Project Management Process

March 2007

Project Management Training

INDIANA DEPARTMENT OF TRANSPORTATION
PROJECT MANAGEMENT TRAINING

Project Management Process

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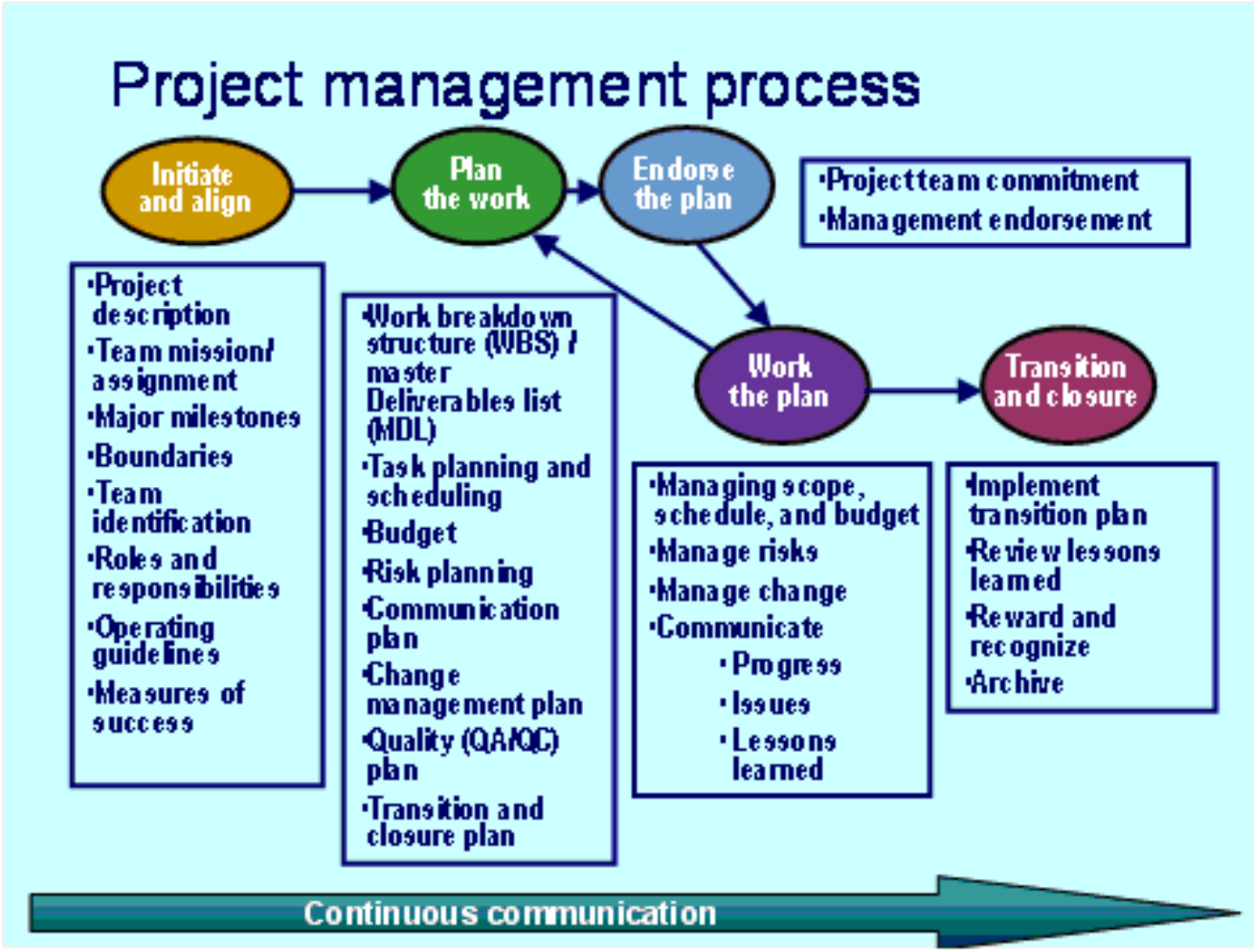
Contents


Project management process
Initiate and align
Plan the work
Endorse the plan
Work the plan
Transition and closure
•Project team commitment
•Management endorsement
•Project description
•Team mission/ assignment
•Major milestones
•Boundaries
•Team identification
•Roles and responsibilities
•Operating guidelines
•Measures of success
•Work breakdown structure (WBS) / master Deliverables list (MDL)
•Task planning and scheduling
•Budget
•Risk planning
•Communication plan
•Change management plan
•Quality (QA/QC) plan
•Transition and closure plan
•Managing scope, schedule, and budget
•Manage risks
•Manage change
•Communicate
•Progress
•Issues
•Lessons learned
•Implement transition plan
•Review lessons learned
•Reward and recognize
•Archive
Continuous communication

Course Objectives

Course Title: Project Management Process

Date: _____

Location: _____

Instructor(s): _____

AFTER SUCCESSFUL COMPLETION OF THIS COURSE,
STUDENTS WILL BE ABLE TO:

- Initiate and align a project team;
- Use the Master Deliverables List (MDL) to develop a project specific Work Breakdown Structure (WBS);
- Develop a Project Management Plan (PMP);
- Assess project risk;
- Obtain endorsement for a PMP;
- Manage scope, schedule, and budget;
- Manage change;
- Conduct an effective project closure.

This course provides INDOT staff with foundational knowledge and skills in project management principles and methodologies. INDOT's project management processes provide the tools for interdisciplinary teams to efficiently and effectively deliver projects within scope, schedule and budget.

Power Point Presentations

- INDOT Project Management Process - Introduction
- INDOT Project Management Process – Step 1: Initiate and Align
- INDOT Project Management Process – Step 2: Plan the Work
- INDOT Project Management Process – Step 3: Endorse the Plan
- INDOT Project Management Process – Step 4 : Work the Plan
- INDOT Project Management Process – Step 5: Transition and Closure

See the list of books, articles, websites ,and other sources that appears at the end of each Power Point presentation.

Teamwork Exercise

Goal: Each team is responsible for building a bridge that meets the following criteria.

Schedule: 8 minutes and 47 seconds

Work as a team/everyone must contribute

What is your budget?

Building materials may be purchased at the local bridge store.

Meet the following requirements:

Finish on time and on budget

Impress the public with your work

The bridge opening will be aired on the evening news

- What do they need to know?

The bridge must carry 2400 vph

Span = 237.25 feet

SR 26 Bridge over Wabash River

Introduction

This course identifies the principles and methodologies adopted by the Indiana Department of Transportation (INDOT) for successful project management and delivery. Project management requires the application of knowledge, skills, tools, and techniques to deliver the project on time, within budget, and according to specifications. INDOT's project management process is based on proven industry standards for project management, such as the Project Management Body of Knowledge (PMBOK) prepared by the Project Management Institute (PMI).

INDOT's Mission

Build, maintain, and operate a superior transportation system enhancing safety, mobility, and economic growth.

INDOT's Values

Customer Focus

We will understand and meet the needs of our customers in our policy, program development, and decision making process.

Integrity

We will maintain the highest ethical standards in our dealings with each other, our customers, business partners, and the environment.

People

We commit to developing and supporting a flexible, technically skilled work force with individual teams that work toward our shared mission and goals.

Agility

We will have the knowledge and ability to rapidly adapt to the opportunities and challenges offered by changing technology and business processes.

Continuous Improvement

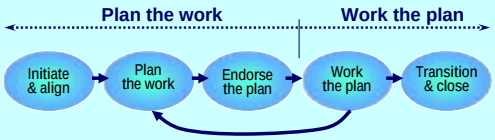
We will continually improve our business processes through better products, practices, procedures, and information-based decision making.

Safety

We will create, maintain, and promote a safe work environment for our employees and continually strive to reduce incidents and severity of traffic-related accidents and injuries.

INDOT's vision, mission, and values can be found at:
www.ai.org/dot/about/general/sp.html

INDOT's project process is *based on a set of proven tools* available to help project managers and teams define, execute, and deliver projects more effectively



18

INDOT's *Vision:* Driving Indiana's economic growth

INDOT's *Mission:* Build, maintain, and operate a superior transportation system enhancing safety, mobility, and economic growth

Source: http://www.ai.org/dot (7/14/06)

27

INDOT's *Values:*

Customer focus
Integrity
People
Agility
Continuous improvement
Safety

Source: http://www.ai.org/dot (7/14/06)

28

Project Management

While terminology may vary, the principles of project management are consistent. A project manager needs more than tools to succeed in delivering quality projects on time and within budget. Project managers with the knowledge and skill to lead a team toward a common goal will optimize team member talents to the best benefit of the team.

The Project Management Body of Knowledge (PMBOK) describes the work planning process as defining and refining objectives and selecting the best alternative courses of action. There are many tools and techniques unique to project management; such as work breakdown structures, critical path, or earned value. These tools and techniques alone are not sufficient without effective project management knowledge and skills. The project team must recognize and use knowledge and skills from at least five areas of expertise:

The Project Management Body of Knowledge - knowledge unique to the project management field and overlaps other management disciplines.

Application area knowledge, standards, and regulations - Project categories with common elements but not necessary in all projects

- Functional and supporting disciplines - legal, inventory management, personnel, traffic, right-of-way, environmental, etc.
- Technical elements – software development or engineering
- Management specializations – government contracting, new product development
- Industry groups – automotive, chemical, agriculture.

Each of these areas typically have there own set of accepted standards and practices.

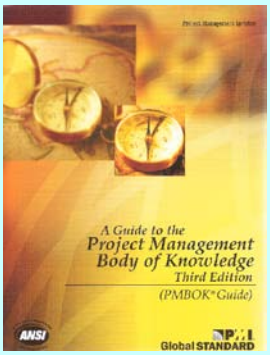
Understanding the project environment – the team needs to understand the positive and/or negative cultural, political, social and environmental impacts the project may have and how people (customers, stakeholders, etc.) may affect the project.

General management knowledge and skills – planning, organizing, staffing, controlling ongoing operations; including strategic planning, accounting, procurement, human resources, information technology, etc.

Interpersonal skills – effective communication, getting things done, leadership, motivation, conflict management, and problem solving.

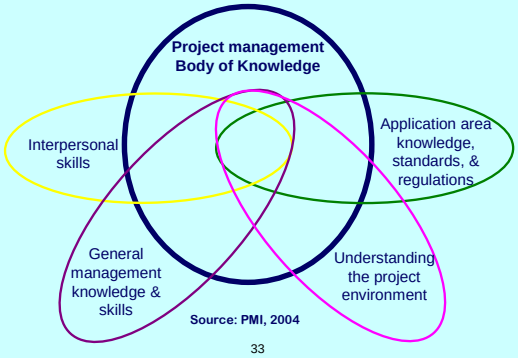
Each of these areas may appear to be discrete elements, but they generally overlap. It is not required that every team member be an expert in all five areas, the combined knowledge of the team leads to an effectively managed project.

Principal source of INDOT's Project Management Process



31

Project management areas of expertise



Source: PMI, 2004

33

INDOT *gratefully acknowledges:*

- The INDOT/Purdue University Joint Transportation Research Program for guidance

- The Washington State Department of Transportation for aiding and advising INDOT in the development of the INDOT Project Management Process

17

History of Project Management at INDOT

Formal project management is new to INDOT. The Office of Project Management was formed in 2005. Prior to that, the only times the process has been practiced were the design-build and fast track contracts of the Special Projects section. These contracts had tight schedules and budgets that required that Design and Construction work together from the start. The construction managers delivered the major projects on time and on budget. While change orders on other contracts averaged11% of construction costs, changes on these projects were less than 2%.

JTRP Review

From these "lessons learned" a program for construction management was developed and defined. The FHWA endorsed the project management concept and recommended that the Joint Transportation Research Program (JTRP) at Purdue University research this process for appropriate training. The JTRP has developed a curriculum for project management training and, after review, made these recommendations:

> Recommendation 1 – INDOT should extend the application of Managing Project Delivery, Project Delivery Information System, and Primavera Project Planner for the Enterprise tools and put management steps in place to confirm their adoption.

> Recommendation 2 – INDOT should develop a plan and timeline for implementing recommendations which center primarily on a) using existing exemplary practices in place at some projects to develop minimum standards and/or templates; b) improving the clarity of project communication by documenting terms and definitions; and c) confirming the consistency and currency of reporting information.

> Recommendation 3 – INDOT should conduct an assessment of the effectiveness of current information systems and options for addressing any deficiencies.

> Recommendation 4 – INDOT should develop a criteria for extending Cost Risk Estimating and Management (CREM) analyses to a wider universe of projects.

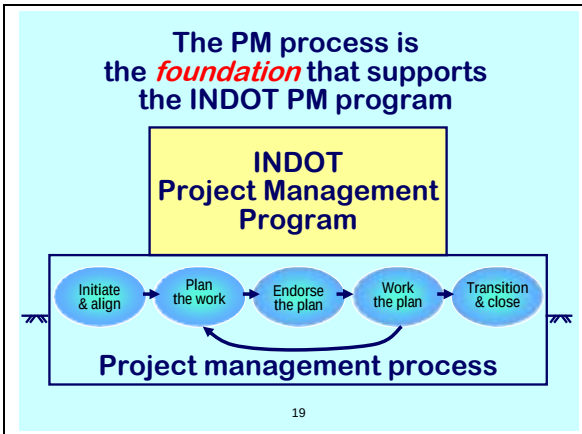
INDOT's Response

INDOT is proactively identifying ways to address these recommendations. One step was the formation of a Project Management Task Force. The Project Management Task Force is made up of representatives from across the state; representing multiple disciplines (design, construction, etc.) They were tasked with identifying ways to implement the JTRP recommendations, but more importantly to improve our project management process. Make the process more scalable, and identify and develop easy to use tools, templates, and techniques to encourage and simplify the use of the process.

Project Management Process Overview

Changes have occurred this past year but the philosophy remains the same. INDOT's project management process features a five step process very similar to other project management approaches being used around the world by project managers in the private and public sectors. The five project management steps are:

- **Initiate and align**
- **Plan the work**
- **Endorse the plan**
- **Work the plan**
- **Transition and closure**



INDOT Project Management Process Matrix

INDOT's project management process provides the tools to actively manage and deliver projects. How the tools are used is up to the project manager and team. A responsibility matrix, which follows on the next page, was developed to help the project manager and his or her team understand the process. The matrix identifies:

- Who is responsible for each step
- Who is involved in the process
- What is it
- What are the project management steps
- What it looks like to team members
- Outcome or work product

The project manager is responsible for assuring total team participation, including specialty groups.

