environmental review process and transmitting project-specific knowledge to new team members being onboarded onto the project.
- Continue to increase formalization and standardization of NEPA documentation.

Invest in Knowledge Curation

- Organize recurring meetings between organizers to share ideas, best practices, and strategies for upcoming GPTQ meetings.
- Increase uniformity of OES sections' SharePoint sites. Redesign different OES sections' SharePoint sites to have the same format, organization, and style to reduce transaction costs for users who must access multiple sites.
- Dedicate a SharePoint management agent who is responsible for removing out-of-date material from sites; troubleshooting site issues; ensuring consultants have, and keep, access; and informing new users on how to navigate SharePoint.
- Create a single web portal for consultants to access links to all of GDOT's formal communication platforms (e.g., SharePoint, ProjectWorks, FTP). Consolidation of access points will decrease transaction costs for consultants and lead to more streamlined and effective communications.

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Chapter 1 Introduction

1.1. Research Context

The environmental review process associated with the National Environmental Policy Act (NEPA) is often pointed to as an area of risk for the delivery of on-time, high-quality infrastructure projects (Oppermann 2015; USDOT 2018). This effect has led policy leaders to engage in numerous efforts to streamline the process of environmental review. The past several presidential administrations have emphasized the need to increase the efficiency of environmental reviews through executive orders signed by Presidents Bush, Obama, and Trump. Congressional actions aimed at the goal of streamlining were included in laws passed in 1998, 2002, 2005, 2012, 2015, and 2017.[1] Federal and state transportation agencies have also been engaged in streamlining efforts. The Federal Highway Administration (FHWA) has implemented programmatic cooperative agreements as a means of streamlining compliance and mitigation documentation by state departments of transportation (DOTs). The FHWA has also developed the Every Day Counts (EDC) initiative, encouraging state DOTs to develop their own organizational innovations to shorten and streamline the project delivery process. EDC is now in its fifth two-year cycle, focusing on helping state DOTs develop and adopt innovative strategies (FHWA 2019).

The majority of these recent initiatives are centered on streamlining work processes and bureaucratic procedures. Several studies have been published by the Transportation Research Board focused on streamlining agency processes, such as environmental review, that affect performance (see Table 1-1 for examples). However, all of these activities are associated with

[1] The referenced executive orders are E.O. 13274 in 2002, E.O. 13604 in 2012, E.O. 13766 in 2017, and E.O. 13807 in 2017. The referenced transportation acts are TEA-21 (P.L. 105-178, 1998); SAFETEA-LU (P.L. 109-59, 2005); MAP-21 (P.L. 112-141, 2012); and FAST (P.L. 114-94, 2015).

formal organization structures and processes. Less attention has been devoted to the informal organization and the associated practices of communication within project teams, across organizational units, and between agency personnel and consultants. The Office of Environmental Services (OES) at the Georgia Department of Transportation (GDOT) commissioned this research to explore the neglected role that communication and coordination practices play in streamlining environmental review as a means of improving project performance.

Table 1-1: Examples of TRB Publications on Streamlining and Performance (2013–2019)

Project Number	Date Published	Report Title	Subject Area
20-118	1/30/2019	Benchmarking and Comparative Measurement for Effective Performance Management by Transportation Agencies	Organizational management; Program evaluation
20-104	1/17/2018	Developing the Guide to Retaining Essential Consultant-Developed Knowledge Within DOTs	Best practices/tools; Contracting; Knowledge retention
20-104	1/17/2018	Keeping What You Paid For—Retaining Essential Consultant-Developed Knowledge Within DOTs	Best practices/tools; Contracting; Knowledge management
20-06/Topic 22-01	10/2/2017	Legal Requirements for State Departments of Transportation Agency Participation in Conservation Plans	Best practices/tools; Project management
19-11	8/31/2017	Applying Risk Analysis, Value Engineering, and Other Innovative Solutions for Project Delivery	Best practices/tools
25-43	9/28/2016	Navigating Multi-Agency NEPA Processes to Advance Multimodal Transportation Projects	Best practices/tools; Communication; Efficiency; Project management
25-39	9/22/2015	Environmental Performance Measures for State Departments of Transportation	Organizational management; Program evaluation
S2-C12-RW-1	3/1/2013	Effect of Public–Private Partnerships and Nontraditional Procurement Processes on Highway Planning, Environmental Review, and Collaborative Decision Making	Best practices/tools; Contracting; Project management
S2-R10-RW-2	2/22/2013	Guide to Project Management Strategies for Complex Projects	Best practices/tools; Efficiency; Project management

The research has two distinct lines of inquiry. In Phase I, we (the research team) explored how the administrative tools, practices, and procedures of OES integrate into the environmental review process (Kingsley et al. 2017). Phase I focused on the communication practices between

OES staff and environmental consultants. In Phase II, we take a broader approach. First, we compare OES practices with their counterparts in environmental programs of state DOTs across the United States. Second, we investigate interactions between OES staff, environmental consultants, and the entire project team, including project managers (PMs). This research analyzes communication and coordination across the entire project team as a factor shaping the efficiency of the environmental review process.

This approach allows us to explore the importance of communication in the environmental review process and understand its integration with both formal and informal tasks and procedures required on GDOT projects. GDOT operates in a complex organizational structure involving interdepartmental coordination, parallel procedures, and outsourcing. Understanding how communications interact with the organizational properties of this structure can allow us to determine how to facilitate streamlining and increase efficiency in the environmental review process.

Organizational communications shape and are shaped by task processes (McPhee 1985). In complex organizational systems, the communication tools and structures employed can drive engagement in work processes (Gluch and Räisänen 2009) and project performance (Visser and Fill 2000). A lack of timely and adequate coordination or reliance on subpar methods of communication to transmit information can create problems in project processes and undermine performance. Additionally, the unstable transmission of information can lead to unpredictable project outcomes (Tribelsky and Sacks 2011). Formal channels of communication are those officially defined by the organization in standard operating procedures. Informal channels of communication develop in work settings as relational interactions that supplement and facilitate official channels. Formal and informal communications can have different effects on organizational processes (Johnson et al. 1994). Formalized pathways or procedures for

information sharing and discussion form the backbone of organization performance processes, including for GDOT. Formal communication channels and technical solutions are often useful for providing procedural clarity and overcoming communication barriers (Tsai 2009). At the same time, informal and relational modes of communication are necessary for effective interaction between project team members. Informal communications are critical for overcoming discontinuities that arise from unique technologies, norms, and professional cultures of the different project team members (Klimova and Semradova 2012). Communication skills are crucial for ensuring project success (Carvalho et al. 2015; Sosa et al. 2007).

GDOT relies on both formal and informal communication in the environmental review process. In this project, we investigate how each of these types of communication integrates into the project process and contributes to project outcomes. By examining how GDOT communication and coordination operates across the entire project team, we assess how they interact with current processes and streamlining initiatives used in the environmental review process. This project specifically extends and expands a research program established by OES at GDOT to understand challenges arising during the environmental review process. In alignment with the current direction of the transportation policy studies, the principal project goal is to identify strategies for improving performance.

1.2. Summary of Phase I

The first phase of this research focused on two related topics (see Kingsley et al. 2017). First, we identified and compared factors influencing the duration of environmental review projects with factors influencing the duration of the overall preconstruction design projects. Using a sample of 560 GDOT projects (completed between 2011 and 2015), we were able to contrast performance across the range of different project improvement types. Second, we explored

whether communication practices between OES staff and environmental consultants contributed to variability in the duration of environmental review projects using two qualitative research methods. Case studies of six environmental review projects were developed that compared three cases (i.e., projects) yielding higher quality review documents and three cases yielding lower quality environmental review documents. Semi-structured interviews with project team members, including both OES and consultant subject-matter experts (SMEs), formed the basis for the case comparisons. Finally, we conducted scenario-based focus groups with 22 consultants representing firms across the consulting community serving OES projects. Communication and coordination challenges identified during the case studies generated scenarios that focus group participants reviewed. In this way, we identified a range of existing communication practices associated with schedule delay and quality variation across projects.

The Phase I study brought to the forefront several practices used by OES to improve performance and coordination with environmental consultants. The most prominent practices were the use of the digital platform SharePoint for environmental document development and information dissemination, and the use of templates for technical studies, reports, and NEPA documents. Although the Phase I research focused upon communication and coordination between OES staff and environmental consultants, we also found considerable evidence regarding the influence of GDOT PMs and consultant PMs. Environmental consultants and OES staff both noted that PMs play an important role in prompting, as well as inhibiting, communication and coordination practices. Specific focus areas identified for coordination improvement with PMs include the communication of performance expectations to consultants and streamlining procedures for coordinating the environmental phase of project delivery (including the use of guidance, templates, and standard operating procedures).

1.3. Phase II Research Objectives

The goal of Phase II is to broaden the focus on communications to incorporate the activities of PMs and other project team members. Phase II consists of the following elements that comprise the core tasks for the research:

- Task 1: A cross-state comparison of environmental review communication and coordination practices among state departments of transportation
- Task 2: An assessment of OES innovations aimed at improving communication and coordination in environmental reviews implemented after Phase I
- Task 3: Focus groups on communication and coordination practices with consultant project managers and GDOT project managers.

Each chapter of this report is dedicated to a particular task, including a more detailed discussion of the research questions, data collection and analysis methodology, and findings.

1.3.1. Task 1: Benchmarking Communications with State DOTs

The goal of the task 1 of research is to identify and compare common and best practices in communications, including conveying performance expectations, across the environmental review programs of state DOTs. Task 1 comprises the following research objectives (detailed in Chapter 2):

- Identify alternative communication practices used by state DOTs regarding performance expectations for the environmental review process
- Review procedures for maintaining and updating templates and other forms of guidance associated with environmental review
- Identify alternatives for monitoring performance during environmental review

To accomplish this task, we surveyed both the leaders and staff of environmental review programs in U.S. state DOTs. A total of 100 responses are included in this analysis (see Chapter 2, section 2.2).

1.3.2. Task 2: Case Studies of Communication Innovations within OES

Task 2 calls for the development of comparative case studies of communication practices developed by OES (see Chapter 3). The case studies contrast distinctive communication practices used by OES to assist in interactions with the environmental consultant community. The cases vary in the degree to which participants use formal and informal channels to connect OES staff with environmental consultants. The cases vary in the length of time that OES has employed the practice and the number of units within OES that have adopted the practice. Communication practices associated with the quarterly Georgia Partnership for Transportation Quality (GPTQ) meetings represent a long-standing practice that is used by each of the major units within OES (i.e., Ecology, Environmental Program [NEPA], Air & Noise, and Cultural Resources). Innovative adaptations and use of SharePoint sites represent a relatively recent addition to communication practices (within the last 5 years) adopted by a few of the units (Ecology and NEPA). Lastly, the development of templates standardizing reporting requirements for technical reports is the newest addition to the formal communication practices within OES. The common goal across all three practices is to improve the quality of project communications with environmental consultants. We examine how well GDOT communication practices are working and whether they are generating improvements in performance or time management. The case studies associated with task 2 provide a balanced assessment of the impacts each communication practice has had on task duration, workload, and report quality for document review and project delivery.

1.3.3. Task 3: Focus Groups with Project Managers

Task 3 focuses on integrating the perspectives of project managers (PMs) into our review of the communication and coordination practices associated with environmental review processes and project delivery. GDOT PMs are responsible for the delivery of transportation engineering design projects. Fulfilling this role requires GDOT PMs to consolidate knowledge from a wide variety of agency offices dedicated to key components of the design process. GDOT management refers to the agency personnel associated with these offices as subject-matter experts (SMEs). The associated skill sets of SMEs span subject areas such as engineering design, environmental services, right of way, geotechnical, utilities, and environmental review.[2]

In addition to coordinating with the SME offices, GDOT PMs are also responsible for coordinating the inputs of consultants. The majority of engineering design projects hire a consultant project manager to facilitate delivery of the project. The consultant PM's firm may have units that match up with each of the agency SME offices. Alternatively, the GDOT PM and the consultant PM work with the agency SMEs as they produce the knowledge inputs for the design process or with the consultants that the agency SMEs hire. GDOT PMs are responsible for communicating quality expectations for consultant performance and coordinating with consultant PMs for contracted projects.

Phase I research identified strong GDOT and consultant PM leadership of project communication processes as a key factor in the timely delivery of high-quality environmental reviews. Task 3 explores this further in Chapter 4 through a pair of PM focus groups, one comprising GDOT PMs and the other consultant PMs, to examine the range of strategies used to

[2] The engineering design unit includes offices devoted to bridge design and maintenance, right of way, and roadway design. Environmental sections include units for ecology, NEPA, air & noise, and cultural resources (history and archaeology) (see also Table 1-2).

manage project communications and expectations of quality performance. The focus group goals are as follows:

- Identify prevailing practices for communication on engineering design projects, including how communications are managed between GDOT PMs, consulting PMs, environmental consultants, and OES staff
- Examine the challenges associated with balancing the needs for maintaining effective project schedules and budgets, and the needs for generating high-quality environmental documents
- Identify best practices that have developed in managing communications for each of the types of design projects

1.4. Project Management at GDOT

The Office of Program Delivery (OPD) is the administrative home of the GDOT PMs and has overall responsibility for each of the design-bid-build projects within the GDOT portfolio. Table 1-2 details the engineering offices and SMEs involved in project delivery at GDOT.

GDOT's Plan Development Process (PDP) provides a roadmap to the formal processes and procedures used in project delivery (GDOT 2019b). The subsections that follow provide an overview of these procedural standards. Each of the SME offices have additional processes and formal communication processes documented in their respective standard operating procedures. For example, the *Environmental Procedures Manual* (EPM) provides a foundation for the formal communication processes used by OES (GDOT 2019a).

Table 1-2: SME Fields Within Engineering Offices

Office	Unit(s)	Group(s)
Office of Bridge Design & Maintenance	Bridge Design	Bridge Design Bridge Hydraulics
	Bridge Maintenance	Bridge Inspections (topside, specialized, underwater) Engineering Asset Management
Office of Design Policy and Support	Statewide Design Programs	Conceptual Design (+PDP) Roadway Hydraulics Roadway Lighting Water Resources (erosion & settlement, MS4, process & requirements)
	Statewide Design Standards	Engineering Software Standards Engineering Support & Documents Policy Standards & Roadway Design (roadway policy, construction standard details, ADA/PROWAG design) Special Projects
	Statewide Location	Photography & Photogrammetry Surveys/Standards/Quality Assurance
Office of Environmental Services (OES)	Air & Noise	
	Cultural Resources	Archaeology History
	Ecology	
	Environmental (NEPA)	
Office of Right of Way	Acquisition	Court Coordinator Local Government
	Acquisition Support	Condemnation Prep Funds & Certification Plans & Engineering
	Appraisal and Review	
	Property Management	Demolition/Removal Inventory/Surplus Disposal
	Relocation	
Office of Roadway Design	Roadway Design	

As a project proceeds through the delivery process, the PM ensures that the necessary documentation, permitting, and coordination activities occur. Figure 1-1 provides a simplified diagram of the process. Among other steps in the process, project roles are coordinated during

the Project Team Initiation Process (PTIP) and justification statements are generated by the Office of Planning. These provide relevant information and materials for OES at the initiation of the project. The *concept development* stage serves as a scoping process where project team members review the project's purpose and need, programmed budget, and other considerations setting the scope of tasks to follow. It also serves as the starting point of the environmental review process. Final design engineering can begin in full once the environmental process is completed. While this process may vary from project to project in practice, these steps outline a simplified timeline of the project process in the PDP. The PDP depicts the project delivery process in a primarily linear fashion, proceeding from concept development to preliminary design to final design, and then out to let for construction.

The linear model of project delivery in Figure 1-1 disguises the complicated reality of coordination between project team members and the role of the PM. Figure 1-2 is a portrayal of the more complex communication and coordination activities that occur between actors over the life of an environmental project.

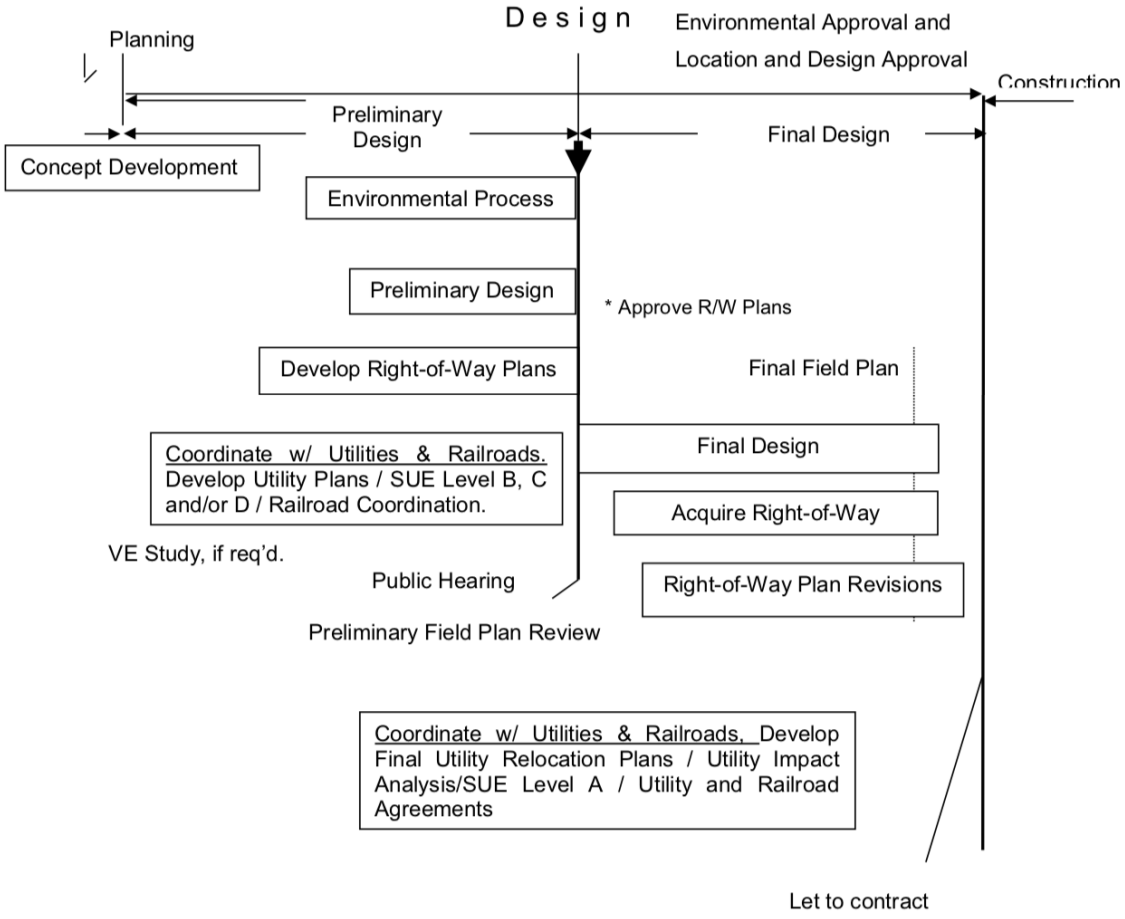

Figure 1-1: Project Delivery Process

R/W: Right-of-Way
SUE: Subsurface Utility Engineering
VE: Value Engineering

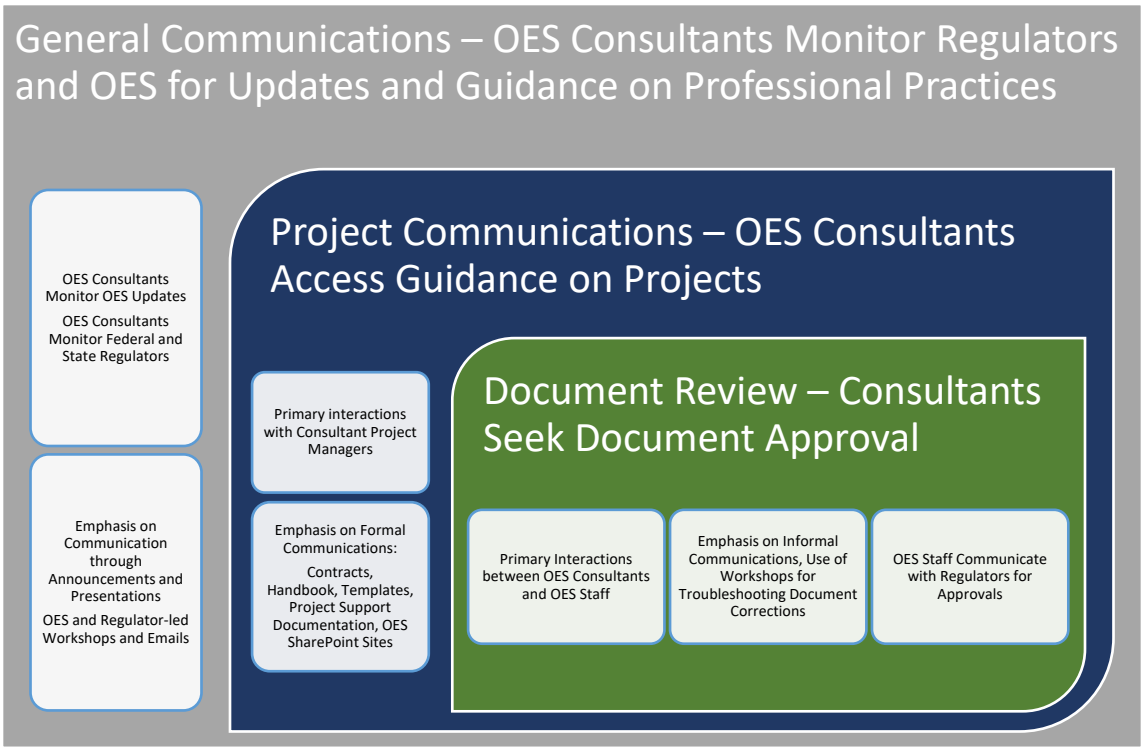

Figure 1-2: Environmental Review Communication Patterns

GDOT's organizational design means that each SME (such as those within Environmental Services) has dual accountability reporting vertically within his/her specialty office as well as to the GDOT PM. Organization researchers describe this type of reporting structure as a hybrid organizational design (Galbraith 2002). Additionally, the structure of contracts on design projects can further remove GDOT PMs from a central role in project communications. Frequently, consultant PMs hired to manage a project exhibit greater responsibility for project communications. Consultant SMEs assigned to a project communicate directly with the consultant PM (this is particularly true on projects where a single organization provides both the consultant PM and the consultant SMEs). GDOT PMs and GDOT SMEs are ultimately responsible for the quality of the engineering design that incorporates the environmental review process. However, for large parts of the project portfolio the work of the public-sector managers is to monitor the work of private-sector consultants, making sure that the project work complies with the full range

of public values authorized under the law, as well as agency objectives for project scope, schedule, and budget. The research literature on communications in project management focuses on team coordination across groups directly engaged in design production. It provides less guidance on communication across the different roles played by public- and private-sector managers. One of the core findings from this research is that GDOT and OES have struggled to find the right balance of project team authority and communications in both the project delivery and environmental review processes.

1.4.1. The Environmental Review Process

The environmental phase of transportation projects provides the technical studies and mitigation strategies as mandated under federal and state laws. The NEPA process serves as an umbrella policy coordinating all of the relevant environmental regulations into a single process of environmental review. Federal policy requires an environmental review process for all federally funded projects (including all state DOT projects that utilize any federal dollars). Under NEPA, a classification commensurate with the expected environmental impacts is provided to all transportation projects; this classification may change as additional resources are identified (see Table 1-3 for descriptions).

The majority of DOT projects receive a classification of a categorical exclusion (CE), meaning that the type of project itself (such as a resurfacing or bridge replacement) is unlikely to have significant environmental impacts. States can also negotiate programmatic agreements with FHWA that designate an entire class of CE projects as programmatic categorical exclusions (PCE) for federal review rather than review on a project-by-project basis. Projects not falling into an excluded category undergo a more detailed reporting process in the form of an Environmental Assessment (EA), which either determines the project to be of no significant impact (i.e., a Finding

of No Significant Impact, or FONSI) or identifies potentially significant impacts and triggers an Environmental Impact Statement (EIS), which is the most exhaustive NEPA process. While EIS projects receive far more attention (FHWA 2000; AASHTO 2014), CE projects account for over 96% of projects (Trnka and Ellis 2014).

Table 1-3: NEPA Classifications for a Sample of GDOT Design Projects from 2011–2015

NEPA Class	Applicability[3]	Percentage of Portfolio at GDOT
Programmatic Categorical Exclusion (PCE)	CE projects that are small and unlikely to have significant impacts. Can be reliably completed by the state without federal review.	58.17%
Categorical Exclusion (CE)	Specific low-impact, minimal construction projects.	34.33%
Environmental Assessment (EA)	Projects with unknown environmental impact requiring further investigation (may be later classified as CE or EIS).	7.49%
Environmental Impact Statement (EIS)	Projects with significant impact; requires substantial technical analysis and public review to investigate alternatives or mitigate impact.	0.00%

The environmental review process for all NEPA classifications demands several forms of coordination within the project team, including across the units of OES, with other GDOT SME offices, and with the GDOT PM. Each of these actors is likely to have the support of a consulting firm to produce the components needed for producing a completed set of engineering design plans and permits that are ready for construction. GDOT, like all other state DOTs, has made a transition over the last 20 years from doing most of the design work in-house to employing consultants to assist on the majority of the portfolio of projects (Yusuf and O'Connell 2014; Gen and Kingsley 2007; Ponomariov and Kingsley 2008). GDOT consultants handle the majority of the

[3] Source: USDOT www.transit.dot.gov/regulations-and-guidance/environmental-programs/national-environmental-policy-act

fieldwork, surveys and assessments, technical reporting, and documentation required in the environmental process. These firms often subcontract specific technical tasks to other consultants, further expanding the project team. Consequently, even a relatively small project requires communication and coordination across a large number of actors.

GDOT employs a mix of formal and informal communication tools and practices to facilitate project development and allow the environmental process to develop smoothly. Numerous communication channels and checkpoints are set up to connect PMs with project SMEs, consultants, and other project staff. Formalized communication tools, such as published guidance handbooks, outline how to complete environmental tasks, and templates outline document requirements. In addition, formal meetings serve as key checkpoints in the life of the project (such as the concept review meetings, the initial field plan review, and the final field plan review). Informal communication practices supplement this process to facilitate completion of environmental tasks (e.g., through project team meetings and horizontal conversation between SMEs via email and phone). These communication pathways are critical for coordinating the tasks associated with project development and completing high-quality project activities efficiently.

The NEPA classification of each project determines the required level of documentation and public involvement and coordination activities. This effectively sets the scale of the procedural activities and communication requirements associated with most projects. However, there are checkpoints in the process allowing for reclassification as technical studies and engineering design develop. A CE or PCE project can proceed with little or no public involvement and without preparing impact mitigation alternatives, allowing the environmental process to be completed before design begins (see Figure 1-3 for the timeline of NEPA activities according to GDOT). By nature, PCE and CE projects demand less project coordination and communication across team members. With fewer subjects to review and mitigate, environmental specialists

coordinate fewer tasks with a smaller number of other actors. Additionally, PCE projects can proceed with state-level approval under the terms of the agreement with FHWA, further reducing the burden of communication on those projects.

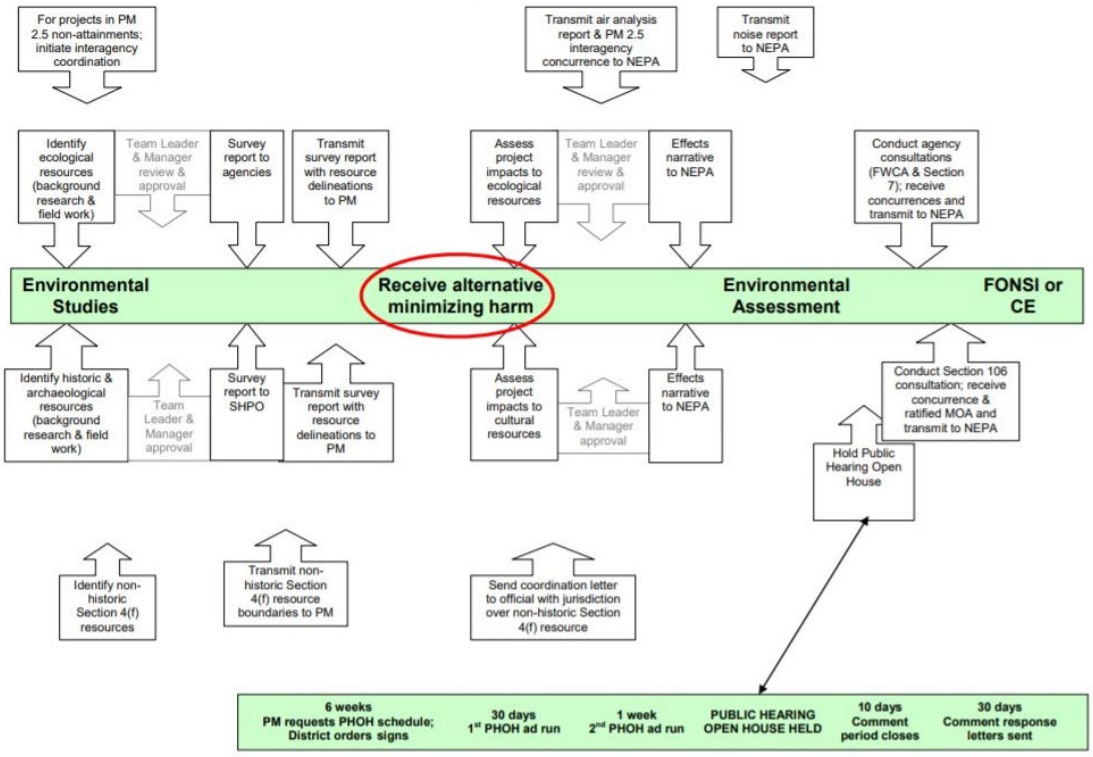

Figure 1-3: Timeline of NEPA Activities for CEs and EAs/FONSIs[4]

MOA: Memorandum of Agreement

SHPO: State Historic Preservation Officer

If a more intensive review is necessary, an Environmental Assessment (EA) might be required. The EA could become a FONSI or EIS, depending on the impact of the proposed project on the resource. EAs demand much more communication from the project team. EA reviews cover an expanded number of subjects and categories, forcing environmental SMEs to engage in increased communication in order to complete project studies. More environmental work

[4] Source: GDOT (2019b). *Environmental Procedures Manual*

requires SMEs to reference more of GDOT's formal communication materials, discuss project issues with other project team members more frequently, and utilize a larger number of informal communications to complete work successfully. Larger projects may also require more work be outsourced, and the additional contracting or subcontracting increases the burden of communication by increasing the number of actors who must coordinate with each other.

The Environmental Impact Statement (EIS) process features expanded documentation requirements, a public involvement plan and execution, and two rounds of alternatives preparation and public review (i.e., the Draft EIS and the Final EIS). The GDOT *Environmental Procedures Manual* describes EIS documents as "full disclosure documents that provide a full description of the proposed project, the existing environment, and identification of the anticipated beneficial and adverse environmental effects of all reasonable alternatives." This is the most complex NEPA category and consequently requires the most intense communication. Every increase in task and procedural complexity demands more frequent and robust use of both formal and informal communications.

The environmental review process required under NEPA functions as a vehicle for surveying and assessing the environmental context and potential project impacts and does not supersede or replace additional regulatory requirements. Discovery of specific classes of environmental resources can trigger additional regulatory requirements and may vary from project to project based on geography (e.g., the presence of certain protected species). Each of these resource categories has its own unit within GDOT OES and its own dedicated SMEs responsible for assessing and documenting those resources. In addition to the Environmental Program (NEPA) section of OES, there are sections for Ecology, Air & Noise, and History & Archaeology (Cultural Resources). Permitting or regulatory requirements across these resources invoke the involvement of their corresponding resource agencies, such as the U.S. Army Corps of

Engineers (USACE) or the U.S. Fish and Wildlife Service (USFWS). When the form or interpretation of these requirements changes, project teams must adequately communicate information and guidance on those changes between resource agencies, consultants, and other project staff. States also adopt their own environmental regulations, which may be more or less stringent than federal regulations. In the case of Georgia, the Georgia Environmental Policy Act (GEPA) applies to all state-funded projects. The NEPA process satisfies GEPA requirements for all federally funded projects. For DOT projects, FHWA is the agency responsible for reviewing and approving NEPA documents before the corresponding project can be let out for construction as required by law.

