ITD Project Manager Guidebook

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Project Management Tiger Team
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1 VALUE OF PROJECT MANAGEMENT

1.1 Purpose

This document is a reference for project management at the Idaho Transportation Department (ITD), Division of Highways. The main goal of this guide is to introduce the principles of project management and provide resources to help all PMs continue to build their skills, thus creating a consistent, statewide, high-standard of management.

1.2 Value of Project Management

"At the highest level, effective project management brings together three important elements – technical skills in scheduling, estimating, risk analysis and other competencies specific to project management, leadership skills and business knowledge.

Projects and tasks of any size are far more likely to be successful if you take the time and effort to define objectives, roles and responsibilities; identify tasks, dependencies and deliverables and the acceptance criteria; estimate realistically and to manage expectations through transparent communications across project lifecycle." From <https://www.projecttimes.com/george-pitagorsky/why-project-management-adds-value-how-to-promote-pm.html

The value of Project Management in ITD's Division of Highways is to accomplish the following:

- Teach and follow the process to deliver projects
- Improve planning through the life of a project
- Increase the number of projects completed on time and on budget
- Reduce the amount of stress in delivering projects
- Be proactive instead of reactive in the scramble at end of project
- Provide clear expectations and responsibilities
- Improve transparency of project delivery with documentation and managed schedules
- Allow better management of cash flows and spend down surplus cash balances

1.3 Overview

A Project Manager (PM) at ITD is a rewarding yet demanding role assignment. The PM is responsible for the effective and efficient use of staff and resources to lead a team of skilled technical experts to meet the goals (scope, schedule, budget, and quality) and objectives of Highway Infrastructure projects. This guide outlines the duties, responsibilities, and the expectations of a project manager.

1.4 What is a Project Manager?

A PM is the project team leader who is familiar with the project goals and serves as a single point of contact. A PM leads throughout the project life cycle.

As the team leader, the PM is accountable for the planning, executing, monitoring, and closing of each phase of the project lifecycle. However, the PM's role is larger than simply managing. The PM also serves as a project coach, mentor, and risk manager. The PM may also act as a crisis

manager if unplanned, high-risk events occur. A PM ensures projects have the appropriate level of support and resources needed to create a self-supporting, easily maintained, quality project.

A PM may ask:

- Does the project support ITD's Strategic Goals?
- Is it an asset to the surrounding communities and environment?
- Does it increase safe and efficient travel, not only through its project limits but by how it connects travelers with the transportation system?
- Rather than hold project resources for its own expansion, does the project consider efficiencies to benefit the whole program?
- What is its purpose and why was it programmed? What are and how do we meet the goals of the project?

These are some of the high-level challenges a PM may encounter as they lead their team through development, advertisement, and construction.

This leadership role also requires strong communication skills—the ability to ask penetrating questions, detect unstated assumptions, resolve conflicts, and guide a team through unknown, changing obstacles. While the structure of the project team can vary widely from project to project, the one constant is the PM's role as the leader of the project team, regardless of their authority over the team members.

There are numerous resources to turn to for guidance. The Program Management Office, Contracting Services, District Engineers, Design Construction Engineers, Controller, and Financial Planning & Analysis are ready to provide assistance. The most valuable resources may be sitting near you—your fellow PMs and District Liaisons.

A PM manages a project from a high level. For example, to ensure the quality of the project, a PM does not need to know the details of each technical area's Quality Control and Quality Assurance (QC/ QA) program. Rather, a skilled PM takes every opportunity to remind team members that each is responsible to know and certify the QC/QA for their area's deliverables.

1.5 How Will This Guide Help You?

The mastery of Project Management requires continued learning and practice similar to any other engineering or professional area of expertise. Design Construction Engineers and Project Team members will also find value in this guide to better understand their team role along with the role of the PM.

Each project is unique and will present different challenges to overcome. This guide will help interpret and apply different techniques to complete the project.

There are many Project Management resources available online, such as the PMI (Project Management Institute), which offers industry-recognized resources for project management. However, resources are available that relate more specifically to the transportation field. This guide combines skill-building resources with transportation related resources.

1.6 How is This Guide Organized?

The guide is organized by the project life-cycle workflow, with project management and business system practices included in each section. The sections cover areas such as how to:

- Initiate, plan, and scope a project.
- Manage, adjust, and execute your team plan.
- See the project realized through construction.

2 THE SCOPING PHASE

The planning team scopes project ideas from a collection of data from a variety of sources at ITD (e.g., Materials, Traffic, Bridge, Maintenance, Data Analytics). This includes accident data, previous project history, pavement condition, bridge condition, corridor studies, traffic volumes, and other data that the District may have collected that generate project ideas. These ideas are then used to create scoping charters for projects which are subsequently programmed into the Idaho Transportation Investment Program (ITIP).

2.1 Initial Scope Determination

The initial scope defines program type, project standards, goals, purpose & need, scope of work, project limits, and contract type. Include assumptions of what the project is and is not in the initial scope. See Section 200 of the Roadway Design Manual.

2.2 Form Scoping Team and Conduct Scoping Meeting

Assemble a holistic project team and engage team members throughout the project.

The project team should include and/or regularly engage transportation engineers and technicians as well as subject-matter experts (SMEs) like Environmental, Bridge, Right-of-Way, Materials, Traffic, Public Involvement, Communications, and third-party stakeholders. This ensures the right people are involved early enough to be effective while also establishing consistent and effective communication between the PM and SMEs.

The scoping team may include Environmental, Right of Way (ROW), Bridge, Materials, Traffic, Location, and representatives from Design/Construction, Maintenance, or Enterprise Technology Services (ETS). The scoping team will:

- Address whether the proposed project meets ITD's Strategic Goals.
- Brainstorm all risks, issues, and/or opportunities.

2.2.1 Engage Environmental

Environmental issues may require significant time. Communicate with Environmental early and continue throughout the project. It is important to anticipate any issues and plan resources accordingly in conjunction with Environmental staff. Consult the Environmental Process Manual for detailed processes.

2.2.2 Engage Right of Way, if needed

ROW is another area that may require significant time and coordination with ROW staff to ensure that all ROW tasks can be completed within the schedule. Consult the Right of Way Manual for detailed processes and information.

2.2.3 Engage Bridge, if needed

Bridge provides the type, size, and location for the intended structure. The ITD Bridge Design LRFD Manual is intended to supplement and provide interpretation of the AASHTO LRFD Bridge Design Specifications as well as provide guidance for designers, checkers, and consultants.

2.3 Draft Scoping Charter

Clarify the project's goals, purpose, scope, needs, key assumptions (what's included), and key exclusions (what's not included). Document this information clearly in the Project Charter and stick to them unless a change is needed.

At the outset, clearly define the reason for the project, what the project includes, and what the project does not include. Stick to that scope throughout the project's development. Remember to included SMEs when establishing these items. Many budget increases during development and cost overruns during bidding and construction are a direct result of undocumented or late changes to project scope that are inconsistent with the project's charter.

The scoping team creates a project charter identifying project scope, schedule, and budget, along with other supporting information. Please refer to the Project Charter Instructional Manual for definitions and samples.

2.4 Establish Budget – Preliminary Engineer's Estimate

Establish the project-delivery strategy and contracting/delivery method (e.g., Design-Bid-Build, Design-Build, CMGC, etc.) to best achieve project goals. The strategy and contracting/delivery method largely drive the project's schedule, cost estimates, and risks. It's imperative to define the strategy early.

- Develop stable, accurate cost estimates that will endure through the project (i.e., estimated costs don't increase every year).