A project team consists of the project manager, team members from their project office, team members from specialty groups such as Real Estate Services, Environmental, Hydraulics, Traffic, Operations, Geotech, Bridge, Utilities, and any others that are needed to deliver the project.

The project manager is ultimately responsible for the outcome of the project. The project manager is:

- Formally empowered to use organizational resources
- In control of the project
- Authorized to spend the projects budget
- Authorized to make decisions for the project

INDOT Project Management Process

The 5-step Process	Initiate and Align the Team	Plan the Work	Endorse The Plan	Work the Plan	Transition and Closure
Who is responsible?	*Project Manager	*Project Manager	*Project Manager	*Project Manager	*Project Manager
Who is involved?	**Project Team	**Project Team	**Project Team	**Project Team	**Project Team
What is it?	This step defines the what, identifies who is on the team and how and what are they going to contribute to completing the assignment	A work plan that specifically identifies who will do the work and mutually agreed upon time frames and budgets to get the work done.	An agreement of what is to be completed and by whom	Actively managing the work plan	A completed project or phase
What are the steps?	• Project Description • Team Mission / Assignment • *Team member identification and roles and responsibilities • Measures of success • Major Milestones • Boundaries • Operating Guidelines	• Task Planning using MDL • Schedule • Budget • Identify Risk Factors • Communication Plan • Change Management Plan • QA/QC Plan • Transition/Closure Plan	• Project Team Commitment • Management Endorsement	• Manage the scope, schedule and budget • Manage risks and opportunities • Managing change • Communicate progress, issues and lessons learned	• Implement transition plan • Review Lessons Learned • Reward and Recognize • Archive
What it looks like to team members?	Attends and participates in a general project kick-off and review.	Participates in development of schedule at the task and deliverable level, develops budget for deliverables they are responsible for, participates in a risk assessment. Participates in development of communication and change management plans	Reviews schedule and estimate for consistency with earlier input and says “can do” A project management plan approved by the team and ARA or equivalent.	Regularly contacted by project manager or representative to review adherence to the project plan. Initiates contact with project manager upon discovery of potential change. Actively monitors key milestone dates for dependant	Participates in lessons learned and development of phase transition plan

				activities that initiates his or her work.	
What is the outcome or work product?	An understanding of what is to be produced by whom and how they will work together. A document describes who is to be included on the team and what their responsibility is. A list of the milestones and critical success factors this team will accomplish.	A refined scope of work, a baseline schedule, a current estimate, a risk register that identifies and quantifies risk, a document on what information will be communicated to whom and when, and a document on what the team will do when change occurs.	A commitment by the individual team members and management agreeing to the: who, what, when and for how much.	Actively managed scope, schedule and budget, monthly status meetings to communicate progress and any changes to scope, schedule or budget, quarterly reports, and change management plans. Clear understanding of project status. Documents that communicate scope schedule and budget status.	A completed project phase, a transition (archive and hand off) document, a list of lessons learned.

- The Assigned Project manager is responsible for assuring total team participation

(Including Specialty Groups).

**A project team consists of the project manager, team members from their project office, team members from specialty groups such as Real-Estate Services, Environmental, Hydraulics, Traffic, Operations, Geotech, Bridge, Utilities, and any others that are needed to deliver the project.

Additional project management terms:

Project – The application of knowledge, skills, tools, and techniques to project activities to meet project requirements

Project Management Plan(PMP) – A formal, approved document used to guide both project execution and project control. The primary uses of the project plan are to document planning assumptions and decision, facilitate communication among stakeholders, and document approved scope, cost, and schedule baselines. A project plan may be summary or detailed.

See *Appendix A* for the I-74 and US 421 PMP.

Level vs. Effort

The five project management process steps can be further simplified into two basic phases; Plan the Work and Work the Plan.

In a typical project application planning the work (the first two steps) will constitute approximately 10% of the total project effort and time. The remaining three steps constitute approximately 90% of the project effort and time.

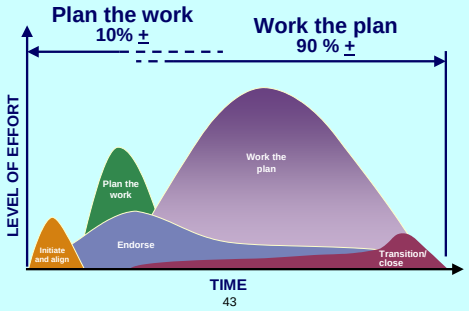
When the level of effort for each of the five steps of a project is reviewed, the general observation is that the majority of resources are spent doing the work, that is, working the plan. Only a small amount of resources are devoted to planning the work. However, the investment in planning the work is highly leveraged; it is the "secret" to a successful project.

How much time, money, and effort should I spend on this project management stuff? The amount of time spent on each of the steps should be commensurate with the following elements:

- Project Size & Complexity
- Team Size
- Stakeholder Involvement
- Potential resistance to the project

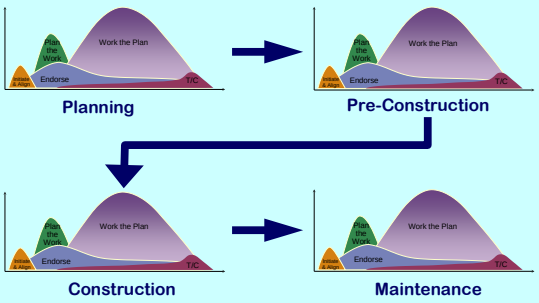
Scalability is the level of work planning required based on those elements. The Project Manager determines the appropriate level of detail.

The five steps in the project management process require *different levels of effort*



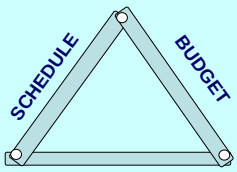
43

The five step process can be *applied to planning through maintenance*



44

The *three essential requirements* of a project:



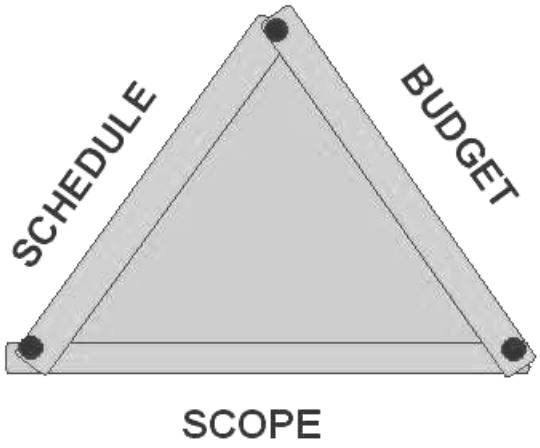
A "link and pin" truss where every element must remain connected

47

Scope, Schedule, Budget Triangle

Another fundamental topic in project management is commonly referred to as Trade-Off Triangle or Scope, Schedule, Budget Triangle. While changes occur on a project they do not occur in a vacuum. When the scope of a project is changed, time and cost are affected. Of course, the same is true when changes are made to cost or time.

Scope, Schedule, and Budget are each project constraints and must be actively monitored and managed throughout the project delivery process. As change occurs it is essential in project management to be mindful of these constraints and help keep others aware of it. Changes should not always be accepted as valid; rather they should be evaluated on how the change affects other aspects of the project.



But first! Before diving into "doing the work" the team needs to get ready and establish its direction by **Initiating and Aligning** the team.

Step

1

Initiate and Align

Initiate and Align is the first step of the project management process. It provides for team building early in the process and sets the direction of the project. Effective teams develop a project purpose, team mission, operating guidelines, project boundaries, roles & responsibilities, and measures of success. These elements establish a firm foundation with a common goal in sight.

Initiating is the process of formally recognizing that a new project exists (this includes transition of projects from one phase to another (i.e. Scoping to Design).

District/Central Office Management initiates the project by providing:

- Project Description
- Team Mission/Assignments
- Major Milestones
- Boundaries

The project team reviews and commits to meeting these initial elements.

Aligning the team is the basis for establishing a common understanding of the team's roles and responsibilities; the requirements of and limits on their performance; and their commitment to act as a cohesive and cooperative team for the effective delivery of the project.

The project manager aligns the project team by developing:

- Team Member Identification
- Team Roles and Responsibilities
- Measures of Success
- Operating Guidelines

Project Description

The Project Description is a formal statement that defines the purpose and need for the "product" or "outcome" that the project is intended to produce. District/Central Management provides the Project Description to the Project Manager. It is used to establish a common purpose and need of both the project and the project phase among the members of the project team.

Steps for development/review of the Project Description:

1. The Project Manager receives the Project Description from Region/Organization Management and:
   - Reviews the needs the project is intended to fill;
   - Reviews the goals, products, and outcomes of the project.
2. The Project Manager uses his/her understanding of the Project Description to begin to identify team members.
3. The Project Manager reviews the Project Description and preliminary team membership with District/Central Management.
4. The Project Manager or designee refines the Project Description .

The Project Description is a statement of the reasons why the project or phase is being undertaken, and acts as the foundation for all further project planning and actions.

A Project Description generally includes the following characteristics:

- It is a statement of the desired condition at the end of the project; hence, it describes an "end result" and should be capable of being seen.
- It is a "project" objective, not the duty of an individual.
- It establishes a common goal toward which all project activities and efforts strive.
- It is expressed in positive terms; it is a positive end result.

Definition of project description:

Formal statement
defining *purpose* and *need*
for the product or outcome
the project is intended to produce

5

Example *project description*

I-74/US 421 Interchange Reconstruction

Because of the inherent operational and geometric deficiencies of the existing partial interchange it is recommended that the existing unconventional, substandard interchange be modified to a new partial cloverleaf Type-A interchange. Twin bridges on the interchange crossroad are recommended. The crossroad typical sections show open drainage and paved shoulders. The crossroad will have full limited access right-of-way. There will be six new interchange ramps.

The new interchange will connect to newly constructed US 421 (Five Lane Section) and Old US 421 (Four Lane Section) urban section roadways to the south and to a newly constructed two lane local roadway to the north.

6

A useful project description has four *characteristics*

- End result, capable of being "seen"
- "Project" objective
- Common goal
- Positive terms

7

Pragmatic Benefits of a Project Description

Recall the adage "go slow to go fast." Take time to establish a firm foundation for the team. The initiation and alignment phase provides a structured way to do this - the no-nonsense benefits of a clear purpose are undeniable. A few of these are listed below.

Work planning

Provides an integrated theme for developing a written plan (i.e. writing a scope of work, preparing a schedule, identifying resources, developing a budget, etc.).

Organizing

Arranges activities into a coherent whole, enabling the making of day-to-day decisions for the long-term goal of the project.

Employee Development

Helps decide what skills do we need and when do we need the people with those skills?

Leadership

Responds to employee questions such as:

- "where are we going?"
- "how do we plan to get there?"
- "what role am I expected to play?"
- "how will my job change?"

Project teams throughout history had focus or a "purpose." Whether exploring new continents, building pyramids, the Great Wall, the Panama Canal or challenging the elements there was a mental picture of what was to be achieved. Maybe they used a formal process, maybe not, but the teams knew exactly what their objectives were.

Team Mission/Assignment

The Team Mission Statement/Assignment is an expansion of the Project Description and describes the overall actions the project team will take to accomplish its portion of the project. It is usually a short paragraph developed with input from District/Central Management.

Steps for development/review of the Team Mission/Assignment:

1. The Project Manager reviews the Project Description to determine the major elements of the work needed to produce the end product or outcome of the Pre-Construction Phase of the project.
2. The Project Manager and the project team collaboratively develop simple descriptions of the major activities the team will perform to produce the end product or outcome (e.g., develop the plans, specifications, and contract documents needed to advertise for bids; identify and obtain all required environmental permits).
3. Review the Team Mission/Assignment with the key members of the project team in order to obtain their agreement.
4. Review the Team Mission/Assignment with the District/Central Management.

While the Project Description identifies the end product or outcome, the Mission Statement addresses the specific work the team is assigned to perform and relates only to specific work deliverables and tasks needed to accomplish the assigned scope of work. The team mission is of particular importance during project work planning as it clearly defines the scope of the Work Breakdown Structure (WBS).

Definition of team mission/assignment:

An expansion of the project description and describes the overall actions the project team will take to accomplish its portion of the project

9

Example *team mission/assignment*

Team Mission/Assignment
Deliver a PS&E package and all supporting documents and approvals required to advertise the I 74/US 421 Interchange Modification project. Meet the following criteria:
A construction project that minimizes impacts to the public and environment
An improved facility that is responsive to the needs of and meets the requirements and expectations of all stakeholders.
Within funding limits.
By the agreed upon RFC date.
Phase of the project assigned? (Check the phase that applies for the team you are initiating for this effort):

☐ Scoping ☐ Preliminary Engineering ☐ Construction

10

Suggested process for developing the team mission/assignment:

1. Review project description
2. Define major activities
3. Review with key team members
4. Review with district/central management

11

A Highway Construction Program project is developed in phases; scoping, design/PS&E (including right of way) and construction. A specific team mission may be limited to a specific phase or phases of a Highway Construction Program project. The team mission of any given project team may not attain the ultimate end product of the Highway Construction Program project as described by the project purpose. For example; the team assigned to the design/PS&E phase of the project develops a work plan that includes deliverables such as a contract plans, specifications, and estimate for advertisement.

Consider the U.S. space program beginning in the early sixties and culminating in man's landing on the moon in 1969. JFK established a purpose for the nation. The scientists and engineers developed a series of progressive rocket programs (established a mission) that in progressive and ever-advancing iterative steps lead to a successful landing on the moon. You may recall the Mercury program, the Gemini program and finally the Apollo program that accomplished the purpose and fulfilled the mission.