While the intended purpose of NEPA is widely understood to be to consolidate complexities (including the presence of environmental and cultural resources) in a way that informs decision-making and creates venues for citizen input, the procedural process creates costly hurdles as state DOTs pursue project delivery (AASHTO 2008). Even CE documentation regularly totals over 100 pages in length, despite the intent to be as expeditious as possible (e.g., AASHTO recommends the increased use of programmatic categorical exclusions) (Trnka and Ellis 2014). The United States DOT (USDOT) has repeatedly expanded its Every Day Counts initiative, aimed at reducing project timelines. The American Association of State Highway and Transportation Officials (AASHTO) has prepared numerous guidance materials on preparing high-quality and efficient environmental documents, including a focus on systems to better standardize reports and documents (AASHTO 2014). However, the desire to avoid delays comes into direct conflict with the desire to avoid litigation and avoid issues during the environmental process (Trnka and Ellis 2014).

The environmental review process consists largely of three categories of tasks: (1) survey work that identifies resources in the field and the collection of recorded resource data; (2) documentation of resources, possible impacts, and other elements relevant to reducing

impact, including the preparation of NEPA, GEPA, or other permitting materials; and (3) coordination with resource and permitting agencies, local governments, environmental consultants, and other project team members. Complicating factors during the environmental process can be numerous, but common trends in the previous research emphasize the following (AASHTO 2008; Plotch 2015):

- Requests for difficult or unreasonable detail for permitting agencies, i.e., principal–agent problems
- Poor or uninvolved project management
- Scoping difficulties
- Staff turnover (at DOTs, but also at FHWA and resource agencies)
- Understaffing
- Design changes
- Social and political values (public participation)
- Poor performance measurement (specifically of project outcomes)

1.4.2. Communications and Coordination in GDOT

Figure 1-2 illustrates the different forms of communications that occur throughout the project process and describes the primary communication channels used in each stage. We observe that in the background of all project-level communications is a system of *general communications* between environmental consultants, OES staff, and other federal and state regulatory authorities. Environmental consultants regularly engage in general communications with OES, as well as the federal and state regulatory authorities associated with the NEPA process. Firms coordinate with OES regardless of their contract status by attending quarterly meetings, monitoring updates from OES and resource agencies, and accessing OES resources online. For

environmental consulting firms, general communications serve as a form of monitoring developments in the science, technology, regulations, administrative processes, and the personnel associated with environmental review. For agencies, general communications are a way to make announcements and to provide explanations of preferred practices. Firms consider this a normal cost of doing business, allowing them to stay up to date. We also note that firms that do not participate in general communications are at risk for lower performance.

When environmental consultants begin the process of working with OES, they enter into the system of *project communications.* This system is governed by a set of rules and procedures constructed by OES to guide consultants in performing the technical studies needed in the environmental review process. This process begins when OES staff communicate with the Office of Procurement to help specify the scope of the environmental work for a transportation project. OES staff and GDOT PMs each report communication challenges associated with the procurement process; both lack influence over the final consultant selection and do not have a satisfactory way of giving feedback on consultants' quality to procurement.

Once a project has been outsourced and consultants are performing environmental work, consultants engage with OES and GDOT project managers through a variety of formal communication channels. These channels convey project templates for technical studies, the EPM, project resource documents providing site and technical specifications of the project, and updates on OES and regulatory rules and procedures. However, consultants rarely use direct, informal channels of communication during this phase of work. Consultant PMs and environmental consultants emphasized the need for more informal communication channels during the life of a project.

After the technical studies are complete, projects enter the *document review* phase during which consultants submit work to OES for review. When poor-quality work occurs, it can

require documents to bounce back and forth between OES reviewers and consultants over multiple rounds of review. This places increased emphasis on informal communications and workshops for troubleshooting issues. Finally, once OES approves the documents, it sends them to the FHWA for review. During this phase, OES staff communicate with external regulatory agencies in order to move the project toward approval.

This description demonstrates the wide variety of communication channels that environmental consultants must engage in during the life of a project. However, their primary engagement with OES staff occurs during document review, a relatively late stage in the process. OES staff indicate that high project workloads can make communicating with consultants a struggle. OES staff want to be hands-off during project development, so they will often only communicate after repeated consultant requests.

One point of consensus within GDOT (among project managers and OES staff) is that conflicts in performance expectations can arise. For example, OES may want quality and compliance while PMs demand expediency to meet the project scope and schedule. GDOT staff report a need for shared standards for how to balance environmental compliance and delivery schedule. Improvements in communication during the environmental review process need to be accompanied by process improvements in OES workflow and enhanced communication with other GDOT staff.

1.5. Research Literature

The coordination challenges arising between GDOT SMEs, PMs, and consultants are not unique to the agency. Coordination across roles and tasks is a fundamental challenge for large bureaucratic organizations, and one of the defining conditions that led to the development of formal organizational structures and strategic design decisions based on the needs and

production processes of the organization. State DOTs are largely alike in their mission and responsibilities; as a result, state DOTs have adopted some similar structural qualities to align individual tasks and goals with the organization's goals (AASHTO 2009). We develop an understanding of coordination and communication processes by reviewing the research on control theory, formalization and standardization, project management, and contracting to identify organizational elements that may drive the performance of environmental review within GDOT and across peer organizations.

1.5.1. Structure and Control

One of the fundamental challenges defining the operation of an organization, particularly a large agency, is the alignment of goals and tasks across the programs and offices charged with fulfilling key functions (Caglio and Ditillo 2008). The organization's design aligns the capabilities, activities, and performance of individuals with the organization's goals (Dunbar and Statler 2010; Cardinal et al. 2004). Control theory (see Cardinal et al. 2010; Ouchi 1979; Simard et al. 2018) models how different types of organizational tools and practices increase alignment of these elements. Table 1-4 describes a typology of controls used at organizations such as GDOT.

Table 1-4: Typology of Control Mechanisms and Targets

Mechanisms:	*Formal*	Fixed rules, procedures, and structures (officially sanctioned and usually codified)
	Informal	Emergent patterns of behavior and beliefs, including norms, practices, and values
Targets:	*Input*	Training, qualifications, and other means of regulating knowledge, skills, and motives through labor and resource selection, preparation, and qualification
	Behavioral	Process rules and behavioral norms that structure behavior
	Output	Performance tracking

NEPA itself is a form of federal control designed to ensure DOTs comply with environmental laws. This formal control from the federal government has led DOTs to implement

their own organizational controls to ensure project-level alignment with NEPA. GDOT created a subunit within the organization in OES to respond to this pressure and provide the forms of coordination necessary to meet legal sufficiency in the environmental review process. These control procedures create the conditions in which communications occur.

The structure of OES procedures and the controls it implements over the environmental process dictate the types of communication and coordination that take place on projects, driving project outcomes. Implementation of inappropriate or poorly specified controls can reduce flexibility, create opportunities for miscommunication, and hinder project processes (Liu et al. 2014; Verbeeten and Speklé 2015). Organizations like GDOT need a balance of formal and informal communications, along with other types of control, to achieve high performance (Cardinal et al. 2004; Liu et al. 2014).

GDOT employs a mix of controls to manage the environmental process. Like other state DOTs, GDOT uses a traditional bureaucratic structure with a hierarchical organizational design outlining vertical reporting and oversight structures, specialized roles, and high degrees of formality. Furthermore, GDOT offices organize around specific functions such as construction, environmental review, or maintenance (AASHTO 2009). When projects rely upon outsourcing, this specialization extends to consultants to complete specific tasks in the project process. In OES, formal controls outline consultants' responsibilities and guide the types of communication needed for project work. Consultants go through a qualification procedure set by the agency and are required to be familiar with the formal communications published by OES. However, during the Phase I research (GDOT RP 15-06) we found that OES staff commonly expects that consultants actively manage project communication and coordination on their projects. Both types of controls are crucial for organizing and structuring expectations for communications across the project team at GDOT.

1.5.2. Formalization, Standardization, and Routines

While project details differ greatly and local context can lead to wide variation in project purpose, resources, and challenges, the fundamental tasks necessary for engineering and project delivery generally fall within a defined range, called a routine. However, the ostensive routine (the expectation of how the process should go) often looks very different from the performative routine (how it actually occurs in practice) (Pentland and Feldman 2005). The presence of areas where performative routines deviate from ostensive routines in the environmental process at GDOT is one indicator of challenges in communication and coordination.

Deviations from the ostensive routine may arise from behavioral biases among project personnel (Cardinal et al. 2004) or from a failure to perform procedural mandates or directions (Pentland and Feldman 2005). Poor communication between GDOT PMs, SMEs, and consultants can lead to breakdowns in the planned routines in the environmental review process. GDOT organizational design suggests that GDOT PMs play a key role in coordinating team communications and project tasks throughout the process. Identifying key areas of divergence from plans may reveal areas where communication is at greater risk of breaking down.

1.5.3. Project Management

GDOT, like other DOTS, delivers transportation improvements as clearly delineated "projects" with a shared goal and set of required tasks defined through the project scope. In contrast to a purely systemized delivery of products or services, the use of projects allows organizations to handle variation, novelty, or uncertainty (Miterey et al. 2017). Organizations are increasingly structuring their work around portfolios of projects to improve coordination and quality (Bakker 2010; Clegg 2012; Miterey et al. 2017). However, projects confound traditional management hierarchies when they span across otherwise independently managed

interorganizational units or across multiple organizations. In these cases, the project's hierarchies may conflict with the organizations' hierarchies (Sydow and Braun 2018).

For a single project, GDOT PMs must integrate the work of actors from numerous GDOT departments and offices, as well as consulting firms. This creates coordination challenges that can threaten to disrupt communications and project processes. Furthermore, project hierarchies within projects do not always align with those established within individual GDOT offices. For example, PMs are responsible for overseeing and delivering their projects, but they are not always provided with the authority to ensure that team members meet project goals. Similarly, there is an expectation that OES NEPA managers organize and integrate the work of other environmental SMEs into a single product on projects; however, they lack authority over other SMEs inside their office.

We use project management theory (i.e., Lundin and Soderholm 1995; Miterev et al. 2017; Turner and Müller 2003; Van de Ven et al. 2013) to develop our understanding of how project-based management affects organizational processes and communications at GDOT. Public management research has found that agencies use a combination of project governance standards and flexibility in project-specific management regarding project team communication and coordination norms to achieve performance goals. Project governance standards prescribe coordination through modes such as formal guidance documents and quarterly meetings, as well as project-specific communication through project team coordination, and apply to all projects within the portfolio (Simard et al. 2018). However, project-specific management sets norms for adaptation to the specific conditions encountered within a project and is key to successfully navigating diversity between individual projects (Sydow and Braun 2018). Project governance standards and project-specific management practices can greatly change the impact of different types of communication. Implementing many different types of tools and practices provides

GDOT PMs and other project team members flexibility in how to coordinate the environmental process in their projects.

1.5.4. The Role of Contracting

Consultants have become a normal part of the project teams on preconstruction engineering design projects (Yusuf and O'Connell 2014). In ideal conditions (i.e., high competition, contract specificity, monitoring capacity, monitor expertise, incentives, and contract expertise), outsourcing promises opportunities for simultaneous cost reduction and quality improvement (Ponomariov and Kingsley 2008). However, the increase in outsourcing has required agency staff to adjust to new roles and responsibilities (DeHart-Davis and Kingsley 2005) and created increased demands for project communications. Outsourcing increases the number of actors that must coordinate for project delivery and introduces additional complexities to the project team.

Contracting as an activity is best broken down into two sub-activities: procurement and management. Contracting at GDOT is subject to clearly defined behavioral controls, with procurement and management processes specified formally in the GDOT *Procurement Manual*. The Procurement Office is responsible for managing the contractual relations with consultants. However, the decision whether to outsource and the choice of vendor involve the PM and, at times, representatives from SME offices. The decision to outsource is part of the Project Team Initiation Process (PTIP) meeting deliberations. The decision to outsource largely hinges on GDOT's internal staff capacity, and available technical expertise (Yusuf and O'Connell 2014). The selection of a contractor involves a process of criteria selection and evaluation where SMEs, the PM, and the contract specialist each identify key roles for the project and make decisions whether to prioritize particular services, experience, qualifications, or resources. This phase ostensibly provides opportunity for previous consultant performance to be considered in the decision (in the

form of “documented knowledge on performance of consultant on prior projects,” including performance evaluations). Importantly, consultant qualifications, rather than costs, drive final contracting decisions (known as Qualification Based Sourcing, or QBS). However, final contract awards are dependent upon successful cost negotiation, ensuring acceptable cost levels.

Contracting creates opportunities for “principal–agent” problems, in which one party acts or makes decisions on behalf of another, creating the potential for misaligned goals or self-serving behavior. The assumption here is that individual parties act opportunistically, and that specificity in a contractual agreement will serve to mitigate and control such behavior (Malatesta and Smith 2014). The traditional answers to these principal–agent dilemmas have been vertical integration (such as producing in-house) or arms-length transactions (purchasing very specific products from a competitive marketplace where costs of switching providers are minimal) (Anderson and Dekker 2005). However, these options have been problematic for state DOTs, which have instead favored the pursuit of more complete contingent contracts.

During the Phase I research, we observed some problematic variation in consultant quality. For some projects it is difficult to specify the full scope of work, the terms of exchange, and participant obligations. Predicting all possible scenarios is challenging. In cases like these, contracts are necessarily incomplete, and additional controls are required to ensure that the exchange delivers on the expectations of the parties (Brown et al. 2016). Research has found examples of additional controls might include flexibly enforceable contract language that specifies that the consultants complete all tasks in line with particular guidance materials, third-party standards, or benchmark practices.

GDOT currently uses a combination of Master Agreements and Task Orders to secure contract services. Master Agreements specify the essentials of a relationship between a firm and GDOT, such as general responsibility, rates, term, credentials, and terms of resolution, but do not

specify tasks. Task Orders focus on scope and budget for a specific item or for a clearly delineated menu of projects. The content of these contracts appears to be largely in line with a contract specificity approach, attempting to reduce variation through specificity. Yet the findings of Phase I indicate that, for whatever reason, current contracts or management controls are not sufficient to reduce variability in consultant performance.

One of the most important unanswered questions from Phase I was what caused the variation in consultant quality, or more specifically, what led some consultants to operate at higher quality levels than others, despite seemingly identical requirements per their contracts. One possible explanation comes from a body of research on relational contracting, which argues for informal, rather than formal, controls. Specifically, shared values, group norms, and informal gatherings and processes replace traditional formal contract control mechanisms (Grafton and Mundy 2017). Such an informal approach naturally leads to the repeated use of contractors to mitigate the risks of short-term opportunism. In other words, the desire of contractors to secure additional future contracts (and the value of those contracts) through strong, positive relationships surpasses the value of short-term perfunctory or opportunistic behavior (Brown et al. 2016; Gil and Marion 2013). Research on the use of relational contracting has identified the potential for reduced coordination costs and moral hazard behavior, as well as improved cost, time, and quality outcomes (Gil and Marion 2013; Ling et al. 2014). However, there are also concerns about the effectiveness of relational approaches on accountability and competition, and the challenges of managing such an approach (Ling et al. 2014).

1.6. Roadmap to Phase II

In the four chapters that follow, this report details the findings of Phase II of the research regarding GDOT coordination and communication. In Chapter 2, we compare GDOT to peer state

DOTs. State DOTs have significant flexibility on programs and organizational structure, so determining practices other states are using could reveal alternative communication and coordination methods. In Chapter 3, we examine existing communication and coordination systems and practices used by GDOT's Office of Environmental Services. We develop case studies of procedural innovations and examine the communication patterns associated with each. In Chapter 4, we present findings from focus groups, comparing GDOT PM and consultant PM perceptions of effective communication and coordination practices. Finally, in Chapter 5 of the report we conclude by proposing various program recommendations for communication and coordination practices based on the results from the prior chapters.

Chapter 2 Benchmarking Against Other State DOTs

2.1. Introduction

The consistency of organizational mandates, policy context, and delivery tasks across state transportation agencies makes benchmarking comparisons between DOTs a common exercise. At the same time, the Council on Environmental Quality (CEQ) and FHWA, as well as other permitting agencies, leave much discretion on practices up to individual states (AASHTO 2014). The implementation of FHWA's EDC initiatives furthered this differentiation, spurring DOTs to pursue unique combinations of memoranda or programmatic agreements with permitting agencies and stakeholders and implement procedural modifications, along with other streamlining efforts. Some systematic research has been performed comparing states (AASHTO 2008, 2014; FHWA 2000; Deyle and Slotterback 2009; Trnka and Ellis 2014), but this work has largely focused on environmental documentation and Environmental Impact Statement (EIS) processes. Several authors (Miller et al. 2016; Ozawa and Dill 2005; Roberts and Whorton 2015) investigate state differences through a body of case findings, but they provide little actionable guidance on what practices, tools, or processes are effective for coordination during the environmental process. In this chapter, we examine the communication and coordination practices, structures, tools, and metrics in place across state DOTs to develop a comparative understanding of the environmental review process and identify key areas for improvement at GDOT.

In order to compare DOT processes across states, we developed a benchmarking study around four core topics. First, we examine DOT communication practices between project team members, identifying alternative communication practices at state DOTs regarding performance

expectations. Second, we investigate the use of tools, practices, and other input controls, such as templates, manuals, and other behavioral controls. Next, we look at the performance measures employed by different state DOTs to assess and report output quality, identifying alternative strategies for tracking error rates and consultant performance. Finally, we inspect the role of consultants and analyze factors and practices that may support high-quality performance. Comparing DOTs in these areas allows us to examine key similarities and differences between the environmental review process in different states, distinguishing best practices and identifying potential solutions for common issues. In this study, we survey U.S. state DOTs and conduct a qualitative comparative assessment in order to benchmark the environmental review process at GDOT and identify areas and opportunities for improvement in project communications and coordination.

2.2. Methodology

A census survey is the best method to assess current practices across U.S. states as it allows a broad inspection of state DOTs. In this task, we survey the leadership and staff of the environmental units to ascertain their perspectives on the environmental review process at their DOT. One of the challenges in assessing DOT outcomes is that the prominent measures of performance (our dependent variable) that DOTs use either exist at the project level or are aggregated from large groups of projects, e.g., schedule deviation, cost change, quality, and productivity (Weshah et al. 2014). The same is true for the measurements of many independent variables that are critical to project outcomes. This limits the specificity of conclusions drawn from state DOT data. Aggregated data cannot effectively shed light on many of the project-level and day-to-day procedures influencing project performance. An ideal research design should incorporate both aggregated departmental data and project-level data into a multi-level analysis

to study the DOT alongside the projects it delivers. We collect survey data at two levels to conduct this analysis. Perspectives from environmental leadership provide insight at the departmental level, while responses from environmental staff in those departments shed light on the project level (note that in this chapter, we adopt GDOT's terminology of referring to staff as SMEs). Additionally, the selection of benchmark states provides structured sampling for a complementary case analysis. We examine key similarities and differences across states and between leadership and SME perspectives with a focus on states identified as closely comparable to GDOT.

Our research questions center on the environmental review process, with an interest in understanding communication and coordination between environmental units and other project team members. To this end, we designed our primary survey to capture senior administrators' expert perceptions of their units' performance and current practices. These respondents provide an expert overview of departmental processes. We then administered a reduced version of the same survey to environmental SMEs in those departments. Respondents from our leadership sample alerted staff to the opportunity to participate in this follow-up survey to give us information about environmental processes from individuals who interact with it at the project level. Table 2-1 outlines the focus and primary dependent and independent variables our surveys are designed to measure. It also describes which of the two surveys each question appears in. A complete list of topics, as well as full copies of each survey, are included in Appendix A.

The state response rate on the primary survey was 27%. Twenty-two DOT leaders from 14 states, and 68 SMEs from 19 states responded to the two surveys. Due to the low response rate on our survey of DOT leadership, we invited environmental leaders from nonresponse DOTs to participate in semi-structured interviews pursuing the same topics covered in the survey. The semi-structured interview protocol that we used mirrors the core concepts employed in the

leadership survey. The full protocol, along with other details of our methodology, are included in Appendix A. Leaders from 10 DOTs participated in these follow-up interviews, bolstering our coverage of DOTs to 45% of states. Figures 2-1 and 2-2 describe the number of responses we received from each state DOT for each of the surveys.

Table 2-1: Primary Survey Variables

#	Dependent Variables	Leadership	SME
Q10	Performance of environmental process assessment	✓	✓
Q14	Project efficiency assessment	✓	✓
Q40	Average project timeline length	✓	✓
Q41	Average rounds of revision	✓	✓
#	**Independent Variables**	**Leadership**	**SME**
Q5	Regularity of project scoping meetings	✓	✓
Q6	Attendance of project team members at scoping meetings	✓	✓
Q7	What tasks are completed before scoping meetings	✓	✓
Q11	NEPA document performance measures	✓	
Q12	Problem situations	✓	✓
Q13	Serious situations	✓	✓
Q15a	Frequency that project guidance tools are used	✓	✓
Q15b	Effectiveness of project guidance tools	✓	✓
Q16a	Frequency that project guidance practices are used	✓	✓
Q16b	Effectiveness of project guidance practices	✓	✓
Q20	Frequency of tracking consultant document error rates	✓	
Q21	Revision tracking and procurement	✓	
Q22	Responsibility for environmental coordination	✓	
Q23	Actual phase of most communication	✓	✓
Q24	Ideal phase for most communication	✓	✓
Q25	Frequency of SME communication with PM	✓	✓
Q26	Consultant quality	✓	
Q27	Causes of quality variation in consultant work	✓	✓
Q31	Staff qualifications	✓	
Q32	Outsourcing rates	✓	
Q33	Contract specificity and controls	✓	
Q34	Staff experience	✓	

2.3. Results

We analyze the data qualitatively to discern key differences between state DOTs and important relationships between communications, organizational strategies and practices, and performance. Our results are split into three sections in which we: (1) investigate the impact of different communication practices through a comparative cluster analysis; (2) examine key characteristics and performance aspects of state DOTs identified as benchmarks for GDOT, while investigating key differences between state DOT and GDOT perspectives at the project level; and (3) compare leadership and SME survey responses.

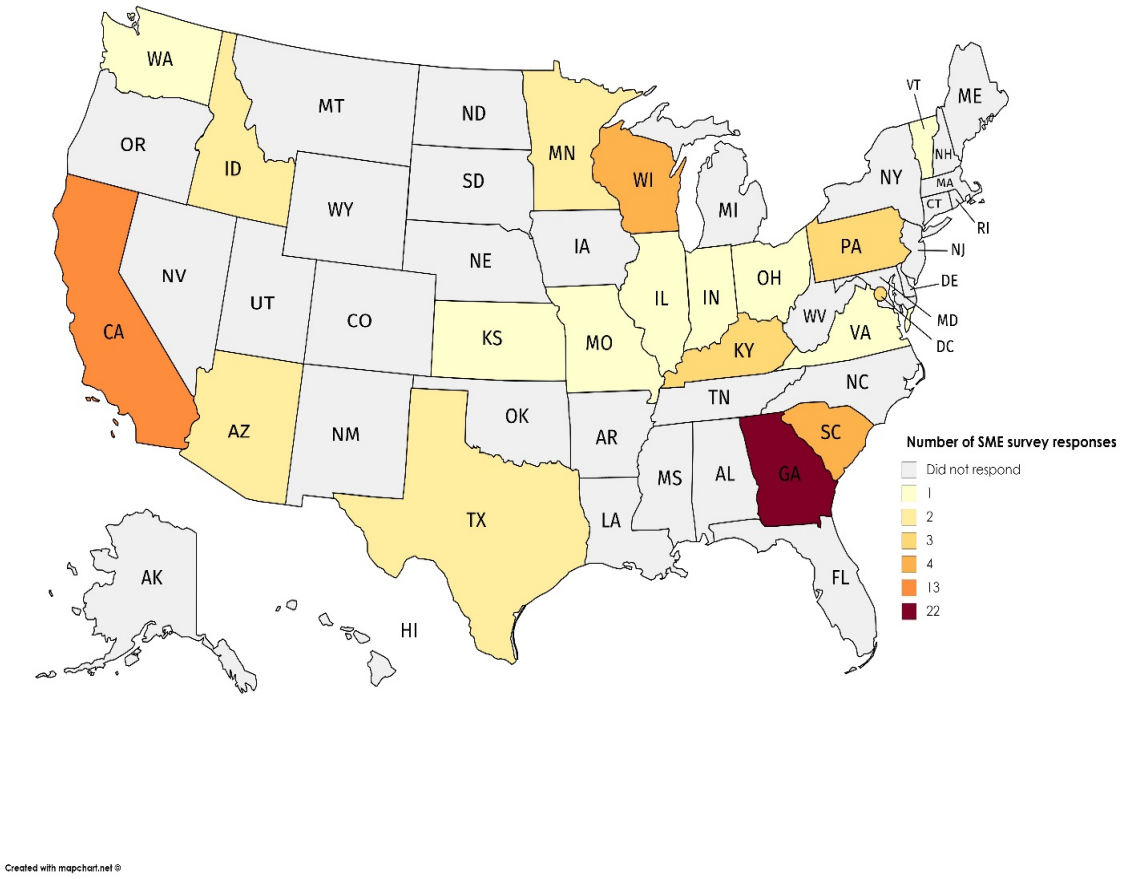

Figure 2-1: Environmental SME (i.e., Staff) Survey Responses[5]

[5] Figure 2-1 depicts the number of staff members from each state DOT who responded to our SME survey. The color key corresponds to the number of individuals who completed the survey from each state.

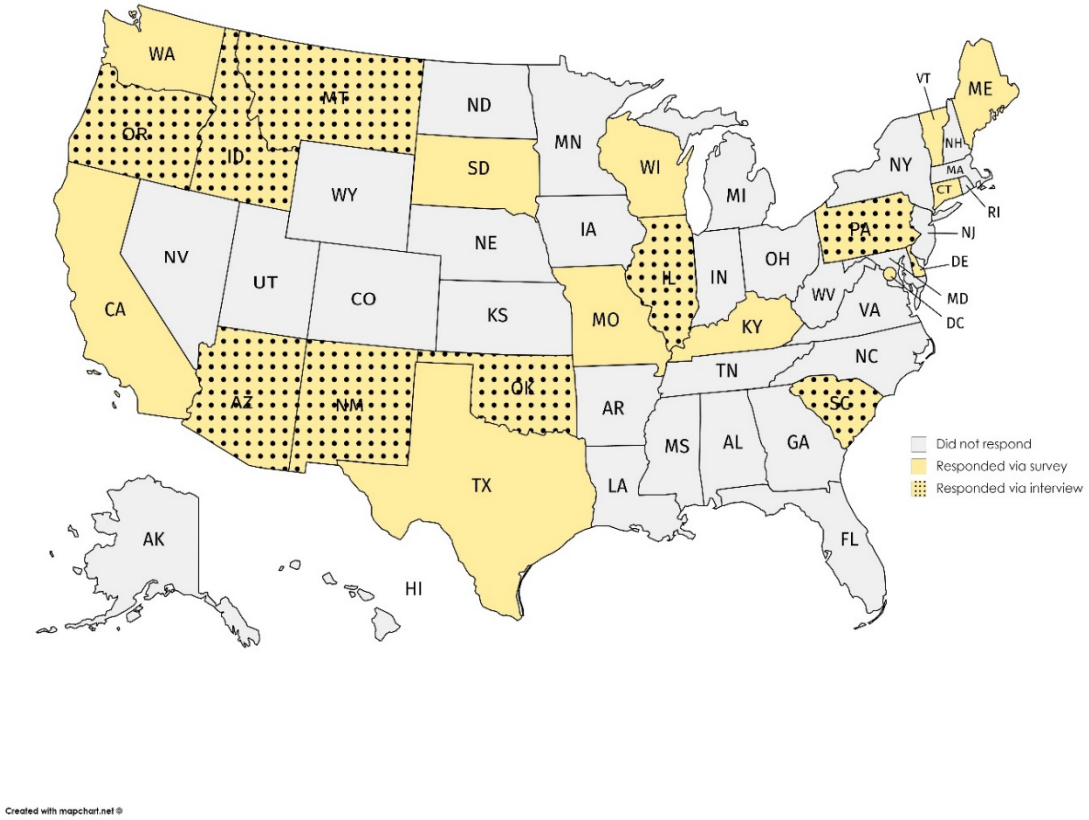

Figure 2-2: Environmental Leadership Survey Responses[6]

2.3.1. Comparative Cluster Analysis

We cluster states based on their communication practices in order to examine important differences in performance outcomes between those groups. Relying on departmental data from leadership respondents, we sort states into a series of clusters based on two variables. First, we cluster states based on the level of communication across project stages, categorizing them as early, late, or continual communicators. Second, we cluster them based on the frequency with

[6] Figure 2-2 illustrates the states in which state DOT environmental leaders responded to our survey, as well as the method of their response as described in the color key. Leaders from plain-colored states responded via survey, while leaders from dotted-colored states responded via interview.

which PMs and SMEs directly communicate during the life of a project, splitting states into groups that communicate on a daily, weekly, or monthly basis. A tabulation of the states in each cluster appears in Table 2-2. Next, we compare these groups on their performance across a number of performance measures[7], and the frequency and impact of common issues on environmental projects[8]. We then describe our findings, highlighting important areas of divergence.

Table 2-2: State DOT Clusters

Category	States
Cluster 1 (Communication timing)	
State DOTs emphasizing early communications	AZ, ID, IN, MT, NM, PA, SC, SD, TX, WA
State DOTs emphasizing late communications	CT, KY, IL, OR
State DOTs emphasizing neither	CA, DC, DE, MO, OK, VT, WI
Cluster 2 (Communication frequency)	
Daily	AZ, CT, ME, WI
Weekly	KY, MT, NM, OK, OR, SD, VT
Monthly	CA, DC, DE, ID, MO, SC, TX, WA

The cluster analysis demonstrates that state DOTS emphasizing communication in the early stages of the project perform better. Communicating early on, in particular during the scoping, preliminary engineering, fieldwork, and technical reporting stages, correlates with better performance across several metrics. Figure 2-3 illustrates the percentage of each main group of state DOTs (early and late communicators) that report positive performance outcomes for different metrics. Early communicators in our sample report positive performance on the majority

[7] Time and cost to complete projects (of different NEPA categories), percentage of projects completed on schedule and budget, number of rounds of revision, number of public comments, design improvements generated by the process, and project outcome measures.

[8] Project issues we investigate are: drafts being rejected by resource agencies; improper grammar in drafts; drafts not being in line with templates; reviewer variance; variance in stakeholder agency expectations; insufficient detail in work; number of rounds of revision; scope changes; design changes; having too many cooperating entities; information not being transmitted to document preparers; insufficient team cooperation; communication breakdowns; inaccurate or distorted communications; turnover of environmental staff, project managers, designers, and consultants; and having inexperienced consultants.

of metrics we measure, with large benefits coming for total time and the number of rounds of review required for project completion. Early communicators perform better than state DOTs that emphasize communications late during the document preparation, review, and submission stages.

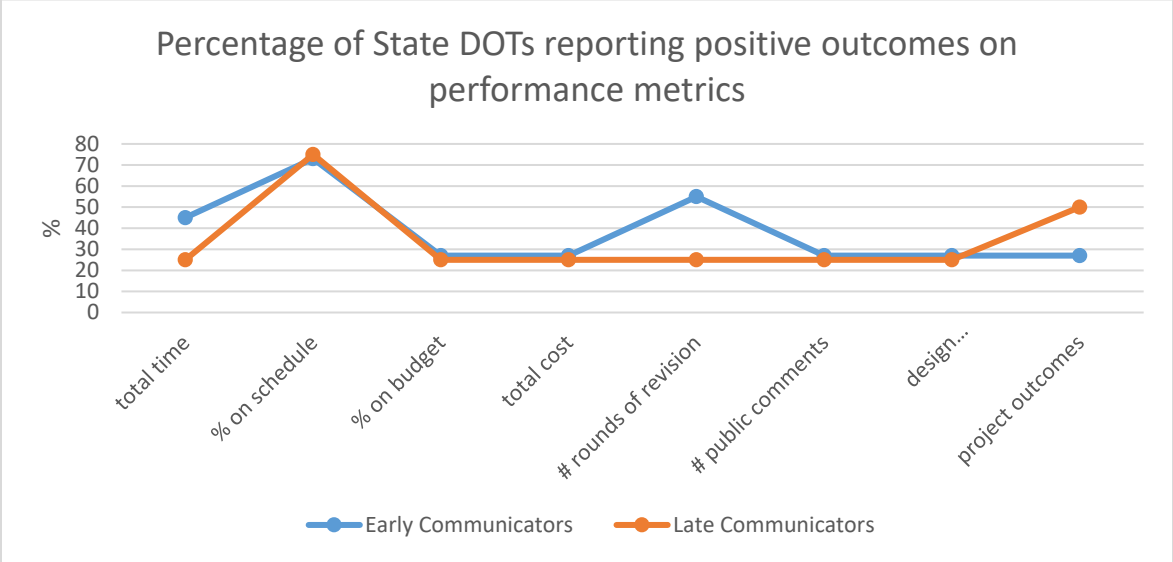

Figure 2-3: Impact of Early Communications on Performance Metrics

State DOTs that prioritize frequent communication between project SMEs and PMs may also perform better, although the strength of this result is less robust. Organizations that report daily or weekly communication between PMs and SMEs as typical receive fewer public comments and are able to develop design improvements based on the environmental process more often than state DOTs where these communications occur monthly. However, the opposite is true for other metrics. State DOTs that prioritize daily communications report needing the highest number of revisions to approve documents, while monthly communicators have the best self-assessed efficiency. Communication frequency between PMs and SMEs can be an important factor, but its impact in our data is unclear and may vary on different aspects of project performance.