  Many inaccurate cost estimates are due to not honoring one or more of these key concepts:

  - Keep cost estimates up to date and be consistent with the current approved project charter (goals, scope, schedule, and key assumptions and exclusions, contracting/delivery method). The ITIP must reflect the latest cost estimate.
  - Estimates must be comprehensive (don't leave anything out), shouldn't double-count any costs, and should consider unique or difficult project conditions. Early in the project, include "allowances" as cost placeholders for known items that have yet to be estimated in detail.
  - Cost estimates should make use of the best-available costing information (e.g., the latest relevant unit prices with suitable adjustments for potential price fluctuations by the time the project is advertised). Estimates should always state the dollar-year basis (e.g., "costs are estimated in 2018 dollars").
  - Estimates should include a suitable contingency to cover uncertainties and risks. The contingency should reflect the project's complexity, level of development, and size. In general, more-complex projects early in development should carry higher contingencies. ITD's traditional 5% contingency is almost certainly inadequate for a project in planning & scoping or in preliminary design, but might be reasonable for a project entering construction. Proactively manage (improve) key project risks.

Estimate the initial cost of a project with the Project Estimate Summary sheet in the charter in conjunction with the District's preferred estimating method. PMs update these estimates at least once a year during program update and at critical design milestones (e.g., Preliminary Design, Intermediate Design, Final Design, Plans Specification & Estimate (PS&E), pre-advertisement) with more detailed estimates as the project develops.

2.5 Program Project in ITIP Using Office of Transportation Investment System (OTIS)

Phase Code	Description
CC	Construction Engineering by Consultant
CE	Construction Engineering
CL	Construction Engineering by LHTAC
CN	Contract Payments
LP	Land Purchase
PC	Preliminary Engineering by Consultant
PD	Preliminary Engineering by Consultant Operating Budget
PE	Preliminary Engineering
PL	Preliminary Engineering by LHTAC
RW	Right of Way
UT	Utilities

PMs enter projects into the ITIP during the annual Program Update cycle which occurs as defined in the FY20 Update Manual for the Idaho Transportation Investment Program.

2.6 Update Charter in Project Scheduling System (PSS) With Temporary Key Number from OTIS

Once a project is entered into OTIS, the system generates a Temporary Key Number. This is then entered into PSS under the Exit Criteria Project Detail page. This is important because it provides the linkage to update the Key Number once the program is approved as well as update the fields controlled by OTIS.

2.7 Edit Schedule for Initial True Minimum Milestones (TMMs) Completion Dates

Identify the key project tasks and activities required to achieve the goals, and then develop and create a project schedule for completing those activities.

Base project schedules on an "early-start" philosophy—start work activities as early as possible rather than the "late-finish" philosophy, which determines how late work can start. The late-finish philosophy is extremely risky because it does not allow for contingencies that would otherwise absorb inevitable project-schedule risks. Moreover early-start, particularly not scheduling PS&E for completion right at the Fall delivery deadline when many construction projects are still active, could significantly reduce project-delivery stress

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Once you have scoped the project and consulted with Environmental, Right of Way, Bridge, Design/Construction, and future development team, plan the year of inclusion in the ITIP. Project TMMs are important dates in which a project's progress is measured. Adjust Durations

and other items in the schedule to ensure the project reaches TMMs (e.g., PS&E, Advertisement and Award) to construct the project in the programmed year.

2.8 Record Initial Risks and Opportunities

Consider and document initial risks and opportunities in the charter. Develop a record of risk items, triggering event, probability, impact, cost, mitigation and contingencies to address a path forward should a risk be realized.

2.9 Establish Generic Resources Required for Project

Consider what resources are required to execute the project. Resources can be specified as generic types to allow for resource planning. Assign initial resources at the Development phase kickoff.

3 DEVELOPMENT PHASE

The project moves from the scoping phase to development phase when the Division of Highways places the project in the Idaho Transportation Investment Program (ITIP) and is approved by the Transportation Board. District leadership will assign the PM duties for all of the projects in the ITIP.

3.1. Project Startup

- Review documents (e.g., Charter, estimate) completed by the Scoping Phase
- Perform a field review of the project to assess the overall needs of the project to help refine the scope of work.
- Develop the plan (e.g., what tasks are needed, Bridge TS&L)
    - Scoping Phase Documents
    - Review initial schedule
    - Communication Plan
- Seek input, advice, and comments from maintenance (i.e., Operations Manager, Maintenance Foreman)
- Define Stakeholders with their level of involvement. See Appendix I, Typical Project Team. Conduct a stakeholder assessment to identify external personnel to the project that may need to attend the kickoff meeting.
    - Internal
        - Project Sponsor and Project Owner
        - Project Management Office
        - District Operations Manager
        - Maintenance personnel
    - External
        - Political
        - Property owners
        - MPOs
        - Utilities
- The PM builds the project team and determines the roles and responsibilities for each team member. Below are possible roles or responsibilities the team will need.
    - Engineer of Record
    - Public Involvement Specialist (assigned directly from Office of Communication or the District representative)
    - Roadway design lead
    - Environmental lead
    - Materials Lead – See Materials Manual for details on the needs of the project.

        - Geotechnical
    - Bridge Lead
    - Traffic Lead
    - Survey
    - Environmental Technical report development – Work with the Environmental Lead. See the Environmental Manual.
        - Hazardous Materials (e.g., test bridges for asbestos and lead)
        - Wetlands
        - Cultural Resources
        - Endangered Species Act
        - Noise
        - Sole Source Aquifer
    - Hydraulics and drainage
    - ROW lead
- Determine what tasks need to be assigned to a consultant. The tasks contracted to a consultant will consist of all or portions of the project team listed above. What is the estimated cost for a consultant? Cost can be calculated based on experience and consultation with other internal team members for advice. Once an estimate is determined, compare it to the scheduled budget of the PC funds. Use OTIS to check budgets. OTIS manages the department's financial budgets for all projects. If you are projecting to need more PC funds than have been allotted, a charter change request (CCR) is required in order to increase the budget. Reference the procedures to develop a CCR page 84 of Project Charter Guidebook.
- Determine the solicitation method for the consultant, if required. ITD has three methods: direct select, Request for Information (RFI), and Request for Proposal (RFP). See Consultant Administration Manual for rules and guidelines.
- Prepare agenda and documents for the project kickoff meeting.

3.2 Kickoff Meeting

- Assemble meeting attendees. Attendees should consist of the entire project team, a representative of the Scoping phase, and all necessary stakeholders. At a minimum, stakeholders that should be included are the Sponsor, Owner, and Maintenance.
- Conduct initial kickoff meeting to review the entire plan and roles and responsibilities as initially defined. Assess risks, schedule, and scope issues.
- If project requires a field review, schedule a field visit. The purpose of the meeting is for the team to visit the site, identify risks, and potential budget issues. A checklist aids in the analysis of all items (see Appendix C).
- Conduct the follow-up kick off meeting, if necessary.
- The purpose of the meeting(s) is to gain buy-in, assess risks, understand roles and responsibilities, refine the scope, budget, schedule, and to update the Charter.

- See Appendix A for a sample outline for a kickoff meeting.

3.3 Refine Charter and Schedule

Assess and refine the scope, schedule, and budget within the Project throughout the life of the project. As the project progresses through the development phase and more information is obtained (e.g., survey, materials, environmental, hydraulics, bridge), update the Project Charter to reflect this new information.

Project charters and the related project schedules and cost estimates must be kept up to date and consistent with one another. These items must be documented in ITD's enterprise PM tools (not in your head or in your personally preferred spreadsheet), and must be reflected in the ITIP.

Verify that the Engineer of Record has updated the design standards. See the Project Charter Instruction Manual and the Roadway Design Manual for more information.

3.4 Plan Public Involvement

Utilize the Guide to Public Involvement Manual and application to assess the level of effort necessary. Work with the Environmental Planner and Public Involvement Specialist to define level of effort to meet NEPA requirements and inform both stakeholders and the public. To ensure the proper distribution of project communications, develop a mailing list.

Some possible examples of involvement are:

- Project Website – The Office of Communication and GIS both have public website templates that can be used for public involvement.
- Letters, post cards
- Public Information Meetings
- Public Hearings
- Waiver of Hearing
- 511 Website – Ensure the ITD-511 form is completed and filed with the 511 administrator.