EXAMPLE OF A PROJECT DESCRIPTION

"To put a man on the moon and bring him safely home. And to accomplish this by the end of the decade." John F. Kennedy

EXAMPLE OF A TEAM MISSION/ASSIGNMENT

"Develop and execute a space program that progressively advances the USA technologically to accomplish a lunar landing." NASA

What is a "good" purpose statement? What is a "good" mission statement? Purpose and mission statements are good if they help the team deliver the project.

Major Milestones

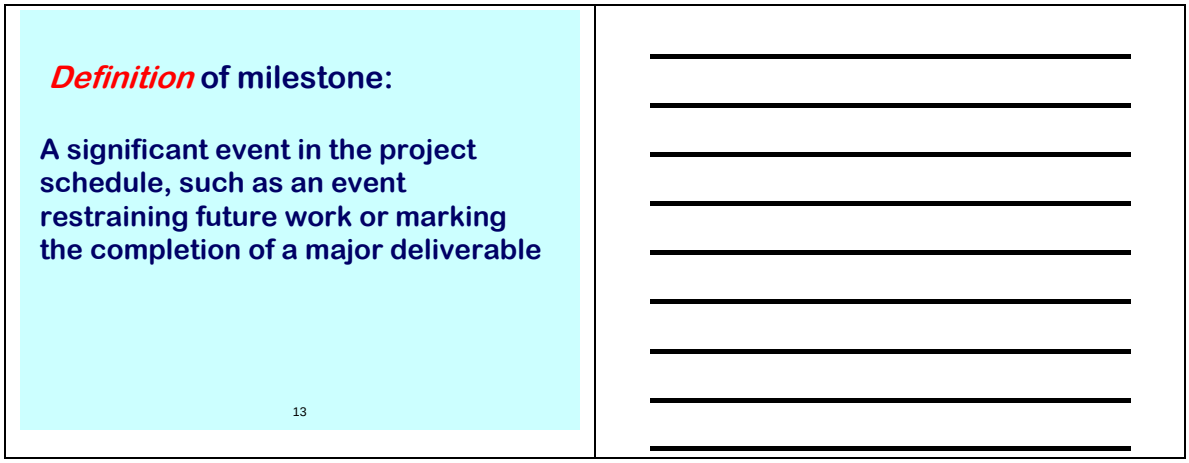
A Major Milestone is a significant event in the project schedule, such as an event restraining future work or marking the completion of a major deliverable. A schedule milestone has zero duration. Major Milestones identify specific elements or phases of the project phase and the dates by which they must be accomplished in order to consider the project or phase "successful."

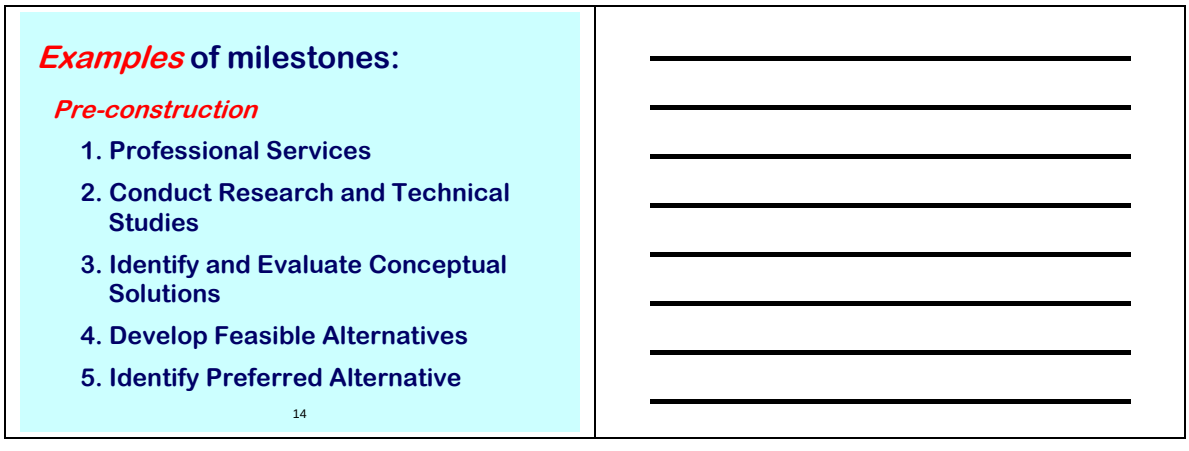
INDOT identifies nineteen Major Milestones for all projects. Twelve of which occur during the Pre-Construction Phase:

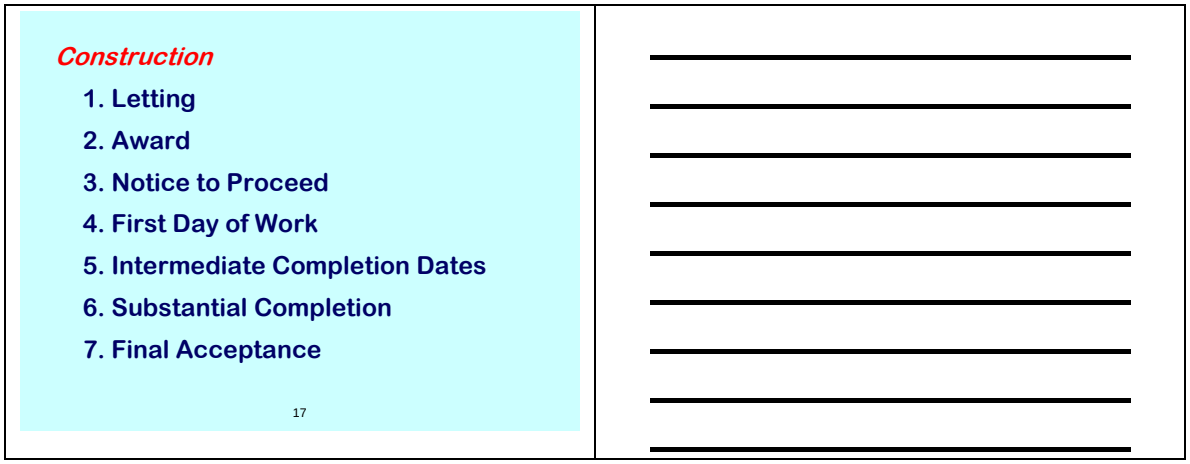
- **Professional services**– Date of concurrence for professional services (e.g. establish contract with consultant) to commence.
- **Conduct research and technical studies** – Start collecting information on the project.
- **Identify and evaluate conceptual solutions** – Professional services group issues conceptual solutions to consider.
- **Develop feasible alternatives** – Narrow the conceptual solutions to options that are technically and financially feasible.
- **Identify preferred alternative** – By this date the preferred design option will be selected so design can proceed.
- **Develop preferred alternative – Stage 1 Design –** This is initial detailed design in the 0-30% stage. A review occurs.
- **Develop stage 2 detailed design and preliminary right-of-way plans**– This is detailed design during the 31-60% phase. A review occurs.
- **Environmental Approval** – Environmental approval of the design is granted at this milestone.
- **Prepare final right-of-way plans** – Design drawings of the right-of-way are prepared by this date.
- **Develop stage 3 design** - This is the 61-90% phase. Design is reviewed at this stage.
- **Prepare final design package** – Project documents, drawings, specs, and bidding documents are completed and submitted.
- **Letting** – Date when bids are submitted.
- **Award** – Construction Contract is awarded to bidder.

- **Notice to Proceed** - Contractor is given notice that construction activities may commence on this date. This is the date that starts the construction days.
- **First day of work** – The first day that can be charged against the contract
- **Intermediate completion dates** - Certain construction milestone dates may be required in the contract.
- **Substantial complete** – This is the date when the intended end user has free and unobstructed use of the facility.
- **Final Acceptance** – This is the date when the contract is accepted by the owner signifying that all construction activities are completed and approved.

Along with these Major Milestones, and as planning progresses, District/Central Management may identify additional milestones for the project. Also, the project team will identify other project and phase-specific milestones that are critical to the success of the pre-construction and construction phases of the project.







Steps for reviewing the major milestones for a project:

1. The Project Manager reviews the critical path and/or other information for specific milestones and dates for accomplishment.
2. The Project Manager reviews the Major Milestones with the project team.
3. The project team reviews the work and the performance conditions of the project and determines those activities that are critical to the success of the project or phase.
4. The Project Manager and the project team identify the risks, impacts, and implications of failure to meet each Major Milestone.
5. The Project Manager reviews the Major Milestones identified with the District/ Central Management: Discuss the implications of failure to meet Major Milestones and Measures of Success.
6. The Project Manger (or designee) records the Major Milestones.

The Major Milestones previously listed are linked to critical path activities on the project schedule. The critical path describes the continuous sequence of project activities that determine the completion date of the project or project phase. Other milestones may be associated with events that must occur by a certain date, but may not, logically, be on the critical path that determines the end date of the project.

Example *major milestones*

The project team tracks major milestones, which provide an overview and status to the INDOT Management & Project Team, state and local government representatives, and the public. The following is a selection of the major milestones that will apply:

Project Definition Complete	6/10/2006
Begin Preliminary Engineering	7/5/2006
Environmental Documentation Complete	1/24/2007
Right of Way Certification	1/24/2007
Advertisement (Ad date)	7/2/2007
Bid Opening	8/15/2007
Award	8/29/2007
Execution	11/1/2007
Construction Start	11/16/2007
Operationally Complete	4/13/2009
Final Contract Completion	6/23/2009

18

Suggested process for identifying milestones:

1. Project manager reviews critical path method schedule for specific milestones
2. Project manager reviews major milestones with project team
3. Project team determines activities critical to success

20

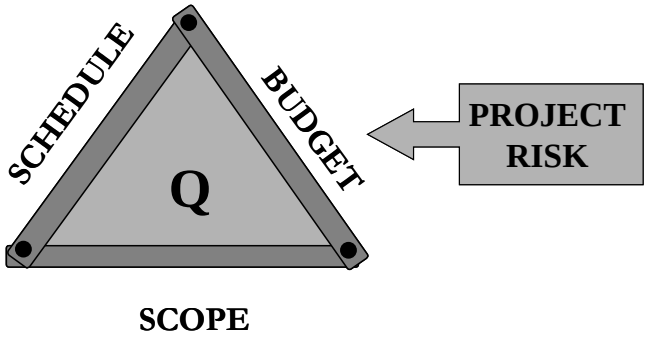
4. Project team identifies risks and impacts of failure to meet milestone dates
5. Project manager reviews major milestones with district/central management

21

Boundaries

Boundaries describe the limits of the project with regard to the project team's responsibilities and decision-making authority. They are the physical boundaries; (e.g., length of roadway) design improvements from MP to MP, as well as operational parameters (e.g., funding, legal, and regulatory) delineating the project and its performance envelope.

Trade Off Triangle (Triple Constraints Theory)



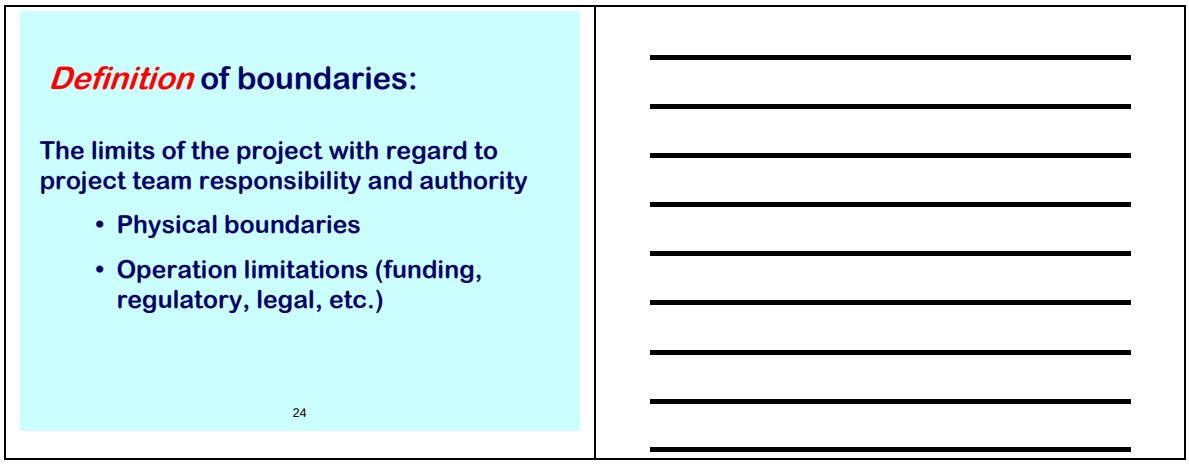
Project Managers often talk of a "triple constraint" or "trade off triangle" – project requirements (scope), project time (schedule), and project costs (budget). Replacing the project parameters with the tools to manage those parameters gives the "trade off" triangle of scope, schedule, and budget.

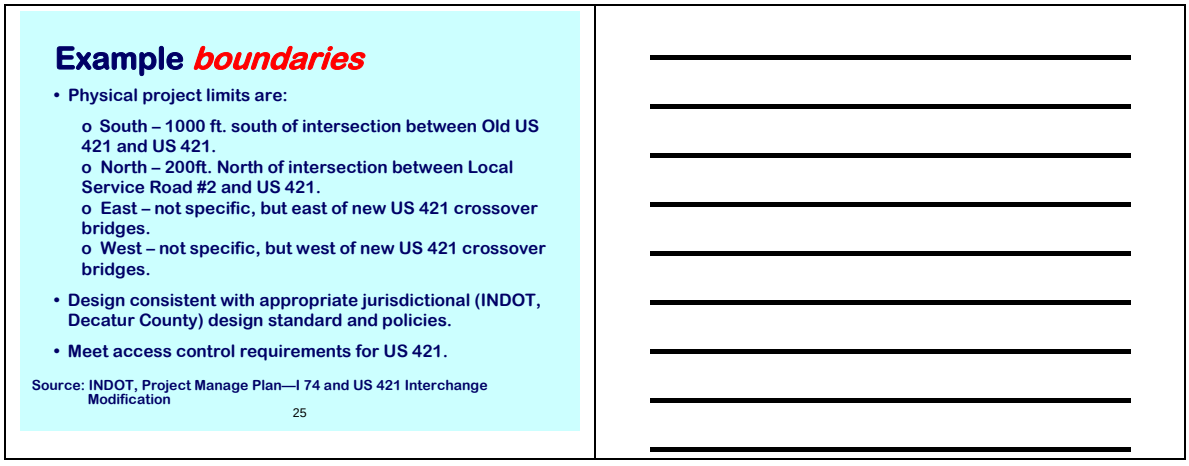
Project quality is affected by balancing these project parameters. High quality projects deliver the required product, service, or result within scope, on time, and within budget.