Additionally, state DOTs that do not emphasize early communications (particularly those that communicate throughout the project process but do not prioritize the early phases) and/or

demonstrate infrequent PM–SME communication (monthly) have a much larger range of efficiency outcomes than the other groups. While some of these state DOTs report themselves completing PCE, CE, and EA NEPA projects very efficiently, this group demonstrates a much wider range of possible outcomes than other clusters of DOTs. Some state DOTs still perform well, but many that do not prioritize early or frequent communication practices see their efficiency suffer. State DOTs that emphasize these communication practices report a more controlled set of project outcomes throughout the survey data.

These clusters also shed light on how communications can interact with common issues in the environmental process. State DOTs prioritizing early communications report dealing with many common issues less frequently than other state DOTs. Furthermore, early communicators see many of these issues as serious much less often, indicating that early communication may not only help avoid problems, but help in handling them if they do arise. Table 2-3 describes the specific issues that early communicators report dealing with less often, as well as the ones they are less likely to report as serious. Figures illustrating the quantitative percentages this table describes are included in Appendix A.

Early communicators do report experiencing design changes and consultant turnover more frequently than state DOTs that do not emphasize early communications, but overall the survey data demonstrably indicate that this group of state DOTs suffers from fewer issues.

The influence of the frequency of communication between PMs and SMEs is, again, much less clear. Several issues (e.g., grammar issues, insufficient detail, scope changes) are common problems reported by state DOTs where communication is infrequent (monthly). However, many other issues appear as common problems when communications occur daily or weekly. Furthermore, the frequency of communication between PMs and SMEs does not appear to have any consistent impact on how serious these issues are when they arise.

Table 2-3: Common Issues Alleviated by Early Communication

Issue	Less frequently encountered by early communicators	Less likely to be serious for early communicators
Draft materials deemed insufficient by a resource agency		✓
Unclear grammar in submitted work	✓	
Draft materials not in line with templates		
Reviewer variation		✓
Variation in stakeholder agency expectations	✓	
Insufficient detail in submitted work		
Number of rounds of revision	✓	✓
Scope changes		✓
Design changes		✓
Too many coordinating entities		
Failure to communicate task-relevant information	✓	✓
Insufficient team cooperation	✓	✓
Communication breakdowns along hierarchy	✓	✓
Inaccurate information communicated		✓
Turnover of internal environmental SMEs		
Turnover of internal PMs or designers		✓
Turnover of consultants		✓
Inexperienced consultants		✓

2.3.2. Benchmark States

To better facilitate accuracy in comparative analysis, and to help us prioritize possible future multi-level surveying, we prepared a subsample of benchmark DOTs. States were selected on the basis of several criteria, including: (a) the overall size of the transportation program; (b) the degree to which design operations are performed through a central headquarters or distributed

to district offices; (c) the roles that PMs play in the organization; and (d) through nominations of benchmarks by OES leadership. We also examine benchmark states that are closely comparable to GDOT, looking for key similarities and differences to draw on. This allows us to see if the communications patterns yielding better performance are occurring in programs of a similar size to the GDOT program. We highlight important points pertaining to the communications, practices, and structures at each state DOT.

Missouri (MoDOT)

Respondents from MoDOT report good performance across the survey metrics we use and relatively few issues as frequent or serious problems.[9] MoDOT emphasizes communication throughout projects' lives, ensuring that communication occurs during each phase of the process. It also promotes ongoing coordination by regularly employing several key practices. In addition to other tools, MoDOT regularly uses impromptu meetings and cooperative troubleshooting on its projects, providing project team members critical opportunities to coordinate on project issues. It also focuses on maintaining contact with external resource agencies, engaging in recurring meetings with those agencies on many projects. These coordination practices facilitate project processes.

Additionally, MoDOT structures its projects differently than GDOT and some other state DOTs do in two key ways. First, respondents report that project managers involve in-house NEPA SMEs in projects from a very early stage. NEPA managers are typically involved from the first, kicking off projects. This may give environmental staff a more cohesive view of the overall process. Furthermore, MoDOT employs dedicated environmental leads to organize SME work on projects,

[9] The following list includes all the metrics we include: time and cost to complete projects (of different NEPA categories), percentage of projects completed on schedule and budget, number of rounds of revision, number of public comments, design improvements generated by the process, and project outcome measures.

creating an additional vertical hierarchy to control and organize environmental staff. Second, MoDOT explicitly specifies several communication and coordination requirements in the contracts it awards consultants. MoDOT contracts specify many of the coordination requirements and responsibilities, including expectations for who should initiate communications and details of coordination with project staff attached to projects. These structures formalize requirements and expectations that are ambiguous at many similar organizations.

New Mexico (NMDOT)

NMDOT's responses report high efficiency and very few recurrent issues in the project process. NMDOT emphasizes early phase communications and promotes regular interaction between PMs and SMEs on projects. This state DOT maintains high performance across several performance metrics. In particular, NMDOT reports high performance in document review on the way to project delivery. Consultants working on NMDOT projects have one round of revisions to respond to reviewer comments and get their work up to acceptable standards. The environmental review is considered a failure if additional rounds are needed. This is a large divergence from conditions at GDOT and many other state DOTs where numerous rounds of revision are necessary for document approval. A key factor in the system that allows NMDOT to demand, and meet, such rigorous standards on many of these projects is an increased level of standardization and formalization. Some states, like NMDOT, have sought a level of NEPA reporting for CE projects that is much more formalized and streamlined. Instead of using in-house environmental SMEs as report editors (who provide input and edits on each section of the NEPA report), NMDOT uses its SMEs more like report aggregators, collecting and compiling outsourced work and transmitting relevant knowledge between departments in order to complete NMDOT's project checklist. This systemic change in roles demands much less time and energy of environmental SMEs, allowing them to complete work more efficiently.

Ohio (Ohio DOT)

Responses from Ohio are all at the project level (from SMEs). These data show that Ohio operates similarly to GDOT. Ohio DOT reports high levels of project performance, but the process often suffers from the number of rounds of revision, draft materials not being in line with templates, and insufficient detail in submitted work. However, communication at Ohio DOT is strong. Communication breakdowns, distorted communication, and insufficient team cooperation are reportedly never issues on Ohio DOT projects.

Oklahoma (Oklahoma DOT)

Oklahoma's responses indicate that Oklahoma DOT regularly deals with many of the same issues that are ubiquitous at other state DOTs, including GDOT. In-house turnover, reviewer variance, and communication breakdowns all arise as challenges to project delivery. Oklahoma employs numerous practices to facilitate project communications, coordinating through many tools (e.g., templates, style guides, and tracking systems) that are in use at GDOT and other state DOTs. However, Oklahoma emphasizes holding impromptu meetings as a highly successful practice for improving project performance. Communication during early project phases is also a priority during the project process.

Oklahoma DOT also incorporates two aspects into their outsourcing practices that are distinct from GDOT and may contribute to facilitating successful communications. First, it incorporates past consultant work and experience into procurement decisions about which consulting firms to hire on a project. This gives the Oklahoma environmental department control over the quality of environmental consultants. Second, the contracts awarded to consultants always specify details on the communication and coordination required. Among other items, coordination responsibilities, requirements, and the necessary frequency of coordination with the DOT PM are explicit in Oklahoma's contracts with environmental consultants.

Oregon (Oregon DOT)

Oregon reports mixed performance across several survey metrics and regularly deals with a number of issues that purportedly create serious problems for projects. While Oregon implements many of the same tools as other state DOTs (e.g., templates, explicit timelines, centralized tracking), and sometimes integrates additional coordinative practices such as impromptu team meetings, cooperative team troubleshooting, and training programs, it struggles with several issues. Oregon DOT regularly deals with scope and design changes, reviewer variance, and turnover, as well as problems with communication (i.e., insufficient team cooperation and communication breakdowns). All of these problems, with the exception of reviewer variance, are serious problems for successful project delivery. One contributing factor for this may be Oregon DOT's focus on late-stage communication. While respondents report that communications should ideally occur early on in the project process, in practice the majority of communication and coordination happens on the back end during document preparation, review, and submission. The lack of early communication may contribute to Oregon's challenges during the project process.

Texas (TxDOT)

Texas respondents report good performance across several survey metrics and report very few issues occurring regularly on TxDOT projects. Design changes were the only issue that was not rare. However, TxDOT respondents report poor performance in terms of project efficiency across different NEPA types, saying that project completions of PCE, CE, and EA projects range from "fairly inefficient" to "very inefficient." However, in light of the lack of reported issues, and similar time estimates for project completion to other state DOTs, these responses may be more a matter of contrasting perspective than quantitative performance.

TxDOT uses numerous tools and practices employed by other state DOTs (e.g., templates, explicit timeline requirements, cooperative team troubleshooting), and implements two structural forms that are successful at other benchmark state DOTs. First, TxDOT uses in-house NEPA SMEs to organize SME work, setting up an intermediary hierarchical step between project PMs and the rest of the environmental SMEs in the office. Second, it explicitly specifies communication and coordination requirements in its outsourced contracts. Consultants have detailed contractual requirements about who is responsible for project coordination and initiating communications on TxDOT projects.

Washington (WSDOT)

Washington reports positive performance and very few issues. Issues common at other state DOTs (e.g., unclear grammar, number of rounds of revision, communication breakdowns) are rare at WSDOT; only scope changes occur on projects with any regularity. WSDOT emphasizes early communications and maintains communication throughout the project process. It frequently employs numerous communication and coordination tools and practices, most notably the use of impromptu meetings, cooperative team troubleshooting, and meetings with federal resource agencies.

Washington also implements two of the other structural strategies seen at several other of the benchmark states we examine. WSDOT uses in-house NEPA SMEs to coordinate the work of environmental SMEs, adding structural hierarchy to the system that is not present at GDOT. WSDOT also explicitly contracts some coordination requirements for consultants. Contracts typically specify the coordination responsibilities and the frequency with which consultants must coordinate with the project PM.

Wisconsin (WisDOT)

Wisconsin respondents report good performance across a number of performance metrics and excellent efficiency in completing NEPA projects. However, WisDOT frequently deals with a number of serious issues common among state DOTs (e.g., reviewer variance, number of rounds of revision, variation in stakeholder agency expectations). WisDOT uses a number of tools and practices to facilitate communications, including impromptu team meetings and maintaining contact with external resource agencies to receive their ongoing input. It also emphasizes the importance of frequent communication between SMEs and PMs on projects. WisDOT also employs two of the structural strategies we observe amongst several benchmark state DOTs. First, it gives NEPA SMEs more authority, relying on them as key actors at project launch meetings. Second, WisDOT specifies who is responsible for coordinating projects and initiating communications in their contracts for consultants.

Comparison to GDOT

These case studies offer an in-depth look at the communication and coordination strategies, and performance, of state DOTs comparable to GDOT. In this section, we discuss the environmental review process at GDOT in the context of our findings about these benchmark state DOTs and highlight strategies they employ that are underutilized or absent at GDOT. This examination can identify and highlight key strategies and examples for future streamlining and process development strategies at GDOT.

Many of the comparable state DOTs examined deal with similar issues to those at GDOT. Many of these organizations have similar problems with turnover and high workload, design changes, issues with the quality of outsourced work, and lapses in project communications. GDOT SMEs report that numerous issues in these categories can have serious impacts on projects if they

arise. At least a quarter of GDOT respondents identified the issues in Table 2-4 as serious problems for project delivery when they occur.

GDOT responses indicate that some of the primary causes of quality variation on its projects include team cooperation, contract and outsourcing quality, and turnover and workload. In particular, respondents mention contract quality and clarity about who is responsible for project communications as causes of variation, alongside team cooperation and assistance. Several of the different strategies employed in the benchmark state DOTs address these issues, and the performance assessments indicate that they are doing so with some success. First, encouraging coordinative practices between project team members can help increase communication, as can setting up NEPA specialists as SME coordinators for the team. Second, the contractual specifications detailed in the contracts of several state DOTs aim to decrease ambiguity and focus the structure of project communications.

Table 2-4: Issues that can Seriously Impact GDOT Projects

Issue	Percentage of GDOT respondents identifying as serious (%)	Percentage of benchmark state DOTs identifying as serious (%)
Number of rounds of revision	52	29
Draft materials deemed insufficient by resource agency	28	29
Draft not in line with templates	28	0
Reviewer variance	28	29
Scope changes	26	86
Design changes	80	57
Task-relevant information not communicated	40	29
Insufficient team cooperation	36	29
Communication breakdowns	48	43
Inaccurate information communicated	32	29
Turnover of environmental staff	48	43
Turnover of PMs or designers	28	29
Inexperienced consultants	48	14

GDOT has already invested substantial efforts into alleviating these issues and increasing both efficiency and quality of the environmental review process. It has implemented a variety of tools and practices to this end and has created significant gains in project efficiency (for a fuller discussion of this point see Chapter 3). GDOT SMEs report that templates, explicit timeline requirements, and centralized tracking are used on projects more frequently than others of the numerous tools GDOT uses. While these practices are effective, GDOT responses indicate that training programs and workshops are also highly effective yet are not employed as frequently as other tools. This suggests that these practices are underutilized.

In our analysis of benchmark states, we identify several main strategies used by state DOTs to increase project coordination and performance. We compare benchmark states with other states to see how broadly these strategies are used. We then see whether these strategies are employed by other state DOTs in our sample that we do not include as benchmarks. These practices are absent or underutilized at GDOT. However, this comparison illustrates how common they are in our data for both benchmark and general state DOTs and provides an indication of how popular they are at state DOTs across the U.S. As GDOT continues to implement new streamlining initiatives in environmental review efficiency, it can draw lessons and suggestions from other state DOTs that deal with similar problems in their review processes. While GDOT has already spent considerable energy streamlining the environmental review process, these strategies can provide useful examples to understand and learn about how to improve the project process at GDOT.

Table 2-5 presents the primary strategies observed in this assessment with a depiction of which state DOTs use them. These practices are absent or underutilized at GDOT. However, this comparison illustrates how common they are in our data for both benchmark and general state DOTs and provides an indication of how popular they are at state DOTs across the U.S. As GDOT

continues to implement new streamlining initiatives in environmental review efficiency, it can draw lessons and suggestions from other state DOTs that deal with similar problems in their review processes. While GDOT has already spent considerable energy streamlining the environmental review process, these strategies can provide useful examples to understand and learn about how to improve the project process at GDOT.

Table 2-5: State DOTs Reporting use of Strategies from Benchmark Analysis

State[10]	Emphasize early communication	Dedicated manager or NEPA SME coordinates SMEs	Specify coordination responsibility in contracts	Consultant performance used in procurement	Cooperative team practices[11]	Regularly engage external resource agencies
MO		✓	✓		✓	✓
NM	✓					
OH						
OK	✓		✓	✓	✓	
OR					✓	
TX	✓	✓	✓			
WA	✓	✓	✓		✓	✓
WI		✓	✓		✓	✓
AR						
AZ	✓					
CA		✓	✓		✓	
CT		✓				✓
DC			✓			✓
DE		✓			✓	✓
ID	✓					
IL					✓	✓
IN	✓				✓	✓
KS						
KY		✓	✓	✓	✓	✓
ME		✓	✓	✓	✓	✓
MN						
MT	✓					
PA	✓				✓	✓
SC	✓	✓				✓
SD	✓		✓		✓	✓
VT		✓			✓	✓

[10] Peer states are highlighted in gray.

[11] Impromptu team meetings and cooperative team troubleshooting.

2.3.3. Interlevel Analysis

By surveying both environmental leaders and SMEs, we gather data at both the departmental and project level. This split in the data allows us to investigate whether any important differences exist between these perspectives. We examine the data for any systemic discrepancies in respondent perspectives and look for potential sources of bias between groups.

On the whole, the two perspectives are very similar with responses from both groups being tightly correlated. Project-level respondents reported slightly different attendance rates for project team members at DOT project initiation meetings, as they are likely to have a more in-depth understanding of those meetings in practice. All differences on this topic skew higher in SME responses, indicating that attendance at project initiation meetings may be more extensive in practice than as prescribed departmentally. The only other significant difference between leadership and SME responses was that SMEs at the project level were, on average, less positive about project performance. SMEs report lower quality performance across our survey performance metrics, including project efficiency and length of the review process. However, despite these differences, data at these two levels are remarkably commensurable.

2.4. Conclusions

Communication and coordination play a key role in project performance for environmental review processes across state DOTs. The timing of communications is instrumental in project success at the benchmark state DOTs we studied. State DOTs that prioritize communications during early project stages fare considerably better than those that do not. It is critical that communications occur during the scoping, preliminary engineering, field work, and technical reporting stages of the project process. Early coordination helps the entire project team get on the same page and allows the team members to engage potential problems or issues early

on. Projects at state DOTs that fail to establish these communications can suffer. If the majority of project communications are delayed until late in the documentation, review, and submission phases, team members may lose track of each other's work and move at cross-purposes to one another, and project issues that were not handled early can intensify. Not only does early communication facilitate good performance by helping projects avoid issues, our evidence indicates that it reduces the impact and disruption those issues cause if they do arise. Establishing early contact and communication between project team members is a key element for success.

On the other hand, the impact of communication frequency between project PMs and SMEs is unclear. Frequent communication does not identify any significant trends toward better performance in our data and correlates with poor performance across several metrics for some state DOTs. Communicating frequently may provide benefits to project teams, but it can also be a time sink. The marginal returns of communication between the PM and SMEs decrease the more those actors interact. Additional communication can help address project issues, but the amount of time necessary to do so may not be worth prioritizing daily communication over weekly, or even monthly (as is typical for GDOT), frequency. Very frequent communication may actually be a signal of problematic projects since projects that are performing poorly or suffering from serious issues require more communication and effort to fix before approval. While communication timing is critical, the benefit of very frequent communication is less clear.

Benchmark state DOTs also incorporate several tools and practices that are not regularly employed at GDOT. Many benchmark state DOTs encourage their project teams to host impromptu team meetings and encourage cooperative team troubleshooting on project issues. While these practices do occur at GDOT, our data indicate that they do so less frequently than at other comparable state DOTs, indicating that they may be underutilized. Several benchmark state DOTs also make a deliberate point of engaging with external resource agencies on a regular basis.

Whether by scheduling meetings or engaging them for ongoing input on projects, these states take advantage of the help these agencies can provide. More regular or proactive interaction with resource agencies at GDOT could be helpful.

Finally, several benchmark state DOTs employ structural strategies that benefit their environmental reviews. Setting up NEPA SMEs, or other dedicated staff, as SME coordinators provides a useful level of vertical authority within project teams. As SME coordinators, NEPA SMEs are able to organize the environmental work that will go into the project report better, manage coordination between the PM and other SMEs, and ensure that the project team acts more broadly (avoiding silo thinking). While GDOT does rely on its NEPA SMEs at project initiation meetings more often than other SMEs, it does not provide NEPA personnel the authority to coordinate other SMEs' activities. State DOTs that employ this vertical hierarchy within the environmental group find it to be very beneficial to performance. Several state DOTs we examined also make a point of specifying the communication and coordination requirements they expect from consultants on their projects. They limit ambiguity about who is expected to organize and manage project communications, as well as about when (and with whom) coordination should happen, by detailing it in the contracts. GDOT does not do this and consequently suffers from ambiguity about who should be initiating communications across project teams. GDOT consultants are expected by OES staff to initiate, organize, and manage project communications and coordination, but the consultants themselves are never explicitly informed of this, undermining project communication and performance. The organizational norms and tacit expectations that relay this anticipated role to consultants are often sufficient for experienced consultants that work frequently with GDOT, but they are easily missed by new or inexperienced firms, leading to significant issues for successful delivery of those projects. GDOT should take all of these strategies into account as it continues to streamline its environmental review process.

Chapter 3 OES Innovations in Streamlining and Communications

3.1. Introduction

GDOT has been responsive to the persistent legislative and executive efforts, discussed in Chapter 1, aimed at improving the environmental review process. Like many of its state counterparts, discussed in Chapter 2, GDOT's strategy for improvement focuses on streamlining the environmental review processes associated with NEPA. One of the goals of streamlining is to mitigate the risk for delay in public infrastructure projects. However, studies of streamlining initiatives have generated mixed results. This leads OES to ask additional questions about the communication processes between key actors engaged in environmental review. Specifically, how do patterns of communications between actors facilitate or hinder efforts at adopting innovations aimed at streamlining the environmental review process?

In Task 2, we examine this question by developing case studies of process innovations developed and adopted by OES to improve performance in the environmental review process. We examine whether these innovations improve communication and coordination between key actors in the review process by comparing two recent innovations partially adopted by units within OES with one longstanding procedural tool used throughout OES. To assess the impact of these innovations on environmental review, we examine their integration in project communications, and identify further methods of improvement. This allows us to compare and contrast the influence of different process innovations on communications in the work lives of OES personnel, environmental consultants, and, in some cases, project managers.

This chapter includes an explanation of the conceptual basis for our study, a description of our methodology, and conclusions based on our findings. This analysis reveals how OES tools are currently influencing OES coordination and project processes.

Table 3-1: Innovations at GDOT

Innovation	Description
Environmental Procedures Manual (EPM) revisions	Both in-house and outsourced efforts to update information in the *Environmental Procedures Manual*
Template development	Development and updating of templates for environmental review studies and documentation
Document standardization	Increased standardization and reduction in the complexity of environmental review reports, limiting the number of points where key data need to be entered
Georgia Partnership for Transportation Quality (GPTQ)	Continued use and development of GPTQ meetings
Information workshops	Use of workshops hosted by GDOT to disseminate information on subjects throughout the project process to consultants
Email blasts	Use of environmental consultant email list to disseminate timely updates of guidance and rule changes
SharePoint	Development of SharePoint sites for OES subsections used as a communication platform and project management platform for OES staff and consultants
File Transfer Protocol (FTP)	More effective use of FTP sites for document sharing
ProjectWise	Continued development of ProjectWise for sharing project documents and information
Prioritization of internal adaptation	Incorporation of adaptive processes to adjust to the arrival or detection of endangered species in Georgia
Project Team Initiation Process (PTIP)	Introduction of the Project Team Initiation Process to standardize the role of project managers and subject matter experts during project initiation
Review standardization	Reducing variability in reviewer comments on environmental review documents by encouraging a common understanding of review standards for legal sufficiency
Procedural reforms	Reforms to environmental review procedures aimed at streamlining technical reporting and documentation
Review workshops	Development of workshop procedures for timely interventions on problematic reports during project review
Consultant reviewers	Use of consultants as reviewers on projects
PCE process development	Development of procedural agreements with FHWA to streamline NEPA documentation

3.2. OES Communications and Process Innovations: Case Selection Methodology

OES has developed and adopted several innovations aimed at improving communications and streamlining its review process. Table 3-1 (above) provides a summary list and describes the primary procedures, tools, and practices associated with each innovation. We do not suggest that this captures all of the innovations developed and adopted by OES in recent years. This list represents a range of the different types of innovations pursued and provides a foundation for comparative case selection.

In Table 3-2, we develop a typology of the source and the focus of each innovation. From a sourcing perspective, some innovations are agency-wide initiatives, while others are initiatives developed by OES. Some innovations focus more on communications challenges in contrast with others that may focus more on streamlining and process improvements. In our case selection strategy, we draw exclusively from innovations designed to address elements of communications challenges.

Table 3-2: Innovation Typology

	Communications Focus	**Process Focus**
GDOT Initiative	• GPTQ • SharePoint • FTP	• ProjectWise • PTIP
OES Initiative	• Information Workshops • Email Blasts • EPM • Templates • Review Workshops	• Report Standardization • Prioritization • Consultant Reviewers • PCE Process Development • PCE Reviewers

The use and application of *SharePoint sites* is an example of a technology promoted by GDOT that has been partially adopted by units within OES. The Ecology team within OES has extensively integrated use of this technology, and the NEPA team has begun development of

SharePoint applications. SharePoint is a web-based information technology tool designed to facilitate communication, document storage and management, and collaboration across a single platform. OES uses SharePoint for document submission, information dissemination, and distribution of templates and other source documents.

There are also examples of innovations developed within OES specifically for environmental review. The increased use of *document templates* is an innovation that several units within OES have pursued and developed strategies for regular updates. Templates are used to varying degrees by all OES sections (NEPA, Ecology, Air & Noise, and Cultural Resources). They include technical studies, reports, and NEPA documents designed to simplify, streamline, and provide uniformity to the documentation process. Templates provide guidance and structure for documents, in theory ensuring a measure of standardization for all documents of the same type submitted to OES.

We contrast these relatively recent innovations with a case that focuses on the Georgia Partnership for Transportation Quality, a long-standing partnership between GDOT, the American Council of Engineering Companies of Georgia (ACEC Georgia), and the Georgia Contractors Association (GCA). GPTQ is an agency-wide initiative designed to improve communications and coordination with the communities of professional services consultants who assist GDOT and local DOTs with designing, building, operating, and maintaining transportation infrastructure. The environmental groups within GPTQ primarily consist of a series of quarterly meetings held by individual specialty units within OES to provide a recurring venue for communication between GDOT and the consultant community.

We gathered archival data and interviews from OES staff and consultants (seven GDOT OES staff and five environmental consultants) and analyzed their perspectives and experiences in a qualitative analysis of these innovation case studies. Appendix B provides details on our

methods, interview collection, and the semi-structured interview protocol used to explore how each innovation influenced communications and performance in the environmental review process. Task 2 examines the applications of these communication practices and identifies ways to improve efficiency in the environmental process using OES innovations.

3.2.1. GPTQ

Georgia Partnership for Transportation Quality (GPTQ) meetings are a long-standing coordination tool at OES and are an important tool for communications between OES staff and consultants. In OES, each section (NEPA, Ecology, Air & Noise, and Cultural Resources) organizes its own quarterly GPTQ meetings, providing an opportunity for OES staff from that section and its respective environmental consultants to coordinate on how to approach the environmental process. Each section takes a distinctive approach to the organization of GPTQ meetings in order to accommodate its unique needs, but all are designed to bring OES staff and consultants together to review common issues in the environmental process, discuss troublesome activities, and share ideas and best practices.

This provides OES with a forum to instruct consultants how to appropriately conduct project procedures and provide updates on any changes or rule modifications that occur. GPTQ meetings supplement the formal communication tools used by OES, such as the *Environmental Procedures Manual* (GDOT 2019a), to keep GDOT's environmental consultants up to date and informed about requirements and work processes. Meetings are not a requirement for consultants, but they are well attended, with experienced firms consistently sending one or more representatives to the GDOT office to participate every quarter.

GPTQ meetings are useful for information dissemination and transmitting updates, best practices, and new procedures to consultants. Both OES staff and consultants emphasized the utility of GPTQ meetings. This forum offers the following communication advantages:

- GPTQ augments the formalized communication processes used by OES and GDOT as a venue for seeking clarification on procedures, documentation, and rules. Unlike some of the formal communication channels, information conveyed through GPTQ is more likely to be up to date.
- GPTQ is one of the most important sources of information for environmental consultants because it provides in-depth and discursive exposure to project information.
- Participants in NEPA and Ecology GPTQ meetings underline how face-to-face interaction allows participants to deliberate issues conversationally, making it easier to disseminate nuanced information and deal with the complex issues that often arise in environmental projects.
- GPTQ meetings are valuable because they help consultants and OES staff develop professional relationships with one another. By facilitating relationship building, GPTQ meetings build trust between project team members and reduce the transaction costs associated with interpersonal communication on GDOT projects.
- The relationship building at GPTQ also has the effect of improving the frequency of project communications between OES staff and consultants.

OES staff from the Air & Noise and Cultural Resources sections noted some of the challenges with getting members of the consulting community to attend GPTQ meetings. Attending or participating in GPTQ is not formally required or demanded in OES contracts and can come with high costs to firms that have limited personnel or are located far away from GDOT headquarters. GPTQ meetings are not considered billable hours. For large firms that do frequent

business with OES, this involvement comes with low average costs, making it easier for them to stay abreast of changes and updates disseminated via GPTQ meetings. However, smaller firms, those that are located further away, or those that fulfill fewer contracts with GDOT have less motivation to attend GPTQ meetings and are, therefore, more likely to miss their benefits.

3.2.2. SharePoint

SharePoint is a web-based platform developed for use as a collaborative information technology system. OES has adopted this tool as a communication platform to increase coordination between SMEs in each of its sections and environmental consultants. Ecology was the first section to develop a SharePoint site and has been using it for several years. Environmental consultants working with Ecology have demonstrated consistent and heavy use of this resource. NEPA adopted this tool more recently and is still adjusting to using it as a regular communication resource. Air & Noise and Cultural Resources are currently developing their own sites, but they are not yet operational. SharePoint provides the potential for further improvements to communication as OES integrates more of its features, such as scheduling and data tracking into its toolbox.

SharePoint offers several advantages over other OES modes of communication. Its wide scope means it can host many types of information, allowing consultants to get all the project materials they need from the same place. Consolidating project information and resources into a single forum eases the search costs associated with identifying necessary project materials for consultants and makes it easier for OES to send a clear signal about which documents are appropriate to use. Ecology and NEPA staff and consultants identified the following benefits from this communication tool: (1) flexibility and control over posted content, (2) a venue for timely

updates to procedures and rules, and (3) immediate dissemination of changes in rules and procedures.

Consultant perspectives demonstrate that these advantages translate to perceived benefits for GDOT projects. Several consultants noted that timely access to more relevant project materials on SharePoint allows them to spend less time attempting to communicate directly with GDOT staff to obtain information, leading to increased efficiency and improved project quality. By providing more efficient and effective communication pathways, SharePoint helps GDOT avoid issues in the environmental review process.

However, users have encountered some limitations to using SharePoint at OES. All our consultant respondents note that logistics can pose problems for users. In order to maintain access to SharePoint, it is necessary to log in to the site and change the password every 30 days. This is true for all users regardless of how often they need to access the site and can be burdensome for consultants, particularly for those who do not regularly work with GDOT. Infrequent users, who are less likely to be familiar with the most recent OES updates and guidance, are also more likely to be locked out, intensifying their risk of losing communication with OES.

A lack of consistency across OES sections' SharePoint sites is another concern mentioned by an OES Ecology staff member. SharePoint is highly customizable and OES sections have developed, or are continuing to develop, unique site designs. However, differences between each site's format and organization style can be confusing to consultants who may need to access multiple sections' sites for their work. Misaligned formatting creates a barrier for clear communication through SharePoint, decreasing ease of use and adding to the learning curve already associated with adopting a new type of communication.

Finally, continual updates of the information on SharePoint sites are necessary. SharePoint makes it easy to add new materials as changes occur, but old information also needs to be removed. Curation of obsolete materials is a persistent issue for OES users. OES staff and consultants at both the NEPA and Ecology sections emphasize that out-of-date materials remain on sites and can undermine project performance. The presence of old files creates a risk for miscommunication.

3.2.3. Templates

Templates are a critical tool for OES, laying out the format, content, and structure for documents submitted for review by consultants. Each OES section has its own specific needs and uses templates accordingly. Consequently, each section is at a different stage of incorporating templates into their work. The Ecology section recently rolled out a new set of templates aimed to update, restructure, and streamline outdated templates. These templates lay out the information requirements and structure for environmental documents in a tabular format, designed to be easier to read and review. The NEPA section has also recently updated its templates, designing them to clarify document requirements and increase standardization. Air & Noise and Cultural Resources use templates, but they have not updated any of them recently.

Templates are a critical mode of communication at OES. They help dictate the substance and quality of the documents consultants submit by communicating appropriate guidance and reviewer expectations. Clearly communicating what submitted documents should look like increases standardization, reduces ambiguity, and helps environmental reviews proceed smoothly. While other formal communication tools, such as the *Environmental Procedures Manual* or other guidance documents, are text heavy and can be onerous to parse, templates provide a concise systematic illustration of OES expectations.