Idaho State Statute states any field investigations outside of ITD's right of way requires notification and authorization of the property owner(s). Please see the letter and consent form template for reference.

3.5 Manage Project Development Effort

3.5.1 Ensure Team has Staff Resources

Ensure each individual on the project has the resources required to perform their tasks.

Proactively manage the team and activities per these principles to achieve the project's goals.
Do not leave work undone and assume someone else will handle it.
Regularly follow up and always follow through.

Each member of the team is dependent on each other. Ensure the team knows these dependencies and how each member fits in the overall schedule. Below is a list of examples of

how each individual of the project is tied to others. For example, a teammate is scheduled to complete a task in 2 months and someone is then supposed to start their next task at this completion date. While they are waiting, they work on another project. The PM is responsible for communication and scheduling of resources.

Survey

The property owners' consent forms must be sent and received before any field work. Survey also needs existing roadway and ROW plans as well as existing highway deeds.

Materials Lead

- Need to schedule all field work during appropriate seasons – avoid winter time.
- Need traffic and ESAL counts
- Need a preliminary alignment developed
- Phase IV reports need preliminary Bridge Situation & Layout.

Traffic Lead

- Schedule Traffic Data Collection and Analysis
- Intersection turn counts
- Signal vs. Roundabout recommendations
- Safety projects – done ahead of time to obtain funding
- AADT and VMT from TAMS

Hydraulics and drainage

- Need survey
- Need Bridge layout (Draft Situation & Layout)
- Need design model developed for surface drainage

Right-of-Way Lead

- In Roadway Design Manual Figure 4.1 Section 4.15
- Flow chart for process (see Chapter 2 flow diagram in Right of Way Manual)
- Need environmental document to obligate land purchase (LP) funds and begin property acquisitions
- Need District-approved ROW plans to begin property negotiations

Public Involvement Specialist

- Need a project description
- Need approved Stakeholder list
- Need ITD-511 form

Roadway Design Lead

- Need survey for Bentley Open Roads (see CADD Manual)
- Need all approved materials reports
- Need Final Hydraulics Report
- Need bridge design

Environmental Lead (EL), Environmental Planner

- Writes or directs the completion of the Environmental Evaluation.
- Many of the technical reports under NEPA require coordination with federal and state agencies. The agencies time frames to issue a decision are defined, but if a report has to be revised during the review, the clock restarts. The PM schedules these time commitments with the EL.
- All field work needs to be scheduled during the appropriate seasons by avoiding winter time.
- If a consultant is needed to perform environmental tasks, the PM needs to review the budget to ensure funds are available to hire consultant(s).
- The following disciplines are the most common expected by a project:
    - Cultural Resources
    - Hazardous Materials
    - Wetlands
        - Endangered Species Act
        - Noise Criteria Impacts
        - Sole Source Aquifer

Below is an example of technical data to assist the EL to perform their work.

1. ITD-1500 form.
2. Traffic data (AADT & VMT), current and projected
3. Preliminary alignment developed.
4. Preliminary Bridge Situation & Layout.
5. If the project will cause any changes to existing drainage patterns.
6. Project description. The description will vary slightly based on the intended audience.
7. If any work will occur outside of existing ITD ROW. If the project located near federal or on tribal lands.
8. Draft and approved hydraulics and drainage reports.
9. Accurate location. Provide a vicinity map.
10. Approved Materials Phase I report with typical sections (existing and proposed).
11. Existing roadway and ROW plans.
12. A copy of the current bridge inspection report(s).

Bridge Lead

- Survey

- Approved Hydraulics
- Approved Materials Phase IV Report
- Roadway design alignment
- For roadway projects, submit the bridge request form to the Bridge section.

3.5.2 Meetings

Every project is different and requires a different level of team involvement. The PM must determine the appropriate level of involvement for each project. An example of the level of involvement is determining the frequency of meetings (e.g., every week, bi-weekly, monthly). Define a communication plan for the team and stakeholders. The PM is expected to orchestrate these meetings, solicit input, and buy-in.

Conduct regular one-on-one meetings with team members to assess needs and status.

ITD's Roadway Design Manual defines specific types of meetings.

- Preliminary Design Review
- Intermediate Design Review
- Final Design Review
- PS&E Design Review

3.6 Budget

Projects have multiple phase cost components (PE, PC, UT, RW, LP, CE, CC, CN). The PM must understand each component and check what has been spent and what is remaining. The construction budget must be checked with the Engineer's Estimate. The PM must review the estimates and provide updates to the Scoping group to update the ITIP annually. The typical deadline for the ITIP update is to have the estimate status by March.

3.7 Scope

All Highways projects are funded within select categories (Pavement Preservation & Restoration, Bridge Preservation & Restoration, Safety, and Capacity). The PM must know how projects are funded by category and State Funding vs Federal-Aid. Someone from the Scoping group can help inform on the constraints and requirements of each category. See annual Program Update Manual for descriptions of each category.

3.8 Schedule

Develop a detailed schedule, at the effort level appropriate for the project, during the initiation stage. Consult with team members before the kickoff meeting to ensure the schedule is correct. Refine the schedule to match the team expectations established during the kickoff meeting. Set the schedule baseline and seek approval from the Project Sponsor.

Develop the schedule at the appropriate level of detail to document the critical path for a project to ensure the projects meets its deadlines. All tasks should be based on duration and not driven by effort. The schedules needs to be early start and early finish. Update schedules as needed (ITD recommends updating schedules every two weeks).

Look at the big picture—keep an eye on the final completion date (PS&E Submittal) and construction windows.

Complete a 30-day forecast on a regular basis, roughly every two weeks. Define the tasks that must be completed during the next 30 days and communicate this information to the team. This can be done by status meetings, email, etc.

3.9 Quality

Ensure the entire project is developed at the highest level of quality, both in constructability and free of debilitating errors. The Engineer of Record (EOR) is responsible for the accuracy of the plans and specifications. Work closely with the EOR need to ensure quality.

In some cases, a quality manager (QM) may be essential for a project. A QM would provide the linkage between the PM and the rest of the team to ensure a quality project.

3.10 Delivery PS&E

Ensure the plans, specifications, and estimate are complete and accurate. A checklist is a useful tool to help ensure the project is complete for PS&E. An example checklist is found in the Roadway Design Manual.

Check the final estimate with the scheduled construction cost (CN). Also, check the different funding types for needed and scheduled amounts. The construction cost is divided into multiple pools: contract bid items, non-bid items, and contingencies. Contract bid items are everything that will be bid by contractors. Non-bid items are incentives, disincentives, and bonuses that may be included with the contract. The contingencies are an amount that is unexpected, either due to change orders or quantity overruns; this is typically 5% of the total bid items.

The construction engineering (CE) are the funds that cover ITD staff project expenses. Determine if any consultants are needed to construct the project. Consultants are typically used in construction for staff augmentation, materials testing, contract administration, inspection, and EOR tasks. The EOR is the individual whom signed and sealed the plan sheets. Some EOR tasks are to answer questions, advise, review change orders, and approve shop drawings. CC is the funding phase to cover consultant work in construction. Complete an estimate to determine appropriate CE and CC funds. Tables have been created based on ITD historic data showing % of CE/CC for types of projects. For projects with funds being supplied from any outside entity, make sure that they know how much the overall project is setup for these types of transactions.

Make sure the project schedule is updated. Perform any necessary charter change requests (CCR).

Ensure all railroad, canal companies, local entities, and utility agreements are complete. Make sure that any utility board orders have been executed (see the Guide to Utility Management).

Ensure that all Utility Management consultant agreements are completed and closed.

Coordinate the approval of the Environmental Re-Evaluation for the project. Ensure ROW certification is completed.