The relationship between these parameters is such that if any one of the three parameters is changed, at least one of the other project parameters is likely to be affected.

So which parameter is most important? This is what the Project Manager and the project team need to decide and document for project boundaries.

Project managers also manage projects in response to uncertainty. Project risk is an uncertain event or condition that, if the risk event occurs, has a positive or negative effect on at least one project parameter.





Steps for establishing and reviewing project boundaries:

1. The Project Manager reviews the critical path method analysis and/or other information for specific limitations on the project and its performance.

2. The Project Manager and project team establish a set of "draft" boundaries for review and planning.

3. Review the draft boundaries with the District/Central Management:

   - Validate each "boundary" parameter

   - Identify which parameters are "fixed" and which are "flexible"

- Determine the acceptable range of variation for those parameters deemed flexible

- Plan for change:

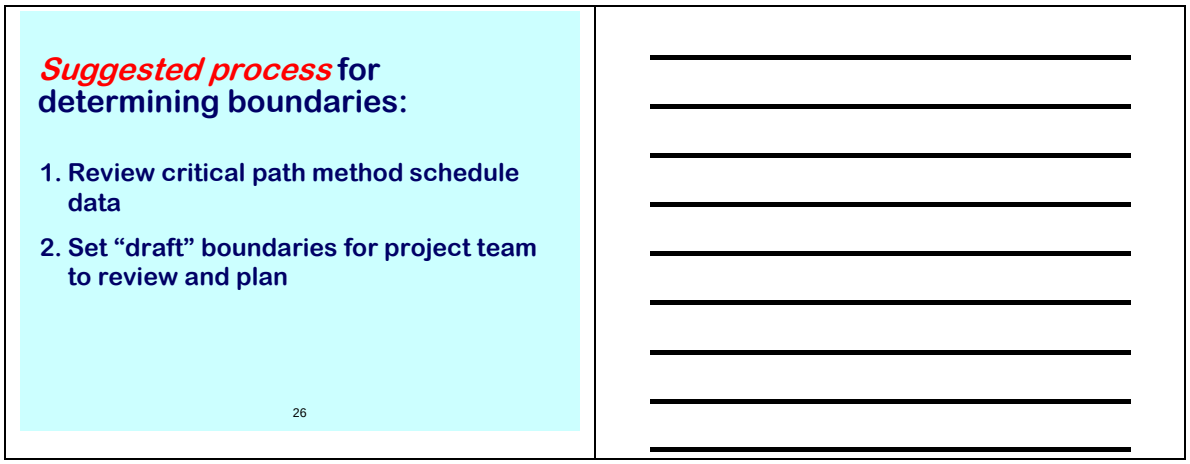
    a. Identify notification requirements and thresholds for early or advance warning when the possibility of exceeding or the need for changing Project Boundaries is imminent.

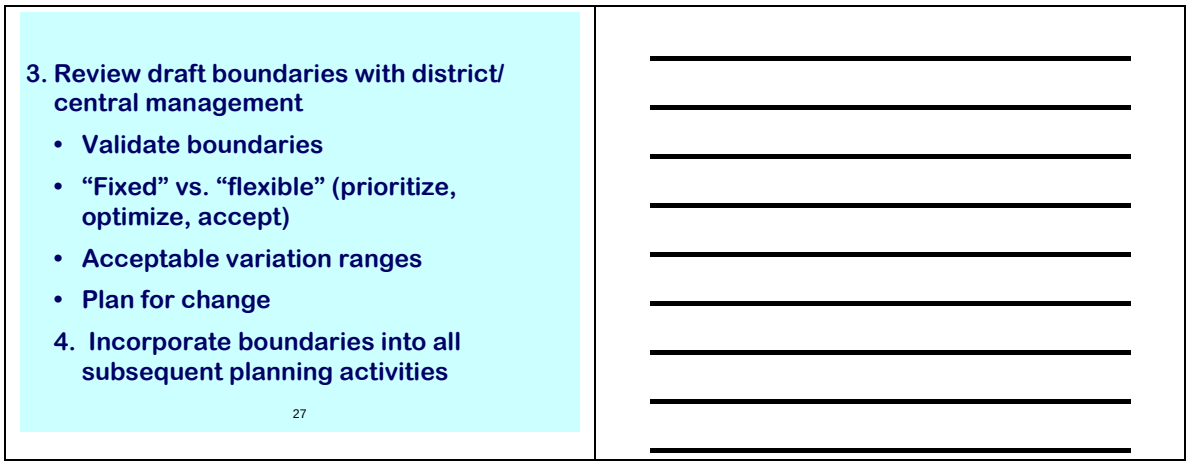
    b. Identify the approvals needed to exceed or change the Project Boundaries

    c. Define the process to follow in obtaining those approvals

4. The Project Manager (or designee) records the boundaries.

5. The Project Manager and project team review the boundaries with the District/Central Management and incorporate them into the development of all project planning.





Team Identification

Once the Project Description, Project Mission/Assignments, Major Milestones, and Boundaries have been received from District/Central Management, the Project Manager identifies the team needed to accomplish the project.

The project team is a designated group of people, including specialty groups, consultants, contractors, and others, who will collaborate and work together under the direction of the Project Manager to perform and complete the work of the project.

Steps for Project Team Identification

1. Review the Scope of Work to be performed and managed; and identify the technical, administrative, and management skills needed to accomplish the work.

2. Work with specialty groups to identify, schedule, and commit appropriate staff for the planning and performance stages of the project.

3. Identify the work that will require the services of consultants, and identify the appropriate consultants to utilize.

4. Based on the staff resources identified for the project, establish, and define the Project Organization.

Definition of team member identification:

Identifying the project delivery team needed to accomplish the work assigned.

- •Specialty groups
- •Consultants
- •Contractors
- •Others (vendors, etc.)

29

Example : *Project Specialty groups*

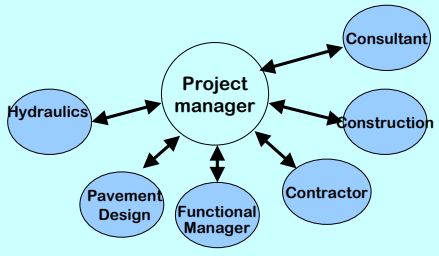
The project team consists of the project manager, design team members and all specialty groups that need to be involved in the development of the project. Specialty groups must be involved in project work planning, schedule development and maintenance, and endorsement of the work plan.

The following specialty groups could be involved:

Land Survey
Materials
Pavement Design
Public Information Office
Real Estate
District Traffic
Hydraulics
Community Action Group
District Planning
Bridge & Structures
Construction
Program Management
Road Review
Environmental/Permits
Geotechnical Services
Highways & Local LPA
Utilities
Railroads
Planning Central Office

30

Example of a project team:



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Roles and Responsibilities

The definition, and mutual acceptance, of organizational and individual Roles and Responsibilities delineates "who will do what." Roles and Responsibilities are defined at the organizational level, down to the level of each individual on the project team.

Role: A defined function to be performed by a project team member. The team members' roles are the specific titles or positions occupied; e.g., team leader, designer, permit coordinator.

Responsibilities: The duties, assignments, or accountability of results associated with a designated role in the project organization. The deliverable or product expected of the team or individual; e.g., hydraulic analyses, schedules.

Steps for Identifying Roles and Responsibilities

1. The Project Manager collaborates with the project team to identify individual roles to deliver the Team Mission/Assignments.

2. Review each role; determine individual and team responsibilities and the corresponding authority with each team member

Definition of roles and responsibilities:

- **"Who will do what?"**
- ***Role:*** **specific title or position**
- ***Responsibilities:*** **expected deliverable(s) and/or product(s)**

37

Example *roles and responsibilities*

Project Engineer/ Supervisor

- On-site administration of construction contract
- Interpretation & enforcement of Contract Documents
- Measurement & payment of items of work
- Maintain contract records – daily, weekly, monthly reports; material records; as-built drawings; final construction record; change orders, etc.
- Direct work of assigned inspectors and assistant engineers

38

Example *roles and responsibilities*

Project Manager

- Coordinates development of projects from time of programming thru construction
- Coordinates with designers, utilities, R/W, railroads, LPAs, etc.
- Plans and attends various meetings during project development
- Develops or assists in development of project budget and schedule
- Monitors project schedule and budget throughout life of project, including construction
- Reviews and recommends solutions to project issues (design, utilities, R/W, etc.)
- Coordinates work of various groups to produce completed contract packages, including Planning, Production, Contracts, and Construction

39

Project Engineer/ Supervisor

- On-site administration of construction contract
- Interpretation & enforcement of Contract Documents
- Measurement & payment of items of work
- Maintain contract records – daily, weekly, monthly reports; material records; as-built drawings; final construction record; change orders, etc.
- Direct work of assigned inspectors and assistant engineers
- Communicate directly with contractor's superintendence and management for all issues related to the contract
- Attends weekly schedule meetings with contractor
- Attends partnering meetings
- Communicate with INDOT PIO as necessary
- Communicate issues and work progress to other INDOT personnel including the Area Engineer, District Construction Engineer and Project Manager
- Refers question of design or scope to AE and Project Manager and provides recommended solutions
- Initiates Change Orders as necessary
- Reports to Area Engineer

Area Engineer

- Directs work of assigner INDOT Project Engineers/ Supervisors
- Directs administration of LPA contracts through consultant PE/ S
- Attends pre-letting field checks
- Review plans and documents for constructability and conformance with Specs
- Sets contract time prior to letting
- Assists DCE in answering pre-bid questions
- Makes determinations of proper interpretation of Contract Documents
- Makes decisions on issues related to contract administration
- Refers questions of design or scope changes to Project Manager and makes recommendations for desirable solutions
- Assigns PE/ S and inspectors to contracts
- Participates in various technical committees and research projects
- Attends partnering meetings and scheduling meetings as able
- Communicates directly with contractor's management personnel concerning contract issues
- Schedules pre-final inspections
- Reports to District Construction Engineer

District Construction Engineer

- Directs all work of the District Construction office including Area Engineers, Final Review, EEO, Administration Assistant, etc.
- Reviews plans for letting and answers pre-bid questions
- Reviews District needs for construction personnel and requests supplemental consultant services as needed

- Makes decisions on contract issues within the District
- Performs Pre-Final Inspections and writes Final Acceptance letters
- Reviews and approves Change Orders/ Time Extensions or recommends approval to SCE
- Reports to District Highway Ops Director

Project Manager

- Coordinates development of projects from time of programming thru construction
- Coordinates with designers, utilities, R/W, railroads, LPAs, etc.
- Plans and attends various meetings during project development
- Develops or assists in development of project budget and schedule
- Monitors project schedule and budget throughout life of project, including construction
- Reviews and recommends solutions to project issues (design, utilities, R/W, etc.)
- Coordinates work of various groups to produce completed contract packages, including Planning, Production, Contracts, and Construction
- Provides project updates to various divisions and offices as needed, including the Executive Staff
- Provides assistance to Construction post-letting in interpretation of intent of project
- Reviews requests for changes to design or scope of contracts and makes recommendations to appropriate construction personnel
- Communicates directly with all personnel associated with the project to understand and coordinate work to achieve desired results for INDOT
- Attends partnering meetings
- Reports to Office of Project Management at Central Office or Production Director at District.

Operating Guidelines

Team Operating Guidelines describe how the project team will govern itself. They identify the functions most commonly performed by the team and guidelines to steer it within those functions.

In addition to using INDOT's Meeting Ground Rules, the project team may develop some or all of the following guidelines:

- Team Decision-Making Process
- Team Meetings (structure, frequency, etc.)
- Communication (methods, uses, frequency, protocols, etc.)
- Team Performance Measures
- Team Issues and Conflicts Management

Definition of operating guidelines:

Processes and rules the team will use to maintain cohesiveness and effectiveness

- **Team decision-making process**
- **Team meetings**
- **Communication**
- **Team performance measures**
- **Team issues and conflict resolution**

45

Use INDOT *Meeting Ground Rules*

46

Example *operating guidelines*

- Team decision-making process
  - Voice and respect each other's opinions
  - Resolve conflicts
  - Early & continued involvement of key players (internal and external
- Team meetings (frequency, who should attend, etc.)
  - Team will meet monthly to review project status, progress and manage change
- Communication (methods, frequency, chain of command, etc.)
  - Refer to Communication Plan
- Manage team change
  - Communicate change in a timely manner

47

Measures of Success

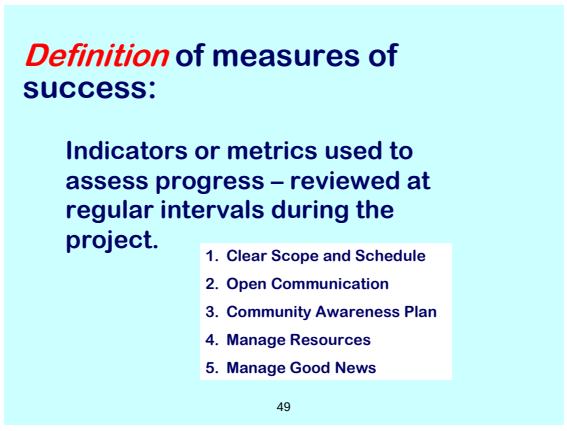
Measures of Success define the most important things the team should accomplish to fulfill its mission and achieve success. The measures of success are tied to the project purpose and team mission. Measures of success are measured incrementally "along the way," not just at project completion. This allows the project to get "back on track" if needed.

Critical success factors describe what the project team must accomplish to fulfill its mission and to achieve project success.

Measures of Success are the "indicators" or "metrics" used to assess progress toward the accomplishment of critical success factors and are reviewed at regular intervals throughout the project.