Overall, templates are effective for streamlining work, outlining document requirements, and promoting uniformity in the documentation process. OES staff and consultants across all OES sections shared this assessment. While heterogeneity between sections causes the role and impact of different sections' templates to vary, some common characteristics are in evidence. Templates make document preparation more efficient by streamlining work. All respondents from NEPA, Ecology, and Air & Noise continually reiterated that this helps increase project efficiency. Templates provide explicit communication of what OES expects to see in submitted documents, reducing ambiguity or confusion over what should be included in a document. OES staff and consultants in Ecology and Cultural Resources frequently reported that this facilitates preparation of high-quality work. Templates also increase document standardization. Our respondents unanimously emphasized that by explicitly outlining OES expectations, submitted documents are more uniform, easing the burden of review later in the project process.

While templates are regarded as a critical OES tool, and largely successful, they have some common issues across OES sections. First, several OES staff in Ecology noted that because environmental rules, regulations, and procedures change over time, templates can become outdated. This is a larger issue for sections that deal with more uncertain subjects (namely Ecology), but all sections need to monitor their templates and update them when necessary. Failure to do so creates distortive and counterproductive communications with consultants where templates can instruct consultants to do the wrong thing. Second, OES does not utilize performance assessment to determine the empirical impact templates have on the documentation and review processes. Failure to collect data on consultant performance makes it more difficult for OES staff to adapt their templates to be most effective. Absence of monitoring can limit the effectiveness of OES formal communication tools.

3.2.4. OES Innovations Analysis by Section

Next, we examine the three innovation case studies across each OES section to identify section-specific characteristics of each innovation and identify key areas of divergence. Each OES section implements its own version of these innovations. Consequently, they exist in different stages of development for each section. Table 3-3 describes the level of development of the three innovations for each section. Our findings describe the assessment, frequency of use, success, and issues related to each innovation for all four OES sections. Tables 3-4 through 3-7 outline the results of this intersectional analysis by section, including areas where individual section's application of innovations diverge from our general findings.

Table 3-3: Innovation Development in OES Sections

		NEPA	Ecology	Air & Noise	Cultural Resources
GPTQ Meetings	**Well established**	✓	✓	✓	✓
	Implemented				
	In development				
SharePoint Sites	**Well established**		✓		
	Implemented	✓			
	In development			✓	✓
Templates	**Well established**			✓	✓
	Implemented	✓	✓		
	In development				

NEPA Section

All three innovations are useful for the NEPA section within OES. These tools greatly increase the ability of OES to communicate with consultants. However, there are several areas of deviation where these innovations have different implications for NEPA than they do for OES

overall. The troubleshooting opportunities that NEPA GPTQ meetings sometimes offer, where consultants are able to break into smaller groups and receive direct input and help working through specific project issues, are viewed very positively by both OES staff and consultants. This type of active communication benefits project outcomes by ensuring higher quality work. While NEPA GPTQ meetings are viewed positively, one consultant respondent noted that scheduling and cancelations can be an issue. OES occasionally cancels its NEPA section meetings due to a lack of relevant materials or developments arising in that quarter. Cancelations create discontinuity in how OES communicates with consultants, undermining the consistent coordination necessary for consultants to stay informed. Furthermore, some consultant participants question the format of NEPA GPTQ meetings. When meetings take place, they can take a long time to complete, creating disincentives for consultants to attend. High attendance also leads to having large groups of people at each meeting and makes it more difficult for some individuals to ask questions or bring up important items they want addressed.

The NEPA SharePoint site has not been in use for long and is still going through a transition period where users learn how to interface with it. This tool has come with a learning curve for NEPA staff and consultants; its success is dependent on the experience and activity of each individual user.

NEPA templates provide the general benefits typical of this innovation in OES. NEPA staff stressed that templates are particularly successful at reducing the volume of documentation required in the environmental review. NEPA documents can be very lengthy, so NEPA templates are very useful for communicating exact requirements to consultants, cutting down on the amount of superfluous documentation. One consultant contended that this practice results in the production of NEPA documents that are more manageable to review and easier for the public to read. However, the context and variance of NEPA projects limits the efficacy of templates as a

Table 3-4: NEPA Section Coordination Tools

	Assessment	Frequency of Use	Successes	Issues
GPTQ	- Effective at conveying new processes, guidelines, policies, and OES tools [C] - Effective way to discuss potential updates to OES materials [C]	- Quarterly	- Very conversational; facilitates relationship building [C] - Good mix of learning and troubleshooting [C] - Helps reduce silo thinking [C]	- Meetings are occasionally canceled due to lack of materials to go over [C] - Meetings sometimes run too long [C] - Large groups can make it difficult for individuals to speak up [C]
SharePoint	- Useful communication tool; most effective for information dissemination and document sharing [C]	- Dependent on user	- Reduces time consultants need to spend communicating with OES [C] - Helps consultants be more efficient [C]	- Out-of-date materials are often maintained on site, causing confusion [C] - Access issues (e.g., getting locked out, requiring multiple email addresses, maintenance required to stay on distribution lists) [C]
Templates	- Helpful tool for outlining requirements for NEPA documents; provides more up-to-date information	- Required for documents submitted to OES	- Reduced the volume of documentation [C] - More uniform document structure; easier for public to read [C] - Ensures that everyone is meeting the same expectations [C]	- Templates cannot possibly provide for every situation that NEPA projects will encounter [C] - Templates may not be the optimal form for NEPA documentation [C]

[M]=Management perspective; [S]=Section subject matter expert; [C]=Consultant

communication tool for the NEPA section. One OES staff member emphasized that a single set of templates, no matter how comprehensive, cannot cover every situation that may arise on environmental projects, so this tool will never be able to completely replace other more flexible modes of communication for the NEPA section. This form of document may be constraining for projects that do not comply with typical expectations, making templates difficult to use.

Ecology Section

Several distinctions separate the impact of each innovation in the Ecology section from our general results. Ecology GPTQ meetings are universally considered a strong method of conveying information and creating project-relevant discussion. However, the consultants continually reiterated that the Ecology section does not provide as many opportunities for workshopping project-specific problems as other sections. Ecology meetings usually take the form of presentations and do not incorporate interactive sessions where consultants can conversationally discuss their projects. This eliminates a method of communication that is viewed as successful by consultants and OES staff in other sections. A positive deviation from other OES sections' meetings is Ecology's development of social networking events after GPTQ meetings. Ecology has begun hosting social hours after meetings where OES staff and consultants can interact outside of the work environment. This opens up additional informal channels of communication and, according to several Ecology personnel (both OES staff and consultants), builds trust and relationships between project team members, reducing the burden of other project activities.

Using a SharePoint site has been particularly advantageous for the Ecology section. Due to the complexity of ecological systems, Ecology SMEs have to work with a frequently changing regulatory landscape, making timely communication of revisions and regulatory changes critical for completing high-quality reviews. SharePoint provides a means for OES to quickly disseminate up-to-date information and precludes the need for consultants to initiate communication themselves or wait until the next quarterly GPTQ meeting to get an in-depth explanation of the change. Both OES staff and consultants note the success of this approach. However, Ecology personnel note that the effectiveness of SharePoint as a communication tool is dependent upon how individuals use it. Experienced and proactive consultants often get the most out of the tool.

Table 3-5: Ecology Section Coordination Tools

	Assessment	Frequency of Use	Successes	Issues
GPTQ	- Best mode of communication for nuanced information [M S C]	- Quarterly	- Excellent tool for disseminating information [M C] - Participants are very candid; facilitates relationship building [S C] - Engages OES staff and consultants in discussion	- Scheduling is difficult due to room availability - GPTQ alone is not enough to communicate everything the consultants need to know [M] - Should be more discursive; not just a lecture/training session [C] - Should utilize participating consultants' knowledge more [C]
SharePoint	- Best mode of communication for tangible materials (announcements, documents, templates) [M] - Currently working very effectively [M] - Useful communication tool; most effective for information dissemination and document sharing [C] - Excellent for keeping consultants up to date on changing requirements [C]	- Dependent on user - Frequent use for most OES staff and 90% of consultants (e.g., daily – weekly) [S]	- Replaces out-of-date materials in the *Environmental Procedures Manual* - Excellent tool for disseminating information [M S] - Affords more control than other internal sites [M] - Reduces time consultants need to spend communicating with OES [C] - Helps consultants be more efficient [C]	- Potential to get locked out of the system [S C] - Necessary to re-register every 30 days - Site can be glitchy [S] - Lack of consistency between OES sections [M] - Out-of-date materials are often maintained on site, causing confusion [C]

	Assessment	Frequency of Use	Successes	Issues
Templates	- Effective method of streamlining work and making reviews easier [M S] - Template updates were a necessary change and a great improvement [C]	- Required for documents submitted to OES	- Makes reporting easier and more streamlined for consultants [S] - Simplifies documentation process [M S] - Increases document uniformity - Makes OES review much faster and easier [S] - Helps reduce preferential comments [C] - Ensures that FHWA receives all the information it wants [C] - Makes documents easier to edit and add/remove individual sections [C] - Information is better organized [C]	- Templates struggle to keep pace with constantly changing regulatory landscape [S] - Periods between template updates are very long (putting them at risk of becoming out of date) - Introduction of new templates carries costs for consultants and OES reviewers (there is a learning curve associated with new additions) - Formatting and page numbering are recurring issues for formatting [M S C] - Efficiency gains are overstated [C] - More labor-intensive [C]
[M]=Management perspective; [S]=Section subject matter experts; [C]=Consultant				

Ecology has the most recently updated templates, so the impacts of this type of innovation are most pronounced for this section. The high complexity of ecological subjects causes regulations and requirements to change more often than for other subjects, so consultants note that Ecology templates can often struggle to stay up to date. The most recent template update in Ecology has enhanced the organization of documents, shifting to a tabular form that has made documents easier to edit and manipulate in draft form. Although one OES staff member and several consultants note that issues with formatting, such as problems with page numbering and appendices, are still being dealt with, the update is viewed as positive overall on both sides.

Omissions of critical information are now more obvious, according to OES staff, making them harder to overlook. The new format is also clearer and more consistent, making the review process less taxing and more efficient, according to OES staff. Consultants note that this, in turn, has resulted in a perceived reduction of non-substantive and preferential comments being sent back to consultants.

From an OES point of view, the template changes have made the documentation and review process more streamlined and efficient. However, consultants have a different perspective. While consultants have positive perceptions of the new templates, nearly every consultant respondent emphasized that they see efficiency gains in the documentation process as overstated. Learning to use new templates carries high costs for document preparers. Even once this learning curve is overcome, efficiency in document preparation is considered about the same as it was before the update. The new templates require the same, if not more, work than previous iterations, according to consultants. This implies that the benefits of the new Ecology templates are disproportionately distributed to document review over document preparation.

Air & Noise Section

The communication practices investigated have not changed much recently for the Air & Noise section. SME staff view all three tools as effective. Air & Noise GPTQ meetings often provide consultants with opportunities to workshop problems on projects, providing a much-needed deliberative communication pathway, according to OES staff.

The Air & Noise SharePoint site is not yet fully functional. However, innovations such as templates are critical for Air & Noise and may offer decided advantages over other communication modes such as GPTQ meetings. These innovations can be accessed more

frequently, provide explicit expectations, and are more openly available to consultants, making them critical for communicating project requirements and information.

Table 3-6: Air & Noise Section Coordination Tools

	Assessment	Frequency of Use	Successes	Issues
GPTQ	- Very effective at troubleshooting and disseminating information [M]	Quarterly	- Has increased communication between OES staff and consultants [M] - Facilitates relationship building	- Consultants from distant firms are not incentivized to spend the time to drive in - Large groups make it difficult for individuals to speak up [C]
SharePoint	- Too early to qualify	- Not yet fully functional	- Will provide useful performance-tracking and scheduling [M] - Will reduce communication burden between OES and consultants [M] - Will streamline communication by hosting everything in the same place [M]	- NA
Templates	- Effective and convenient [M] - Makes work easier and more efficient [M]	- Required for documents submitted to OES	- Shortens the time required for OES review [M] - Makes document preparation easier [M] - Ensures that everyone is meeting the same expectations [C]	- Introduction of new templates carries costs for consultants and OES reviewers (there is a learning curve associated with new additions)
[M]=Management perspective; [S]=Section subject matter experts; [C]=Consultant				

Table 3-7: Cultural Resources Section Coordination Tools

	Assessment	Frequency of Use	Successes	Issues
GPTQ	- Useful tool for communication with consultants and coordination in dealing with project-by-project issues [S]	- Quarterly	- Has helped develop trust between OES staff and consultants [S]	- Should be more conversational and less lecture-style [C] - Large groups can make it difficult for individuals to speak up [C] - Some members of the consultant community don't realize it is open to all consultants [S]
SharePoint	- Too early to qualify	- Not yet fully functional	- Will facilitate communication [S] - Will be an effective tool for storing and sharing documents [S]	- Site is glitchy [S] - Updating to new site carries a learning curve; time is necessary to get accustomed [S]
Templates	- Current documents are sufficient and haven't needed an update [S] - Good tools for outlining requirements for consultants [S]	- Required for documents submitted to OES	- Ensures that everyone is meeting the same expectations [C]	- Having templates available can encourage document preparers to cut and paste rather than evaluating each specific resource they are examining, leading to quality issues [S]
[M]=Management perspective; [S]=Section subject matter experts; [C]=Consultant				

Cultural Resources Section

Similar to Air & Noise, the Cultural Resources section of OES has not made dramatic changes to the communication tools we consider in this chapter. Cultural Resources GPTQ meetings also allow consultants to workshop specific project issues, providing discursive communication opportunities between OES staff and consultants. The Cultural Resources SharePoint site is not yet operational at this time. Cultural Resources staff report that templates have been in place for some time and are sufficient for section needs. These templates are seen as positive communication tools at OES, but one OES staff member commented that they can

encourage some document preparers to cut and paste information from previous submissions, skipping steps to save time and degrading the quality of document submissions. However, these communication tools offer similar advantages over other formal communication modes since they provide easily accessible, explicit communication of OES standards and requirements.

3.3. Conclusions

These three communication case studies demonstrate the critical role that GDOT initiatives take in project communication and coordination. GPTQ meetings are an important tool in OES and highly useful for disseminating complex information, facilitating relationship building between OES staff and consultants, and creating opportunities for consultants to receive help on specific project issues in some sections. GPTQ meetings are a well-established form of communication at GDOT and provide a context in which to view the newer case studies of innovations that we examined.

SharePoint is under development in most OES sections but has proven to be a highly valuable tool where implemented. Its wide scope allows consultants and OES staff to communicate information and materials on many subjects in one place, easing search costs for consultants. Furthermore, its flexibility allows for continuous updating as project resources change. This offers several key advantages over traditional OES communication tools, which can improve project coordination. SharePoint allows OES to make updates with more frequency than could be done through GPTQ and with more ease and coverage than through email blasts. It also provides a common forum for project materials so that consultants can get the resources they need more easily, and with more reliability, than they could with older systems and guidance documents such as the EPM. Furthermore, the ease of access makes communication more

streamlined and reduces the burden of heavy information communications that might otherwise be necessary.

OES templates are an important tool for all sections and are successful for streamlining work, increasing document standardization, and supplementing other GDOT communications. They are critical for relating explicit expectations to document preparers, which increases coordination between consultants and OES reviewers. This can translate to tangible benefits for both document preparation and review but provides its largest benefits to the document review phase.

Additionally, our analysis identifies areas where individual sections' innovations deviate from our general findings across OES. We discuss sectional differences, pointing out areas where sections can learn from each other to improve future iterations of these innovations. The limitations of the innovations identified in our findings indicate a key challenge for communication and coordination at GDOT. The ability of project teams to effectively communicate and produce high-quality work is dependent on the level of engagement and activity of consultants. The cases we study greatly enable and facilitate communication, but their impact can depend on the experience and initiative of the consultants working on the project. Active consultants are able to take advantage of the benefits, but these effects can be minimized, or even reversed, for consultants who are inexperienced, rarely work with GDOT, or do not take ownership of project communications. Firms that are less experienced with working at GDOT have fewer incentives and opportunity to attend GPTQ meetings, putting them at risk of missing critical project information. Less active consultants are more likely to become locked out of SharePoint and lose access to key resources posted there. These consultants are then less likely to know about, or have access to, the most recent templates, putting the quality of their projects at risk.

Consulting firms that provide the highest quality services at GDOT do so, not because GDOT explicitly specifies the communication they are required to engage in, but because they embrace a long-term relational perspective of their work. Taking ownership of project communications and being active may be costly on a project-by-project basis, but experienced firms understand the benefits it can yield across a portfolio of GDOT projects. As currently designed, the communication tools we study offer more benefits to active consultants. Future innovations should take all of these considerations into account.

Chapter 4 Coordination with Project Delivery

4.1. Introduction

Phase I findings indicated that communicating performance and quality standards to environmental consultants is not solely an OES task but also facilitated by GDOT and consultant PMs. To understand the communication and coordination challenges associated with environmental review, we conducted focus groups with both GDOT and consultant PMs (task 3). This analysis contributes to our overall research goal by observing variation in the roles that PMs play in managing, coordinating, and incorporating the work of project team members focused on environmental review. We also identify challenges associated with communication and coordination between members of the project team. Finally, we determine PM perspectives on best practices in project management associated with environmental review.

Focus groups make it possible to observe natural dialogues amongst professionals regarding their shared experiences and to place individual perspectives in relative context to their peers. This type of data is valuable for understanding common values and patterns of behavior amongst PMs, as well as important differences. By design, the focus groups contrast the perspectives of GDOT PMs with consultant PMs. However, we also were mindful of differences based on the number of years of experience of the PMs, as well as whether PMs have experience managing projects in different settings. Focus groups also provide a setting for reflecting upon alternative courses of action. This allows us to examine how PMs approach problem-solving and the management of project teams.

One focus group comprised GDOT PMs and the other focus group comprised consultant PMs (see details in Table 4-1). Consultant PMs are individuals who have extensive experience working on GDOT projects, while GDOT PMs are senior staff who manage their own portfolio of

projects and supervise other junior GDOT PMs. We organized the focus groups by sector affiliation because GDOT and consultant PMs often work closely together on the same projects. This research design feature allows the PMs to speak to their shared experience without self-censorship due to the government–contractor dynamic. A complete copy of the focus group protocol is included in Appendix C.

Table 4-1: Focus Groups

Focus Group	Attendants	# of Participants	Date of Conduct
1	ACEC Georgia	6	01/19/2018
2	GDOT	9	02/12/2018

Using these data, we conduct a qualitative analysis to examine key aspects of communication and coordination in project management that influence performance in project delivery. First, we conduct a comparative analysis between GDOT and consultant PMs in order to identify important areas of management similarities and differences between groups, and to identify potential areas of improvement for GDOT project management. Second, we identify potential vulnerable communication pathways based on the recurring successes and challenges we observed in the comparative analysis. These potential vulnerabilities will provide areas where GDOT can improve its organizational communication and project delivery efficiency.

4.1.1. Focus Group Research Design

Each focus group was recorded and transcribed before being coded using a two-phase cycle of qualitative coding. First, researchers developed conceptual categories based on their theoretical model and understanding of the project process at GDOT. Based on the review of the relevant research literature (see Chapter 1) and an initial scan of the transcribed data, we identified the core concepts used for organizing and coding the data (see Table 4-2 for a list of the coding

categories). The transcriptions from the focus groups were coded by at least two members of the research as a reliability check on our observations. If the coders disagreed, a third member provided an independent code to break the tie.

Table 4-2: Key Concepts Observed in Focus Groups

Coding Categories	Description
Communication *(Data related to communication and coordination activities, both successes and challenges)*	
Formal communication	Formal modes of coordination, including document review, project meeting, EPM
Informal communication	Informal modes of coordination, including GPTQ, phone calls, face-to-face conversation, and email
Role *(Data related to actors' responsibilities, their perceptions of the role, and factors contributing to the actors' performance)*	
Experience	Data on actors' experience, including years of experience, years of experience in the field, and turnover rate
Relational elements	Working relationships or interactions, including personal and professional assessments of other actors' motives, skills, etc.
Structure *(Data related to organizational structure, rules, norms, and uncertainties)*	
Behavioral controls	Controls that relate to directing the activity of actors within the organizations such as training program, manuals, or organizational norm that structure actors' behavior
Challenges	Design changes, project complexity, risk and prioritization, state funded, and uncertainty
Input controls	Controls that influence resources that go into organizational activities
Output controls	Performance measures and quality assurance
Workload	Information on actors' workload

4.2. Results

4.2.1. Comparative Analysis

In this section, we compare focus group responses according to three major themes: (1) the influence of communication practices on environmental review and project delivery;

(2) the variety of roles that PMs play in project management and environmental review; and (3) the organizational structures that influence project teams. We discuss each finding and examine key similarities and differences between GDOT PM and consultant PM perspectives. Tables 4-3 to 4-5 display agreement between focus groups on each subject.

Communication

Communication across the entire project team involved in the environmental review is considered crucial for project success by both GDOT and consultant PMs. Engaging all team members in communication helps ensure that the project is proceeding according to plan, anticipate potential issues, and deal with problems when they arise. Consistent communication between PMs and with other offices is crucial to the environmental review process.

> "[On tackling problems during the environmental process during the project team meeting] *That's kind of the goal of it, is to get everybody in the room and actually take a look at the project as a whole from the environmental standpoint, so that the alignment that is selected takes into consideration all of the specialists. So that's the goal of that meeting."* [GDOT]
>
> *"*[On what brings team member to the same page] *Yeah, communication. You've got to have the team meetings. You've got to bring people together, however you do it, on a regular basis."* [GDOT]

Additionally, consultant PMs indicate that this communication should include federal regulatory agents. GDOT PMs did not uniformly share this perspective. Consultant PMs share the belief that contacting external resource agencies about project issues is worth the time and effort, as well as the risk of receiving a negative response. Consultant PMs describe GDOT and OES staff as reluctant to contact or communicate with external agencies, indicating a divergence in opinion as to whether such communication is typically worthwhile.

> *"Yeah in our experience, it just depends on the individual you're working with at OES. A lot of them are very reluctant to go to the resource agencies and discuss it with them."* [Consultant]

> *"Most of the times I've pushed that, you go in there and the resource agencies start bending over backwards for you. I mean, like, 'Hey I'm explaining to you what I'm doing and why I can't do stuff', and they respond to that."* [Consultant]

GDOT PMs did not discuss the potential benefits of including external agencies in their reflections on communication. They instead spent a considerable amount of time discussing the downsides of silo thinking among SMEs on project teams. Silo thinking causes individuals to prioritize their own work and understand the project from only their disciplinary perspective, undermining team cooperation and communication. This perspective seemed to be exclusive to GDOT project managers, as consultant PMs did not mention this behavior in either their own organizations or in GDOT.

> "[In OES] *they have a NEPA writer, they have ecology, archaeology, environmental, air, noise. They all have competing interests. The historian wants to protect that house…the* [ecologist] *wants to protect that species, and they will—even though they're in the same office, they don't act like they're in the same office."* [GDOT]

> *"If we could just get people out of their silos and…at a point where they can see what everybody else is doing and how they fit into the bigger picture; that would help our jobs a lot more."* [GDOT]

Similarly, GDOT PMs perceive SME conversations between OES specialists and corresponding consultant environmental specialists as detrimental to project delivery because they cut the GDOT PM out of the communication loop. This reduces consideration of the larger project process and increases silo thinking.

> *"You'd have specialist to specialist speaking to one another, but…they don't understand the make-up of what our contracts are, so they don't know what they're asking for necessarily."* [GDOT]

On the other hand, consultant PMs view this specialist communication as a positive, allowing them to avoid unnecessary micromanaging of the consultant specialist's subtasks.

> *"They're fairly engaged with their counterpart on each project. So, the Geotech engineers, we don't deal with that, they handle it for us and kind of report back on what's going on. We step in if we need to, have some assistance from the management side. But in general, we don't have to interact with any groups any more than the project manager group except for specific project issues."* [Consultant]

Finally, both GDOT and consultant PMs agree that personal relationships are extremely helpful for facilitating good communications and coordination on projects.

> "[About having better coordination with people you have personal relationships with] *So I tell them, 'You build a personal relationship.' When they know you're a professional and you do a good job, a lot of times SMEs will go above and beyond to help you out…"* [GDOT]

> *"We don't have a manual telling them who's a good person to talk to for each individual act because it changes so much. It is about occasionally talking with each other within a group,* [and saying] *'I'm having this issue',* [so that] *somebody … can help me solve it."* [Consultant]

Table 4-3: Findings Related to Communication

Conclusion	Description	GDOT PM	Consultant PM
Whole-team communication	Communication across the project team leads to project success	✓	✓
Direct communication with resource agencies	Communication with resource agencies could speed up the environmental process		✓
Silo thinking	Silo thinking is a barrier in project coordination	✓	
Specialist conversation (1)	Specialist-to-specialist conversation causes communication breakdown with PM	✓	
Specialist conversation (2)	Specialist-to-specialist conversation makes communication process more efficient		✓
Relationships	Personal relationship helps lubricate coordination efforts	✓	✓

Role

Project Ownership is the Key to Effective Communication. Both GDOT and consultant PMs agree that project managers need to take ownership of their projects and drive the project forward by initiating communication and coordination activities. A lack of strong leadership from the PM can disrupt coordination activities and delay project delivery. Evidence from the focus groups shows that projects without strong leadership from the PM can go off-track and become delayed. PMs that actively take ownership of their projects and guide their project team through the environmental review process by following through with them on the tasks they are assigned are often able to generate better project outcomes.

> *"You have to have someone who's going to say, 'I'm going to own this project, and I'm going to steward it through the process.' And that's honestly what gets the best results as is related to delivering a project. There is no magic formula. If so, I would have found it out a long time ago* [laughter]*. It doesn't exist. So, it's really just a PM being good and being the one who's constantly trying to move the project along."* [GDOT]

Both groups of PMs also agree that most GDOT PMs are not sufficiently persistent. Too many managers remain passive and rely on other project team members to drive project processes. While GDOT PMs must rely on consultant PMs for outsourced work, passive management from the GDOT PM is counterproductive, particularly if it forces other members of the project team at GDOT to initiate project coordination. This creates extra work for consultant PMs to go up the chain of command when they need important decisions made.

> *"PMs used to be, within the department, much more involved with every decision and progressing the project; now they're paper-pushers. And they're becoming more reliant on the consultant knowing how to get it through."* [Consultant]

However, despite this emphasis on project ownership, both consultant and GDOT PMs caution against PMs that try to micromanage specialist tasks. Overbearing managers can disrupt projects, as well.

> *"*[On GDOT PM's management] *And so some people don't seem to—it's harder for some people to let that go. They figure that the consultant is really not a subject matter expert. It's kind of like, 'You do what I say when I say it. You don't move until I say move', and then the project suffers."* [GDOT]

> *"*[On communication frequency with GDOT PMs] *I think it's definitely hit or miss…a lot of times 'it's okay, just leave us, get out of our way'. 'Let us keep moving the project.' But when we need* [it, when] *we need time extension,* [or] *we need meetings set up with a counterpart with OES, that's when we need them to be responsive on* [their] *end."* [Consultant]

<u>*Inexperience is a Pervasive Obstacle*</u>. Both PM groups agree that many of these issues stem from inexperience among GDOT PMs. A large number of GDOT PMs are young or have limited experience on the job, making it difficult for them to perform all the tasks required of them satisfactorily. Inexperience can translate to indecisiveness, lack of control over a project, and ineffectual management.

> *"So, the young* [PMs], *they don't understand that* [PMs need to take ownership of the project and follow through]*. They just think there's environmental and that someone's in there coordinating everything. And our locals, it's even worse, because they're idle. They have a consultant delivering it, but it comes here to be reviewed. So they'll be like, 'Well, it got submitted to OES,* [name]*.' And they just drop it and walk off and just think somebody's going to catch it on the other end and pitch it when they're supposed to."* [GDOT]

> *"I've had PMs that are just inexperienced but they think they know what they're doing. And I try and avoid communication with them because you get in a meeting and they make a bad decision, and it's a lot of effort to get them back on track."* [Consultant]

Consultant PMs notice that the GDOT PMs' level of engagement varies with the PM experience. GDOT PMs' inexperience can lead to a low level of engagement and can be disruptive to project progress.

> "[On the level of GDOT PMs' engagement]…*we get sort of the maybe some of the newer people that are engaged but then it's like you've got to cross every t and dot every i, and they're almost even too involved and some things where it gets to be a little bit constricting."* [Consultant]

<u>*Role Perceptions and Role Ambiguity can Disrupt Environmental Processes*</u>. Both GDOT and consultant PMs recognize that role ambiguity and personal role perceptions among OES staff and federal regulation agents can hinder project delivery. OES SMEs often see themselves as environmental or cultural protectors and work counter to the goals of project delivery motivating the rest of the project team. This attitude can seriously hinder the progress of the environmental review.

> *"When it comes to environmental, especially ecologists and historians and archaeologists, they are very passionate about their fields, as they should be. But their management needs to redirect their passions in a way that they're aware of why they're here at GDOT is to help us deliver the program, not to preserve the environment at the cost of everything else."* [GDOT]

Consultant PMs also see this as a problem among reviewers at federal regulatory agencies. Individuals from the resource agencies will take on an activist stance and fight GDOT's recommendations.

> *"That activism will drive you crazy. But that's not indicative necessarily of GDOT, because GDOT's going to bat for that saying, 'You guys need to rethink this.' But I feel like the resource agencies play a little bit a part."* [Consultant]

Table 4-4: Findings Related to Actors' Roles

Conclusion	Description	GDOT	ACEC Georgia
PMs should take ownership	PM's strong leadership helps push the project forward	✓	✓
GDOT PMs don't take ownership	Many GDOT PMs are passive in driving project processes	✓	✓
Micromanaging is counterproductive	Overbearing PMs can disrupt project processes	✓	✓
PM inexperience	Inexperienced PMs is an important cause for coordination issues	✓	✓
OES activism	Activisms in OES staff get in the way of project delivery	✓	✓
Federal activism	Activism exists in resource agencies		✓

Structure

Both groups of PMs emphasize that the environmental review process represents a significant part of the overall preconstruction process. Environmental systems are complex and dynamic, and can create unforeseen issues for problems throughout the review process.

> *"Environmental is the hardest element to wrap your hands around. We could probably become de facto SMEs in pavement once you've done it a couple of times, but environmental is constantly shifting*." [GDOT]

> *"Environmental is the number one risk, I think, for just about any project."* [Consultant]

According to GDOT PMs, this fact, in combination with an engineering culture at GDOT, often results in blaming environmental review for any delays in the project process. Other sections in GDOT, including some PMs, can scapegoat OES by pinning project delays on it even if the issue was not its fault or was out of its control. This leads to further challenges for communication as OES staff feel that they have to be defensive about what they say for fear of issues arising.

> *"I've had PMs come and say, 'My SMEs won't make a decision.' I said that, 'I won't make a decision neither if you're going to throw them under the bus every chance you get.'"* [GDOT]

GDOT PMs also struggle to take ownership and command leadership over their projects because they have limited power over project contracts and agreements. GDOT PMs cannot control the amount of resources devoted to a project or the contractual specifications guiding consultants' work. This undermines their ability to address unsatisfactory work or enforce specific contractual requirements that go beyond scope, schedule, and budget.

> *"My PMs don't have any control over their resources or when they'll deliver, or even how much time they spend on it. So, it's like you're told you are project manager, scope, schedule, and budget, but they have no* [control over those subjects]*."* [GDOT]

Design changes are also a major issue for project delivery. This was a common topic of complaints throughout the GDOT PM discussion. Project design teams often fail to see the impact of making design changes late in the project process, but such changes often have huge ramifications and require large amounts of rework for the environmental review. PMs struggle to keep designers from tinkering with project plans, often resulting in delays as the consequences of those changes are sorted out.

> *"Design likes to play in projects. They* [say]*, 'Oh, we can make it better.' 'Well, we don't need it better. Does it function? And, so let's move on.'"* [GDOT]

Many of the communication and coordination issues arise due to the twin challenges of turnover and large workloads within GDOT. Turnover rates and workload assignments are high for GDOT PMs and OES staff, leading to the intensification of coordination issues due to loss of organizational knowledge and added transactions costs. When GDOT PMs or OES staff are overloaded with projects, they have less time to devote to each, and their ability to service each one effectively suffers. Turnover also creates huge problems for project delivery. When project team members leave, the project-specific knowledge and expertise they have leaves with them. This forces their replacements to relearn it at high cost. GDOT compensation and workload levels are potential causes of high turnover rates.

> "[On GDOT turnover rate]*…the most significant factor to the turnover is there's no realistic compensation for these folks. Unless they're passionate civil servants willing to just donate and just want to advance society. There's no reason to stay because they just don't get compensated adequately for what used to be the position."* [Consultant]

Finally, both GDOT and consultant PMs suggest that communication issues between OES SMEs and with the rest of the project team could be improved by restructuring the role of the NEPA SME. Both groups indicated that they thought the NEPA SME should be in charge of organizing communications between each OES subsection and the PM. They suggest that this would facilitate effective communication and benefit project delivery.