Prepare and send an email to HQ informing them that the project is complete and ready for advertisement and award. See the appendix for an example of the email layout and/or discuss

with more experienced project managers on who and how to send this email. Additional guidance is provided in the Knowledge Library in ProjectWise.

3.11 Advertisement and Award

At the completion of the PS&E stage, most of the work is handled by HQ and District program managers. The project is waiting for obligation based on the appropriate time to be bid. HQ staff will review the package to ensure that the documents are complete and ready for advertisement. If documents need revision, HQ will notify the PM to complete the changes.

Depending on the time between the PS&E submittal and advertisement, the PM should check the estimate to ensure the prices best reflect the current market trends. This should occur within three months of the advertisement.

Ensure the Environmental Re-Evaluation is up to date.

Update the project schedule including construction. Prepare the project charter for final approval and exit criteria of the Development Phase into the Construction Phase.

Coordinate any communication from bidders, being cautious not to share any information that would give a competitive advantage to select bidders.

Ensure any needed addendums are processed in a timely matter.

3.12 Consultant Agreement Closeout

Complete and close design consultant agreements after the bid and award period.

4 CONSTRUCTION PHASE

4.1 Manage Scope per Contract

The scope of work is defined in the contract plans and specifications. The PM has the opportunity to modify the scope of work through the change order process, with appropriate approvals by the Design/Construction Engineer or higher authority depending on the cost or time increases. The PM ensures any change orders are necessary, prudent, and within the general scope of the contract. Changes that would add elective or additional elements not within the original contract are discouraged. Refer to the Contract Administration Manual for change order process and details.

4.2 Manage Communication

4.2.1 Correspondence with Contractor

Ensure effective correspondence with Contractor via weekly meetings, phone calls, emails, submittals, preconstruction conference, preoperational meetings, pre-paving meetings and/or other communication mediums as necessary for the project.

4.2.2 Correspondence with Project Team

Establish your construction team including inspectors and testers. Determine if there is a need for consultants during construction. If so, develop construction consultant agreements for the project.

Communicate with the project team via meetings, emails, hallway discussions or other methods as required to share pertinent information regarding progress of the project. Keep the Engineering Manager and District Engineer informed as required.

4.2.3 Update Local Stakeholders

Update local stakeholders as project requires or as necessary and in compliance with state/local agreements. Maintain an open and honest dialogue carried out via meetings, emails, and/or other such correspondence as pertinent to the project.

4.2.4 Communicate to Public

Communicate the status of the project and upcoming modifications or changes impacting the public. Follow the project's public outreach plan in conjunction with the Office of Communication.

4.3 Update and Maintain Construction Schedule

4.3.1 Monitor Contractor Schedule

Monitor the Contractor's schedule and updates as per the Contract Administration Manual. This includes the detailed CPM and required submittals as per the Standard Specifications for Highway Construction. Track contract time in AASTHOWare Projects, handle excusable delays via schedule analysis and contract time extension change orders, coordinate contractor

schedule recovery for inexcusable delays, and assess liquidated damages and other incentives/disincentives as appropriate in accordance with the contract.

4.3.2 Maintain and Update Schedule in PSS

Update and modify the construction and closeout schedule within the PSS system when necessary. Minimally, this will consist of the TMMs for construction start, completion, and project closeout with single line items for the construction period and the project closeout. Update the schedule every two weeks during construction to show progress and any changes to the completion dates.

4.4 Monitor Contract Budget and Variances

Monitor the contract budget, including the effects of change orders, item quantity variances, and bonuses/deductions or other adjustments. Payments, change orders, quantity variances, etc… must be done in accordance with the Contract Administration Manual and Standard Specifications. Communicate budget changes when necessary.

4.5 Coordinate Team

Ensure that staff resources are properly identified and scheduled for all materials testing, project inspection, documentation, contract payments, and communications. This includes ensuring that staff are coordinated to cover shift or weekend work, available for planned operations (e.g., pile driving, concrete placements), and complying with overtime and fatigue policies.

4.6 Monitor Quality

Ensure that all minimum testing requirements are met, including material certifications, material acceptance tests, verification tests, QASP workbooks, and requirements per the Quality Assurance Manual. Verify the posting of test results to ProjectWise under the item files and coordinate the materials review process at the conclusion of the project. Ensure that Independent Assurance testing is being conducted as required.

4.7 Manage Risks and Issues

Monitor communications and report all disputes, claims, requests for change, work not meeting the contractor's schedule, third-party issues, unforeseen site conditions, unseasonal weather, high flows in creeks/rivers, or other risks that jeopardize budget, reputation, or public safety/convenience. Work with the Resident [Design/Construction] Engineer to resolve or mitigate risks upon identification.

4.8 Closeout

Recommend substantial completion per the contract. Prepare and track the completion of contractor punch list items. Schedule and participate in the final inspection. Ensure all documentation is complete in the file. Prepare closeout documentation and coordinate the District Record Inspector final audit and Material Summary review and approval. Initiate a final estimate and verify that all final acceptance documentation is submitted to HQ and the State Tax Commission.

Appendix A – How to Conduct a Kickoff Meeting

- Why:
  - Kickoff Meetings are essential to setting your project up for success. It is a critical time after you know enough about your project to talk about it, but before work is commenced by your team. A successful kickoff meeting will get your team on the same page, clearly communicate expectations, and leave your team feeling like they know what they need to do and when to complete it by. The Kickoff Meeting signals the beginning of the Preliminary Design process and will help answer many preliminary questions.

- When:
  - A Kickoff Meeting is recommended on every project you start managing, no matter how small or big.
  - Schedule your Kickoff Meeting when you first start working on a project.
    - ❖ Best Practice: Organize a site visit with all the meeting attendees prior to the Kickoff Meeting. For example, you can have a site visit in the morning and Kickoff Meeting in the afternoon.
    - ❖ Best Practice: Limit the Kickoff Meeting to 1 to 2 hours in length. Employ meeting facilitation skills to stay on topic and make sure everyone is heard. The use of a "Parking Lot" for items that need more discussion at a later time is a helpful tool to keep the meeting going.

- Meeting Purpose:
  - To introduce the project to everyone involved such as designer, engineer, resource team, stakeholders, etc…
  - To refine the Scope of Work and determine what will and will not be included in the project, or identify what questions need to be answered to finalize the Scope of Work.
  - To get input on tasks: what needs completed, what is needed to complete, who will complete, and how much time is needed?

- Where:
  - Schedule your Kickoff Meeting wherever meetings are usually held for your district. This will likely be your normal conference room.
  - Choose a room that has a projector and computer to show your agenda and notes.
  - Make sure there is enough room for your attendees.

- Who should be invited to the meeting:
  - Project Manager
  - Designer
  - Engineer of Record
  - Design/Construction Engineer (Project Owner) (both if it will change from design to construction)
  - District Engineer (Project Sponsor)
  - HQ Bridge Lead (if applicable)
  - Area Maintenance Foreman
  - Materials Engineer
  - Environmental Planner

- Traffic Engineer
- Communications
- Surveyor
- Planning Group Member
- Other Stakeholders

- What to discuss:
  - Example Agenda:
    - Welcome and Introductions
    - Meeting Purpose: *(Share the following to let everyone know why you are having this meeting)*
      - Introduce the project to everyone involved
      - Refine Scope of Work
      - Get input on tasks
      - Assign tasks
    - Project Overview *(Review all the items below from ITIP and verify with attendees that they are correct. Make note of what needs changed.)*
      - Location (Route, Milepost, Segment Code, Road Classification, NHS Classification; A vicinity map is helpful)
      - Project Limits (include ramps?, rest area?, turnouts?, mtce. Crossovers?, etc.)
      - Program Year
      - State/Federal Funding
      - Phase I or TS&L overview (What will the project complete? Mill and inlay, overlay, CRABS, how deep, is there a grade increase, …?)
      - Design Standards
        - Determine Project Type from Section 315.00 of Design Manual
        - Determine Design Criteria from Appendix A of Design Manual
      - Project Budget (PE, PC, CE, CN, CC, RW, UTIL)
    - Sponsor Perspective *(Have the sponsor share their priorities for this project (scope, schedule, budget) and any other special situations (political). It is best to let the sponsor know before the meeting what you want to hear from them. It is important for the sponsor to attend up to this point to show support for the project and pass off authority to the project manager. The sponsor can leave after this if they would like.)*
    - Project Plan, Deliverables, Schedule by discipline *(Work through each discipline and identify what tasks need done, who will do each task, what is required to complete the task, how long is needed to complete the task. Use the Work Breakdown Structure (WBS) as a prompt if needed. *Best Practice: Go through the WBS before the meeting.)*
      - Design
      - Traffic
      - Location
      - Environmental
      - Materials
      - Right-of-Way
      - Public Involvement
      - Bridge
      - Risks, Issues, and Strategies *(Brainstorm these items as a team)*
      - Communication Plan *(Discuss the communication expectations. Determine how often the team will meet. This is a good time to discuss anything special such as WebEx meeting*

conduct. Discuss how often the team members will provide a status update to the project manager.)