Steps for developing Measures of Success

1. Identify the critical success factors of the project phase. (e.g., environmental documentation complete, budgetary limitations met, etc.)
2. Review the list of critical success factors with District/Central Management.
3. The Project Manager and project team identify corresponding Measures of Success.
4. Define the specific indicators, signals, threshold values, etc., that will be monitored and reported.
5. The Project Manager or designee documents Measures of Success .
6. Develop specific methods and assignments for monitoring and reporting the Measures of Success.
7. Review the Measures of Success with District/Central Management and the project team.



Example *measures of success*

What the team must accomplish for this project to be successful:

- A clearly defined product (Ad ready PS&E, R/W certification and permits), scope, schedule, and manage change effectively.
- Maintain open, effective and timely communication within the team, with sponsors, other agencies, stakeholders, and the public.
- Conduct timely and meaningful public involvement as identified in the communication plan.
- Understand all our stakeholders' needs and concerns, mediating issues to an acceptable conclusion.
- Gathered stakeholder needs and concerns are through interviews: tabulate, evaluate, and address prior to the Design Hearing.
- We effectively manage our resources, including funding, by comparing and reporting work order expenditures to the planned budget.
- Regularly recognize and celebrate accomplishments and successes.

50

Summary

Aligning to common goals helps the project team form a cohesive, effective unit. It builds a foundation of cooperation where team members are comfortable communicating with one another and working together. The Team Mission/Assignments statements align the team… and help maintain alignment as the work progresses.

Teams must not only be built but also sustained. Each team member brings knowledge, skills, attitudes and interests strive to maintain focus and team alignment throughout the project. For successful project delivery, the participants must conduct their efforts in a coordinated and complementary manner. The most important function of this first step is to establish communication with the people who will develop and deliver the project.

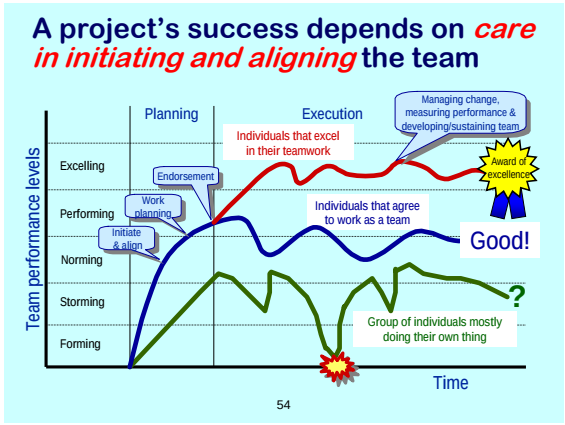
What is the most important skill set of a Project Manager?

Communication! It is integral to everything the Project Manager does.

Remember, the project management process is scalable, and should be tailored to fit the project by the project manager and team. A Project Management Plan is as simple or as complex as the team makes it. The work plan and work planning effort should be commensurate with the needs of the team and the project.

The project team is more than just the assigned designer and CADD operator –it is the deliberate establishment of a multi-disciplinary team – an "extended" or "hybrid" team – including appropriate representation from all key specialty groups as well as the project sponsor(s) and/or customer(s). All parties need to be represented and involved in order to obtain their endorsement and commitment to accomplish the work plan and deliver the project. This does not mean that all team members must participate in every team meeting or project work session.

Do not be trapped by current ways of thinking or limited by the way we've always done it before… for example at the very same time the pony express was trying to deliver mail faster by getting speedier horses and moving stations closer together, someone else was inventing the telegraph.



I-74 Purpose and Mission Exercise

Each team is accountable to develop an Initiate and Align Worksheet for the I-74 and US 421 Interchange Improvements project. The "Initiate the Project information" located in Appendix D.

Goal: Based on the assigned roles, develop an Initiate and Align Worksheet that documents the following:

- Project Description
- Team Mission/Assignment
- Major Milestones
- Boundaries
- Team Identification
- Roles and Responsibilities
- Operating Guidelines
- Measures of Success

Schedule: 20 minutes

What do Geese instinctively know?

A Flock of Geese

Each of us is strong, talented and capable. However a group of strong, talented individuals become capable in the extreme if they function as a unified team.

Geese in flight are like teams in formation united by a purpose, aligned toward a common goal and working together -achieve the mission. Each has individuality yet they put the team before themselves. Geese in flight support their team the way the team and each member needs support. Completing the mission and realizing the purpose requires it.

When are geese at their best? When working as a team on their great migrations. The term for a flock of geese in flight is "skein". This is an interesting word, there are several definitions for the word skein but two are very applicable to us. A skein is a flock of geese flying in the "V" (victory) formation, they never let each other down, they never give up until they reach their goal. Skein also means a series of similar or interrelated things: such as a skein of completed projects delivered on time, on budget and of superb quality.

Team **success depends on each member committing to the purpose**: are you going to be the "silly" goose that doesn't know what to do because of lack of communication, refusing to contribute to the discussion or not actively listening? Are you going to be the goose that let's down the rest of the team?

Geese working together

Have you ever noticed how geese fly in a "V" formation? Did you notice there are no geese drafting lazily in the middle? That's because the others won't allow it. Those who give their best to the team get the whole team behind them and achieve success. Did you know that if a goose in flight becomes wounded or ill and has to land one of the others goes with him to care for and comfort him until he can rejoin his team. That's what having team behind you can do. That is something you can never do on your own.

Do you know why geese fly in a "V" formation? It is very effective; geese in formation can fly 70% farther than a lone goose. Migrating geese fly at extremely high altitudes for sustained periods at speeds ranging from 40-60 mph. A lone goose, not working with a team, tires and stops to rest, it may be eaten by a fox, or fly too low and wind up in a goose hunter's cook pot in Kennewick. When the geese are at their optimum altitude even the hunters can't get them. A team flies higher, farther, and faster than an individual.

The "V" Formation provides the ability to cooperate and communicate; it is also the epitome of a team in alignment. The toughest place to fly is up front, the lead goose in the team, so they take turns leading, each leader bringing special skills to share with the team.

Consider how this works in project delivery with a project team. At different times, during the project, various elements assume prominent roles "leading" the effort. Sometimes we need the environmental to play a more prominent role, other times it may be design, utilities, real estate services, traffic, or others to take the lead, blazing the trail at the front. As these changes occur during the project, the team continues forward.

Initiating and aligning the team establishes an atmosphere conducive to cooperation and an environment that promotes a positive attitude. It is the attitude of the team members that holds the team together and the purpose helps maintain team alignment and focus throughout the project.

Ask yourselves at the beginning of each project your level of commitment to the team. When tempted to whine or complain, or speak or act in a way that brings down the attitude (and altitude) of the team recall these things: "the team needs my help", "I'm here", "I'm ready", "you can count on me", then cheer your team on, honking encouragement just like the geese do when they fly over 5,000 miles twice a year.

Be aligned and united in purpose as a team, with a clear purpose and mission. Depend on one another; Support one another. Communicate and encourage one another (honking encouragement in flight). Share leadership as appropriate and use the unique strengths of each other. Deal with and adjust to changing conditions (just as geese adjust to wind, darkness, etc.). Establish milestones along the route (geese use lakes and fields where they rest and refresh)

Establish a work plan that includes scope, schedule and budget

- Scope = migration start and finish points.
- Schedule = time to begin and time to complete
- Budget = we use money geese use food and water along the way, their energy reserves
- Work plan = the migration route and scope, schedule, and budget elements of their journey: resources have been assigned; roles and responsibilities are known; each team member is committed and contributes and offers encouragement along the way; completion of the project brings rewards and recognition.

Teams

As stated earlier, the project management process is a scalable process that can be tailored by the team to suit the needs of their project. But what about the team is it scalable? Can the size of the team be scaled to best suit the project? Yes, according to Glenn M. Parker, author of "Cross-Functional Teams" the following are worth consideration:

↑ = Increase ↓ = Decrease

Think about the following as the size of a team increases:

1. ↑ Team size = ↓ Productivity
2. ↑ Team size = ↓ Accountability
3. ↑ Team size = ↓ Participation/Trust

But there is an allure of larger teams. Some potential benefits (perceived or actual) of larger teams include:

4. ↑ Team size = ↑ Ideas
5. ↑ Team size = ↑ Importance of Project
6. ↑ Team size = ↑ On the job training opportunities

Limit Team Size

Do the right thing – "right-size" the team for your project. Teams are always free to invite subject-matter experts to assist as the need arises.

Use the Core Team Approach

Core teams typically include 5 to 8 members. The core team provides leadership and key decision-making, but meets regularly with their respective functional groups to ensure work conforms to quality standards, and meets schedule and budget.

Dividing into Subgroups

When teams are large, skillful use of subcommittees achieve the advantages of small groups. In this model the full team may meet monthly (or every other month, or quarterly as the team deems appropriate) and the subcommittees provide status reports at these full team meetings. The small groups meet weekly and continue to do the work between the large full team meetings.

Ultimately it is up to your team and the nature of your project as to how to best size your team and strategize involvement of all appropriate parties so as not to offend either allies or enemies. The only limitation is the imagination of the team.

Step

2

Plan the Work

Failing to plan is planning to fail

Proper work planning is art and science. It requires a blend of engineering and imagination. Predicting time, resources, risk, and possible change. Building a quality work plan requires skill in both the "soft" skills and "hard" skills of our business. Communication makes this happen.

Plan the work is the portion of the project management process that produces the Project Management Plan(PMP). The (PMP) describes both the Project Performance Baseline – the project deliverables and the schedule and budget plans for delivering them – and the project management methods that will be used by the project team during their delivery.

The detailed planning needed to establish a PMP begins during the Step 1 Initiate and Align process and continues throughout the remainder of the project. Not all PMPs are the same; the size and complexity of the PMP depends on the project and the project team.

Project Performance Baseline

The Project Performance Baseline documents the project team's detailed planning for the performance of the project within the scope, schedule, and budget parameters established by District/Central Office. The baseline identifies all of the deliverables to be produced, the sequences and schedule for their production, and the budgets allocated for their performance.

The baseline is simply the original plan plus any approved changes. As the plan changes the baseline must be reviewed, updated, and endorsed. Documenting how the plan has progressed and changed over time is essential for two reasons. First, updating the PMP and sharing it with project participants keeps everyone informed- enables everyone to "be on the same page." Second, updating the PMP produces an accurate history of how the project actually progressed thus providing a valuable reference document to be used as a guide for the planning of future similar projects.

Establish Project Management Plans

The development of performance plans for critical project management processes provides the project team with procedures and tools to direct their performance and confirms the project team's commitment to performance within District and Central Office management methods and requirements.

Work Breakdown Structure (WBS)

"Project scope management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully." (*PMBOK, Third Edition*). The first step in Plan the Work is to develop the Work Breakdown Structure(WBS), which identifies and describes all of the project deliverables.

Development of the WBS requires collaboration by the entire project team; the team includes the design team, specialty groups (Traffic, Environmental, Right-of-Way, etc.), and any others who have a role in the project's development and delivery. Typically the WBS is in chart format and includes progressively detailed levels of information, beginning with the top level deliverable of the project as the first and highest level. The WBS is used as an input to create the schedule, verify the budget, to create activity lists, and to define all of the work that will be done on the project. If an item is not in the WBS, it is not part of the project scope of work.

INDOT's standardized Project Development Process (PDP), is a starting point for developing a project specific WBS. The PDP is a comprehensive list that identifies project phases, work processes, and deliverables. The INDOT PDP is shown in Appendix B.

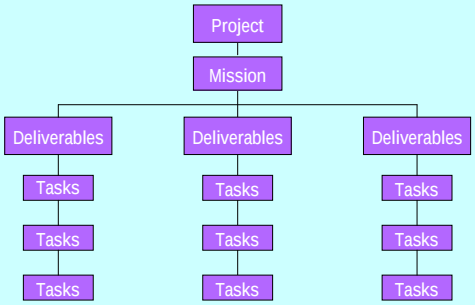
Communication in project delivery is more than transmitting random words, thoughts and pictures but involves sending, receiving and disseminating useful information. The PDP is one of the many products available for statewide use. It provides a common identifier for deliverables and the opportunity to identify the required time and resources to produce a work product. The PDP provides a common language and consistent terminology for project communication.

Recall the *"smart way"* to do a project twice:

- Plan the work
- Work the plan

2

The work breakdown structure (WBS) identifies *tasks needed to produce deliverables*



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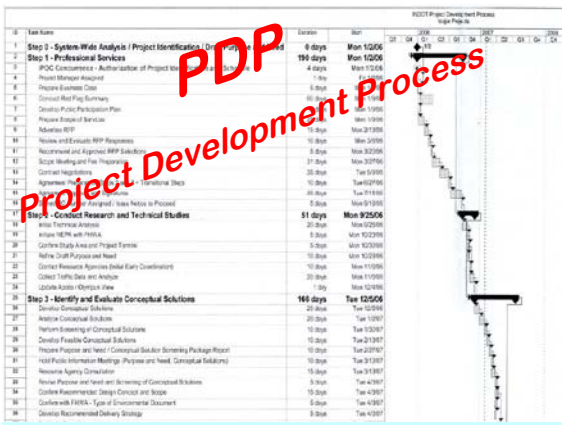


Project Development Process(PDP)

The Project Development Process(PDP) provides a list of tasks that are typical of INDOT projects. Obviously not every project will produce every deliverable, in fact most projects will provide just a portion of the deliverables that are on the list. The PDP is only the starting point for defining the deliverables and building a project specific WBS.

The PDP, shared by all the Districts, provides consistent terminology for project communication. In the past one project team might use the term "Storm Water Plan" and another team "Storm Water Design," even though they meant the same thing to the project teams. A common language is crucial for PDP to be effective.

In addition, the PDP simplifies development of the WBS for a project. In the planning process the project team looks at the PDP and determines which deliverables their project requires and simply eliminates the rest. Note that each deliverable already has a specific identification number and formal name. To enhance communication, use the PDP numbers and names as provided on the PDP.

Once the deliverables are determined there is great flexibility on creating the rest of the WBS. Each deliverable will require some activities (tasks) needed in order to produce it. The PDP provides the freedom to do this as preferred by the team.

Reminder – We are building the PMP to take us from our existing state to the realization of the project description. Keep the project description and team mission/assignment in mind throughout the development of the project.