> *"*[The NEPA specialist is] *supposed to be, I guess, overseeing what the other specialists are doing on their project."* [GDOT]

Table 4-5: Findings Related to Organizational Structures and Cultures

Conclusion	Description	GDOT	ACEC Georgia
Environmental complexity	Complexity of the environment further complicates the environmental review process	✓	✓
Scapegoating	Environmental review process is sometimes blamed for project delay even when it's not at fault	✓	
Limited PM authority	GDOT PMs can't fully take ownership of projects due to their limited authority	✓	
Late design changes	Project design teams often fail to recognize the impact of late design changes, causing major delay in the environmental review process	✓	
Workload	High workload prevents GDOT PMs and staff from paying enough attention to each project	✓	✓
Turnover	High turnover rate exacerbates communication and coordination issues as specific knowledge leaves with exiting people	✓	✓
NEPA SME leadership	Project delivery would benefit from having the NEPA SME in charge of organizing communications between OES subsections and the PM	✓	✓

4.2.2. Communication Pathway Vulnerability Assessment

To illustrate the potential vulnerability of communication pathways among project team members, we construct a network of the project communication and coordination patterns based on the GDOT Plan Development Process (PDP), organizational structure outlines, outlines of project structure revealed in Phase I, and focus group data (see Figure 4-1). This network map depicts the primary actors involved in the environmental review process for a typical project at GDOT (as colored blocks) and illustrates who they communicate with by showing communication pathways between actors (as lines between them). We number each of these pathways so that they can be easily identified. When issues arise during the environmental review process, the

integrity of these communication pathways are put at risk of being disrupted. Using the focus group data, we identify the primary risks for each communication pathway according to PM perspectives. We describe these risks and link them to the numbered communication pathways they are most likely to disrupt in Table 4-6. Figure 4-1 and Table 4-6 are designed to be read together, with the network map illustrating communication pathways and the table matching them to their biggest risks.

Turnover and inexperience are pervasive issues at GDOT; as turnover occurs in projects, new staff must be recruited. These staff are often inexperienced and require training about GDOT processes and how they should interact with project team members. They also need to learn project-specific information such as: (a) where the project is in its lifecycle, (b) what issues have arisen, and (c) who their relevant contacts should be. When turnover occurs, it creates knowledge loss, increasing and intensifying the problems of inexperience.

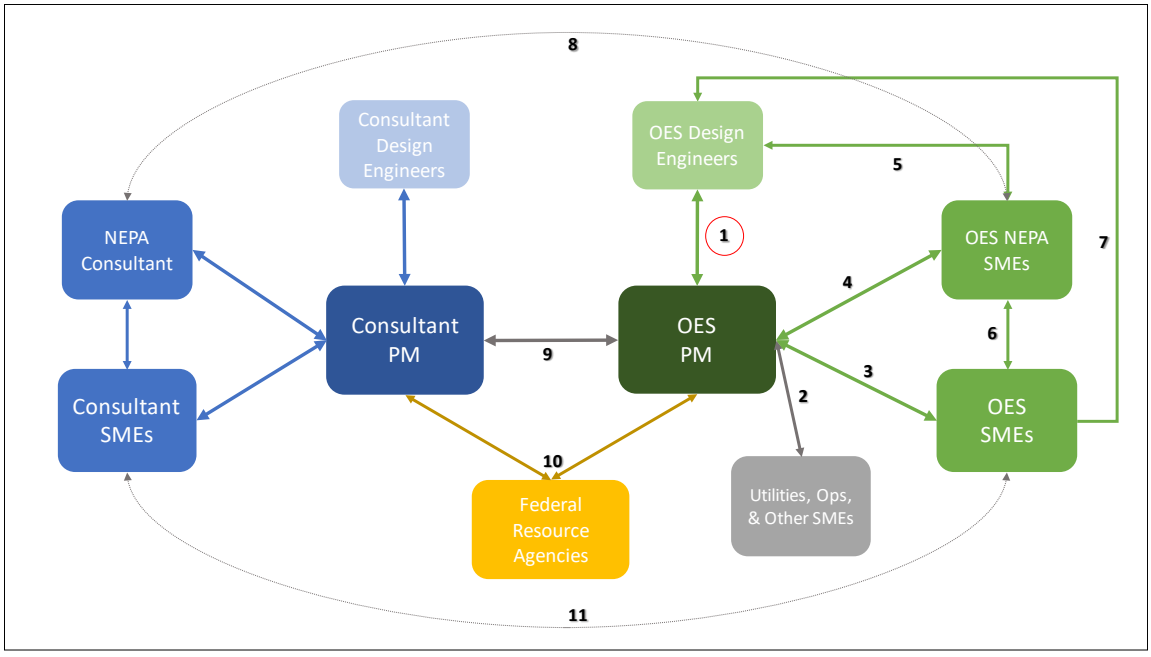

Figure 4-1: Communication Pathways in the Environmental Process

Table 4-6: Communication Pathways and Associated Risks

Pathway	Issues that frequently undermine the communication pathway
1	Designer experience, PM experience, Turnover, Design change
2	PM experience, Turnover
3	Specialists' communication, PM experience, Turnover, Activism, Silo thinking, Environmental subject changes, Workload
4	Specialists' communication, PM experience, Turnover, Activism, Silo thinking, Environmental subject changes, Workload
5	Lack of interdepartmental communication, Environmental subject changes, Workload
6	Lack of communication, Silo thinking, NEPA's lack of authority, Turnover
7	Lack of interdepartmental communication, Environmental subject changes, Workload
8	Lack of communication, Environmental subject changes, Turnover, Workload
9	Lack of communication between GDOT PMs and consultant PMs, PM experience, Turnover
10	Relational issues, Federal experience, Activism
11	Lack of communication, Environmental subject changes, Turnover, Workload

> *"And some of that actually is due to their turnover rates. I mean, all of us have experienced new NEPA specialists, new ecologists, all the special studies. I mean, they're constantly trying to figure out ways to maintain their personnel. And, so when another person comes along, it depends on what their experience level is. They have a lot of projects and they've actually loaded up. There are a few people that they have left, but probably more projects than they thought..."* [GDOT]

> *"There's, I think, to me, the most significant factor to the turnover is there's no realistic compensation for these folks. Unless they're passionate civil servants willing to just donate and just want to advance society. There's no reason to stay because they just don't get compensated adequately for what used to be the position. I think it's evolved now, a little bit of what* [name]*'s talking about with the commissioner changing the tone and just the reaction to the fact that they don't have people with institutional knowledge to understand how the project has to progress."* [Consultant]

Workload operates similarly. Both GDOT PM and consultant PM focus groups recognized that OES staff are assigned large numbers of project. This makes it harder for them to stay informed about project-specific information and limits the amount of time and attention they can

spend on any single project. If staff do not know what is going on or who to contact, or do not have the time to find out, then communication breakdown will occur.

> "[When asked about a specific issue at GDOT] *That's specifically at OES. It seems that they're understaffed. They need to add staff, but I know they're trying. It's just the struggle and people have said, it's probably salaries, while they can't hold on to people, many hold on to the really good people as well. That's probably number one because the folks have got too many projects that they're overseeing*." [Consultant]

Inadequate training and guidance also create a risk of communication breakdown. This deficit allows organizational knowledge to be lost on new projects or with new staff. This also interacts with inexperience; GDOT staff who must quickly catch up on project-specific information often struggle to get up to speed on the project they have been assigned to and integrate into the project team because they are not given adequate tools to help them do so. GDOT and consultant PMs disagreed on this point. GDOT PMs think that their organization provides sufficient mandatory training to both its staff and to consultants to ensure the production of high-quality documents. Consultant PMs, however, think that GDOT's training programs are insufficient in providing information to their staff.

> *"And we have a very active training committee. They train all new project managers that come into the office, whether they'd be GDOT employee, project managers, or consultant project managers that we hire to assist this. They have to go through our training."* [GDOT]

> *"—the training program that I was in—a two-year program and you rotated through all the different aspects of the department, and you learned a lot. Now, it's a condensed, maybe six-month program where you're not really doing as much. And so, you're not even getting the experience that you used to when you started there."* [Consultant]

Finally, relational issues are also a source of risk. Successful bi-directional communication is often dependent on personal relationship and trust. Staff or consultants are more likely to

communicate iteratively on project tasks if they have a previous relationship with their counterpart. Disruption of relationships can destroy communication pathways and create barriers to project delivery.

In addition to the aforementioned causes of communication breakdowns, the focus group data presented some recurring specific vulnerable communication pathways disruptive to project delivery.

Communications Between GDOT PMs and Design Engineers (Pathway 1). The vulnerabilities in communications between these actors appear to stem from inexperience of either the design engineers or GDOT PMs. The lack of experience in either actor prevents important information from being communicated, which could later cause project delays. One GDOT PM indicated that young designers might not fully grasp what is the best way to design the project without the PM's input.

> "[About his experience with younger designers] *You know you have that advertising billboard, and he will be like, 'Well, I'll just have to move the billboard.' 'The billboard is a million dollars.' 'Oh.' Then all of a sudden he's thinking, 'Oh, I can't do that to design standards. I might need to look at something different.' They really are not thinking that way, and so the experience in their office kind of helps."* [GDOT]

In addition, if there is a design change that would affect the environmental process, an inexperienced GDOT PM might not communicate the change back to the environmental subunits, causing the project to delay.

> *"No, but what happens is always that lack of communication that's coming from design, and environmental a lot of times hears about it on the back end.*" [GDOT]

Communications Between OES and Design Engineers (Pathways 5 and 6). The major cause of this potential communication breakdown was brought out in the GDOT PM focus group. There is not enough coordination between environmental SMEs as well as between environmental and design subunits. This creates delays in moving tasks from one department to another and causes further delay from any uncommunicated project changes.

> *"I've literally gone down there* [to OES] *and taken the plans from beneath the desk and taken it 20 feet over to a specialist. I mean, that's just how much we have to get involved in their interoffice communications."* [GDOT]

Communications Between GDOT PMs and SMEs (Pathway 3). Focus group data indicate that GDOT PMs typically engage in unidirectional communication with project team subunits and engage in much less robust coordination with OES SMEs. GDOT PMs often communicate with SMEs sporadically, sending them information or instructions rather than hosting back-and-forth discussions, and only coordinating once a problem arises. This can result in PMs, and the rest of the project team, losing touch with the SMEs and the SMEs proceeding with their work without the rest of the team having an accurate view of the project status. The findings from both focus groups clearly stated that team-wide communications and informal communication using personal relationships are useful in strengthening these PM–SME communication pathways, whereas the lack of such practices weakens them.

> *"So, we have to tell our PMs constantly, 'Do not assume they're* [SMEs] *doing anything. Constantly be engaging them to make sure it's getting moved or so you have documentation when it doesn't get moved.'"* [GDOT]

While the GDOT PM can be a powerful coordinative actor, both groups of PMs shared the view that many GDOT projects do not see the GDOT PM fill this role as prescribed. Inexperience, high workload, and organizational norms often undermine the GDOT PM's communication

patterns. This weakens the intended coordinative pathways between project team members and can act as a barrier to successful project delivery.

> *"That's the biggest problem. They're* [GDOT PMs] *becoming very prescriptive in what they do. They're less involved with decision-making just because they don't have the experience."* [Consultant]
>
> *"We get some folks that their GDOT PMs are not engaged at all. I mean, they* [GDOT PMs] *don't even show up for meetings*." [Consultant]
>
> *"So, part of the challenge for any of our newer project managers is they have to learn that. And we tell them that. We learn through experience at this point. Our senior management* [inaudible]. *You have to look at them as multiple offices in one. Because to do anything otherwise means that you cannot deliver your project."* [GDOT]

Communications Between GDOT SMEs and Consultant SMEs (Pathway 11). While much team communication should flow through the GDOT PM, subunit staff such as OES SMEs and designers often engage in iterative two-way communications with their consultant counterparts on the project. This causes GDOT PMs to be at risk of missing subunit communication on many projects.

> *"In the past, they got into this whole scenario. 'Well, hey, I'm an ecologist and I want to talk to a fellow ecologist. We speak the same language', and things like that. So, you'd have specialists speaking to one another, but…they don't understand the makeup of what our contracts are, so they don't know what they're asking for necessarily."* [GDOT]

While this communication can facilitate subunit work, moving forward without the PM being involved risks complex interactive effects across the project team that can cause delays. Project subtasks such as design changes often create issues for other project phases if they are not coordinated with the PM.

> *"They* [designers] *really only understand what they do. A very few of them understand what the other ones do, but the reality is they're not understanding where they fit and how that's like when you take that pebble and drop it in the*

> *pond, it causes these waves. They really don't understand the waves. And that's what project managers—project managers see that."* [GDOT]

Communications Between GDOT PMs and Consultant PMs (Pathway 9). Due to GDOT's increased reliance on contracting out environmental tasks, the lack of communication between GDOT PMs and consultant PMs could severely affect the delivery of the projects or GDOT's project budget. The data from the GDOT focus group reveal that it is important to explicitly require communications between the two organizations to avoid these problems.

> *"And a lot of times our environmental consultants are subconsultants on the contract in lot of ways. They're not the prime. So, we have to make sure that the prime is actively monitoring what's going on because our contract is with the prime. So, if they go over budget or however they do it, we're going to be looking at the prime, saying, 'Hey. How did you let this happen?'"* [GDOT]

4.3. Conclusions

In this chapter, we use data from two separate focus groups with GDOT PMs and consultant PMs to examine the key communication and coordination issues across the entire project team during project delivery. A comparative analysis between GDOT PM and consultant PM perspectives reveals several conclusions about project communications, roles, and structures. Project communication can be improved through whole-team communication, engagement with external resource agencies, and having interpersonal relationships between team members. Alternatively, silo thinking and bypassing PMs in favor of interdisciplinary conversation can undermine communication efforts.

Comparing the data from the GDOT PM and consultant PM focus groups reveals that the communications are intended to flow through GDOT PMs and maintain robust connections between actors in the project team. These comparisons also identify important sources of

communication and coordination problems. Key areas where communication pathways become vulnerable are communications between PMs and specialists, such as designers and OES SMEs. SMEs often engage in only unidirectional communication with GDOT PMs or exclude them from project communications altogether by exclusively engaging in specialist-to-specialist communication. Communication with design engineers suffers from the lack of interdepartmental coordination. The consensus view is that GDOT projects lack sufficient team-wide communications. Both GDOT PMs and consultant PMs consider team-wide communications to be highly effective at moving projects forward and preventing project delays. Major disagreements in communication issues between GDOT PMs and consultant PMs are regarding the effects of specialist-to-specialist conversations. GDOT PMs see this communication pathway as detrimental to project delivery as it excludes GDOT PMs from the communication loop, while the consultant PMs see it as a more effective means of communication as they can take a hands-off approach in the project. Common risks for communication breakdowns in GDOT projects are turnover, inexperience, high workload, unsatisfactory input controls, and relational issues.

Role conflicts can cause issues for project delivery when GDOT PMs underperform in taking ownership and driving project activities. Inexperience commonly hurts GDOT PM performance and causes projects to suffer. Environmental activism is also pervasive at GDOT and at federal regulatory agencies and can sidetrack projects.

Structural issues can arise as well. Environmental complexity commonly makes the environmental review difficult to work with and can contribute to OES scapegoating on project issues, undermining communication efforts. GDOT PMs' authority to control project resources may also undermine their ability to deliver projects. Design changes commonly cause issues for effective project delivery if they take place late in the project process. Finally, high levels of workload and turnover at GDOT exacerbate other issues that can arise.

Chapter 5 Conclusions and Recommendations

5.1. Project Context

This study investigates the communication and coordination practices involved in the environmental review process associated with transportation infrastructure projects. Public agencies responsible for environmental review have struggled to incorporate the complex technical studies and mitigation strategies into the preconstruction designs. The challenges posed by environmental review are not unique to transportation. As the executive orders of several U.S. presidents make clear, streamlining of the environmental review process is the directive applicable across federal agencies.

However, environmental review has been sufficiently challenging for transportation agencies that streamlining elements of the process has been addressed in numerous acts of Congress (see Chapter 1 for a list). These efforts have taken aim at a range of activities, including: (a) allowing state agencies to streamline processes for less complex projects; (b) limiting the range of projects that require project-specific federal review; (c) providing states options for assuming greater authority (and liability exposure) for their transportation program; and (d) encouraging the use of environmental review data collected during planning stages to be used during the preconstruction stage of operations. While this is not an exhaustive list of the streamlining efforts initiated across the transportation agencies, it captures the essential flavor of these efforts focusing on greater flexibility in the processes and accountability requirements governing environmental review.

GDOT initiated this research to focus on communication and coordination practices associated with environmental review. This is the first study focusing on this topic among the transportation agencies. The research has proceeded in two phases. In Phase I, we examined

communication practices between OES staff and environmental consultants. We asked whether and how communications between these groups may influence the duration of environmental review and, consequently, the duration of project delivery. In Phase II, we build on this work to incorporate the activities of project managers and understand communications in the context of the entire project team. A particular focus of Phase II is the key role that project managers play in the observed patterns of communication and coordination. We were drawn to this focus based on findings during Phase I that project manager communications with environmental consultants were at times more influential to project durations than their interactions with OES staff.

5.2. Management Challenges Posed by Environmental Review

The environmental review process poses several management challenges during the preconstruction design phase of a transportation project. The technical studies associated with identification of environmental resources are performed early in the life of a design project so that the mitigation strategies can inform the engineering designs and so that permits can be secured in a timely fashion. We observed some variation across the states in terms of the scheduling of the engineering design work and the environmental review work. However, in most states the technical studies supporting environmental review are taking place between the concept review and the preliminary field plan review stages of a transportation project so that mitigation strategies can be incorporated into the development of the engineering plans.

The technical studies associated with environmental review are complex and time sensitive. One of the chief ways in which environmental review can become a problem for the duration of the preconstruction design is if adjustments are made to the footprint of the project or to the scope of the transportation design after the completion of the environmental studies. Though changes of this sort are often quite reasonable from the perspective of creating an asset

that serves the transportation needs of a state, they often mean that much of the environmental work needs amendment. For example, if the footprint of a project is changed, that can have implications for the NEPA specialist, ecologist, and archaeologist working on a project. They will need to see if the new footprint contains habitat for species or cultural artifacts and structures that need to be accounted for in the project. For ecologists, this can create year-long delays if the window is missed for observing migratory species. The NEPA specialist will then need to review all new information for any consequences to mitigation strategies and the summary documentation for regulatory review.

Several of the state DOT environmental managers that we interviewed or surveyed report having experienced these types of challenges in the coordination between engineering design and environmental review. The communication strategies that they developed are designed to limit the incidence of coordination challenges. However, several of the state environmental managers report limitations to the effectiveness of their communication practices.

One of the chief sources of difference across states relates to the strength of project team communications. States that have strong project teams also exhibited communication practices that worked better at mitigating challenging coordination problems. As we observed in Chapter 2, strong project team communications have the following characteristics: (1) effective early communications where responsible parties were identified for each of the specialties contributing information to the project; (2) good responsiveness by project team members to participate in impromptu meetings when challenges arose during the project; and (3) NEPA staff who took the lead in coordinating other environmental specialties. In contrast, the frequency of meetings by project teams was not found to be a factor for effective communication.

5.2.1. Communication and Coordination on Projects

One key characteristic of communication patterns at GDOT is that project teams rely on different communication channels at different periods of the project process. We observe distinctive communication patterns associated with general communications, project communications, and document review. While all of these communication strategies are used, the bulk of communications in OES takes place during the document review stage. OES staff tries to be hands-off on projects in order to manage workload, and often fails to engage in timely and effective communications on individual projects. Simultaneously, conflicts in performance expectations can arise, where OES and PM goals fall out of line. This goal divergence, with OES agents pursuing quality environmental compliance and management demanding expediency, requires more coordination and communication to overcome.

5.2.2. Consistent Themes for Improvement from Phase II

Three overarching themes for improving communication and coordination arise from the Phase II research: (1) strengthen project team coordination; (2) prioritize early communication between OES staff, project managers, and consultants; and (3) invest in knowledge curation. These themes emerged from points of convergence in the findings from the three lines of research conducted. Our recommendations grow from comparing communication patterns in other state DOTs, case studies of current developments in OES communication channels, and perspectives of project managers. We describe these themes generally and then detail recommendations pursuant to each.

Strengthen Team Coordination

Strengthening team coordination around individual projects can greatly improve project communication. Currently, GDOT structures its work in the environmental review process by

relying on the tools for bureaucratic coordination. Individuals working on a project orient their work around the completion of individual tasks rather than overall project goals. This form of bureaucratic coordination undermines project team members' sense of connection with each other and weakens their identity as a team. Individuals working on a project together see themselves as responsible for their distinct set of tasks, not as a collective unit who, as a group, are responsible for overall project delivery. This reduces the incentives for them to communicate consistently and can weaken coordination across project tasks. While shifting GDOT projects toward team coordination can come with added administrative costs of direct interaction, current practices that limit engagement with consultants until after document submission and transfer communication burdens to the consultant community have also proven costly in terms of on-time, low-quality documents.

Prioritize Early Communications

Placing a greater emphasis on early communication and creating a sense of continuity throughout the project process will also benefit project coordination. OES currently focuses much of its communication during projects late in the review process. It has prioritized and made progress in formalizing its communications, particularly for early project stages, but struggles to respond to consultant requests for additional guidance prior to document submission. Without a source of communications continuity, turnover and internal project changes can create knowledge loss and undermine project performance. Focusing on early and continuous communication throughout the environmental review process can reduce the frequency and impact of project issues and facilitate knowledge transfer between subsequent project stages.

Invest in Knowledge Curation

Establishing more control over the current communication and coordination tools used by OES through knowledge curation will benefit GDOT projects. Knowledge curation, as applied to environmental review, means the active management of critical information that consultants and OES staff need to produce high-quality work that satisfies the NEPA and GEPA processes and provides timely knowledge to the design process. GDOT has made significant progress in developing formal communications and implementing innovations that help project coordination. However, these approaches are relatively passive and place the burden of knowledge curation on consultants. The success of these strategies remains highly dependent on the experience of project consultants and other team members. Experienced personnel will learn how to navigate those tools, but others can struggle to use them effectively. OES should prioritize knowledge curation in order to prevent miscommunication and facilitate efficient communication on GDOT projects.

5.3. Recommendations

In this section we outline actionable recommendations for how to effectively pursue our suggestions. We describe each recommendation and how it will contribute to OES goals.

5.3.1. Strengthening Team Coordination

Recommendation 1: Increase the authority of in-house project managers.

Evidence from GDOT perspectives in task 3 suggests that GDOT PMs either lack or do not exercise enough authority over their projects. They have little control over procurement decisions, contract structure, or project personnel. Furthermore, experienced PMs, consultants, and other project team members often consider new GDOT PMs as too inexperienced to

adequately manage their work, undermining the norms that give PMs authority. PMs need to be adequately trained before being assigned to projects (see recommendation 2) so they can use their managerial position and authority appropriately. Giving GDOT PMs more authority over contracts, personnel decisions, and project work would strengthen norms of PM leadership and give project teams a stronger sense of identity and shared responsibility on their projects.

Recommendation 2: Provide new project managers more effective training.

Inexperienced PMs are often viewed as incapable of project management by other project team members because they are being asked to learn how to perform tasks on the job without receiving adequate training beforehand. Both GDOT and consultant PM perspectives illustrated this issue in task 3. More effective training for new PMs will help them perform tasks better and take more control over the projects. GDOT is not alone in this concern. Other state DOTs also report challenges in environmental review when bringing in project managers who lack experience on transportation projects. Not surprisingly, states that report stronger communication practices in our survey from task 1 were also less likely to experience turnover in their project management staff.

Recommendation 3: Strengthen the role of NEPA SMEs on projects.

OES should consider giving NEPA staff the responsibility of coordinating subject-matter experts' work on projects. NEPA SMEs are currently co-equals to SMEs from other OES sections on projects and do not have any authority to organize their work. However, in task 3, GDOT PMs indicated that they often expect the NEPA SMEs on their projects to fill this role. Asking them to act as both project synthesizers (compiling work into the NEPA report) and communications officers (coordinating all SMEs together) will increase team coordination by creating a stronger connection between ongoing SME tasks and giving PMs a single point of access to SME work. This

was also a practice observed in the surveys among state DOTs experiencing stronger performance in environmental review and project delivery.

Recommendation 4: Cultivate organizational norms around project teams by encouraging underutilized team practices.

OES incorporates numerous tools and practices to the advantage of its environmental review process. However, procedures focused on setting norms and expectations around team communications are largely missing. Evidence from task 1 demonstrates that state DOTs with stronger performance in environmental review and project delivery enforce the norm of participation in project team meetings. GDOT PMs and consultant PMs in task 3 also report that OES staff are largely missing from team meetings. Additionally, they report high levels of turnover as the project workload in OES gets redistributed over time. We recommend that OES place a greater emphasis on encouraging project team members to engage in team meetings and to engage in cooperative team troubleshooting on project tasks. This can help encourage the informal, discursive communications that task 3 evidence indicates is underutilized on GDOT projects.

Recommendation 5: Strengthen consultants' understanding of their communication and coordination responsibilities by explicitly specifying them in contracts.

OES currently holds implicit expectations for their consultants to initiate and manage communications on projects, but it does not formally specify these responsibilities. Experienced consultants learn how to navigate and fulfill these expectations, but this system overlooks new or less experienced firms and individuals. OES should explicitly define communication and coordination responsibilities in GDOT contracts, such as who should initiate communications, who is responsible for coordinating the project team, and how often consultants should coordinate with the PM. This will help solidify the roles of project team members and facilitate

communications. In task 1, we observe that several state DOTs with strong performance also included communication and coordination expectations in the bodies of their contracts.

Recommendation 6: Use consultant performance in procurement decisions.

GDOT only awards contracts to certified consultants, but the firms' past performance on environmental review is not currently taken into account when deciding who to hire. Consultant performance should be used as an input to outsourcing decisions in order to ensure higher quality consultant work and team performance. While most state DOTs are similar to GDOT in not having a feedback mechanism for the procurement office regarding consultant performance, we observe several states in task 1 that have created these procedures and indicate that they are effective.

Recommendation 7: Continue to eliminate reviewer variance in OES by solidifying reviewer roles and norms.

OES has been trying to eliminate reviewer inconsistency in the department for some time, but despite these efforts the issue persists. This creates non-trivial transaction costs for consultants preparing documents, as they must learn to interpret and navigate a shifting set of review expectations. Part of why this issue continues, despite the efforts of OES to mitigate it, is that many OES staff do not perceive it as a problem. In task 1, GDOT SME respondents most commonly reported that reviewer variation is rarely an issue, while less than a third of respondents reported it as a serious issue. Despite this perception, consultants are regularly forced to adapt to reviewer expectations. Both GDOT and consultant PM perspectives from task 3 demonstrate that this type of variance is an ongoing issue at GDOT, while numerous other state DOTs in our survey sample report it as an issue in their states, as well. OES staff, and consultant PMs, report that they experience a similar phenomenon when they engage with federal regulatory offices during document approval. OES can help reduce in-house reviewer variance by

increasing formalization of reviewers' roles within the context of the project team and reinforcing the norm of legal sufficiency for all project reviews.

5.3.2. Prioritizing Early Communication

Recommendation 8: Emphasize team communication in early stages.

While OES incorporates many formal tools for communicating project resources, more focus should be paid to initiating both formal and informal communications early on in the lives of projects. OES should emphasize creating more communication between OES staff and consultants during the scoping, preliminary engineering, field work, and technical reporting phases of projects. While this can create added work by requiring more interaction between project team members, state DOTs that responded to our survey in task 1 demonstrate that engaging in communication during each of these phases benefits project outcomes.

Recommendation 9: Create a point of continuity for team communications.

Early communications are useful, but their influence depends on whether project team members are able to transfer the knowledge communicated to their peers in subsequent phases of the project. GDOT project teams regularly experience turnover and project teams shift personnel, while project specifics and details are changing. If a consistent presence, and point of continuity for communication, is not present, project coordination will suffer. Projects last so long that turnover and project changes can lead to knowledge loss and undermine performance. Formalization of communications is not sufficient to avoid this problem, OES should assign a member of the project team (e.g., many other state DOTs use the NEPA SME) as a point of communication that stays on projects for their duration and ensures knowledge transfer between project phases and shifts in personnel. This actor should be present at early project initiation meetings and coordinate with the team throughout the project process so that they can organize

knowledge and translate project information to new staff being onboarded onto the project team. Several state DOTs that responded to our survey in task 1 involve NEPA SMEs or dedicated environmental coordinators responsible for managing the work of environmental SMEs early on in this fashion.

Recommendation 10: Continue to increase formalization of NEPA documents.

GDOT has continued to increase standardization and formalization of the environmental review process. Our survey results from task 1 show that other state DOTs are following this tactic, as well, and demonstrate that they have found success on this path. In addition, our investigation of OES innovations demonstrates that increased standardization can yield large benefits for project efficiency, particularly for document reviewers. Shifting to more simplified tabular formats can limit document preparers' ability or willingness to add tertiary or unnecessary information to the report, which must be reviewed later. OES should continue increasing the explicit specifications present in document forms and templates. Further, other state DOTs show that increasing reliance on checklist forms of review can be advantageous. Shifting from a hands-on review where document reviewers make substantive comments and additions to a checklist-based review upon completion can increase efficiency. Reviewers at other state DOTs show that a more hands-off approach to document review can be successful without undermining project performance.

Recommendation 11: Increase use of underutilized communication practices.

GDOT responses from our task 1 survey identify training and workshops as underutilized in OES. Increasing opportunities for program training can be beneficial to project outcomes. Projects need to incorporate better training and onboarding of staff who join midway through the life of a project. Further, as evidenced in task 3, GDOT PMs often lack experience and need more

training to be effective (see recommendation 2). Additionally, survey results from task 1 reveal that engagement with external resource agencies can be a successful strategy. Many state DOTs engage resource agencies in projects with success by arranging recurring meetings and soliciting their ongoing input. However, consultant PM perspectives from task 3 reveal that engagement with these agencies is not done enough at GDOT. OES should take advantage of the help and resources of external resource agencies by arranging more meetings with them and engaging them on project-level issues.

Recommendation 12: Increase the frequency and opportunity for informal communication.

Informal meetings between project team members are useful but underutilized in OES. Other state DOTs we surveyed successfully employ informal meetings much more regularly. Such meetings do not need to take place in conference rooms or other such formal settings; GDOT should consider encouraging teams to use video conference platforms or other similar technological tools that allow informal meetings to take place at reduced transaction costs. Additionally, evidence from our investigation of OES innovations in task 2 indicates that informal contact between OES staff and consultants can be increased through the organization of social events after OES sections' GPTQ meetings. Happy hours following GPTQ meetings are already used by the Ecology section in OES. This should be extended to other sections, as well.

5.3.3. Investing in Knowledge Curation

Since knowledge curation is critical for managing project communications, and the majority of suggestions we develop come directly from our investigation of OES innovations, we organize our recommendations on how to improve curation around the three cases we have studied. While innovations are, and should, be generally tailored to each OES section, the

following recommendations apply directly to improving GPTQ meetings, SharePoint sites, and templates at OES.

Recommendation 13: Implement breakout sessions in GPTQ meetings.

All OES sections should incorporate breakout sessions into their GPTQ meetings. While interviews in task 2 revealed that this strategy is successfully used in some sections, it should be extended to all OES section meetings. Time should be provided for consultants and OES staff to break out into small groups to ask questions and discuss project-level issues on their ongoing work. This can provide an additional source of communication and assistance for consultants while allowing OES to take advantage of the expertise of consultants who attend.

Recommendation 14: Organize recurring meetings for GPTQ organizers from each OES section to share ideas.

The leaders from different OES sections who are tasked with organizing GPTQ meetings should meet with each other on a regular basis to share ideas about how to organize and structure their meetings, discuss what works or does not, and coordinate strategies. Interviews in task 2 revealed that the organizers of GPTQ meetings in different OES sections have a diversity of perspectives and strategies that they employ at their meetings, but that different strategies are seldom communicated or shared between sections.

Recommendation 15: Consolidate, unify, and manage GDOT online communication platforms.

Task 2 revealed that OES SharePoint sites each have their own format, style, and system of organization. These sites should be redesigned so that they are uniform across sections. This will ease the transaction costs involved in learning to navigate a new format for each OES section. Further, task 2 interviews showed that maintenance of out-of-date materials, access issues, and confusion about how to navigate OES SharePoint sites can create problems for users. SharePoint

sites need to be appropriately managed to ensure they are communicating accurate information and facilitating communication with consultants well. OES should dedicate a staff member to manage its SharePoint sites. This worker should be responsible for: (a) regularly purging sites of out-of-date information; (b) dealing with technical problems on sites; (c) helping consultants get, and keep, access; and (d) informing new consultants how to navigate SharePoint.