- How:
  - Send out meeting invite with agenda and basic project information.
  - Talk to Sponsor about attending, what you want to hear from them, and that they can leave if they want after their part.
  - Best Practice: Coordinate with resources prior to the meeting so they have a basic idea of the project and their tasks. This allows them time to think about any other tasks they need, identify issues and/or concerns to resolve at the meeting.
  - Display agenda on projector and take notes as you go.
  - Document who attended the meeting.
  - After the meeting, finalize your notes, document decisions in the project charter where appropriate, and use the task discussion to finalize the project schedule.
    - Best Practice: do this immediately after the meeting while it is fresh in everyone's mind.
  - Save meeting notes in a general location for the project such as ProjectWise Project Management Folder or PSS Project Site OneNotebook.

Appendix B – Environmental (placeholder)

Appendix C – Field Visit

Field Visit Checklist

{Project Name} [Route] [BMP] to [EMP] KN:

Items	Approx. Milepost			Yes	No	NA
Roadway Width						
Lanes						
Shoulders						
Is guardrail to standard						
Average Height						
Any hazards?						
Are the slide slopes less than 4:1?						
Is the clear zone to standard?						
Is there a sight distance problem?						
Any drainage problems?						
Any culvert/pipe problems?						
Any bridges with concrete decks?						
Any manholes, catch basins, water valves?						
Number of field approaches? Width?						
Number of residential approaches? Width?						
Number of commercial approaches? Width?						
Number of county roads? Width?						
Any potential wetlands?						
Is there significant right-of-way?						
Waters of US locations?						
Is there any thermoplastic?						
Is the condition of the delineators ok?						
Is the condition of the milepost markers ok?						
Is the horizontal and vertical curves standard?						

Appendix D – Property Owner Notice

Your Safety • Your Mobility
Your Economic Opportunity

IDAHO TRANSPORTATION DEPARTMENT
216 S. Date Street • Shoshone, ID 83352
(208) 886-7800 • itd.idaho.gov

8/2/2018

«AddressBlock»

RE: <<Project Name>>

Project Number:

Key No:

You are receiving this letter because you have been identified as the owner of property adjacent to a proposed roadway project along *U.S 93 or SH 74 in Twin Falls County*. The Idaho Transportation Department is *proposing to improve the intersection of SH-74 and US 93 to provide a safer roadway*.

ITD and its consultants will be performing technical studies (survey, soil/subsurface investigation, cultural, and environmental). These studies are used in the roadway design to determine needs of the project. Work will be done on or near property boundaries and will cross into your property. All possible precautions will be taken to minimize impacts to your property.

Pursuant to Idaho Statute and ITD policy, written permission is required for ITD employees or its consultants to enter private property. All work is expected to be completed this fall. We will contact you prior to any work. A permission form is included with this letter and can be returned in the enclosed envelope.

If you have any questions or concerns please feel free to contact me at the phone number or E-mail listed below.

Thank you,

BCC: DE, ADE, RE, Project File

PRIVATE PROPERTY ACCESS PERMISSION FORM

Permission is granted to the Idaho Transportation Department and any consulting agencies to go upon or cross over the property of the land owner in order to perform technical studies, including but not limited general site analysis, survey activities, investigation of cultural resources, noise, underground materials, and wetlands search or delineation.

If provided with a phone number or alternate means of contact, the project lead will contact the signee to provide a date, time, and estimated duration access is requested prior to entering private property. A property owner may revoke permission at any time.

Land Owner Name: _____

General description of property access request:

_____

_____

_____

_____

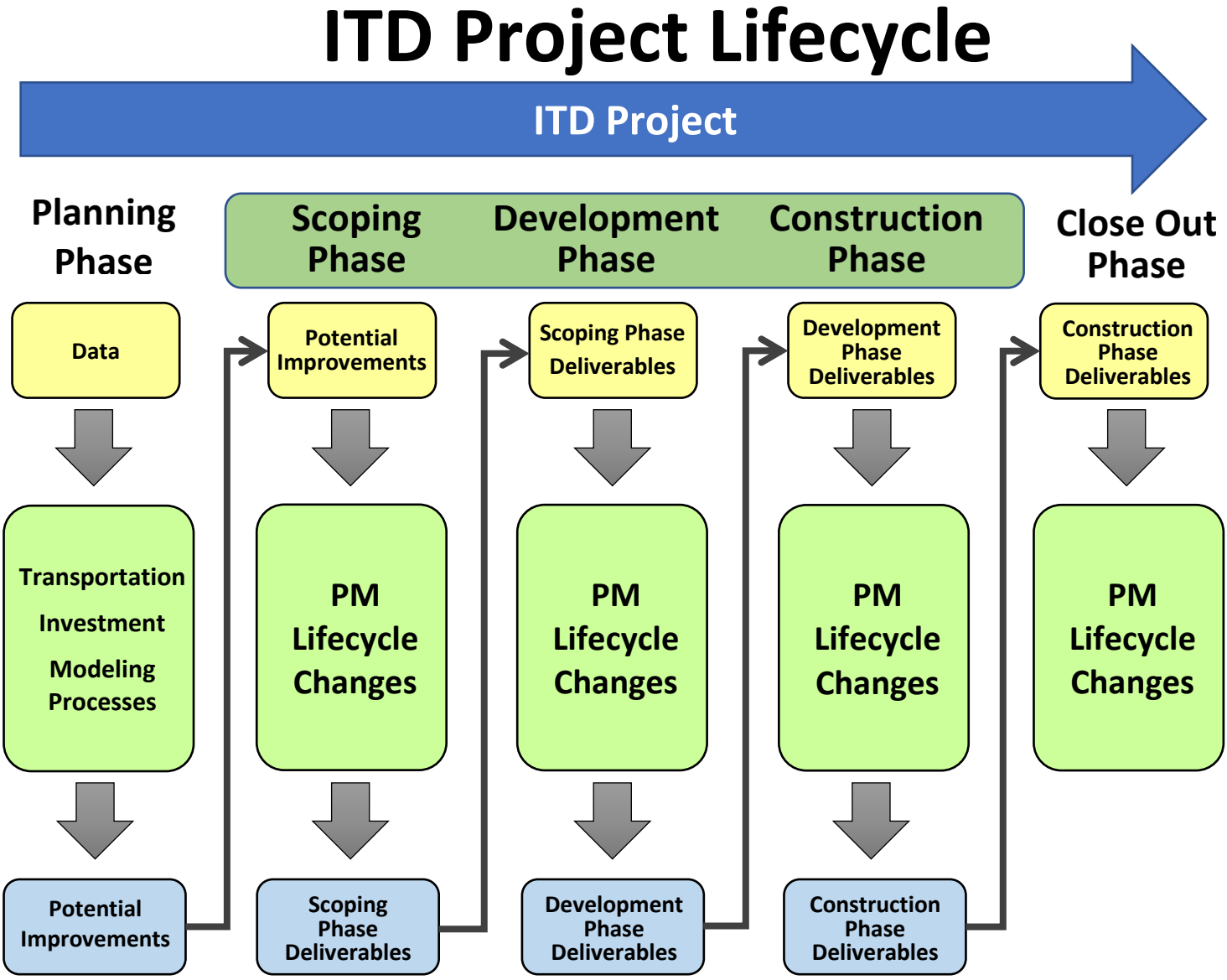
Owner or Agent Signature: Contact information:

_____ _____

If necessary, dates restricted from access:

From: _____ To: _____

Appendix E – Project Lifecycle



Appendix F – PM Authority (RACI Chart) Final

R - responsible, A- accountable, C- consulted, I - informed

What	Who				
Overall Phase	**Project Manager**	**Project Owner**	**Project Sponsor**	**PMO**	**HILT**
Manage project staffing (who's on the team, and their roles, quals)	R	A	I		
Manage project expectations / communication - Internal stakeholders / project team	R/A	C			
Manage project expectations / communication - External Stakeholders	C	R/A	I	C	
Decision to consult services - entire project	C	C	R	I	A
Decision to consult services - task or small subset of tasks	R	C	I		
Alternative Contracting Methods	C	C	R	I	A
Facilitate/Negotiate third-party agreements - RR, Util	R/A	C	I		
Facilitate/Negotiate third-party agreements - City, HWY Dist	C	R	A		
Planning and Scoping Phase	**Project Manager**	**Project Owner**	**Project Sponsor**	**PMO**	**HILT**
Program Update Decisions					
Charter	R	C	A		
Contract Type, Need for RFP, DB or CMGC	R	C	A		
Establish Initial Project Charter and Schedule	R	C	A		
Establish Initial Project Timeframes and Budgets - layout program priorities	R	I	I	A	
Existing Program Decisions During Update					
Moving Projects within Program	R	C	A	I	C
Development Phase	**Project Manager**	**Project Owner**	**Project Sponsor**	**PMO**	**HILT**
Charter Updates as Needed (See items below)	R	C	A		
Scope change					
Increase or decrease project limits (Consult Environmental for project limit increase)	I	R	A	I	C
Add or remove design features	R	A	C		
Schedule change					
Milestone variance of <= 30 days	R/A	C			
Milestone variance of <= 90 days	R	A	I		
Milestone variance of <= 180 days	R	C	A		
Milestone variance of > 180 days or Later than the 1st FFY - 6 months	R	C	C	I	A
Any increase in funding including at advertisement					
If project total is <$2M and < 5% increase OR if project is > $2M and < $100K increase	R/A	C	I		
If project total is <$2M and >5% increase OR if project is > $2M and > $100K increase	R	C	A		
Changes to Engineers Estimate during advertisement up to bid opening	R	A	C	C	
Increases for Award > 10% Engineers Estimate	R	C	A	C	I
Manage third-party agreements/contracts: PC	R/A	C			
Construction Phase	**Project Manager**	**Project Owner**	**Project Sponsor**	**PMO**	**HILT**
Project Acceptance	C	R	A		
Change Orders	-	-	-		
Dispute Resolution, changes, extra work < $25K	R/A	C			
Dispute resolution, changes, extra work $25K to $100K	R	A	I		
Dispute resolution, changes, extra work > $100k	R	C	A		
Dispute resolution, changes, extra work > $1 Million (Chief Engineer = A (Accountable))	R	C	C		I
Contract time extention <= 5 days	R/A	C			
Contract time extention 6 - 10 days	R	A	I		
Contract time extention > 10 days	R	C	A	I	I
All other change Orders	R	C	A		
Manage Estimate at Completion (EAC) <105% of Contract Amount	R	C			
Manage Estimate at Completion (EAC) >105% of Contract Amount	R	C	I	C	
Manage Estimate at Completion (EAC) >110% of Contract Amount	R	C	C	C	I
Manage third-party agreements/contracts: Construction	R	A	I		
Manage third-party agreements/contracts: CC	R/A	I			

Responsible: person who performs an activity or does the work.
Accountable: person who is ultimately answerable for correct and thorough completion of deliverables or tasks and has Yes/No/Veto. The "Signatory".
Consulted: persons whose opinions are sought, typically subject matter experts; and with whom there is two-way communication
Informed: person that needs to know of the decision or action; and with whom there is just one-way communication.

Managing EAC: No A (Accountability) needed since accountability/approval occurs under change order part matrix.

- The PM is responsible to manage the estimated completion costs and Owner is consulted when costs are within 105% of contract amount. (Contract +5% Contingency)
- If the estimated completion costs are less than the contract amount the PM is responsible for releasing these funds. The Owner, Sponsor and PMO are informed.
- If the estimated completion costs are projected to be between 105 - 110% of the contract amount the PM is responsible for managing the costs, the Owner is consulted and the Sponsor is informed. The PMO is consulted for funding options.
- If the estimated completion costs are projected to be over 110% of the contract amount the PM is responsible for managing the costs, the Owner and the Sponsor are consulted and the HILT is informed. The PMO is consulted for funding options.

Appendix G – Risk Checklist

"Starter" Risk Checklist for Projects and the ITIP

This "starter" risk checklist is not a template; it is a companion to the Risk Register template. This checklist is intended to be a seed – we hope that ITD PMs will add to this over time, so that this checklist becomes a useful resource for other PMs as they develop their internal risk registers.

Risk checklists are intended to be consulted as one of the last steps in the risk identification process. After the PM has utilized other approaches to identify risks to ITD (see PMIG Section 5.14; e.g., individual interviews, group brainstorming), the PM can refer to a risk checklist as a prompt to ensure all the potential issues have been identified (i.e., none were missed).

Note that risk checklists are *not* proper project risk registers, because the items in a checklist are not a comprehensive list of risks and are not non-overlapping. Risk checklists are more like a shopping list of potential issues or *types* of issues that have been observed on past projects, and could potentially occur on future projects.

To keep this checklist generalized, the *types* of risks to ITD are organized into categories defined by the five project-management process groups outlined by PMI. The PM can choose or define another set of categories (e.g., project phases or tasks in the Work Breakdown Structure, technical and management disciplines involved in the project; questions in the Risk Opportunity Assessment, the 11 project management knowledge areas, etc.) for organizing a register of risks to ITD.

"Risk" is defined here to include both potential losses ("threats") and potential improvements ("opportunities"). PMs should consider both when defining potential changes from the assumed conditions, scope, design, and performance of the scope of work.

Note that risks related to Health, Safety, and Environment (HSE) are included below, although they may not be described in detail in the project risk register since they are generally addressed as part of the risk register in the Charter. Please be sure that the HSE risks are adequately captured in one location or the other (and if fully documented in both locations, that they are not inconsistently documented across documents).