Using the PDP

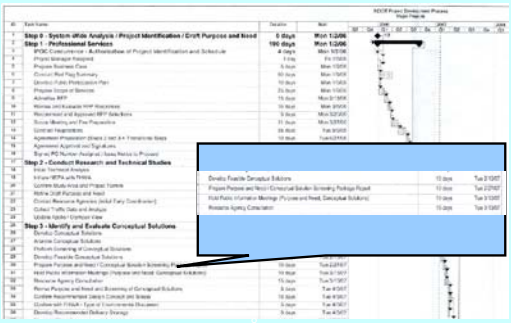
Using the PDP is simply a process of contraction and expansion. Eliminate the processes and deliverables that you do not need for your project. Then build upon this by identifying the tasks required to accomplish the deliverable. The PDP can be reorganized as the team desires.

Use of the Project Development Process (PDP):

- Enables project manager to start with a list of potential tasks for a project in consistent terminology
- Determine which tasks are needed and how to assemble them
- Build a project work breakdown structure (WBS) - like a fine running machine

7

Edit the PDP to *fit your project*



8

Task Planning and Scheduling

Use the project-specific WBS to develop “manageable” tasks and put them into a time phase format.

Steps for Task Planning and Scheduling

1. Review the deliverables identified in the project specific WBS and establish the logical sequence within their work categories or processes.

2. Define the task(s) for each deliverable; what activities will take place?

3. Establish durations and task dependencies:

   - Estimate durations for each task.
   - Identify all precedence relationships between dependent tasks.
   - Review each task dependency and determine if lead/lag times are required, and enter them.
   - Review the schedule, dates, and major milestones for appropriateness.

4. Assign resources and/or estimated costs to the tasks (generic resources are a minimum).

   - Identify the estimated effort needed for the assigned resource.
   - Identify any constraints associated with the assigned resource. Resource constraints may include things like: availability of staff, experience of staff and complexity of the task.

Task planning and scheduling *terminology*

Task	*Milestone*	*Deliverable*
Activity Finite duration Defined start & finish Assignable A deliverable upon completion	Event Identifiable point Completion of a major deliverable or set of tasks	Measurable Tangible Work product

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Suggested process for task planning and scheduling:

- Define the tasks
- Estimate durations
- Identify dependencies
- Assign resources
- Determine constraints
- Estimate costs

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More on Scheduling

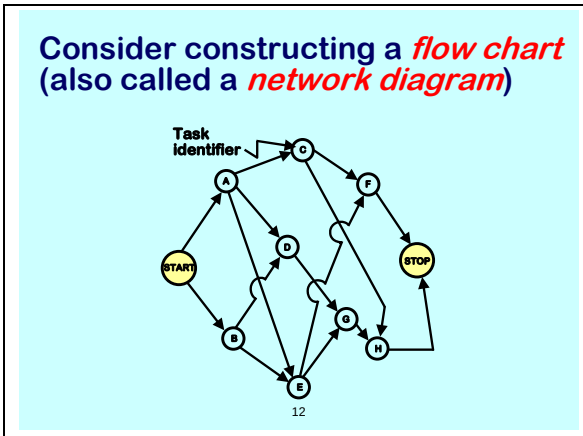
The next step is to look at the logic or the order in which the work must be performed. This is known as a flowchart or network diagram using the activity on node structure. It is generally the preferred method for representing the tasks, their dependencies, and the sequence.

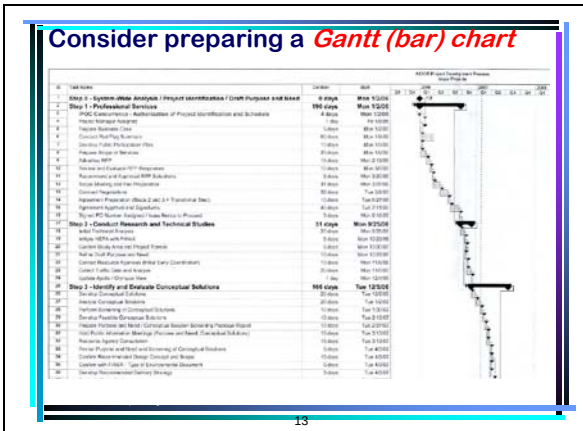
Using the completed network diagram and task durations you can build the project schedule. Gantt or bar charts are graphic displays of schedule related information, typically having a calendar along the horizontal axis. Gantt charts can show percentage complete and are considered to be a good tool to communicate with management.

The critical path is a sequence of events that affect each other on the project from start to finish. These paths are used to identify areas of high risk on a project. Generally, the longest path through the schedule is the critical path.

Include the entire project team in schedule development. Organizations that consist of multiple divisions and functional work areas, such as INDOT, need to have a clear understanding of what is required for tasks and what each group is responsible for. Task relationships linking functional work groups are often not emphasized strongly enough.

Want to know more about project scheduling? Attend the Project Scheduling course





Budget

Validate the programmed project budget in the Capital Project Management System (CPMS) through comparison with specific project planning.

Steps for Validating the Project Budget

1. Compare the estimated project costs from the resource-loaded schedule to the programmed project budget.
2. Identify any variances between project estimated costs and programmed budget, including their sources (scope elements, resource costs, etc.).
3. Review and reconcile all budget differences with District/Central Office Management.
4. Based on reconciled project budgets and the performance baseline schedule, develop the project aging report.

Definition of *budget*

Authorized allocation of funds
for an entire project
or
the authorized funds
for a project component
or
the authorized funds
for a part of a project

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Budget page, **used to indicate estimated costs.**


PROJECT SCOPING ESTIMATE

Construction (CN)

Roadway $

Bridges $

Utilities $

Traffic Maintenance $

Environmental $

Contingency $

Construction Subtotal $

Right-of-Way (RW)

Permanent R/W $

Temporary R/W $

Right-of-Way Subtotal $

Preliminary Engineering (PE)

Preliminary Engineering Subtotal $

PROJECT TOTAL $

FUNDING INFORMATION

Funding Program

Allocated Amount $

16

Risk Planning

Risk as defined by the Project Management Institute (PMI) is "An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives".

Risk planning is the systematic process of deciding how to approach, plan, and execute activities throughout the life of a project. It is intended to maximize the beneficial outcome of the opportunities and minimize or eliminate the consequences of adverse risk events.

Risk planning is an important aspect of the PMP. It involves the entire project team, begins early in the project planning process, and is an iterative process that takes place along with WBS development, task planning and scheduling, and validation of the project budget.

Risk *definitions*

- ***Risk:*** An uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives
- ***Risk response planning:*** The process of developing options and actions to enhance opportunities and to reduce threats to project objectives

Source: PMBOK, 2004

- ***Triggers:*** Indications that a risk has occurred or is about to occur
- ***Risk mitigation:*** A risk response planning technique associated with threats that seeks to reduce the probability of occurrence of impact of a risk to below an acceptable threshold

Source: PMBOK, 2004

Steps for Risk Planning

1. Determine the required level of risk analysis and management.

    - Review the project: location, size, participants, type of work involved, general "risks" involved and their consequences, previous experience, etc.

    - Work with District/Central Office management to determine the risk factors to be considered, the risk tolerance levels/thresholds to be used, and risk reporting and visibility requirements.

    - Communicate the level of risk analysis and management to the project team.

2. Identify risk events that might affect the project and document their characteristics.

3. Qualitative risk analysis assesses the impact and likelihood of the identified risks and develops prioritized lists of these risks for further analysis or direct mitigation.

4. Quantitative risk analysis is a way of numerically estimating the probability that a project will meet its cost and time objectives. Quantitative analysis is based on a simultaneous evaluation of the impacts of all identified and quantified risks.

5. Risk response planning is the process of developing options and determining actions to enhance opportunities and reduce threats to the projects objectives. It identifies and assigns parties to take responsibility for each risk response. This process ensures that each risk requiring a response has an "owner".

6. Risk monitoring and control tracks identified risks, monitors residual risks, and identifies new risks - ensuring the execution of risk plans, and evaluating their effectiveness in reducing risk. Risk monitoring and control is an ongoing process for the life of the project.

Risk Response Strategies

The project manager and the project team identify which strategy is best for each risk, and then design specific actions to implement that strategy. Risk strategies include:

- **Avoidance:** The team adjusts the project plan to eliminate the risk or to protect the project objectives from its impact. The team might achieve this by changing scope, adding time, or adding resources, while maintaining the balance of scope-schedule-budget.

- **Transference:** The team transfers the consequence of a risk to a third party together with ownership of the response. Transferring the risk gives another party responsibility for the management of the risk; it does not eliminate it.

- **Mitigation:** The team seeks to reduce the probability and/or consequences of a risk event to an acceptable threshold. Taking early action to reduce the probability of a risk's occurring or its impact on the project is more effective than trying to repair the consequences after it has occurred. Mitigation costs should be appropriate, given the probability of the risk and its consequences.

- **Acceptance:** The project manager and the project team decide not to change the project plan to deal with a risk, or cannot identify a suitable response action. A contingency plan may be developed or no action may be taken, leaving the project team to deal with the risk as it occurs.

Risk Factors

INDOT has developed a list of risk factors by category. This list identifies what to consider when evaluating risks.

Technical Risks

- Design incomplete
- Right-of-Way analysis in error
- Environmental analysis incomplete or in error
- Unexpected geotechnical issues
- Change requests because of errors
- Inaccurate assumptions on technical issues in planning stage
- Surveys late and/or surveys in error
- Materials/geotechnical/foundation in error
- Structural designs incomplete or in error
- Hazardous waste site analysis incomplete or in error
- Need for design exceptions
- Consultant design not up to Department standards
- Context sensitive solutions

- Fact sheet requirements (exceptions to standards)
- Topography, roadway design factors
- Others

External Risks

- Landowners unwilling to sell
- Priorities change on existing program
- Inconsistent cost, time, scope, and quality objectives
- Local communities pose objections
- Funding changes for fiscal year
- Political factors change
- Stakeholders request late changes
- New stakeholders emerge and demand new work
- Influential stakeholders request additional needs to serve their own commercial purposes
- Threat of lawsuits
- Stakeholders choose time and/or cost over quality
- Others

Environmental Risks

- Permits or agency actions delayed or take longer than expected
- New information required for permits
- Environmental regulations change
- Water quality regulation changes
- Reviewing agency requires higher-level review than assumed
- Lack of specialized staff (biology, anthropology, archeology, etc.)
- Historic site, endangered species, wetlands present

- EIS required
- Controversy on environmental grounds expected
- Environmental analysis on new alignments is required
- Formal NEPA/404 consultation is required
- Section 106 issues expected
- Project in an area of high sensitivity for paleontology
- Section 4(f) resources affected
- Project on a Scenic Highway
- Project in a floodplain or a regulatory floodway
- Project does not conform to the state implementation plan for air quality at the program and plan level
- Water quality issues
- Negative community impacts expected
- Hazardous waste preliminary site investigation required
- Growth inducement issues
- Cumulative impact issues
- Pressure to compress the environmental schedule
- Cultural resources (parklands historic and archeological resources)
- Endangered and threatened species
- Hazardous waste
- Noise and vibration
- Wetlands
- Others

Organizational Risks

- Inexperienced staff assigned
- Losing critical staff at crucial point of the project
- Insufficient time to plan
- Unanticipated project manager workload
- Internal “red tape” causes delay getting approvals, decisions
- Functional units not available, overloaded
- Lack of understanding of complex internal funding procedures
- Not enough time to plan
- Priorities change on existing program
- New priority project inserted into program
- Inconsistent cost, time, scope and quality objectives
- Others

Project Management Risks

- Project purpose and need is poorly defined
- Project scope definition is poor or incomplete
- Project scope, schedule, objectives, cost, and deliverables are not clearly defined or understood
- No control over staff priorities
- Too many projects
- Consultant or contractor delay
- Estimating and/or scheduling errors
- Unplanned work that must be accommodated
- Communication breakdown with project team

- Pressure to deliver project on an accelerated schedule
- Lack of coordination/communication
- Lack of upper management support
- Change in key staffing throughout the project
- Inexperienced workforce/inadequate staff/resource availability
- Local agency issues
- Public awareness/support
- Agreements

Right of Way Risks

- Utility relocation may not happen on time
- Freeway agreements
- Railroad involvements
- Objections to Right of Way appraisal takes more time and/or money
- Others

Construction Risks

- Inaccurate contract time estimates
- Permit work windows
- Utility
- Surveys
- Buried man-made objects/unidentified hazardous waste
- Utility locations (underground and overhead)
- Major drainage issues (floodways and flood plain)
- Location of railroads and facilities

- Location of airports
- Historic landslide areas
- Location of cemeteries
- Others

Regulatory Risks

- Water quality regulations change
- New permits or new information required

Risk Assessment Tools

A variety of tools exist for assessing risk, most involve some consideration of the impact of the risk and the probability that it will occur. Some of the many assessment tools include:

Risk Interview

Interviews are used to determine the probability and consequences of risks on project objectives. A risk interview with project stakeholders and subject-matter experts may be the first step in quantifying risks.

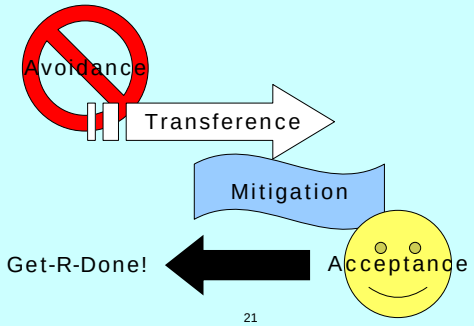
Decision Tree Analysis

The decision tree is a diagram that describes a decision under consideration and the implications of choosing one or another of the available alternatives. It incorporates probabilities of risks and the costs or rewards of each logical path of events and future decisions.

Probability – Impact Matrix

A common way to determine whether a risk is considered low, moderate, or high is by combining the two dimensions of risk, its probability of occurrence, and its impact on objectives if it occurs.