Finally, evidence from tasks 2 and 3 reveals that GDOT currently uses numerous formal communications platforms to transmit information to consultants (e.g., SharePoint, ProjectWorks, and FTP). Learning to access and navigate all of these different sites can be burdensome for users. GDOT should consider creating a web portal that consolidates access to all of these resources into a single place. This will greatly decrease the transaction costs and implicit knowledge necessary for consultants to access GDOT resources and produce high-quality work.

Recommendation 16: Track and reassess performance of OES templates.

Task 2 interviews demonstrated that OES templates are largely perceived as useful, but no performance metrics are explicitly measured. Tracking performance quantitatively will allow OES to ascertain which templates are most beneficial and produce more effective products in future versions. Further, OES templates in each section risk falling out of date as the environmental context on projects changes. Each template should be regularly reassessed to ensure that they all remain up to date.

Pursuit of these three strategies can result in stronger project teams and lead to more effective communication practices. However, we note that OES alone will not be able to stimulate a stronger project team culture within GDOT. This effort will require enthusiastic support and coordination with GDOT project managers and senior GDOT leadership to supplement and build upon existing patterns rooted in bureaucratic coordination.

References

AASHTO. 2008. *Practitioner's Handbook 10: Using the Transportation Planning Process to Support the NEPA Process.* American Association of State Highway and Transportation Officials, Center for Environmental Excellence. Retrieved from https://environment.transportation.org/pdf/programs/practitioners_handbook10.pdf.

AASHTO. 2009. *21st Century Leadership and Management Techniques for State DOTs.* Oasis Consulting Services, NCHRP Project 20-24.

AASHTO. 2014. *Practitioner's Handbook 15: Preparing High-Quality NEPA Documents for Transportation Projects.* American Association of State Highway and Transportation Officials, Center for Environmental Excellence. Retrieved from https://environment.transportation.org/pdf/programs/pg15-1.pdf.

Anderson, S., and H. Dekker. 2005. "Management Control for Market Transactions: The Relation Between Transaction Characteristics, Incomplete Contract Design and Subsequent Performance." *Management Science,* 51(12):1734–1752.

Bakker, R. 2010. "Taking Stock of Temporary Organizational Forms: A Systematic Review and Research Agenda." *International Journal of Management Reviews,* 12(4):466–486.

Brown, T., M. Potoski, and D. Slyke. 2016. "Managing Complex Contracts: A Theoretical Approach." *Journal of Public Administration Research and Theory,* 26(2):294–308.

Caglio, A., and A. Ditillo. 2008. "A Review and Discussion of Management Control in Inter-firm Relationships: Achievements and Future Directions." *Accounting, Organizations and Society,* Elsevier Ltd., 33(7–8):865–898.

Cardinal, L., S. Sitkin, and C. Long. 2004. "Balancing and Rebalancing in the Creation and Evolution of Organizational Control." *Organization Science,* 15(4) Jul–Aug:411–431.

Cardinal, L., S. Sitkin, and C. Long. 2010. "A Configurational Theory of Control." In *Organizational Control*: Sitkin, S., L. Cardinal, and K. Bijlsma-Frankema (eds), Oxford Press, England, 51–79.

Carvalho, M. de, L. Patah, and D. de Souza Bido. 2015. "Project Management and Its Effects on Project Success: Cross-country and Cross-industry Comparisons." *International Journal of Project Management,* 33(7):1509–1522. doi: 10.1016/j.ijproman.2015.04.004.

Clegg, S. 2012. "The End of Bureaucracy?" In *Reinventing Hierarchy and Bureaucracy: From the Bureau to Network Organizations* (Research in the Sociology of Organizations, Vol. 35), T. Diefenbach and R. Todnem (eds.), 59–84.

DeHart-Davis, L., and G. Kingsley. 2005. "Managerial Perceptions of Privatization: Evidence from a State Department of Transportation." *State and Local Government Review,* 37(3):228–241.

Deyle, R., and C. Schively Slotterback. 2009. "Group Learning in Participatory Planning Processes: An Exploratory Quasiexperimental Analysis of Local Mitigation Planning in Florida." *Journal of Planning Education and Research,* 29(1):23–38. doi: 10.1177/0739456X09333116.

Dunbar, R., and M. Statler. 2010. "A Historical Perspective on Organizational Control." In *Organizational Control,* S. Sitkin, L. Cardinal, and K. Bijlsma-Frankema (eds.), Cambridge Companions to Management, Cambridge University Press, 16–48.

Executive Order 13274. 2002. *Environmental Stewardship and Transportation Infrastructure Project Reviews.*

Executive Order 13604. 2012. *Improving Performance of Federal Permitting and Review of Infrastructure Projects.*

Executive Order 13766. 2017. *Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects.*

Executive Order 13807. 2017. *Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects.*

FAST (P.L. 114-94). 2015. "Fixing America's Surface Transportation Act."

Federal Highway Administration. 2000. "Reasons for EIS Project Delays." Retrieved from https://www.fhwa.dot.gov/environment/strmlng/eisdelay.htm.

Federal Highway Administration. 2019. "Every Day Counts." Center for Accelerating Innovation. Retrieved from https://www.fhwa.dot.gov/innovation/everydaycounts/.

Galbraith, J.R. 2002. *Designing Organizations: An Executive Guide to Strategy, Structure, and Process.* Jossey-Bass, San Francisco, Calif.

Garnett, J., J. Marlowe, and S. Pandey. 2008. "Penetrating the Performance Predicament: Communication as a Mediator or Moderator of Organizational Culture's Impact on Public Organizational Performance." *Public Administration Review,* 68(2):266–281. doi: 10.1111/j.1540-6210.2007.00861.x.

Gen, S., and G. Kingsley. 2007. "Effects of Contracting Out Engineering Services over Time in a State Department of Transportation." *Public Works Management & Policy*, 12(1):331–343.

Georgia Department of Transportation. 2019a. *Environmental Procedures Manual.* Retrieved from http://www.dot.ga.gov/PartnerSmart/DesignManuals/Environmental/GDOT-EPM.pdf.http://www.dot.ga.gov/PartnerSmart/DesignManuals/Environmental/GDOT-EPM.pdf.

Georgia Department of Transportation. 2019b. *Plan Development Process.* Retrieved from http://www.dot.ga.gov/PartnerSmart/DesignManuals/PDP/PDP.pdf.

Gil, R., and J. Marion. 2013. “Self-enforcing Agreements and Relational Contracting: Evidence from California Highway Procurement.” *Journal of Law, Economics, and Organization,* 29(2):239–277.

Gluch, P., and C. Räisänen. 2009. “Interactional Perspective on Environmental Communication in Construction Projects.” *Building Research & Information,* 37(2):164–175. doi: 10.1080/09613210802632849.

Grafton, J., and J. Mundy. 2017. “Relational Contracting and the Myth of Trust: Control in a Co-opetitive Setting.” *Management Accounting Research,* 36:24–42.

Johnson, J.D., W. Donahue, C. Atkin, and S. Johnson. 1994. “Differences between Formal and Informal Communicative Channels.” *International Journal of Business Communication,* 31(2):111–22. doi: 10.1177/002194369403100202.

Kingsley, G., D. Matisoff, J. Rogers, B. Ashuri, et al. 2017. *Strategies for Communicating Quality Expectations for Environmental Service Contracts.* FHWA-GA-17-1506, Final Report, Georgia Institute of Technology.

Klimova, B., and I. Semradova. 2012. “Barriers to Communication.” *Procedia – Social and Behavioral Sciences,* 31:207–211. doi: 10.1016/j.sbspro.2011.12.043.

Ling, F., S. Ong, Y. Ke, S. Wang, and P. Zou. 2014. “Drivers and Barriers to Adopting Relational Contracting Practices in Public Projects: Comparative Study of Beijing and Sydney.” *International Journal of Project Management,* 32(2):275–285.

Liu, L., M. Borman, and J. Gao. 2014. “Delivering Complex Engineering Projects: Reexamining Organizational Control Theory.” *International Journal of Project Management,* 32(5):791–802.

Lundin, R.A., and A. Soderholm. 1995. “A Theory of the Temporary Organization.” *Scandinavian Journal of Management,* 11(4):437–455. doi: 10.1016/0956-5221(95)00036-U.

Malatesta, D., and C.R. Smith. 2014. “Lessons from Resource Dependence Theory for Contemporary Public and Nonprofit Management.” *Public Admin Rev,* 74(1):14–25. doi: 10.1111/puar.12181.

MAP-21. (P.L. 112-141). 2012. *Moving Ahead for Progress in the 21st Century Act.*

McPhee, Robert D. "Formal structure and organizational communication." *Organizational communication: Traditional themes and new directions* 13 (1985): 149-178.

Miller, P., A. De Barros, L. Kattan, and S. Wirasinghe. 2016. “Public Transportation and Sustainability: A Review.” *KSCE Journal of Civil Engineering,* 20(3):1076–1083. doi: 10.1007/s12205-016-0705-0.

Miterev, M., M. Mancini, and R. Turner. 2017. “Towards a Design for the Project-based Organization.” *International Journal of Project Management,* 35(3):479–491.

Oppermann, F.Y. 2015. “Perspectives from the Field: Applying LEAN Process Management to the NEPA Process: The Simplified EA/CE.” *Environmental Practice,* 17(4):302–307. doi: 10.1017/S1466046615000319.

Ouchi, W. 1979. “A Conceptual Framework for the Design of Organisational Control Mechanisms.” *Management Science,* 25(9):833–848. doi: 10.1287/mnsc.25.9.833.

Ozawa, C., and J. Dill. 2005. *An Evaluation of the Oregon Department of Transportation’s (ODOT) Environmental Streamlining Efforts: A Focus on CETAS.* CUS-CTS-05-01.

Pentland, Brian T., and Martha S. Feldman. "Organizational routines as a unit of analysis." *Industrial and corporate change*14, no. 5 (2005): 793-815.

Plotch, P. 2015. *Politics Across the Hudson: The Tappan Zee Megaproject.* Rutgers University Press, New Brunswick, New Jersey.

Ponomariov, B., and G. Kingsley. 2008. “Applicability of the Normative Model of Outsourcing in the Public Sector: The Case of a State Transportation Agency.” *Public Organization Review,* 8(3):253–272.

Roberts, C., and M. Whorton. 2015. “Environmental Reviews and Case Studies: NEPA Strategies for Accelerating Project Delivery: Every Day Counts, Tiering, and Alternative Delivery in the I-70 Mountain Corridor.” *Environmental Practice,* 17(4):278–290. doi: 10.1017/S1466046615000332.

SAFETEA-LU (P.L. 109-59). 2005. *Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users.* Federal Highway Administration, Office of Legislation and Governmental Affairs.

Simard, M., M. Aubry, and D. Laberge. 2018. “The Utopia of Order Versus Chaos: A Conceptual Framework for Governance, Organizational Design and Governmentality in Projects.” *International Journal of Project Management,* 36(3):460–473.

Sosa, M., S. Eppinger, and C. Rowles. 2007. “Are Your Engineers Talking to One Another When They Should?” *Harvard Business Review,* November:134–142.

Sydow, J., and T. Braun. 2018. “Projects as Temporary Organizations: An Agenda for Further Theorizing the Interorganizational Dimension.” *International Journal of Project Management,* 36(1):4–11.

TEA-21 (P.L. 105-178). 1998. *The Transportation Equity Act for the 21st Century.*

Tribelsky, Effi, and Rafael Sacks. "An empirical study of information flows in multidisciplinary civil engineering design teams using lean measures." *Architectural Engineering and Design Management* 7, no. 2 (2011): 85-101.

Trnka, J., and E. Ellis. 2014. “Environmental Reviews and Case Studies: Streamlining the National Environmental Policy Act Process.” *Environmental Practice,* 16(4):302–308. doi: 10.1017/S1466046614000313.

Tsai, M.K. 2009. “Improving Communication Barriers for On-site Information Flow: An Exploratory Study.” *Advanced Engineering Informatics,* 23(3):323–331. doi: 10.1016/j.aei.2009.03.002.

Turner, R., and R. Müller. 2003. “On the Nature of the Project as a Temporary Organisation.” *International Journal of Project Management,* 21(1):1–8. doi: 10.1016/S0263-7863(02)00020-0.

United States Department of Transportation. 2018. *National Environmental Policy Act.* Federal Transit Administration. Retrieved from: www.transit.dot.gov/regulations-and-guidance/environmental-programs/national-environmental-policy-act.

Van de Ven, A., R. Garud, and P. Tuertscher. 2013. “Perspectives on Innovation Processes.” *The Academy of Management Annals,* 7(1):775–819. doi: 10.1080/19416520.2013.791066.

Verbeeten, F., and R. Speklé. 2015. “Management Control, Results-Oriented Culture and Public Sector Performance: Empirical Evidence on New Public Management.” *Organization Studies,* 36(7):953–978.

Visser, E., and C. Fill. 2000. “The Outsourcing Dilemma: A Composite Approach to the Make or Buy Decision.” *Management Decision,* 38(1):43–50, doi: 10.1108/EUM0000000005315.

Weshah, N., W. El-Ghandour, L. Cowe Falls, and G. Jergeas. 2014. “Enhancing Project Performance by Developing Multiple Regression Analysis and Risk Analysis Models for Interface.” *Canadian Journal of Civil Engineering,* 41(11):929–944. doi: 10.1139/cjce-2013-0499.

Yusuf, J.-E. (Wie), and L. O’Connell. 2014. “Outsourcing Expert Services by State Transportation Departments: A Look at Effects on Cost, Quality, and Changing Employment Levels.” *The American Review of Public Administration,* 44(4):477–492. doi: 10.1177/0275074012469460.

Appendix A: Materials from Chapter 2

A.1. Supplementary Task 1 Materials and Methods

The leadership survey was designed to optimize clarity and brevity while still collecting relevant information on the topics we are investigating. Early drafts were revised by the research team and formally tested, first by a former state administrator (now a consultant), and then by OES leadership at GDOT. These pre-tests facilitated additional revisions and helped refine contents and length. The final leadership survey instrument (included in Appendix A, section A.3 in full as it appeared to respondents) features 42 questions and required an estimated 10 minutes to complete. The protocol used to conduct the semi-structured interviews supplementing the leadership survey results is included in full in section A.4 of Appendix A. The SME survey is a reduced version of this instrument; it is identical to the leadership survey apart from the removal of questions that are irrelevant or unanswerable for SMEs at the project level. The final SME survey instrument (included in Appendix A, section A.4 in full as it appeared to respondents) includes 20 questions. The full suite of dependent and independent variables asked about in each survey is broken down by question number in Tables A-1 and A-2.

Table A-1: Survey Dependent Variables

#	Variable:	Leadership	SME
Q10	Performance of environmental process assessment	✓	✓
Q14	Project efficiency assessment	✓	✓
Q40	Average project timeline length	✓	✓
Q41	Average rounds of revision	✓	✓

Table A-2: Survey Independent and Exploratory Variables

#	Variable:	Leadership	SME
Q2	Respondent state	✓	✓
Q3	Respondent role / title	✓	✓
Q4	Respondent's leadership experience	✓	
Q5	Regularity of project scoping meetings	✓	✓
Q6	Attendance of project team members at scoping meetings	✓	✓
Q7	What tasks are completed before scoping meetings	✓	✓
Q8	Process performance measures	✓	
Q9	Staff performance measures	✓	
Q11	NEPA document performance measures	✓	
Q12	Problem situations	✓	✓
Q13	Serious situations	✓	✓
Q15a	Frequency project guidance tools are used	✓	✓
Q15b	Effectiveness of project guidance tools	✓	✓
Q16a	Frequency project guidance practices are used	✓	✓
Q16b	Effectiveness of project guidance practices	✓	✓
Q17	Innovative practices to improve process	✓	
Q18	Experimental practices to improve process	✓	
Q19	Follow-up on DOT practices	✓	
Q20	Frequency of tracking consultant document error rates	✓	
Q21	Revision tracking and procurement	✓	
Q22	Responsibility for environmental coordination	✓	
Q23	Actual phase of most communication	✓	✓
Q24	Ideal phase for most communication	✓	✓
Q25	Frequency of SME communication with PM	✓	✓
Q26	Consultant quality	✓	
Q27	Causes of quality variation in consultant work	✓	✓
Q28	Standard NEPA review process	✓	
Q29	Standard process communication tools and practices – preparers	✓	
Q30	Standard process communication tools and practices – reviewers	✓	
Q31	Staff qualifications	✓	
Q32	Outsourcing rates	✓	
Q33	Contract specificity and controls	✓	
Q34	Staff experience	✓	
Q35	Consultant reviewer use	✓	
Q36	Consultant reviewer role	✓	
Q37	Issues with consultant document review	✓	
Q38	Steps to address issues	✓	
Q42	Interventions to address issues	✓	

We sampled leadership respondents from the population of USDOT environmental department leaders, as identified through the AASHTO Standing Committee on the Environment, then snowball sampled environmental SMEs for our second survey by asking department leaders to extend our invitation to participate to their staff. The surveys were distributed online via an electronic link to the electronic survey, hosted on the Qualtrics platform. Direct dissemination of the survey to the environmental leader at each state DOT was done through the AASHTO committee on behalf of the GDOT state environmental administrator to lend legitimacy to the survey and maximize our response rate.

In order to ensure commensurability between the survey and interview data we collected, we operationalized strict scoring criteria to translate interview responses into the same format as our survey data. Additionally, we examined differences between leadership and SME responses across data types to identify whether any biases occur between data sources. The scoring criteria we used allowed us to account for differences in the mode of data. Interview questions were first analyzed to ensure uniformity among how each interviewer asked questions from the protocol, then interview responses were translated into the same format as our survey data. Open-ended, categorical, and multiple-choice questions in the survey were matched with corresponding text from interviews. Ordinal survey questions, used to examine both frequencies of occurrence and level of performance, were matched to corresponding interview topics and triangulated along the direction, intensity, and frequency of the interviewees' responses. This method allowed us to appropriately transform interview data into a format that can be easily integrated with our survey results. To check the robustness of this transformation, we compared differences between leadership and SME at DOTs where both parties responded to surveys to those at DOTs where leaders were interviewed. While we expect there to be differences between leadership and SME responses from the same state, large divergence in the type of differences that occurred between

surveyed DOTs and those that were interviewed would indicate bias. This difference in differences robustness check demonstrates no notable divergence in how surveyed and interviewed leadership relate to SMEs in their departments. Our translation between interviews and survey data are commensurable.

Three criteria were identified by the Office of Program Delivery (OPD) as important factors that would indicate a state is (or is not) comparable for the benchmark analysis. The first criterion is the total annual program budget, a measure used by OPD as a best representation of size of agency program. Benchmark states are those with a budget within 75%–125% of GDOT's budget ($2.5–$4.25 billion). We contacted each DOT's program delivery office or department to confirm the agency's most recent budget (FY2016 or FY2017). The other two OPD criteria were components of DOT organizational structure. Centralization varies between DOTs; most feature a more centralized structure, with a state headquarters office managing and delivering the overall program. However, other states have distributed this work geographically such that regional divisions or districts have greater autonomy to deliver their area's program work (AASHTO 2009). GDOT operates a centralized program delivery process, making that a criterion for selecting candidate benchmark states. We extrapolated from state DOT organization charts and then confirmed our assessment with the state DOT via email contact.

To these OPD criteria, we added two complementary criteria related to the overall size of the transportation program: (1) the number of 2016 design engineering projects delivered (captured by the number of projects sent out to let for construction in 2016), and (2) the average State Transportation Improvement Program (STIP) annual budget (which reflects the average projected budget across 3–10 years of planned projects). In both cases, we used a 75%–125% range of GDOT values as our point of comparison (GDOT let 462 projects in 2016 and had an average annual STIP budget of $850 million). Though the variability in annual construction let

counts (it can easily vary by a few hundred projects year to year) led us to consider states with 50%–150% of GDOT let, as well. Lastly, we also noted those states with relatively similar geographic contexts, as defined by their being predominantly rural with limited large population centers, yet a larger population and a large and prominent metropolitan area.

Table A-3 displays all states identified as candidate benchmark states; these included all states that were similar across two or more attributes, as well as Texas and Ohio, which were included by the special request of OPD due to their being widely considered benchmark agencies. While a few states' DOTs were identified as most clearly similar to GDOT (specifically Iowa, Utah, and New Mexico), including a broader mix of categorically similar agencies allows for the possibility of comparing across certain measures (such as centralization or project delivery role).

Table A-3: Candidate Benchmark State Comparisons

State	Annual Budget	2016 Project Let Count	Average Annual STIP Budget	Centralized Delivery	Geography
Missouri				✓	✓
New Mexico			✓	✓	✓
Ohio	✓				
Oklahoma			✓	✓	✓
Oregon					✓
Texas		✓			
Washington	✓	✓			✓
Wisconsin	✓				✓

A.2. Additional Results from Survey Analysis

The cluster analysis indicates that state DOTs that prioritize early communications deal with project issues less frequently and report them as serious less often when they do arise. Figure A-1 illustrates the percentage of state DOTs from each category (i.e., state DOTs that emphasize early communications and state DOTs that do not) that report regular occurrence (i.e.,

reporting them as occurring “sometimes,” “frequently,” or “always”) of several common issues in the environmental review process. Figure A-2 illustrates the percentage of state DOTs from each category that report those issues as serious.

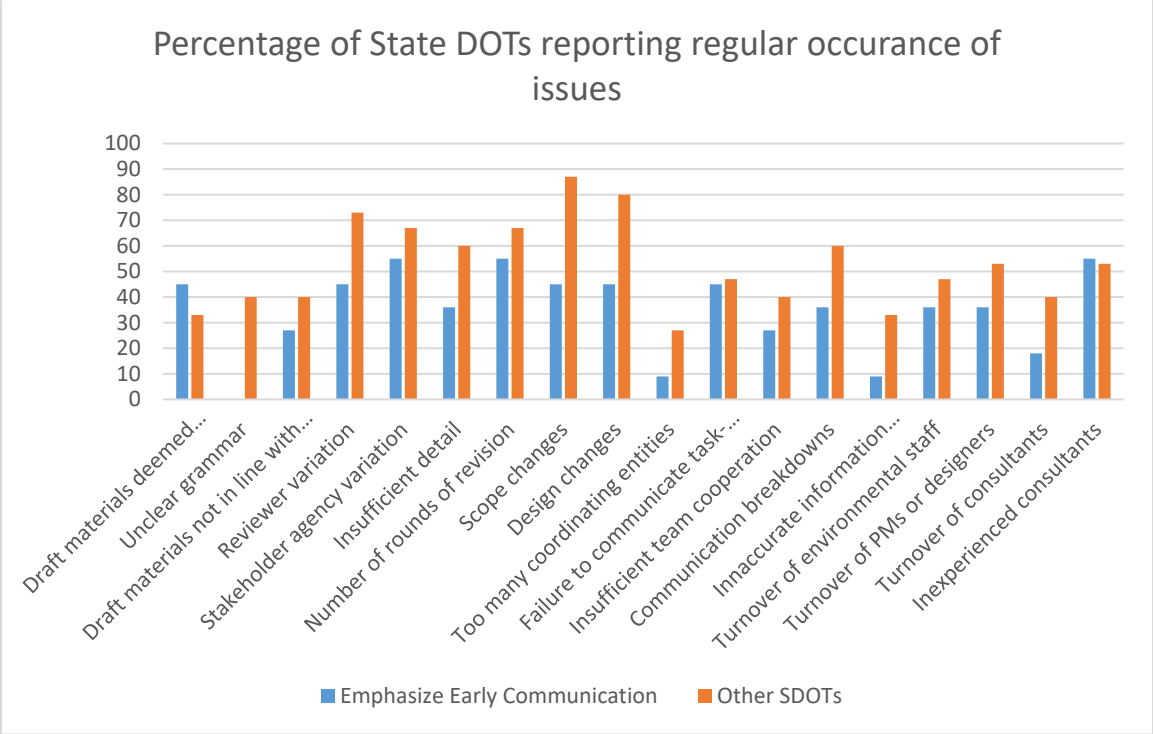

Figure A-1: Impact of Early Communication on Issue Incidence

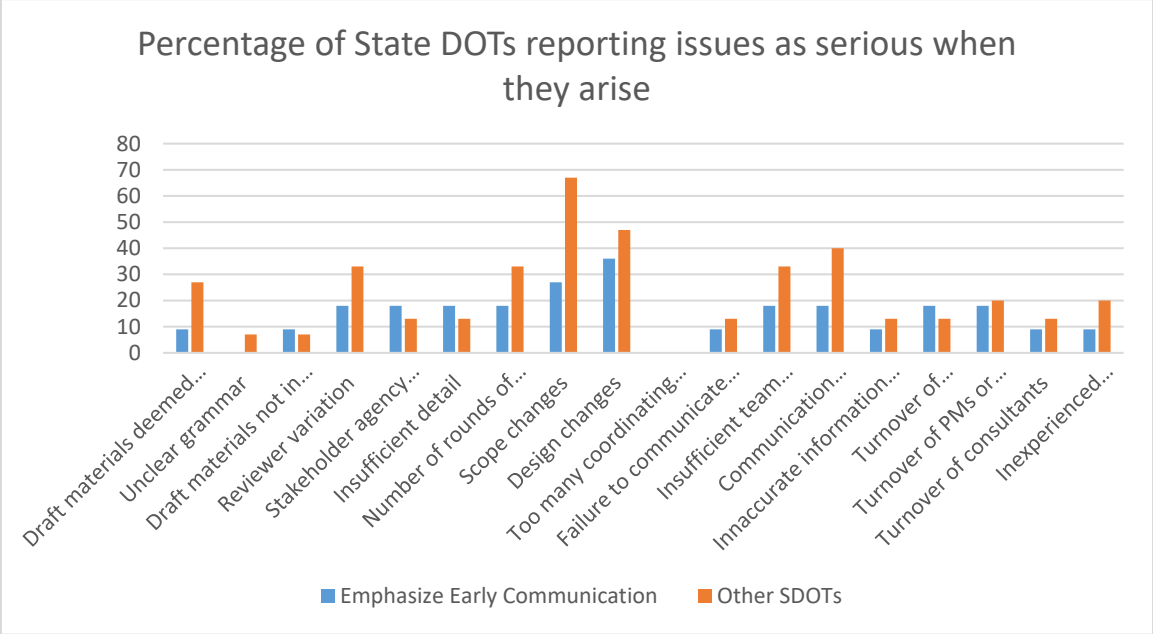

Figure A-2: Impact of Early Communication on Issue Impact

A.3. Leadership Survey

Coordination with DOT Environmental Review Survey

CONSENT TO PARTICIPATE IN A RESEARCH STUDY
(Scroll down to advance the page)

Coordination Within the DOT Environmental Review Process
Georgia Institute of Technology
You are being asked to be a volunteer in a research study.

Purpose: To assess and compare alternative strategies for coordination during the environmental review process. This analysis will help identify effective and problematic practices for project documentation and coordination between project actors. The results of this study will provide guidance for Departments of Transportation (DOTs) on improving communication and coordination within the environmental review process. If you choose to participate, you will be asked to complete a survey about your experiences with the environmental review practices in your office and agency, as well as your coordination and communication with other project members and hired consultants. The survey is administered

to DOT environmental services staff, or contractors, and should take approximately 15 minutes to complete.

Benefits, Costs, or Risks: The findings of this study will provide practical guidance of value to DOTs seeking to improve performance, reduce costs, and streamline project delivery. In addition, participants may identify useful strategies and practices to incorporate into their own individual practices to improve their individual performance and coordination and communication skills. There are no costs to you, other than your time, for being in this study. Participation in this study may carry the possibility of breach of confidentiality in the case of malicious external activity. The risks or discomforts involved are no greater than those involved in daily activities such as email correspondence or user registration via a secure website.

Confidentiality: The data collected about you will be kept private to the extent required by law. Your records will be kept in locked files and only study staff will be allowed to look at them. Your name will not appear when the results of this study are presented or published. Your privacy will be protected to the extent allowed by law. The Georgia Institute of Technology Institutional Review Board (IRB), the Office of Human Research Protections, and/or the Food and Drug Administration may look over study records during required reviews.

Storing and Sharing Information: Your participation in this study is gratefully acknowledged. It is possible that your information/data will be enormously valuable for other research purposes. By proceeding with the survey, you consent for your de-identified information/data to be stored by the researcher and to be shared with other researchers in future studies. If you agree to allow such future sharing and use, your identity will be completely separated from your information/data. Future researchers will not have a way to identify you. Any future research must be approved by an ethics committee before being undertaken.

Questions about the Study: If you have any questions about the study, you may contact Gordon Kingsley at gkingsley@gatech.edu.

Questions about Your Rights as a Research Participant: Your participation in this study is voluntary. You do not have to be in this study if you don't want to be. You have the right to change your mind and leave the study at any time without giving any reason and without penalty. Any new information that may make you change your mind about being in this study will be given to you. You do not waive any of your legal rights by agreeing to participate.

If you have any questions about your rights as a research participant, you may contact:
Ms. Melanie Clark, Georgia Institute of Technology
Office of Research Integrity Assurance, at (404) 894-6942.

If you complete the attached survey, it means that you have read – or have had read to you – the information contained in this letter and would like to be a volunteer in this research study.

Thank you,
Gordon Kingsley, Ph.D.
Associate Professor
Georgia Institute of Technology

Q1 ***Part 1: For the following questions, we are interested in understanding your DOT's processes and practices surrounding federally required environmental review and analysis, across your full portfolio of traditionally delivered (design-bid-build) projects (excluding projects falling under innovative program delivery, e.g. P3, design-build).***

Q2 Please select your state.

▼ AL (1) ... DC (53)

Q3 What is your current role or title?

_____

Q4 How long have you been in this role?

_____

Q5 How common is it for each project to include a meeting with DOT subject matter experts (SMEs) to discuss and establish project scope, schedule, and budget?

- ○ Always; it's standard operating procedure (1)
- ○ Sometimes; at the project manager's discretion (4)
- ○ Never; projects do not involve scoping meetings (5)
- ○ Other (3) _____

Skip To: Q8 If How common is it for each project to include a meeting with DOT subject matter experts (SMEs) to... = Never; projects do not involve scoping meetings

Q6 How frequently are each of the following project team members in attendance at this project scoping meeting?

	Never (1)	Sometimes (2)	Always (3)
DOT Project Manager (1)	○	○	○
Consultant Project Manager (when contracted) (4)	○	○	○
DOT Design Engineer (5)	○	○	○
DOT NEPA SME (6)	○	○	○
DOT Air & Noise SME (7)	○	○	○
DOT Ecology SME (8)	○	○	○
DOT Archaeology SME (9)	○	○	○
DOT History SME (10)	○	○	○
Consultant SMEs (when contracted) (11)	○	○	○

Q7 Prior to the project scoping meeting, how frequently have each of the following tasks been completed?

	Never (1)	Sometimes (2)	Always (3)
Design concept (1)	○	○	○
Field studies (technical environmental studies) (2)	○	○	○
Selection of logical termini (3)	○	○	○
NEPA class determination (where applicable) (4)	○	○	○
Outsourcing determination (5)	○	○	○
Funding source (6)	○	○	○

Q8 What measures or other information (if any) does your office use to assess the quality of the environmental **process**? *Select all that apply.*

- ☐ Total time to complete environmental process (1)
- ☐ % of projects completed per project schedule (9)
- ☐ % of projects completed at/under budget (17)
- ☐ Total cost to complete environmental process (2)
- ☐ Number of rounds of revision (3)
- ☐ Number of public comments (4)
- ☐ Design improvements based off environmental process (5)
- ☐ Project outcome measures (e.g. quantification of environmental effects) (6)
- ☐ Other: (7) _____
- ☐ None (8)

Q9 What measures or other information (if any) does your office use to assess the performance of **individual staff** during the environmental process? *Select all that apply.*

- ☐ Total time to complete environmental process (1)
- ☐ % of projects completed per project schedule (9)
- ☐ % of projects completed at/under budget (2)
- ☐ Total cost to complete environmental process (17)
- ☐ Number of rounds of revision (3)
- ☐ Number of public comments (4)
- ☐ Design improvements based off environmental process (5)
- ☐ Project outcome measures (e.g. quantification of environmental effects) (6)
- ☐ Other: (7) _____
- ☐ None (8)

Q10 For each of the following measures of quality of the environmental **process,** please identify or estimate how you would rate your office's overall performance**.** Use a scale of 1 to 5, where 1 is "Poor" and 5 is "Excellent."