1. "Starter" Risk Checklist – Risks by Project Phase (per PMI)

Initiating Process Group

- ITD loses the project or suffers scope reduction because project funding is significantly reduced
- Unresolvable conflict of interest precludes ITD involvement or requires modification of ITD's role, whether internal conflict or external with third parties
- Project location poses unacceptably high HSE risk

Planning Process Group

- Project scope changes due to request from project owner
- ITD inadequately characterizes scope
- Inadequate cost estimate prepared for the assumed scope (e.g., cost estimate missing key items or soft costs; numerical errors in the estimate; improperly estimated labor hours or expenses, or wrong rates)
- Inadequate schedule estimate prepared for the assumed scope (e.g., improperly estimated task durations; key activities missing from schedule; inappropriate logic ties between key activities in the schedule)

- Difficulty reaching agreement on contract terms and conditions with project owner (either a time delay, or ITD accepts less-than-desirable contract terms, or both)
- Unable to reach agreement (at all) on contract terms (i.e., ITD project cancelled)
- Difficulty or delays acquiring necessary travel documentation or HSE approvals (e.g., High Risk Travel)

Executing Process Group

- Inexperienced PM
- Critical turnover in key ITD staffing during the project (e.g., loss of PM or technical lead)
- Challenges managing staff across multiple ITD offices or regions (e.g., communications, expectations/culture, travel, commitment/availability)
- Poor ITD project-manager performance (could have multiple impacts)
- Critical turnover in project owner staffing during the project, leading to problems for ITD
- Other ITD resource shortage during project (e.g., staff not available, not trained appropriately, labor problems), whether in the office or in the field
- Other project owner resource shortage during project (e.g., leading to delays in design approvals)
- Poor internal communication between office and field staff leads to inefficiency or poor field decisions
- Legal or code compliance failure (whether originating in the office or field) leads to delays and/or cost penalties
- Environmental or permit compliance failure (e.g., ITD or contractor doesn't follow permit requirements) leads to delays and/or cost penalties
- Difficult field environment for ITD staff (harassing project owner, difficult contractor, poor work conditions), potentially leading to disputes, work stoppages, field staff turnover, etc.
- Difficult project owner interactions or relationship leads to reduction in ITD scope or ITD's removal from project
- Difficult or poor-performing sub consultant or contractor leads to additional effort by ITD (at our cost) and/or potential problems with project owner
- Project scope changes for specific reason (e.g., revised understanding of project owner's objectives or site conditions; original scope was inadequate for other reasons; owner changes project definition or scope; etc.). Could result in uncompensated changes if procedures are not followed or if the "change" was ITD's fault.
- ITD must re-do work or do additional work (because of technical mistakes or inefficiency, ITD didn't understand scope of work, etc.). These types of risks could apply to any or all technical disciplines involved in the project.
- Unanticipated technical issues lead to delays or additional costs (e.g., issues during site investigation, design, environmental process, permitting, construction, or closure). These types of risks could apply to any or all technical disciplines involved in the project.
- Unanticipated equipment issue leads to delays or additional costs (delays procuring needed equipment, damage or breakdown, calibration problems, etc.)
- Issues with environmental or geotechnical sampling/samples (sample disturbance, mishandling, QC/QA documentation, poor laboratory performance), leading to cost increases and/or schedule delays

- ITD or contractor causes damage underground utility or other third-party facility (could be one of several types of impacts – fire, explosion, loss of service)
- ITD or contractor causes significant fuel or chemical spill or leak (with environmental consequences or not)
- ITD or contractor causes vertical cross-contamination during drilling
- ITD or contractor improperly handles waste on site
- ITD or contractor damages sensitive or listed species on site (plant, animal)
- Significant accident onsite involving ITD equipment and/or staff (e.g., vehicular, collapsed excavation), from any cause (note: some of these might be covered under risk register in HaSEP)
- Poor weather causes significant delays (not compensated by project owner)
- Issues related to working remotely (e.g., stranding due to unavailability of transportation or medevac)
- Force Majeure ("act of God" like earthquake, fire, major storm event, war, plague) significantly impacts project schedule (with corresponding impacts to ITD)
- HSE incident (reference HaSEP risk register, which contains a detailed risk checklist)
- Poor information from project owner (e.g., data, maps, specifications) leads to dispute or delays
- Issues (conflict, performance) with third parties during project execution lead to delays or additional costs
- Deliverable delays to project owner (for reasons not mentioned above), leading to unhappy project owner and/or delays receiving payment

Monitoring and Controlling Process Group

- Invoices not submitted on timely basis to project owner (slow processing, delays getting progress letters, etc.), leading to delays getting paid
- Invoices rationally contested by project owner (e.g., problems related to charges, invoice format, rates, expenses, etc.), leading to delays getting paid or short pays
- Invoices irrationally contested by project owner (e.g., due to difficult project owner interactions or relationship), leading to difficulty getting invoices paid
- Poor internal sub consultant or contractor charge control (e.g., not tracked appropriately and/or not invoiced on timely basis), potentially leaving ITD with unbillable charges or overruns
- Poor internal cost tracking and/or control, leading to cost overruns
- Poor internal schedule tracking and/or control, leading to deliverable delays
- Difficulties with ITD's internal systems (BST, Dynamics, scheduling software) affect project controls

Closing Process Group

- Project owner won't provide certification of project completion
- Project owner won't provide letter of recommendation based on current project work

2. "Starter" Risk Checklist – Risks by Project Discipline

Contracting, Procurement, and Project Delivery

- Project delivery method (D/B, D/B/B, PPP), including uncertainty in ultimate method, and new or unique method to owner

- Single vs. multiple contracts (if not captured under market conditions)
- Construction market conditions (contractor pricing strategy/markup; cyclic market, and location within cycle at time of bid; number of viable bidders), including the potential for delay to the procurement process and/or re-bidding
- Significant increase in material, labor, or equipment costs (beyond what's included in inflation rates and market conditions)
- Delays procuring critical materials, labor, or specialized equipment
- Bid protests
- Claims related to clarity of bid and contract documents
- Errors and omissions
- Other issues related to unclear contract documents (identified during either procurement or later during construction)
- Other delays to contract procurement process (e.g., bonding and insurance issues)
- Owner approach to specifications (e.g., prescriptive versus performance-based)
- Incomplete or vague specifications
- Contractor non-performance (inefficiency if the impacts are not due to or captured by other risk items; default; bankruptcy)

Construction and Constructability

- Additional pavement resurfacing
- Additional geometry re-alignment
- Uncertainty in construction unit costs (e.g., earthwork)
- Uncertainty in construction quantities (e.g., bridges, walls)
- Inadequate staging areas identified for construction
- Dewatering issues during construction
- Issues related to tunnel construction procedures (see also tunneling under Geotech)
- Issues related to other construction procedures
- Uncertainty in planned construction sequencing / staging / phasing / construction duration
- Planned construction phasing doesn't work (need new plan)
- Maintenance of traffic (MOT) / work zone traffic control (WZTC) issues
  - Labor for assumed plan if plan is adequate
  - Proposed plan is not adequate
  - Issues related to detours
- Difficult or multiple contractor interfaces
- Uncertainty in structure demolition sequence and method
- Force Majeure during construction (acts of nature that impact construction, like earthquake, tornado, etc.)
- Safety issues (personnel, adjoining structures)
- Material reuse, removal, restoration
- Condition of existing structures (repair required?)
- Accidents/incidents during construction (traffic/collapse/crane toppling/slope failure/vandalism)

- Critical equipment failure
- Excessive scour or flooding
- New or unproven systems, processes, or materials
- Marine-construction issues
- Other difficult or specialized construction issues
- Tie-ins with existing facilities/roadways/structures/local access
- Failure prior to replacement (e.g., bridges)
- Additional temporary erosion and sediment control (TESC) costs
- Railroad conflicts (anticipated or unanticipated)
- Utility conflicts (anticipated or unanticipated)
- Work-window restrictions (e.g., fish windows, weather shut-down windows)
- Other third-party delays during construction

Design

- Uncertainty in, or risk or opportunity related to, the ultimate configuration of project components (compared to their current configuration or design), including type, size, and location (TS&L) and unit prices and quantities. Consider related (i.e., correlated or dependent) impacts to design, right-of-way/property easements, environmental documentation, permitting, utilities, and construction. Consider relationships to other issues in this list (conditionality/correlation). Example project components whose design could evolve significantly over a project include:
  - Horizontal alignment (e.g., geometry / grade)
  - Vertical alignment (e.g., underground vs. surface vs. aerial)
  - Bridges (superstructure and substructure)
  - Retaining walls
  - Earthwork
  - Noise walls
  - Other structures
  - Storm water collection and treatment
  - Paving
  - Right-of-way (e.g., full vs. partial takes; uncertain parcels/quantities)
  - Maintenance of traffic / traffic control
  - Traffic Demand Management (TDM) / Intelligent Traffic Systems (ITS)
  - Construction staging/phasing
  - Electrical (systems, signals, illumination)
  - Mechanical
- Design errors and omissions or errors in plans/specs/estimates (discovered during construction)
- Urban design and construction issues
- Changes in design standards (e.g., increased seismic criteria for structures)
- Design deviations (e.g., design speeds, vertical clearances, turn radii)
- Access deviations
- Additional aesthetics / context-sensitive solutions (CSS)