Four possible ways to address an identified risk



21

Tools for identifying and assessing risks

- Interview stakeholders and subject matter experts
- Perform decision tree analysis
- Create probability and impact matrix

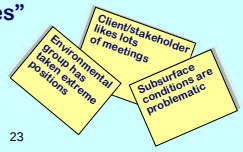
22

Method for conducting a basic *risk analysis*

- Assemble project team

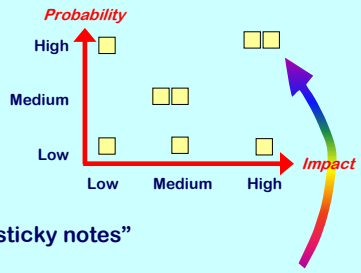
- Give each person "sticky" notes

- Brainstorm risks and write on "sticky notes"



23

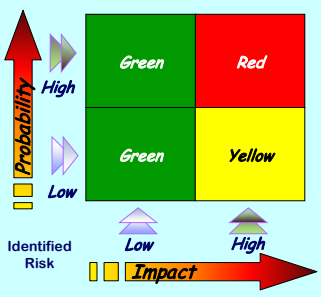
- Create axes



- Place "sticky notes"
- *Select high impact-high probability risks* for most scoping and monitoring

24

Use of colors to rate risks



25

Communication Plan

Communication is defined as a process through which information is exchanged among persons using a common system of symbols, signs, and behaviors.

Change management, risk planning, quality management, and transition & closure all address communication requirements. For example, one step in the change management process is to "communicate the change". This does not mean an individual communication plan is not needed; there are still elements of communication that have not been addressed and should be documented separately. The project communication plan should compliment the plans previously mentioned.

Take an imaginary ride in a hot air balloon, as we rise we see specialty offices, and we see other people we will interact with in order to deliver the project. We see the "big picture" – customers, agencies, and specialty groups. This is helpful during work planning. We recognize relationships that need to be established and maintained in order to work effectively.

INDOT's Communication Plan

A communications plan is important for projects that impact the local community or businesses, are of potential interest to the media, and where there are political stakeholders. The figure below sets out basic guidelines for managing communications in each of these areas.

Guidelines for Managing Communications

Audience	Communications Guidelines
Local Community and Business Groups	● Identify project impacts of concern to local community and business groups ● Communicate frequently and timely on the status of the project and associated impacts (community meetings, informational newssheets) ● Demonstrate sincere empathy and understanding on adverse impacts. ● Mitigate adverse impacts (limit construction at nights/weekends, provide temporary signage where access to business is impacted during construction).
Media	● Limit media contact to designated Agency personnel. ● Require contractors to refer all media comment to the Agency.

	● Establish the Agency's position and message on project issues. ● Address media questions so as to communicate the Agency's message. ● Cultivate the media to present positive news on project events.
Political Stakeholders	● Above all else make certain a political stakeholder is not taken by surprise by a project event, good or bad. ● Regularly brief political stakeholders on project events and issues. ● Discuss project issues with political stakeholders before they have to comment or decide on them in public such as at a board meeting or media interview. ● Include political stakeholders in project milestone events so that their support and contributions can be recognized.

Although communications management is usually thought of as managing damage control when bad things happen, communications management also manages good news on the project such as:

- Announcing the project to promote its benefits
- Holding milestone events to celebrate progress such as:
    - Unveiling the design of a new facility
    - A groundbreaking to mark the start of construction
    - Inaugurating the start-up of a completed facility.
- Publicizing any awards or industry recognition achieved by the project or the project team.

Public participation is an important element of all INDOT projects, from planning and PD&E through design and construction. During planning and PD&E the emphasis is on participation in the decision-making process concerning the need for a project and its basic concepts. In the design phase, the emphasis changes to one of informing the public of the project. People are much more likely to tolerate the inconvenience of a construction project if they understand the need for the work and have good information about the project. Therefore, the emphasis during the design and construction phases is

on communicating with the community. During design there are also opportunities to work out details of the project in an effort to minimize negative impacts.

Each design project should have a Community Awareness Plan (CAP) that will carry forward into the construction phase. This plan can be part of the consultant scope of services or it can be developed by the INDOT PM. The CAP should explain the activities that will take place to keep the community informed of the project and to minimize negative impacts. The scope and complexity of a CAP will vary according to the community concern that is expected about a project. Projects can be grouped into one of four levels of public concern that they are likely to generate.

- **Level 1.** Project is not controversial, causes negligible access impacts and traffic disruption. Examples are work outside the roadway, simple rural resurfacing, some signal work, pavement markings, bridge and other maintenance.

- **Level 2.** Project has general public acceptance, little impact on access and reasonable degree of traffic disruption. Examples are urban resurfacing, bridge repairs and median revisions (not access control) that require lane closures.

- **Level 3.** Project is controversial, will significantly impact traffic flow or will adversely affect access to properties (temporary or permanent). Examples are parking removal, median opening closures, traffic signal removal, roadway widening, major reconstruction and projects requiring a detour.

- **Level 4.** Project involves interstate work including maintenance work, road widening, temporary ramp closures, construction of new interchanges and major reconstruction. All projects that require total closure (either temporary or permanent) of roadways, bridges or railroad crossings.

Phase I of plan development is the most important for CAP activities. Decisions affecting access management, Maintenance of Traffic (MOT), possible interruptions of utility service and drainage are almost always of concern to the public. The PM must have a good understanding of the impacts on the community and the concerns and needs of the public. Changes in vertical alignment are likely to create access problems during construction. Drainage during construction can also be affected.

A CAP should, as a minimum, include the following:

- Date of the plan and each revision.
- Name of person initiating the plan.
- A description of the project and anticipated level of public concern.
- Identification of city, county and other local officials that may be involved in the project and how they will be kept informed of project activities.
- A summary of expected traffic impacts during construction.
- A description of the community and properties affected by the project.
- A discussion of removal of street parking (if any) and how it will affect adjacent properties and businesses.
- Special features and amenities that will be included in the project, including landscaping and esthetic treatments.
- Construction schedule, contract time and consideration for alternative contracting methods.
- A list of known community concerns and a strategy for addressing each of them. The PD&E Report will be a good place to begin this list.
- A list of all PD&E and right of way commitments made to the public and how they are to be addressed.
- A plan for news media relations (for Level 4 and possibly Level 3 projects), developed in cooperation with the district Public Information Office. A public information campaign may be appropriate for very large projects.

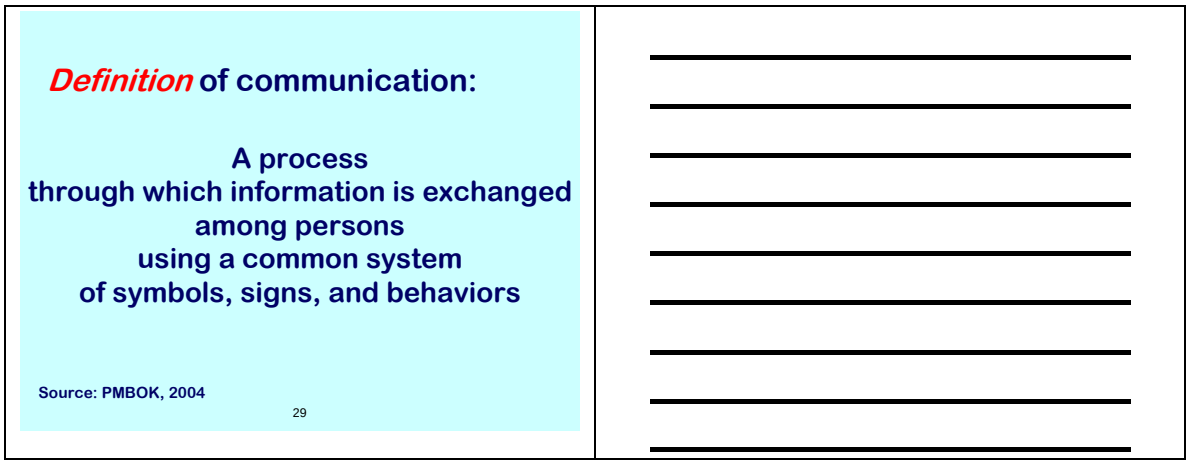
The media can be of great assistance to the Department in encouraging citizen input and keeping the public informed about a project. Project Managers should work with their district PIO to develop and implement a CAP.

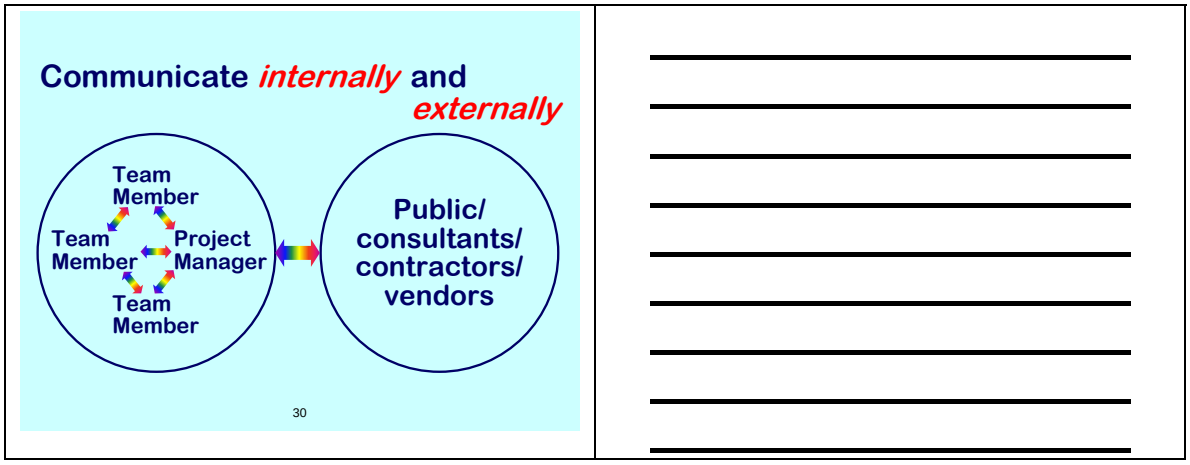
Increasingly, organizations use project teams to work across space, time, and organizational boundaries, linked by webs of communication technologies. Such teams, often widely dispersed, do not have the benefit of informal communication that occurs daily when teams are in the same office.

The project team and manager must pro-actively and effectively use the communication plan and available technologies to ensure project information is getting to the right people at the appropriate time and manner.

Effective communication is vital to the success of a project. When a breakdown in communication occurs, disaster may follow. Typical communication patterns or channels are shown on the slide to the right. Most project managers communicate laterally, where line managers communicate vertically downward to subordinates.

See Appendix C for a copy of the INDOT Communication Plan.





Perception barriers can occur because individuals can view the same message in different ways. Factors influencing perception include the individual's knowledge, experience, and abilities. Clearly defining terms or using words that have precise meaning can minimize perception problems. For example, what does the acronym PMP mean to you?

Personal likes and dislikes can affect communication; people tend to turn a deaf ear to boring topics. How often have you been in a meeting that has gone off on another subject and "tuned out"? Attitudes, emotions, and prejudices also warp our sense of interpretation.

Communication channels refer to how many paths of communication can exist on a project. Because the project manager needs to manage and be in control of project communications, it is important to understand that adding a single person on a project can have a significant impact on the number of paths or channels of communication that exist between people.

$$\text{Channels} = n(n-1)/2$$

Where n = number of people

Keep all elements of the PMP in mind during development and implementation of the Communication Plan. During Work the Plan, it is essential to communicate change or risk events that impact the quality of the scope, schedule, and/or budget.

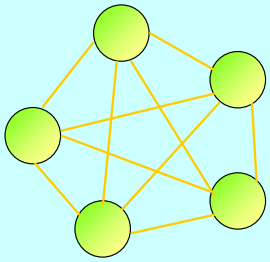
Using each of the individual plans within the PMP as standing agenda items will ensure open communication and action(s) taken at the appropriate time.

When *two people* are involved in a project, there is only *one line* of communication

n=2
n(n-1)/2=1

31

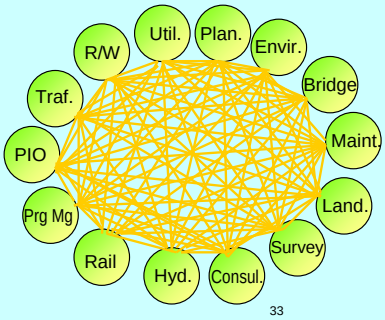
Five people on a project result in *10 lines* of communication or miscommunication



n=5
n(n-1)/2=
10

32

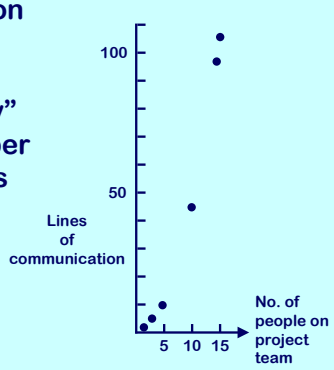
14 people on a project team results in *91 lines* of communication



n=14
n(n-1)/2=
91

33

Communication complexity increases "exponentially" with the number of participants



34

What you *send* is not necessarily what they *get*

You, the Project Manager

Your

Message

Them

35

Fatal assumptions when we send a message:

They *received it*

They *understand*

They *agree*

They *care*

They will *act*

Source: Adapted from Clark and Crossland, 2002, p. 6

36

Change Management

Successful project delivery requires to be prepared for potential change. A common tendency is to deny that change is occurring until it becomes overwhelming. A **Change Management Plan** (CMP) provides the roadmap for decision making when change occurs. Since it is not possible to foresee all potential changes, a project manager plans how change will be addressed when encountered.

The INDOT Change Management Plan is in Appendix C.

Steps for Change Management Planning

Develop a plan for identifying, quantifying, approving, and reporting changes to the Project Performance Baseline – scope, schedule, and budget.

1. Establish, define, and document the Project Performance Baseline components representing scope, schedule, and budget:

    - Project WBS
    - Project baseline schedule
    - Project Budget
    - Prior adjustments to the baseline
    - Depending on the project, define certain elements that document site and performance conditions, limits of work, geotechnical or other physical characteristics, periods of work, or other performance constraints, etc.

    For each component of the baseline, identify the specific project thresholds that trigger the formal change management process.