	Poor (1)	Marginal (2)	Adequate (3)	Good (4)	Excellent (5)	Unknown (6)
Total time to complete environmental process (1)	○	○	○	○	○	○
% of projects completed per project schedule (8)	○	○	○	○	○	○
% of projects completed at/under budget (9)	○	○	○	○	○	○
Total cost to complete environmental process (2)	○	○	○	○	○	○
Number of rounds of revision (3)	○	○	○	○	○	○
Number of public comments (4)	○	○	○	○	○	○
Design improvements based off environmental process (5)	○	○	○	○	○	○
Project outcome measures (e.g. quantification of environmental effects) (6)	○	○	○	○	○	○
Other: (7)	○	○	○	○	○	○

Q11 What measures or other information (if any) do you use to assess the quality of the final NEPA **document** (where applicable)? *Select all that apply.*

- ☐ Meets legal sufficiency standard (1)
- ☐ Follows structure standard set by template/outline material (2)
- ☐ Meets agency/department grammar and language standards (3)
- ☐ Meets individual reviewer grammar and language expectations (4)
- ☐ Document length (5)
- ☐ Sufficient use of visuals and graphics (6)
- ☐ Receives external praise or recognition (7)
- ☐ Other: (8) _____
- ☐ None (9)

Q12 How problematic to your office or agency are the following situations in the environmental process, in terms of how frequently they occur, on a scale of 1 to 5 where 1 is “Never an Issue” and 5 is “Always an Issue”?

	Never an Issue (1)	Rarely an Issue (2)	Sometimes an Issue (3)	Frequently an Issue (4)	Always an Issue (5)
Draft materials deemed insufficient during review by outside resource agency (where applicable) (1)	☐	☐	☐	☐	☐
Unclear/improper grammar or language (2)	☐	☐	☐	☐	☐
Draft materials not in line with standards/templates (3)	☐	☐	☐	☐	☐
Variation in reviewer standards (4)	☐	☐	☐	☐	☐
Variation in stakeholder agency expectations (5)	☐	☐	☐	☐	☐
Insufficient level of detail/ length of submitted documents (7)	☐	☐	☐	☐	☐
Number of rounds of revision/resubmission during document preparation (9)	☐	☐	☐	☐	☐
Scope changes during environmental review (10)	☐	☐	☐	☐	☐
Other design changes during environmental review (11)	☐	☐	☐	☐	☐
Too many Participating, Coordinating, or Cooperating Entities (12)	☐	☐	☐	☐	☐
Task relevant information not communicated to document preparers (18)	☐	☐	☐	☐	☐
Insufficient cooperation or assistance between project team members (19)	☐	☐	☐	☐	☐
Communication break-downs along chain of command (20)	☐	☐	☐	☐	☐
Inaccurate or distorted information transmitted between project team members (21)	☐	☐	☐	☐	☐

	Never an Issue (1)	Rarely an Issue (2)	Sometimes an Issue (3)	Frequently an Issue (4)	Always an Issue (5)
Turnover of Internal environmental staff (14)	☐	☐	☐	☐	☐
Turnover of Internal project management/design (15)	☐	☐	☐	☐	☐
Turnover of consulting staff (16)	☐	☐	☐	☐	☐
Inexperienced consultant (17)	☐	☐	☐	☐	☐

Q13 For each of the following situations in the environmental process, please select any which you consider to be serious problems for your agency or office (those that significantly affect project delivery when they occur):

	Serious Issue: (6)
Draft materials deemed insufficient during review by outside resource agency (where applicable) (1)	☐
Unclear/improper grammar or language (2)	☐
Draft materials not in line with standards/templates (3)	☐
Variation in reviewer standards (4)	☐
Variation in stakeholder agency expectations (5)	☐
Insufficient level of detail/ length (7)	☐
Number of rounds of revision/resubmission during document preparation (9)	☐
Scope changes during environmental review (10)	☐
Other design changes during environmental review (11)	☐
Too many Participating, Coordinating, or Cooperating Entities (12)	☐
Task relevant information not communicated to document preparers (18)	☐
Insufficient cooperation or assistance between project team members (19)	☐
Communication break-downs along chain of command (20)	☐
Inaccurate or distorted information transmitted between project team members (21)	☐
Turnover of Internal environmental staff (14)	☐
Turnover of Internal project management/design staff (15)	☐
Turnover of consulting staff (16)	☐
Inexperienced consultant (17)	☐

Q14 Based on your professional assessment, how efficient in terms of time to complete (i.e. scheduled vs. actual completion time) is your DOT at the following project steps across the specified class of environmental review, using a scale of 1 to 5 where 1 is “Very inefficient” and 5 is “Very efficient”?

	Very Inefficient (1)	Fairly Inefficient (2)	Neutral (3)	Slightly Efficient (4)	Very Efficient (5)	No Opinion (6)
(PCE) Environmental study and documentation (1)	○	○	○	○	○	○
(PCE) Overall project delivery (pre-construction) phase (2)	○	○	○	○	○	○
(CE) Environmental study and documentation (3)	○	○	○	○	○	○
(CE) Overall project delivery (pre-construction) phase (4)	○	○	○	○	○	○
(EA-FONSI) Environmental study and documentation (5)	○	○	○	○	○	○
(EA-FONSI) Overall project delivery (pre-construction) phase (6)	○	○	○	○	○	○

Q15 For each of the following document preparation tools, please identify: (1) How **frequently** they are used by or between members of the project team (with 1 being "Never Used" and 5 being "Always Used"); and (2) How **effective** each tool is for producing high-quality documents or reports (with 1 being "Highly Ineffective," 3 being "Neither Effective nor Ineffective," and 5 being "Highly Effective"). *If you do not use the tool, please enter "N/A" or simply leave blank.*

	Frequency					Effectiveness				
	Never Used (1)	Rarely Used (2)	Sometimes Used (3)	Frequently Used (4)	Always Used (5)	Highly Ineffective (1)	Somewhat Ineffective (2)	Neither Effective nor Ineffective (3)	Somewhat Effective (4)	Highly Effective (5)
Document or report templates (such as standard layouts, text, tables) (1)	○	○	○	○	○	○	○	○	○	○
Style guide with consistent terms, conventions, word choice (2)	○	○	○	○	○	○	○	○	○	○
Sample documents or reports from a similar project (3)	○	○	○	○	○	○	○	○	○	○

Q16 For each of the following practices or activities, please identify: (1) How **frequently** they are used by or between members of the project team (with 1 being "Never Used" and 5 being "Always Used"); and (2) How **effective** each tool is for communicating within the project team (with 1 being "Highly Ineffective," 3 being "Neither Effective nor Ineffective," and 5 being "Highly Effective"). *If you do not use the tool, please enter "N/A" or leave blank.*

	Frequency of Use					Effectiveness				
	Never Used	Rarely Used	Sometimes Used	Frequently Used	Always Used	Highly Ineffective	Somewhat Ineffective	Neither Effective nor Ineffective	Somewhat Effective	Highly Effective
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Explicit timeline requirements (4)	○	○	○	○	○	○	○	○	○	○
Centralized tracking of agency reviewer comments and responses/revisions (5)	○	○	○	○	○	○	○	○	○	○
Impromptu individual meeting (6)	○	○	○	○	○	○	○	○	○	○
Project launch meeting (7)	○	○	○	○	○	○	○	○	○	○
Training program(s) or workshop(s) (8)	○	○	○	○	○	○	○	○	○	○
Recurring "Agency & Consultant Relations" Meetings (independent of specific project) (9)	○	○	○	○	○	○	○	○	○	○
Ongoing input from cooperating, coordinating, and participating agencies (12)	○	○	○	○	○	○	○	○	○	○
Cooperative troubleshooting between project team members (15)	○	○	○	○	○	○	○	○	○	○
Other (describe) (17)	○	○	○	○	○	○	○	○	○	○

Q17 What practices, procedures, or tools has your office implemented that have improved the quality or efficiency of the environmental process?

_____

_____

_____

_____

_____

Q18 Are you currently experimenting with any practices, procedures, or tools that you hope will improve the quality or efficiency of the environmental process moving forward?

_____

_____

_____

_____

_____

Q19 Would you be willing to provide more information about your unique practices, procedures, or tools if requested?

- ○ Yes (1)
- ○ No (2)

Q20 Does your office consistently track error rates (such as number of document or report reviews or resubmits) of consultant-produced environmental documents?

- ○ Yes (1)
- ○ No (2)

Q21 Is the number of resubmits or revisions for consultant reports used to inform future procurement & consultant selection?

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Q22 Who is responsible for coordinating the activities of environmental SMEs (public or private) within projects? *Select all that apply.*

- ☐ DOT Project Manager or Project Leader (1)
- ☐ Consultant PM or Project Leader (6)
- ☐ Dedicated Environmental Lead/Manager (7)
- ☐ DOT NEPA SME (2)
- ☐ Specialty SME (please specify) (3) _____
- ☐ Other (please specify) (5) _____
- ☐ No formal/standard lead (11)

Q23 During which phases of the project does **most** direct communication **actually** occur between environmental SMEs (public or private) and other project team members? *Select all that apply.*

- ☐ Scoping (2)
- ☐ Preliminary Engineering (3)
- ☐ Field Work (4)
- ☐ Technical Report Preparation (5)
- ☐ Technical Report Review (10)
- ☐ Environmental Document Preparation (NEPA or state) (6)
- ☐ Environmental Document Review (NEPA or state) (7)
- ☐ Submission and DOT Approval (8)
- ☐ Other (please specify) (9) _____

Q24 During which project phase **should** the most direct communication between environmental SMEs (public or private) and other project team members occur? *Select all that apply.*

- ☐ Scoping (2)
- ☐ Preliminary Engineering (3)
- ☐ Field Work (4)
- ☐ Technical Report Preparation (5)
- ☐ Technical Report Review (10)
- ☐ Environmental Document Preparation (NEPA or state) (6)
- ☐ Environmental Document Review (NEPA or state) (7)
- ☐ Submission and DOT Approval (8)
- ☐ Other (please specify) (9) _____

Q25 How frequently would you estimate your SMEs (public or private) communicate directly with their Project Lead (project manager, design engineer), *including phone calls, meetings, emails, and other direct communication?*

- ○ 4 or more times per week (daily) (1)
- ○ 1–3 times per week (weekly) (2)
- ○ 1–2 times per month (monthly) (3)
- ○ Less than once a month (5)

Q26 Is there any obvious difference in the quality of environmental services work delivered by different contracted firms?

- ○ Yes; there is wide variation in quality between firms (1)
- ○ Yes; there is slight variation in quality between firms (2)
- ○ No; there is no variation in quality (3)

Q27 Have you observed any of the following as common causes of quality variation in contracted environmental work? *Select all that apply.*

- ☐ Contract specificity (1)
- ☐ Clarity about who is responsible for organizing communications between project team members (25)
- ☐ Consultant financial incentives (2)
- ☐ Consultant performance management (3)
- ☐ Consultant workload (14)
- ☐ Familiarity of consultant staff with your office (4)
- ☐ Familiarity of consultant staff with your agency (5)
- ☐ Familiarity of consultant staff with the environmental process (6)
- ☐ Frequency of work completed for your office (7)
- ☐ Quality of rapport with staff in your office (8)
- ☐ Cooperation and assistance between project team members when dealing with project issues (26)
- ☐ Turnover in consultant personnel (9)
- ☐ Changes in ownership of consultant (10)
- ☐ Regulatory changes (11)
- ☐ Other (please specify) (12) _____
- ☐ None of the above (13)

Q28 Is there a standard process that environmental document (NEPA doc) **reviewers** (including consultants) are expected to follow when preparing revisions, feedback, or requests for additional information?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Is there a standard process that environmental document (NEPA doc) reviewers (including consultan... = Yes

Q29 How is the standard process for environmental review documented or communicated to preparers (including consultants)? *Select all that apply.*

- ☐ Training (video or in-person) (1)
- ☐ Document preparation checklist or manual (2)
- ☐ Sample report(s) or template(s) (3)
- ☐ Reviewer comments (4)
- ☐ Secondary reviewer feedback (5)
- ☐ Learning through experience (6)
- ☐ Other (please specify) (7) _____

Display This Question:

If Is there a standard process that environmental document (NEPA doc) reviewers (including consultan... = Yes

Q30 How is the standard process for environmental review documented or communicated to reviewers? *Select all that apply.*

- ☐ Reviewer training (video or in-person) (1)
- ☐ Document review checklist or manual (2)
- ☐ Sample report(s) or template(s) (3)
- ☐ Secondary reviewer feedback (4)
- ☐ Learning through experience (5)
- ☐ Other (please specify) (6) _____

Q31 What criteria or qualifications (if any) does your office require for DOT environmental SMEs? *Select all that apply.*

- ○ Bachelor's Degree (any field) (1)
- ○ Bachelor's Degree (specified fields) (2)
- ○ Postgraduate Degree (any field) (3)
- ○ Postgraduate Degree (specified fields) (4)
- ○ 1+ Years of previous experience (5)
- ○ 3+ Years of previous experience (6)
- ○ 5+ Years of previous experience (7)
- ○ Completion of agency training course (11)
- ○ Professional certification(s) (8)
- ○ Skill Certification(s) (9)
- ○ Other (10) _____

Q32 By your estimate, what percentage of each of the following project tasks or responsibilities at your DOT are currently completed by external consultants?

	25% or less (1)	26-50% (2)	51-75% (3)	More than 75% (4)
Preliminary Engineering (1)	○	○	○	○
Field Work (i.e. environmental resource identification) (2)	○	○	○	○
Technical Studies (i.e. assessing project effects & agency consultations, if needed) (3)	○	○	○	○
Technical Report Review / Quality Control (8)	○	○	○	○
Public Participation / Engagement (4)	○	○	○	○
NEPA Document Preparation (5)	○	○	○	○
NEPA Document Review / Quality Control (6)	○	○	○	○
Coordination of all team members (both public and private) (13)	○	○	○	○
Troubleshooting project issues as they arise (14)	○	○	○	○
If you'd like to provide any additional information about the above, please enter here: (7)	○	○	○	○

Q33 Do your Task Orders, Master Agreements, or other procurement procedures **explicitly** specify performance and task expectations for consultants in the following areas of the environmental process?

	Always (1)	Often (2)	Sometimes (3)	Rarely (4)	Never (5)
Coordination responsibility (who directs the process) (1)	○	○	○	○	○
Initiating project team communication (16)	○	○	○	○	○
Document or report content (2)	○	○	○	○	○
Review schedule (3)	○	○	○	○	○
Document language & grammar (4)	○	○	○	○	○
Schedule requirements (10)	○	○	○	○	○
Acceptable number of revision rounds (11)	○	○	○	○	○
Coordination requirements (points consultant is expected to provide updates) (5)	○	○	○	○	○
DOT contributions (what agency will provide as resources, guidance, or support) (6)	○	○	○	○	○
Frequency of coordination with DOT PM (7)	○	○	○	○	○
Frequency of coordination with DOT SMEs (9)	○	○	○	○	○

Q34 How many years of experience on average do your team members have completing similar work? *(provide your best estimate for each category of team member)*

	<1 year of experience (1)	1-5 years of experience (2)	6-10 years of experience (4)	11+ years of experience (5)	Do Not Know (7)
DOT Ecologists (1)	○	○	○	○	○
DOT NEPA SMEs (7)	○	○	○	○	○
DOT Air & Noise SMEs (8)	○	○	○	○	○
DOT History & Archaeology SMEs (9)	○	○	○	○	○
DOT Document Reviewers (2)	○	○	○	○	○
DOT Project Managers (3)	○	○	○	○	○

Q35 How often do you use consultant reviewers for the environmental process?

- ○ Frequently (1)
- ○ Sometimes (2)
- ○ Rarely (3)
- ○ Never (4)

Display This Question:

If How often do you use consultant reviewers for the environmental process? = Frequently

Or How often do you use consultant reviewers for the environmental process? = Sometimes

Or How often do you use consultant reviewers for the environmental process? = Rarely

Q36 Which categories of NEPA documents do you use consultants to review? *Select all that apply.*

- ☐ PCE (1)
- ☐ CE (2)
- ☐ EA/FONSI (3)

Display This Question:

If How often do you use consultant reviewers for the environmental process? = Frequently

Or How often do you use consultant reviewers for the environmental process? = Sometimes

Or How often do you use consultant reviewers for the environmental process? = Rarely

Q37 Have you observed any of the following issues with the use of consultants for document review?

	Yes (1)	No (2)
Reduction in review quality (1)	○	○
Inconsistency in reviewer standards (4)	○	○
Firms reviewing each other's work (conflicts of interest) (5)	○	○
Increases in rounds of revision requested by outside resource agencies (6)	○	○
Lengthening of review timeline (7)	○	○

Display This Question:

If How often do you use consultant reviewers for the environmental process? = Frequently

Or How often do you use consultant reviewers for the environmental process? = Sometimes

Or How often do you use consultant reviewers for the environmental process? = Rarely

Q38 If you selected yes to any of the above, what steps (if any) has your office taken to address or prevent these issues? (e.g. Quality Assurance/Quality Control)?

_____

_____

_____

_____

_____

Q39 ***For the following questions, we are interested in understanding your DOT's processes and practices when completing technical studies and documents for a Categorical Exclusion (CE or CatEx) project. Please consider your portfolio of CE class environmental processes, and use that experience to inform your responses.***

Q40 By your best estimate, what is the average timeline for completion of PCE and CE environmental processes?

	6 months or less (1)	6-12 months (2)	13-24 months (4)	24+ months (5)
PCE (3)	○	○	○	○
CE (1)	○	○	○	○

Q41 How many rounds of revision of draft environmental documents (within environmental office or between office and consultants) is normal or average for PCE and CE projects at your DOT?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5+ (6)
PCE (1)	○	○	○	○	○	○
CE (2)	○	○	○	○	○	○

Q42 If a number greater than this was required, would it lead to any intervention or action to address submission issues with the preparer?

- ○ No (1)
- ○ Yes (Please specify what actions would be taken with preparers when the draft environmental review and/or documents are not meeting expectations.) (2) _____

Q43 Thank you for participating in this survey – your responses will facilitate the identification and sharing of best practice coordination and communication practices in the environmental analysis process.

A.4. SME Survey

DOT SME Environmental Review Survey

CONSENT TO PARTICIPATE IN A RESEARCH STUDY
(Scroll down to advance the page)

Coordination Within the DOT Environmental Review Process

Georgia Institute of Technology
You are being asked to be a volunteer in a research study.

Purpose: To assess and compare alternative strategies for coordination during the environmental review process. This analysis will help identify effective and problematic practices for project documentation and coordination between project actors. The results of this study will provide guidance for Departments of Transportation (DOTs) on improving communication and coordination within the environmental review process. If you choose to participate, you will be asked to complete a survey about your experiences with the environmental review practices in your office and agency, as well as your coordination and communication with other project members and hired consultants. The survey is administered to DOT environmental services staff, or contractors, and should take approximately 15 minutes to complete.

Benefits, Costs, or Risks: The findings of this study will provide practical guidance of value to DOTs seeking to improve performance, reduce costs, and streamline project delivery. In addition, participants may identify useful strategies and practices to incorporate into their own individual practices to improve their individual performance and coordination and communication skills. There are no costs to you, other than your time, for being in this study. Participation in this study may carry the possibility of breach of confidentiality in the case of malicious external activity. The risks or discomforts involved are no greater than those involved in daily activities such as email correspondence or user registration via a secure website.

Confidentiality: The data collected about you will be kept private to the extent required by law. Your records will be kept in locked files and only study staff will be allowed to look at them. Your name will not appear when the results of this study are presented or published. Your privacy will be protected to the extent allowed by law. The Georgia Institute of Technology IRB, the Office of Human Research Protections, and/or the Food and Drug Administration may look over study records during required reviews.

Storing and Sharing Information: Your participation in this study is gratefully acknowledged. It is possible that your information/data will be enormously valuable for other research

purposes. By proceeding with the survey, you consent for your de-identified information/data to be stored by the researcher and to be shared with other researchers in future studies. If you agree to allow such future sharing and use, your identity will be completely separated from your information/data. Future researchers will not have a way to identify you. Any future research must be approved by an ethics committee before being undertaken.

Questions about the Study: If you have any questions about the study, you may contact Gordon Kingsley at gkingsley@gatech.edu.

Questions about Your Rights as a Research Participant: Your participation in this study is voluntary. You do not have to be in this study if you don't want to be. You have the right to change your mind and leave the study at any time without giving any reason and without penalty. Any new information that may make you change your mind about being in this study will be given to you. You do not waive any of your legal rights by agreeing to participate.

If you have any questions about your rights as a research participant, you may contact:
Ms. Melanie Clark, Georgia Institute of Technology
Office of Research Integrity Assurance, at (404) 894-6942.

If you complete the attached survey, it means that you have read – or have had read to you – the information contained in this letter and would like to be a volunteer in this research study.

Thank you,
Gordon Kingsley, Ph.D.
Associate Professor
Georgia Institute of Technology

Q1 Please select your state.

▼ AL (1) ... DC (53)

Q2 What is your current role or title?

_____

Q3 How long have you been in this role?

_____

Q4 How common is it for each project you participate in to include a meeting with DOT subject matter experts (SMEs) to discuss and establish project scope, schedule, and budget?

- ○ Always; it's standard operating procedure (1)
- ○ Sometimes; at the project manager's discretion (4)
- ○ Never; projects do not involve scoping meetings (5)
- ○ Other (3) _____

Q5 How frequently are each of the following project team members in attendance at this project scoping meeting?

	Never (1)	Sometimes (2)	Always (3)
DOT Project Manager (1)	○	○	○
Consultant Project Manager (when contracted) (4)	○	○	○
DOT Design Engineer (5)	○	○	○
DOT NEPA SME (6)	○	○	○
DOT Air & Noise SME (7)	○	○	○
DOT Ecology SME (8)	○	○	○
DOT Archaeology SME (9)	○	○	○
DOT History SME (10)	○	○	○
Consultant SMEs (when contracted) (11)	○	○	○

Q6 Prior to the project scoping meeting, how frequently have each of the following tasks been completed?

	Never (1)	Sometimes (2)	Always (3)
Design concept (1)	○	○	○
Field studies (technical environmental studies) (2)	○	○	○
Selection of logical termini (3)	○	○	○
NEPA class determination (where applicable) (4)	○	○	○
Outsourcing determination (5)	○	○	○
Funding source (6)	○	○	○

Q7 For each of the following measures of quality of the environmental **process,** please identify or estimate how you would rate your office's overall performance**.** Use a scale of 1 to 5, where 1 is "Poor" and 5 is "Excellent."

	Poor (1)	Marginal (2)	Adequate (3)	Good (4)	Excellent (5)	Unknown (6)
Total time to complete environmental process (1)	○	○	○	○	○	○
% of projects completed per project schedule (8)	○	○	○	○	○	○
% of projects completed at/under budget (9)	○	○	○	○	○	○
Total cost to complete environmental process (2)	○	○	○	○	○	○
Number of rounds of revision (3)	○	○	○	○	○	○
Number of public comments (4)	○	○	○	○	○	○
Design improvements based off environmental process (5)	○	○	○	○	○	○
Project outcome measures (e.g. quantification of environmental effects) (6)	○	○	○	○	○	○
Other: (7)	○	○	○	○	○	○

Q8 How problematic to your office or unit are the following situations in the environmental process, in terms of how frequently they occur, on a scale of 1 to 5 where 1 is “Never an Issue” and 5 is “Always an Issue”?

	Never (1)	Rarely (2)	Sometimes (3)	Frequently (4)	Always (5)
Draft materials deemed insufficient during review by outside resource agency (where applicable) (1)	☐	☐	☐	☐	☐
Unclear/improper grammar or language (2)	☐	☐	☐	☐	☐
Draft materials not in line with standards/templates (3)	☐	☐	☐	☐	☐
Variation in reviewer standards (4)	☐	☐	☐	☐	☐
Variation in stakeholder agency expectations (5)	☐	☐	☐	☐	☐
Insufficient level of detail/length of submitted documents (7)	☐	☐	☐	☐	☐
Number of rounds of revision/resubmission during document preparation (9)	☐	☐	☐	☐	☐
Scope changes during environmental review (10)	☐	☐	☐	☐	☐
Other design changes during environmental review (11)	☐	☐	☐	☐	☐
Too many Participating, Coordinating, or Cooperating Entities (12)	☐	☐	☐	☐	☐
Task relevant information not communicated to document preparers (18)	☐	☐	☐	☐	☐
Insufficient cooperation or assistance between project team members (19)	☐	☐	☐	☐	☐
Communication break-downs along chain of command (20)	☐	☐	☐	☐	☐
Inaccurate or distorted information transmitted between project team members (21)	☐	☐	☐	☐	☐

	Never (1)	Rarely (2)	Sometimes (3)	Frequently (4)	Always (5)
Turnover of Internal environmental staff (14)	☐	☐	☐	☐	☐
Turnover of Internal project management/design staff (15)	☐	☐	☐	☐	☐
Turnover of consulting staff (16)	☐	☐	☐	☐	☐
Inexperienced consultant (17)	☐	☐	☐	☐	☐

Q9 For each of the following situations in the environmental process, please select any which you consider to be serious problems for your unit or office (those that significantly affect project delivery when they occur):

	Serious Issue (6)
Draft materials deemed insufficient during review by outside resource agency (where applicable) (1)	☐
Unclear/improper grammar or language (2)	☐
Draft materials not in line with standards/templates (3)	☐
Variation in reviewer standards (4)	☐
Variation in stakeholder agency expectations (5)	☐
Insufficient level of detail/length (7)	☐
Number of rounds of revision/resubmission during document preparation (9)	☐
Scope changes during environmental review (10)	☐
Other design changes during environmental review (11)	☐
Too many Participating, Coordinating, or Cooperating Entities (12)	☐
Task relevant information not communicated to document preparers (18)	☐
Insufficient cooperation or assistance between project team members (19)	☐
Communication break-downs along chain of command (20)	☐
Inaccurate or distorted information transmitted between project team members (21)	☐
Turnover of Internal environmental staff (14)	☐
Turnover of Internal project management/design staff (15)	☐
Turnover of consulting staff (16)	☐
Inexperienced consultant (17)	☐

Q10 Based on your professional assessment, how efficient in terms of time to complete (i.e. scheduled vs. actual completion time) is your DOT at the following project steps across the specified class of environmental review, using a scale of 1 to 5 where 1 is “Very inefficient” and 5 is “Very efficient”?

	Very Inefficient (1)	Fairly Inefficient (2)	Neutral (3)	Slightly Efficient (4)	Very Efficient (5)	No Opinion (6)
(PCE) Environmental Study and Documentation (1)	○	○	○	○	○	○
(CE) Environmental Study and Documentation (3)	○	○	○	○	○	○
(EA-FONSI) Environmental Study and Documentation (4)	○	○	○	○	○	○

Q11 For each of the following document preparation tools, please identify: (1) How **frequently** they are used by or between team members in your projects (with 1 being "Never Used" and 5 being "Always Used"); and (2) How **effective** each tool is for producing high-quality documents or reports (with 1 being "Highly Ineffective," 3 being "Neither Effective nor Ineffective," and 5 being "Highly Effective"). *If you do not use the tool, please enter "N/A" or simply leave blank.*

	Frequency					Effectiveness				
	Never Used (1)	Rarely Used (2)	Sometimes Used (3)	Frequently Used (4)	Always Used (5)	Highly Ineffective (1)	Somewhat Ineffective (2)	Neither Effective nor Ineffective (3)	Somewhat Effective (4)	Highly Effective (5)
Document or report templates (such as standard layouts, text, tables) (1)	○	○	○	○	○	○	○	○	○	○
Style guide with consistent terms, conventions, word choice (2)	○	○	○	○	○	○	○	○	○	○
Sample documents or reports from a similar project (3)	○	○	○	○	○	○	○	○	○	○

Q12 For each of the following practices or activities, please identify: (1) How **frequently** they are used by or between team members of your projects (with 1 being "Never Used" and 5 being "Always Used"); and (2) How **effective** each tool is for communicating within the project team (with 1 being "Highly Ineffective," 3 being "Neither Effective nor Ineffective," and 5 being "Highly Effective"). *If you do not use the tool, please enter "N/A" or leave blank.*

	Frequency of Use					Effectiveness				
	Never Used (1)	Rarely Used (2)	Sometimes Used (3)	Frequently Used (4)	Always Used (5)	Highly Ineffective (1)	Somewhat Ineffective (2)	Neither Effective nor Ineffective (3)	Somewhat Effective (4)	Highly Effective (5)
Explicit timeline requirements (4)	○	○	○	○	○	○	○	○	○	○
Centralized tracking of agency reviewer comments and responses/revisions (5)	○	○	○	○	○	○	○	○	○	○
Impromptu individual meeting (6)	○	○	○	○	○	○	○	○	○	○
Project launch meeting (7)	○	○	○	○	○	○	○	○	○	○
Training program(s) or workshop(s) (8)	○	○	○	○	○	○	○	○	○	○
Recurring "Agency & Consultant Relations" Meetings (independent of specific project) (9)	○	○	○	○	○	○	○	○	○	○
Ongoing input from cooperating, coordinating, and participating agencies (12)	○	○	○	○	○	○	○	○	○	○
Cooperative troubleshooting between project team members (15)	○	○	○	○	○	○	○	○	○	○
Other (describe) (16)	○	○	○	○	○	○	○	○	○	○

Q13 During which phases of the average project does **most** direct communication **actually** occur between environmental SMEs (public or private) and other project team members? *Select all that apply.*

- ☐ Scoping (2)
- ☐ Preliminary Engineering (3)
- ☐ Field Work (4)
- ☐ Technical Report Preparation (5)
- ☐ Technical Report Review (10)
- ☐ Environmental Document Preparation (NEPA or state) (6)
- ☐ Environmental Document Review (NEPA or state) (7)
- ☐ Submission and DOT Approval (8)
- ☐ Other (please specify) (9) _____

Q14 During which project phase **should** the most direct communication between environmental SMEs (public or private) and other project team members occur? *Select all that apply.*

- ☐ Scoping (2)
- ☐ Preliminary Engineering (3)
- ☐ Field Work (4)
- ☐ Technical Report Preparation (5)
- ☐ Technical Report Review (10)
- ☐ Environmental Document Preparation (NEPA or state) (6)
- ☐ Environmental Document Review (NEPA or state) (7)
- ☐ Submission and DOT Approval (8)
- ☐ Other (please specify) (9) _____

Q15 How frequently would you estimate you communicate directly with your Project Lead (project manager, or design engineer), *including phone calls, meetings, emails, and other direct communication?*

- ○ 4 or more times per week (daily) (1)
- ○ 1–3 times per week (weekly) (2)
- ○ 1–2 times per month (monthly) (3)
- ○ Less than once a month (5)

Q16 Have you observed any of the following as common causes of quality variation in contracted environmental work? *Select all that apply.*

- ☐ Contract specificity (1)
- ☐ Clarity about who is responsible for organizing communications between project team members (25)
- ☐ Consultant financial incentives (2)
- ☐ Consultant performance management (3)
- ☐ Consultant workload (14)
- ☐ Familiarity of consultant staff with your office (4)
- ☐ Familiarity of consultant staff with your agency (5)
- ☐ Familiarity of consultant staff with the environmental process (6)
- ☐ Frequency of work completed for your office (7)
- ☐ Quality of rapport with staff in your office (8)
- ☐ Cooperation and assistance between project team members when dealing with project issues (26)
- ☐ Turnover in consultant personnel (9)
- ☐ Changes in ownership of consultant (10)
- ☐ Regulatory changes (11)
- ☐ Other (please specify) (12) _____
- ☐ None of the above (13)

Q17 Have you observed any of the following issues with the use of consultants for document review? *(Skip if your office does not use consultants for any document review.)*

	Yes (1)	No (2)
Reduction in review quality (1)	○	○
Inconsistency in reviewer standards (4)	○	○
Firms reviewing each other's work (conflicts of interest) (5)	○	○
Increases in rounds of revision requested by outside resource agencies (6)	○	○
Lengthening of review timeline (8)	○	○

Q18 ***For the following questions, we are interested in understanding your DOT's processes and practices when completing technical studies and documents for a Categorical Exclusion (CE or CatEx) project. Please consider your portfolio of CE class environmental processes, and use that experience to inform your responses.***

Q19 By your best estimate, what is the average timeline for completion of PCE and CE environmental processes?

	6 months or less (1)	6-12 months 2)	13-24 months (3)	24+ months (4)
PCE (3)	○	○	○	○
CE (1)	○	○	○	○

Q20 How many rounds of revision of draft environmental documents (within environmental office or between office and consultants) is normal or average for PCE and CE projects at your DOT?

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5+ (6)
PCE (1)	○	○	○	○	○	○
CE (2)	○	○	○	○	○	○

Q21 Thank you for participating in this survey – your responses will facilitate the identification and sharing of best practice coordination and communication practices in the environmental analysis process.