- Allowances for miscellaneous items (known pay items not yet itemized in the estimate)
- Floodplain issues

Environmental

- Uncertainty in appropriate environmental documentation and all the related consequential events (e.g., change in design, ROW, scope, and construction costs)
- Challenge to environmental documentation (e.g., resulting in delay in ROD)
- Delay in review and/or approval of environmental documentation
- Supplemental environmental documentation or re-evaluation required
- Challenge to Early-Action Mitigation Plan (Wetlands, Floodplain/Habitat)
- Additional habitat mitigation required, on- or off-site (e.g., wetlands, fish ladders, meandering; connectivity)
- Uncertain wetland mitigation (e.g., uncertain impacts, uncertain type of mitigation (replacement, enhancement, banking); different replacement ratio than assumed)
- Difficulty identifying and/or acquiring suitable wetland-mitigation site (including collecting required growing-season data)
- Biological Assessment consultation issues / delay
- New threatened or endangered species listings
- Encounter unanticipated threatened or endangered species during construction
- Uncertain storm water treatment standards or quantities
- Uncertain storm water discharge criteria (e.g., Receiving body exemptions)
- Uncertain groundwater treatment standards or quantities
- Encounter unanticipated contaminated or hazardous materials (and possibly extent of liability for remediation)
- Encounter unanticipated contaminated groundwater (and possibly extent of liability for remediation)
- Additional noise mitigation required
- Additional view mitigation required
- Unanticipated archaeological, cultural, or historical finds encountered during design or construction
- Known archaeological or historical issues different than anticipated
- Unanticipated parks issues
- Known parks issues different than anticipated
- Other Regulatory Issues (environmental regulation/process such as EIS, NEPA, etc.)

External Influences and Management (e.g., Political, Regulatory, Municipalities, Economic)

- Difficulty obtaining other agency approvals/agreements (higher-level, municipalities)
- Conflicts with other projects (municipalities, counties, state)
- Other predecessor projects not completed on time (delay current project)
- Coordination with other entities (e.g., Railroads)
- Coordination between multiple contractors on this project

- Force Majeure during design (e.g., earthquake causes existing facility to fail, requiring accelerated design/construction of new facility)
- Public opposition
- Political opposition
- Funding shortfall (and related delay or increased financing cost)
- Funding delay
- Legal challenges (other than environmental)
- Intergovernmental agreements and jurisdiction
- Labor issues (contract negotiations/strike)
- Tribal issues (e.g., fishing rights, TERO employment, etc.)
- Program management / executive oversight issues
- Project management issues / workload management
- Revenue issues (ridership; regulations/policies)
- Cash flow constraints
- Other significant constraints/milestones/"promises" to be met

Geotechnical and Structural

- Uncertainty in bridge or culvert design (including type/size/location (TS&L) – foundations and superstructure)
- Difficult bridge construction (e.g., transportation or erection of large components; other specialty construction; groundwater, adverse ground conditions; obstructions; scour; other foundation problems)
- Uncertainty in retaining wall design (including type, length, height – foundations and superstructure)
- Difficult retaining-wall construction (e.g., groundwater, adverse ground conditions; obstructions; other foundation problems)
- Slope stability issues – natural, man-made (cuts, embankments), etc.
- Liquefaction design issues
- Uncertainty in seismic design criteria
- Uncertainty in ground improvement design (e.g., what type, how much is required)
- Uncertainty in ground improvement performance (i.e., construction – need additional or different type of improvement)
- Damage to nearby structures during construction or as result of construction
- Tunneling-specific issues
    - Uncertain or early design (including uncertainty in tunneling method, lining, etc.)
    - TBM problems (e.g., TBM operator issues / inexperience; machine procurement; machine assembly, disassembly, and recover; machine maintenance; power-supply problems; drive rate/productivity (various causes, including obstructions or other poor ground conditions); drive misalignment; other problems)
    - Liner problems (e.g., damaged liner segments; bad gasket/seal resulting in leakage)
    - Problems with shaft or emergency exit construction
    - Problems with cross-passage excavation
    - Other tunnel construction problems

- Compatibility of new structures when placed adjacent to existing structures
- Other general geotechnical risk

Operations and Maintenance
- Uncertain annual costs for typical maintenance
- Additional resurfacing or re-decking cycle(s) required
- Additional significant (unplanned) maintenance required
- Uncertain O&M period (e.g., for P3 concessions)

Permitting
- Difficulty obtaining permit approval (by permit type; e.g., 401, 404, NPDES, USCG, shoreline) – manpower issues; incomplete or inadequate permit applications; or simple disagreement by approving agencies
- Uncertain permit requirements (current and in the future)
- Challenges to permits once issued (e.g., shoreline, 401, 404)
- Air quality permitting issues
- Non-compliance with permits (environmental or construction)

Right-of-Way / Real Estate
- Environmental requirements
- Global right-of-way (ROW) problems (for widening, drainage, pipelines, detention, staging, etc.)
- Additional right-of-way required (e.g., plans change; inaccurate early estimates)
- Difficult or additional condemnation (either globally or for particular parcels)
- Additional relocation required (either globally or for particular parcels – business vs. residential)
- Additional demolition required (including unanticipated remediation) (either globally or for particular parcels)
- Accelerating pace of development in project corridor
- Changes in land use / demographics in project corridor
- Manpower shortages
- Process delays (e.g., ROW plan development by team; plan approval process)
- Planned ROW donations do not occur, or opportunity for additional donations
- Difficulty obtaining rights-of-entry
- Railroad ROW Problems
- Issues related to required easements (surface, subsurface)
- Other ROW issues

Scope Issues (other than identified through other items elsewhere in this list, such as design)
- Additional capacity required (e.g., lanes)
- Additional interchanges required (system-to-system or service)
- Additional local improvements required (e.g., additional paving or signals on local connections)
- Additional transit facility, park-and-ride, etc. required
- Other additional structures required (e.g., wildlife crossings)

- Scope reduction opportunity / Value Engineering
- Replace structures instead of retrofit existing (or vice-versa)
- Tolling facilities
- Managed lanes
- Note on scope changes: scope changes can occur during design and/or construction, and can be due to:
  - Incomplete design
  - Stakeholder influences leading to additional scope (e.g., aesthetics; political pressure)
  - Errors in design
  - Construction problems
  - Regulatory changes

Systems

- Software problems (technical, labor)
- Electrical-system problems (technical, labor)
- Mechanical-system problems (technical, labor)
- Problems with station finishes (technical, labor)
- Track-installation problems (technical, labor)
- Problems related to systems integration and testing

Traffic and Access Issues

- Uncertainty in traffic management costs (ITS, TDM)
- Access to site during construction
- Business or economic disruption mitigation

Utilities Issues

- Delay in completing utility agreements (for example, due to: disagreement over responsibility to move, disagreement over cost-sharing; delay in reviews and approvals by utility)
- Late changes to design delays utility planning (e.g., have to re-do utility design)
- Utility relocations to be completed by others (utility companies, municipalities) are not completed on time
- Encounter unexpected utilities during construction
- Damage utilities during construction (known or unknown)
- Utility integration with project and/or utility betterments not as planned
- Cost sharing with utilities not as planned

Appendix H – Timesheet Code Examples

Use of PM Codes

PE	G701	Project Management Scoping	Used for all scoping PM activities
PE	G702	Project Management Development	Used for all development PM activities
CE	G703	Project Management Construction	Used for all construction PM activities

Appendix I – Typical Project Team