A.5. Leadership Semi-structured Interview Protocol

Communications and Performance in Project Teams at GDOT: Focus on Environmental Review
Interview Protocol – State DOT

Objective:

The interview is designed to benchmark current practices in the environmental process across State Departments of Transportation. We are particularly interested in standard operating procedures, quality control mechanisms, perceived performance, and the role of contracting. We also would like to explore implemented methods for improving the environmental process.

Procedure:

Interview administration will consist of a general exploration about the DOT's environmental process as perceived by a high-level environmental manager. A number of probing questions will be used to encourage elaboration on specific sub-topics.

Key Theoretical Framing:

The interviews aim to provide evidence for the hypothesized relationship between communication patterns of Project Managers and GDOT-OES, and their potential contribution to project performance through coordination and communication within project teams and across project team members, including OES staff, project managers, and design engineers.

Steps:

1. **Consent instructions, and then confirmation of permission to record**
2. **Ground Rules**
    a. Participation in the survey is voluntary.
    b. It's alright to abstain from discussing specific topics if you are not comfortable.
    c. All responses are valid—there are no right or wrong answers.
    d. Please respect the opinions of others even if you don't agree.
    e. Speak as openly as you feel comfortable.
    f. Help protect others' privacy by not discussing details outside the survey.
3. **Introductions – Question 1: Ask about the background of the respondent in terms of fields of training and years of experience in managing preconstruction design projects.**
4. **Discussion**
5. **Wrap-Up**
    a. End the discussion by summarizing the main points. Invite participants to reflect.
    b. Thank the respondent for participating; let them know how the discussion results will be used.
    c. Collect and save all notes and recordings.
    d. If a report will be produced, let them know when it might be available and how they can obtain a copy.

Moderation Items for Task 1 Interviews

The questions are not ordered specifically by priority. They may be used in any order depending on how the participant's dialogue evolves. This is not a Q&A session but rather an elicitation of a narrative.

Introduction:
Would you briefly describe your current role at your DOT including your title, section, and length of time in that role?

- Please identify your state.
- What is your current role or title?
- How long have you been in this role?

Context of Communications:
Please describe the portfolio of transportation design projects that your agency is currently working on in terms of the following:

- Approximately how many projects are currently active?
- What percentage of projects is in each NEPA class?
- What percentage is state funded, federal funded, or local funded?
- Are environmental staff organized centrally or through district staffs?
- What percentage of projects are being delivered on-time?

Contracting:
By your estimate, what percentage of project tasks are outsourced or completed by external consultants at your DOT?

- What percentage of projects are performed by consultant project managers?
- What percentage of environmental reviews are performed by consultants?
- What percentage of environmental consultants are a part of the consultant project manager contract, or are they hired directly by your environmental office?
- Does the environmental office get involved in decisions to hire environmental consultants? In what ways?
- What kinds of tasks are outsourced?
    - Preliminary engineering
    - Field work
    - Technical studies
    - Technical review
    - Public engagement
    - Document preparation
    - Document review
    - Team coordination
    - Project troubleshooting
- In the contract, does your DOT explicitly state tasks or responsibilities the consultant will have to do?
    - Schedule/Timeline
    - Document-related
    - DOT contributions
    - Frequency of coordination with DOT
    - Communication and coordination of project team
- Does your DOT keep track of the quality of consultant-produced documents? (e.g. number of documents or report reviews or resubmits)
    - Does your office use this information to make future consultant selection decision?

- Do you observe any issues with the use of consultants for document review? If so, what kind of issues?
    - Review quality
    - Conflict of interest
    - Delayed timeline
- Has your office taken any actions to prevent the issues you mentioned? In what way?

Project Initiation:
What communications occur to staff indicating that a project has been initiated?

- When do environmental staff begin communicating with: 1) project managers, or 2) consultants?
- How common is it for each project to include a meeting with DOT subject matter experts (SMEs) to discuss and establish project scope, schedule, and budget?
- What are some different actors that would attend this meeting?
    - DOT Project Manager
    - Consultant Project Manager
    - DOT Design Engineer
    - DOT NEPA SME
    - Other SME (Air & Noise, Ecology, Archaeology, History)
- On a scale of 1 to 5, with 1 being "Never Present" and 5 being "Always Present," how common is it for these actors to attend these meetings?
- Which are some activities that are typically completed prior to the scoping meeting?
    - Design concept
    - Field studies
    - Selection of logical termini
    - NEPA class determination
    - Outsourcing determination
    - Funding source

Communication – Project Phase:
Throughout the duration of the environmental process, how frequently and in what way do you expect environmental staff to communicate internally and with other project team members?

- How often would you estimate your environmental SMEs communicate directly with their project lead? This could include any types of direct communication.
- How about their direct communication with other project team members?
- Does most direct communication happen early or late in the process?
    - During what specific phases is this direct communication occurring?
        - Scoping
        - Preliminary Engineering
        - Field Work
        - Technical Report Preparation
        - Technical Report Review
        - Environmental Document Preparation (NEPA or state)
        - Environmental Document Review (NEPA or state)
        - Submission and DOT Approval
- Are these communications helpful?
- Is existing communication happening according to plan? What are some deviations?
- During what phases do you think communications should occur?

Communication – OES and PM:
Describe the communication between the PM and OES during the environmental process. (Frequency? Means? Bi-or Uni-directional?)

- Does the PM communicate directly with the individual environmental staff or does the NEPA lead act as an intermediary?
    - Is this according to plan?
- What is the role of the PM during the environmental process?

Performance Measures (Staff, Process, NEPA document): How does your office assess the quality of the environmental process?

- What measures or other information (if any) does your office use to assess the quality of the environmental process?
    - Total time to complete environmental process
    - % of projects completed per project schedule
    - % of projects completed at/under budget
    - Total cost to complete environmental process
    - Number of rounds of revision
    - Number of public comments
    - Communication skills of SME staff
    - Project communication and coordination skills of consultants
    - Design improvements based off environmental process
    - Project outcome measures (e.g. quantification of environmental effects)
    - Change Request Forms or number of Changes
- Do you use the same measurements to evaluate the performance of individual staff during the environmental process? If not, what measurements does your office use?
- Are there any sets of expectations or measurements that you look for in a "good" final NEPA document?
    - Meets legal sufficiency standard
    - Follows structure standard set by template/outline material
    - Meets agency/department grammar and language standards
    - Meets individual reviewer grammar and language expectations
    - Document length
    - Sufficient use of visuals and graphics
    - Receives external praise or recognition

Performance Assessment:
How well do you think your office performs in completing the environmental process?

- Are there any performance measures that you use for monitoring environmental review?
- What is the average timeline for completion of PCE and CE environmental processes? EA? EIS?
    - On average how long does the overall design project take?
- On average, how many rounds of revision does it normally take for your office for PCE and CE projects?
    - Is there any difference between technical reports and NEPA reports in the number of rounds of revisions?
    - Do you take any actions with the preparers if there are too many rounds of revision? (Y/N, if Y, what kind of action?)
- Overall, how efficient do you think your DOT is in completing the environmental process, using a scale of 1 to 5 where 1 is "Very Inefficient" and 5 is "Very Efficient"?

Behavior Controls – Document Preparation Tools:
Are there any tools, processes or procedures your office uses for producing high-quality documents or reports?

- How commonly used are these tools on a scale of 1 to 5, with 1 being "Never Used" and 5 being "Always Used"?
    - Templates
    - Style guides
    - Sample documents
- How effective are these tools you mentioned in achieving quality documents on a scale of 1 to 5, with 1 being "Highly Ineffective" and 5 being "Highly Effective"?
- Since the implementation of the tools, have you tracked any changes in document performance metrics such as number of rounds of revisions or number of public comments?

Behavior Controls – Practices or Activities:
Are there any meetings, activities, or practices your office uses to ensure the quality of your project?

- How commonly used are these practices? (On a scale of 1 to 5, with 1 being "Never Used" and 5 being "Always Used"?)
    - Explicit timeline requirements
    - Centralized tracking of agency reviewer comments and responses/revisions
    - Impromptu individual meeting
    - Project launch meeting
    - Training program(s) or workshop(s)
    - Recurring "Agency & Consultant Relations" Meetings (independent of specific project)
    - Ongoing input from cooperating, coordinating, and participating agencies
    - Cooperative troubleshooting between project team members
- How effective are the practices you mentioned in helping with the communication within your team on a scale of 1 to 5, with 1 being "Highly Ineffective" and 5 being "Highly Effective"?

Process Standards:
In your DOT, is there a standard process or guideline that environmental document preparers and reviewers are expected to follow?

- What are the tools NEPA doc preparers, either in-house or consultants, use to ensure their documents meet the standard process?
    - Training
    - Document checklist/sample
    - Comments/feedback
    - Learning from experience
    - Other
- What about tools that the reviewers use to ensure their NEPA documents meet the standard process?
    - Training
    - Document checklist/sample
    - Learning from experience
    - Other
- How do these tools work to help your DOT environmental process?
- What practices, procedures, or tools has your office implemented that have improved the quality or efficiency of the environmental process?
- Any other tools or procedures that your office is experimenting with that you hope will improve the process? How are they working so far?

Problem Situations:
According to your office or your agency, what kinds of problems frequently occur in the environmental process?

Appendix B: Materials from Chapter 3

B.1. Supplementary Task 2 Materials and Methods

Task 2 includes the perspectives of both OES staff and consultants who have experience dealing with the innovations when working on GDOT projects. GDOT respondents were selected from each OES section (Air & Noise, Cultural Resources, Ecology, and NEPA) based on their level of experience and knowledge about the OES innovations we discuss. This ensured that our data contain information on each section's unique application of these innovations. Each section uses GPTQ, templates and SharePoint, but the way they use them, and the extent to which they were integrated in the review process at the time of the interviews, differ, so it is important for us to understand each section's implementation separately. Respondents from the consulting community include individuals with extensive experience working with OES. Consultant respondents provide input on a variety of the innovations they work with across different OES sections.

Seven OES staff members and five consultants participated in ten interviews to formally investigate the usage and success of each innovation. Table B-1 provides a breakdown of the respondents in each interview.

Table B-1: Interview Breakdown

Interview	Number of Respondents	Agency	Section	Duration
#1	1	GDOT	Ecology	75:04
#2	1	GDOT	Ecology	78:59
#3	1	GDOT	NEPA	57:39
#4	2	GDOT	NEPA	60:45
#5	1	GDOT	Air & Noise	45:56
#6	1	GDOT	Cultural Resources	63:13
#7	1	Consulting Firm	Ecology	142:32
#8	1	Consulting Firm	Ecology	94:09
#9	2	Consulting Firm	Ecology & NEPA	62:37
#10	1	Consulting Firm	NEPA	68:18

We relied on a semi-structured interview protocol to guide our investigation of the impacts of OES innovations on the project process. This protocol was tailored for different respondents based on their position and the section of OES or consulting firm in which they work in order to accommodate their unique perspectives, but it was designed to explore the success and impact of the innovations in use at GDOT for OES staff and consultants. The use of a semi-structured interview form allowed us to explore differences between perspectives from multiple individuals and inspect the varying degrees to which each innovation is used in the various sections of OES. It provided a standard framework of topics to be discussed during each interview; these are described in Table B-2. Copies of the full interview protocol for both OES and consultant respondents are included in sections B.2 and B.3 of Appendix B.

Table B-2: Interview Topics

Topic	Question Descriptions
Work experience	Information about the respondent's role, tenure at GDOT, and professional background
GPTQ meetings	Perspectives on the frequency, purpose, effectiveness, evolution, and quality of GPTQ meetings at OES
Training	Information about how OES trains project team members to use and interact with different communication tools
Templates	Perspectives on the development, use, purpose, evolution, quality, and benefits of document templates used by each OES section
SharePoint	Perspectives on the development, use, purpose, evolution, quality, and benefits of the SharePoint site used by each OES section
Evaluation	Information about how OES tracks the quality and effectiveness of innovations, and perspectives on how well each innovation is working at OES
Innovation comparisons	Comparisons between OES innovations and those experienced elsewhere
Recommendations	Recommendations for future development of OES innovations

Interviews were recorded, transcribed, and then coded by three members of the research team in order to identify key factors and relationships in the data. Using multiple coders helps avoid bias and ensures exhaustive coverage of our conceptual categories. We conducted several steps in the coding process. First, we established an initial set of coding categories, comprising 33 total coding nodes (17 parent and 16 child nodes), and used it to code a representative sample of text from the interview data. We used this trial run to determine the relevance of the bins we chose, and to establish internal validity among our conceptual categories. After conducting this exercise, we revised our bins to best accommodate the integration of our theoretical expectations with the trends of what types of information were actually present in the data. The revised set of coding categories includes 66 nodes (31 parent and 35 child nodes) spanning categories such as behavioral controls, coordination, experience, and relational elements. Finally, we conducted a second round of coding with the revised coding categories. After coding the interviews, they were

analyzed by multiple members of the research team. We conducted qualitative assessments of the data using multiple stages of coding to determine our results and inform our discussion.

B.2. Case Study Semi-structured Interview Protocol (OES Staff)

History/Background:
1. How long have templates been used by OES? How effectively and frequently have they been used in the past?
a. Who developed the new templates, and how much time would you estimate went into these templates?
b. When were the templates last updated? i. How well do such templates stand the test of time?
c. What triggered this particular series of template updates? i. Did consultant requests contribute to the update? ii. Did OES requests contribute? iii. What led to this particular timing (i.e. why not sooner or later)?
d. Was the template update called for by OES leadership, staff, or higher administrators?
2. Have templates been developed for all types of environmental documents/reports?
a. If not, what is the focus of current template development?
b. Are there types of documents that best lend themselves to templates, or that do not work well for templating?
3. When designing the new templates, did you review templates at other DOTs or agencies?
a. Does FHWA contribute in any way to template development (directly or indirectly)?
b. Does FHWA provide review of the templates to confirm them as accurate markers of what is sufficient?
c. What seems to be the lifespan for use of the same templates, before they need to be updated again?
4. How frequently do you attend GPTQ meetings?
a. How frequently does someone from your firm attend these meetings? Do you have an attendee to each section of GPTQ for each meeting?
b. What purpose do GPTQ meetings serve?
c. How effective is GPTQ at this purpose? At communicating information between OES and the consultant community?
d. Has GPTQ evolved in your time in the field? If so, in what way?
e. Are there any changes you'd make to GPTQ?
f. Have you observed any greater emphasis on social activities as part of GPTQ? If so, have you observed any effects of this on staff or interactions with GDOT?

Substance/Content:
5. What types of updates were made to the templates? Were there content changes, structural changes, or otherwise?
a. Who was involved in the template creation?
b. Are all OES reviewers part of the template creation?
c. Are these templates exclusively replacing previous templates (on a 1 for 1 basis), or are they filling gaps or combining previous templates in any way?
d. How has OES approached the challenge of capturing project-level variation within standard templates?
6. Are the templates designed within a legal sufficiency standard in mind? Was this standard applied to the templates in any way, or does it inform the use of templates by OES?
a. What happens if a reviewer asks for content not in the template? Is the template considered a sufficient standard, or does the reviewer establish a higher standard that the consultant must meet?

	b. If there was such a dispute, is there a process or channel for resolving it? If not, how would the reviewer and consultant resolve this in practice?
	c. Do the reviewers use the template as a benchmark when reviewing? If not, what standard do they use? How does OES provide them guidance on reviewing?

Goals:	
7. What is OES' underlying intent with regard to the existence and use of templates?	
	a. What is the goal for the updated templates?
	b. What is the optimal intended workflow for the templates?
	c. Is there any intention of reducing points or frequency of communication through templates? If so, what does OES consider the ideal amount of communication needed between consultants and OES staff?

Transitions:	
8. How are consultants trained in using the templates? If they're not trained, how is it expected that they will learn how to optimally use the templates?	
	a. Who do they contact if they have questions or encounter any issues?
9. When new templates are rolled out, how are reviewers brought to the same page on them? Is there a training or workshop?	
	a. Are OES reviewers and consultant reviewers trained on templates in the same way? If not, why?
	b. How quickly is SharePoint updated with new templates?
	c. How has OES communicated to consultants the presence of the new templates?
	d. How do consultants access the new templates?
	e. Are templates provided to them directly by a project member, or are they expected to access them on their own?
	f. If FHWA or CEQ change a requirement, or GDOT implements a change in process, how quickly would the templates reflect this? How would this be communicated to OES, and to the consultants working with OES?

SharePoint:	
10. What information and materials are available via SharePoint?	
	a. What are not?
	b. Where do you go to find information that is not on SharePoint?
	c. What reasons might lead there to be different content in the email blast updates vs. SharePoint announcements?
	d. How is information organized within SharePoint? Is the existing organization a formal structure, or are folders created ad-hoc as new materials are added? i. How frequently is SharePoint reorganized, and if an update was needed what steps would need to be taken for it to happen?
	e. How/when are materials removed from the SharePoint?
11. Do you and all of your team members have access to SharePoint? If not, why not?	
	a. What is the process for getting a new team member access to SharePoint?
	b. Does the need for approval by OES ever cause any delays or challenges?
	c. Do you prefer SharePoint to having templates or other resources on a public website? Why or why not?
	d. Who do you contact if there are any issues accessing or using SharePoint?

	e. Do you feel SharePoint is working as it should?
12. Have you observed any improvements in access to SharePoint over time? If not, what improvements would you like to see made?	
	a. Consultants previously flagged it as inaccessible – do you believe this has changed? How much progress has been made, and how?
	b. IT issues (access to the system) were an issue before, has this changed at all? What has changed?

Evaluation:	
13. How are you measuring the impact or effectiveness of the updated templates?	
	a. What indication do you have so far on the effectiveness of the updated templates?
	b. Have you seen any evidence as of yet whether the new templates are leading to changes in the quantity of reviews/revisions?
	c. Are you seeing any changes in timeline of document preparation?
	d. Did you see improvements in document preparation under the previous templates?
	e. Has the use of templates changed how frequently OES staff interact with consultants? i. Is this consistent across all projects or consultants?
	f. Are templates equally effective for all types of projects (and all NEPA classes)? i. Are there any other factors that influence how effective templates are?
14. How have staff and consultants been responding to the templates?	
	a. What feedback have you been receiving?
15. What elements of the new templates seem to be working as intended (or better)?	
	a. Have the templates affected the workload of individual OES staff?
	b. Are there any elements not working as intended?

Future Evolution:	
16. What improvements, if any, would you recommend for future iterations of the template system?	
	a. What would be your ideal template content and practice? i. Do you believe your answer would match that of your peers, supervisors, or team members?
17. What improvements, if any, would you like to see for future expansions or usage of the SharePoint system?	
	a. What would be your ideal practice for SharePoint?

B.3. Case Study Semi-structured Interview Protocol (Consultants)

History/Background:	
1.	**Can you briefly describe your role at (firm), including the nature of your experience working as a consultant for GDOT?**
	a. How long have you been working as a consultant for GDOT?
	b. What previous experience do you have with this work?
	c. Which OES section(s) do you work with? What environmental documentation have you produced for them during your time as a consultant?
2.	**Do you have any experience working with other public agencies on similar work (i.e. environmental studies and reporting)?**
	a. If so, how do these other agencies differ in their use of IT systems, templates, or other communication or coordination systems?
3.	**How frequently do you attend GPTQ meetings?**
	a. How frequently does someone from your firm attend these meetings? Do you have an attendee to each section of GPTQ for each meeting?
	b. What purpose do GPTQ meetings serve?
	c. How effective is GPTQ at this purpose? At communicating information between OES and the consultant community?
	d. Has GPTQ evolved in your time in the field? If so, in what way?
	e. Are there any changes you'd make to GPTQ?
	f. Have you observed any greater emphasis on social activities as part of GPTQ? If so, have you observed any effects of this on staff or interactions with GDOT?

Training:	
4.	**How are consultants trained in using OES templates, SharePoint, or other OES systems? If they're not trained, how was it expected that you will learn how to optimally use the templates or other systems?**
	a. Who do you contact if you have questions or encounter any issues?
	b. How quickly is SharePoint usually updated with new templates or other material?
	c. How has OES communicated to consultants the presence of the new templates?
	d. How do you access the new templates?

Templates:	
5.	**Based on your understanding, what types of updates were made to the templates? How are they different now from before?**
	a. Is this a small change, or a large change?
	b. Are these templates exclusively replacing previous templates (on a 1 for 1 basis), or are they filling gaps or combining previous templates in any way?
	c. How much flexibility exists within these templates for capturing project-level variation?
6.	**How long have you and your colleagues been using OES templates in your work? How effectively and frequently have they been used in the past?**
	a. Did you perceive a need for new Ecology templates? Why?
	b. What seems to be the lifespan for use of the same templates, before they need to be updated again?

	c. Did OES engage the consultant community to provide input or feedback on the previous templates? i. Did they provide an opportunity to provide input or feedback on the new templates as they were being designed? As they were being refined? ii. Did you personally contribute any input? If so, what?
7. Has OES provided templates for all reports and documents that are contracted out?	
	a. If not, what reports/documents lack templates?
	b. Are there types of documents or tasks that best lend themselves to templates, or that do not work well for templating?
8. Do you see the templates as a legal standard (i.e. completing the template is a legally sufficient product)?	
	a. What happens if a reviewer asks for content not in the template? As a consultant, how would you respond to such a request?
	b. If there was a dispute between you and a reviewer, how would you resolve it?
	c. Is there a process or channel for resolving it? If not, how would the reviewer and consultant resolve this in practice?
	d. Has there ever been a need for you to include information in your report which was not required by the template? If so, how did the OES reviewer respond?

Goals:	
9. What do you see as OES' underlying intent with regard to the provision and use of systems like SharePoint and document templates?	
	a. What do you consider to be their goal for the updated templates?
	b. What goals, if any, do you or your firm have for the provision and use of templates?
10. What do you consider to be an optimal amount of communication with OES staff?	
	a. Is minimizing the frequency of communication an improvement? Is there even an optimal level of communication?

SharePoint:	
11. What information and materials are available via SharePoint?	
	a. What are not?
	b. Where do you go to find information that is not on SharePoint?
	c. What reasons might lead there to be different content in the email blast updates vs. SharePoint announcements?
	d. How is information organized within SharePoint? Is the existing organization a formal structure, or are folders created ad-hoc as new materials are added? i. How frequently is SharePoint reorganized, and if an update was needed what steps would need to be taken for it to happen?
	e. How/when are materials removed from SharePoint?
12. Do you and all of your team members have access to SharePoint? If not, why not?	
	a. What is the process for getting a new team member access to SharePoint?
	b. Does the need for approval by OES ever cause any delays or challenges?
	c. Do you prefer SharePoint to having templates or other resources on a public website? Why or why not?
	d. Who do you contact if there are any issues accessing or using SharePoint?

	e. Do you feel SharePoint is working as it should?
13. Have you observed any improvements in access to SharePoint over time? If not, what improvements would you like to see made?	
	a. Consultants previously flagged it as inaccessible – do you believe this has changed? How much progress has been made, and how?
	b. IT issues (access to the system) were an issue before, has this changed at all? What has changed?

Evaluation:
14. Are you tracking in any way the impact or effectiveness of the updated templates? Do you track other performance measures for delivering reports and studies for OES?
a. What indication, if any, do you have so far on the effectiveness of the updated templates?
b. Have you seen any evidence as of yet whether the new templates are leading to changes in the quantity of reviews/revisions?
c. Are you seeing any changes in timeline of document preparation?
d. Did you see improvements in document preparation under the previous templates?
e. Has the use of templates changed how frequently you and your colleagues interact with OES staff? i. Is this consistent across all projects or staff?
f. Are templates equally effective for all types of projects (and all NEPA classes)? i. Are there any other factors that influence how effective templates are?
15. Qualitatively, what has been your perception of the new templates? How about the reception by your colleagues?
a. What feedback have you been receiving?
16. What elements of the new templates seem to be working as intended (or better)?
a. Have the templates affected the workload of your staff?
17. Are you assessing the impact or effectiveness of SharePoint?
a. What indication do you have so far on the effectiveness of SharePoint?
b. Has usage of SharePoint increased?
c. Are you seeing any changes in timeline of document preparation or revision?
d. Has SharePoint affected the workload of your staff? If so, in what way?
e. Has the use of SharePoint changed how frequently your staff interact with GDOT? i. Is this consistent across all projects or GDOT staff?
18. What elements of the SharePoint system seem to be working as intended (or better)?
a. Are there any elements not working as intended?
b. Are there practices that have altered the effectiveness of SharePoint for Ecology? For example, the management or organization of information on SharePoint?
c. Are there features you'd like SharePoint to have that it doesn't, or that it has but that work sub-optimally?
d. Are there any elements not working as intended?

Future Evolution:
19. What improvements, if any, would you recommend for future iterations of the template system?
a. What would be your ideal template content and practice?

	i. Do you believe your answer would match that of your peers, supervisors, or team members?
20. What improvements, if any, would you like to see for future expansions or usage of the SharePoint system?	
	a. What would be your ideal practice for SharePoint?

Appendix C: Materials from Chapter 4

C.1. Focus Group Protocol

Objective:

The focus groups are an instance of observation of an important group of informants on what transpires in an important phenomenological area. In our case, we hope to understand the actions of the project managers as they communicate with OES, consultants, and other actors at various levels, especially concerning the preparation and review of environmental documents, beyond what can be found by interviewing individual project managers, by observing their interactions and not only the answers to our questions.

Procedure:

The focus group activity will consist of a general exploration about the experiences of the project managers in working on transportation projects for the public sector for which a number of probing questions will be used expecting to encourage comparisons and contrasts among project managers in response to said questions. The purpose of this phase is to foster and observe a dialogue among the group regarding their experiences in working with GDOT.

Key Theoretical Framing:

The focus groups aim to provide evidence for the hypothesized relationship between communication patterns of project managers and GDOT-OES, and their potential contribution to project performance through coordination and communication within project teams and across project team members, including OES staff, project managers, and design engineers.

Steps:

1. **Consent instructions, and then confirmation of permission to record**
2. **Ground Rules**
    - **a.** Participation in the focus group is voluntary.
    - **b.** It's alright to abstain from discussing specific topics if you are not comfortable.
    - **c.** All responses are valid—there are no right or wrong answers.
    - **d.** Please respect the opinions of others even if you don't agree.
    - **e.** Speak as openly as you feel comfortable.
    - **f.** Help protect others' privacy by not discussing details outside the group.
3. **Introductions**
4. **Discussion**
5. **Wrap-Up**
    - **a.** End the discussion by summarizing the main points. Invite participants to reflect.
    - **b.** Thank the group for participating; let them know how the discussion results will be used.
    - **c.** Collect and save all notes and recordings.
    - **d.** If a report will be produced, let them know when it might be available and how they can obtain a copy.

Moderation Items for Task 3 Focus Groups

The questions are not ordered specifically by priority. They may be used in any order depending on how the participants' dialogue evolves. Since this is not a Q&A session but rather an elicitation of narratives, the moderating team will use visuals to summarize the progress of the discussion.

<u>Process Overview</u>: **Can you walk us briefly through your role in the pre-construction process?** [Use white board to monitor progress of participant contributions]
• **Do you consider it a normal part of your job to coordinate communication across other offices within GDOT? (i.e. environmental, design, etc.)** • If not, who has this responsibility? If so, why, and how effective has this been? • What leads you to undertake this task? • How often do you have to do this? • **Which offices are you coordinating communication between?** • **What other organizations are you coordinating with?** • Is coordination of tasks within a project's *environmental process* the responsibility of the GDOT PM, the consultant PM, the OES reviewer, an OES supervisor, or the consultant preparer?
<u>Coordination Form and Quality</u>: **In a traditional project in pre-construction, how frequently and in what way do you primarily communicate with project team members? OES / OES Consultants /GDOT PM/ GDOT Designers / Consultant Designers?**
• **Describe the key pieces of information that you need from environmental staff (whether GDOT or consultants) at each major phase of a project? Who do you look to for this information (GDOT OES, consultant analyst, other)?** • How/when do you first engage OES staff and designers to contribute specified tasks to the project? How about contractors or other contributors? • What topics/issues prompt direct communication (i.e. phone call or in-person meeting)? • <u>Other elements of interest</u>: Frequency / Timeliness / Helpfulness / Shared Goals / Respect / Problem-Solving • **Does coordination within a project change based on the details of the project? For example, NEPA class (EA v. CE) or higher complexity projects (technical complexity, scope, number of participants)? If so, how?** • <u>Other details of possible interest</u>: **NEPA class**, project type, level of public interest, technical complexity, budget, scope • Does the number of project participants (including team members and stakeholders) vary? • If there are any of these variations, do PMs attempt to recognize those early on and change approach, or do you change the approach as differences arise?
<u>Quality of the Product & Process</u>: **As a PM, what actions do you take to facilitate the best possible final design?**
• In an ideal project, what is the role of the environmental review process? • What is its ideal contribution to the project? • Where in the process does the environmental analysis lead to changes in the design? How is this need communicated (from who to who, and by what means?) • Is this coming directly from a consultant, or mediated by OES? • Is the environmental scoping done by OES, or by consultants? How far into the process is this specified? • **How do you determine whether a project was a success?** • **How do you determine whether an environmental process was a success?**

- **How often is the environmental review process a key factor in whether a project is a success or failure?**
- **How common is it for challenges in the environmental review process to be the result of poor communications? Please describe.**
- Does GDOT provide clear standards for what a high-quality environmental process is?
- **What types of challenges do you experience in securing high-quality NEPA documents or technical reports?**
- How does communication with consultants influence your ability to secure a high-quality environmental document?
    - Does this vary between ecological documents and NEPA documents? Other sections?
- Are there other factors that are more important than communications in influencing your ability to produce a high-quality report?

<u>Efficiency of the Process</u>:
If a project is behind on the programmed budget and/or schedule, how do you adapt your project management approach?

- If a project is behind schedule or at risk of above-estimated costs, do you communicate more or less often with team members?
- Do you communicate schedule or budget concerns with team members?
- Are there more frequent areas of schedule or budget "risk" based off your experience?
- **How frequently do you encounter delays or issues due to revisions or changes during the environmental review? What are common sources of delay?**
- **In what ways could GDOT's environmental review process be improved?**
- Does GDOT's environmental review process meet or exceed standards for legal sufficiency?
- **How about delays or issues due to design changes? How often are these design changes necessitated by environmental information?**
- **How impactful, if at all, is GDOT staff turnover and/or promotion?**
- **How impactful, if at all, is the years of experience of GDOT staff and/or consultants?**
- If so, do you devote extra time or attention to these areas up-front, or as the project progresses?
- What other potential pitfalls do you look out for in the environmental process?

<u>Contracting</u>:
What portion of your projects involve a consultant PM? What responsibilities do they have compared to yours, w/ regard to a given project?

- How much flexibility do you feel consultant PMs have to execute their responsibilities?
- How important is contract specificity vs. flexibility for the execution of consultant work?
- What do your contracts with consultants specify about the environmental document preparation process?
- Is coordination responsibility/leadership specified in these contracts?
- Are there any tasks or activities not included under the contract that consultants regularly complete for GDOT?
- Are there any items of a contractual nature that are sensitive or a subject of concern with respect to performance by contractors in working with OES?
- **Is each firm's previous performance tracked? Is it referenced during procurement or contracting?**

<u>Output Controls</u>:
What performance expectations are communicated to consultants?

- Do these take the form of specific measures or results?
- **How are performance expectations communicated to individual OES staff or design engineers?**
- Are these performance expectations made explicit (through documented project roles, job descriptions, responsibilities, or contracts)?
- How do <u>you</u> assess whether work is meeting expectations? For example, do you have specific performance measures or criteria for team members or tasks?

- How are performance expectations enforced? If work by a consultant or GDOT staff member does not meet expectations, how is this communicated?
- What barriers or hurdles (if any) limit the establishment of clear performance expectations?

Behavioral Controls:

How common are templates, manuals, or guidance materials in the execution of your work? How useful are they, and in what way(s)?

- When completing a task in line with a template, manual, or other procedural guidance, how is performance assessed (if at all)?
- How common are templates, manuals, or guidance materials in the execution of work by your project team? How useful are they, and in what way(s)?
- Do you use these materials in any way to assess the performance of your project team? If so, how?

Input controls:

Are there any informal procedures that you or your project team follow, such as routines or practices that are not explicitly captured in any guidance material?

- How would you describe the organizational culture within GDOT? Project delivery? OES? Do these differ in any way(s) from that at consulting firms?
- If expectations are implied but not explicit, how do actors learn the expectations?
- Are there implied shared practices or procedures (not formally required) sourced from professional education or training?
- Do you interact with other GDOT staff or consultants outside of the direct execution of your work? (for example, social settings or professional development)