2. Develop and document project specific processes and instructions for the change management process.

    - Identify, report, and track potential change issues.
    - Team and individual responsibilities for identifying and reporting all potential change issues.
    - Establish and use a single change issue tracking and management log.
    - Work with District/Central Office management to establish change reporting thresholds and levels of authority.
    - Review risks and risk response strategies and recovery plans.
    - Identify approval and commitment requirements for changes to the Project Performance Baseline.
    - Update the Project Performance Baseline.

- Develop guidance for documentation and incorporation of change in design or other product records.

3. Gain approval and commitment for the project specific CMP from District/Central Office management.

4. Review the CMP with the project team and provide instructions on the specific responsibilities of each team member.

Quality (QC/QA) Plan

A short definition of quality is: conformance to requirements – all requirements.

A somewhat more detailed quality definition is: a measure of how well engineering services meet the user's needs and conform to governing criteria and current practice standards.

A quality plan is defined this way: It documents the project's quality standards and goals and provides the baseline against which the quality control/quality assurance efforts of the project team may be compared.

Quality planning involves identifying which quality standards are relevant to the project and determining how to satisfy them. The activities of the quality planning process basically translate existing quality policy and standards into a project Quality Plan.

Steps for Quality (QC/QA) Planning

1. Review each work element of the project WBS and determine the applicable standards for each process, product, and deliverable.

2. List each of the applicable standards with the appropriate work element in the "draft" Quality Plan.

3. Using the draft Quality Plan, review each work element and applicable standards with:

    - Performing staff – Verify understanding of assignment, specific quality standards and requirements, and qualifications for performance. Develop specific plans and documentation procedures for performance and achievement of the quality standards.

4. Complete the Quality Plan and review updating and reporting procedures with appropriate team members.

Quality management:

- Is a consistent approach to meeting appropriate quality standards, objectives, and requirements on all INDOT projects.

- Is performed only on those quality activities that add value to INDOT projects.
- Shifts the focus from review and correction of work performed to those activities that enhance the production of quality during the planning and performance of the work in order to minimize costly rework.
- Establishes responsibilities for meeting appropriate quality standards on all INDOT projects.

Appendix C has a copy of the QA/QC Plan.

A *definition* of quality:

"Conformance to all requirements"

Source: Adapted from Phil Crosby in *Quality is Free,* 1979.

48

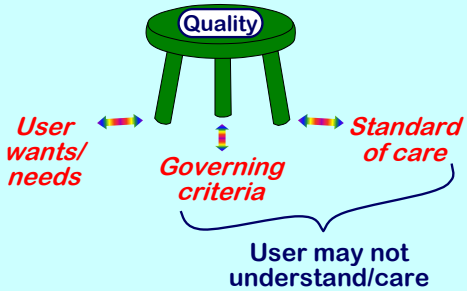
Another *definition* of quality:

"A measure of how well engineering services meet the *user's needs* and conform to *governing criteria* and current *practice standards*"

Source: Adapted from Snyder, 1993.

49

Quality has *3 legs:*



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Definition of QC and QA:

- ***Quality Control*** – the process of monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance
- *Quality Assurance* – the process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards

54

Why do we need a quality plan?

- Consistency
- Value
- Avoidance of Rework
- Responsibilities

55

Transition & Closure Plan

Transition and closure is the process of completing a major activity, phase, or the project itself. This includes transferring the completed work and remaining project responsibilities to others, demobilizing the appropriate team members and facilities, completing document archiving, and closing out the administrative and financial processes associated with the activity, phase, or the project.

The **Transition and Closure Plan** (TCP) outlines the points in the project at which formal transition and closure activities will take place, the requirements of the transition, the responsible organization, and the process steps that will be taken to accomplish an efficient and effective transition.

The resulting TCP is an integral part of the PMP and is implemented at appropriate points throughout the project and at project completion.

Certain elements of the TCP are implemented continuously, e.g. lessons learned, reward and recognition, etc. Other elements can be implemented at appropriate intervals prior to the full completion of the work of the activity or phase (preparing no longer needed files for archiving, demobilizing staff, facilities or equipment no longer needed for the work, etc.). All transition and closure activities are completed before the activity, phase, or project is deemed “complete” and the project manager is released from responsibility for the project.

Appendix C contains a copy of the Transition and Closure Plan.

Begin with the End in mind

Definition of transition and closure plan:

Outlines points in the project at which formal *transition* and *closure* activities will take place, the requirements of the *transition/closure* and the responsible organization, and the process steps that will be taken to accomplish an efficient and effective *transition/closure*

Begin with the end in mind!

58

Definitions of transition and closure:

Transition – the process of changing from one phase to another

Closure – the act or process of closing, a finish or end

59

Steps for Transition and Closure Planning

1. Establish Transition and Closure points

   Identify major activities and milestones of the project that will require a formal transition and/or closure process. In general, there are clear transition points between Pre-Construction and Construction. Other transition/closure points may be more obscure and associated with the project type, or specific to the project itself. Consider the following criteria:

   - Delivery and acceptance of major elements of work.
   - Transfer of responsibility for all or a major portion of the project.
   - Major changeover of project staff, resources, or location of performance.

2. Identify Acceptance Criteria

   - Identify all of the work included in each transition/closure and develop acceptance criteria for all deliverables.
   - Identify the responsible parties for each element of the work to be accepted – the performers and those accepting the work
   - Work with the appropriate staff to establish a common understanding of the requirements and acceptance criteria.
   - Identify the activities and responsibilities involved in the completion and acceptance process, and develop a discrete transition and closure schedule for the specific transition event or incorporate them into the Project Performance Schedule.

3. Outline demobilization strategies

   - Staff - Planning for the transition of staff is one of the most critical transition and closure planning activities. The absence of a sound approach to staff transition often creates a “non-productive” environment in which the staff is focused on identifying their next assignment.
   - Facilities, Equipment and Services - Identify all of the activities, steps and requirements for demobilizing and returning (or terminating) facilities, equipment and services as they are acquired. For each transition event; establish roles, responsibilities, budgets and schedules for all demobilization activities.

4. Describe the lessons learned procedure

    - INDOT has established a formal Lesson Learned System, which includes the collection of lessons learned from INDOT projects.
    - Based on the requirements of the INDOT Lessons Learned System, establish specific project team activities and responsibilities for identifying, documenting, reporting, and compiling lessons learned. During the course of the project, and as each transition/closure point is reached, compile and report the complete lessons learned file for the appropriate area or phase of the work.

5. Consultant Rating

    INDOT has developed a form for evaluating and rating project consultants. This is to be completed during this phase.

6. Specify archiving method

    - Review archiving requirements with District/Central Office management.
    - Develop specific instructions on record keeping, document management and preparation for archiving during the course of the project. SiteManager training will describe how to enter and archive project data. Most of the contract data will reside in SiteManager which will expedite project closeout.

7. Outline financial closure

    - Review the requirements and specific procedures for financial closure of the activity, phase or project with District/Central Office management.

8. Suggest reward and recognize

    - Review requirements and policies regarding reward and recognition with District/Central Office management.
    - Identify “target” performance measures in “key” areas that are critical to project success. The measures should indicate performance beyond expectations and should be “stretch” targets that are achievable, but require significant “extra” effort to accomplish.
    - Based on these “key” areas and target performance measures, identify appropriate project rewards and recognition for exemplary performance. Consider non-monetary recognition and rewards as well as those requiring budget allocations.
    - Develop a budget around the appropriate awards and targets and include in the PMP.

9. Set transition and closure schedule

   - The activities to be performed must be included into the Project Baseline Schedule. The required budgets for their performance must be established so they can be tracked and their status monitored.
   - All transition activities should be linked to the appropriate project milestones and activities for tracking and status monitoring. This provides as an effective method to ensure that they are not overlooked.

9. Consider possible need to shelf the project.

   - Remember that the transition and closure process starts during planning.
   - Many projects are "put on the shelf" for a number of years before they are actually completed.
   - Good records – starting with the PMP and a sound TCP can expedite the start-up and completion process.

10. Suggest means to update throughout the project.

   - Even if all of the requirements, roles and responsibilities are not understood when beginning the planning for the transition and closure process, include your best estimates and "guesses" in the TCP and upgrade it regularly throughout the project.

Consultant Rating Form

66

Step

3

Endorse the Plan

Can I have your John Hancock please?

Endorsement is the final step in the preparation or planning phase of the project management process. It can be simple if the team is prepared and ready with a quality PMP. A good plan instills confidence within the team and with the sponsors and customers. Once the work plan is endorsed the project moves into the Work the Plan phase of development.

Communication must be clear, coherent and complete… people are asked to commit to something…. they need to know what that something is. It is natural for them to be curious about how something will get done, how much will it cost, how long will it take, and why?

What is Endorsement?

Endorsement unifies a group of individuals and transforms them into a team. Effective endorsement involves communication and collaboration during the Initiate and Align phase and work planning. By endorsing the work plan, key participants take ownership of the team mission and agree upon the method by which it will be accomplished. Endorsement is a combination of approval and commitment.

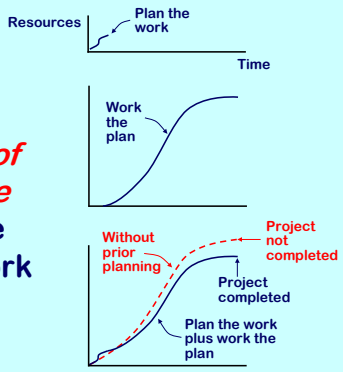
Approval

Definition: Regard favorably; confirm or agree officially and publicly.

Commitment

Definition: Agree or pledge to do something.

Recall the *importance of "planning the work"* before doing the work



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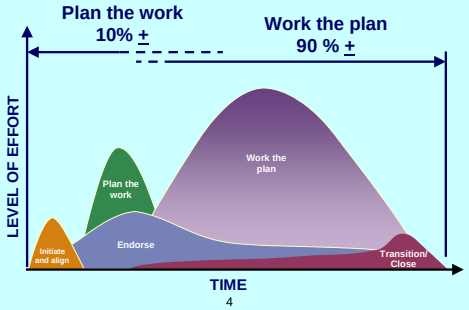
Resources invested in planning the work will *"pay for themselves"* when we work the plan



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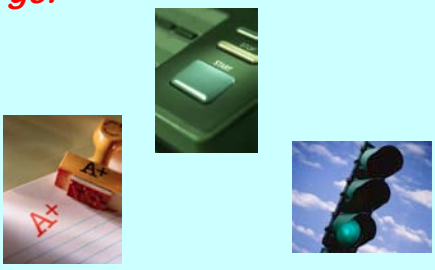
To be effective, the planned work *must be endorsed—given a "go!"*



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Project Team Approval and Commitment

The process of gaining the approval and commitment of project team members to the PMP can be as simple as a discussion of their assignment and their commitment to perform that assignment, or as formal as a workshop session with all team members, culminating in a formal, signed document committing to the PMP.

In all cases, the result is an understanding of the PMP, the team members' role in its execution, and their specific commitment to perform their responsibilities according to the plan.

The approval and commitment process can unify a group of individuals and transform them into a team.

Steps for obtaining Project Team approval and commitment:

1. **Identify the Participants**

   The project team is comprised of all project participants required to deliver the project. This includes those directly engaged by the project, as well as specialty groups, consultants, contractors, and other organizations or agencies.

   Review the PMP, particularly the WBS and responsibilities, to identify all resources needed to complete the project.

   Identify those project team members whose specific commitment to the PMP is appropriate.

   Endorsement is easier when the participants have been included in the development of the PMP.

2. Establish Approval and Commitment Process

Identify the appropriate methods for gaining approval and commitment from each participant—individual discussions, group meetings, etc.

Formal Meeting: Participants review and sign-off on the PMP. The use of a formal endorsement meeting provides a team-building opportunity where participants can discuss their assignments, discuss the inter-relationships of their assignments with other assignments, develop their working relationships, and open the channels of communication.

Prior to the meeting, the project manager should:

- Coordinate with specialty groups.
- Coordinate with local agencies, cities, counties, police, emergency services, etc.
- Distribute the PMP for review.

The endorsement meeting should be held as soon as possible after completion of the PMP.

- Use the PMP as the structure for the meeting agenda.
- Discuss the team mission, roles and responsibilities, schedule, and resources to complete major deliverables.
- Discuss any outstanding issues.
- Review change management, risk planning, communication, quality, and transition/closure plans.
- Have a method for signifying commitment: signature on the PMP or a suitable substitute for documenting commitment.

Individual Discussions: A second approach is to conduct individual discussions and sign-offs with each predetermined project participant. The same principles used to conduct an organized session with a group apply here, except that it is less formal.

Distribute and Return: A third – and less desirable – approach is to distribute portions of the PMP, either electronically or by hard copy, to selected project participants and ask for their endorsement. If using this technique, attach a cover letter that clearly states what is being requested, with directions for providing comments.

Often PMPs are all-inclusive documents that overwhelm rather than inform the reader. They can be much more informative if they are transmitted with instructions that clearly focus readers on the portions of most

Suggested process for earning project team commitment:

1. Identify the participants and review the plan

11

2. Establish approval and commitment *process*
   - Formal meeting
   - Individual discussions
   - Distribute and return

12

3. Establish approval and commitment *schedule*

Project team support is required before seeking management approval and commitment

13

relevance to them. In some cases, only part of the PWP needs to be transmitted, reviewed, and endorsed by project participants.

3. Establish Approval and Commitment Schedule

Team approval and endorsement are needed when Plan the Work process is concluding and the PMP is being completed for management approval and commitment.

Project team support is required before seeking management approval and commitment.

Endorsement is ***not*** a one-time occurrence for most projects. The PMP should gain new endorsement any time there are major changes to the scope, schedule, budget, sponsor, or team members. Establishing team approval and commitment as soon as possible will help expedite management endorsement.

Management Approval and Commitment

Management includes those individuals who have responsibility and authority for resources defined in the PMP. Gaining management's understanding of the PMP, particularly resource requirements, assumptions, schedule, and issues, leads to gaining their approval and commitment to the project. It also provides the baseline of understanding needed to balance their total resource requirements to avoid "over commitment."

The approval and commitment of the management of all planned resources is essential to ensure that the right resources will be available when they are needed to support execution of the PMP.

Steps for Obtaining Management Approval and Commitment

1. Identify the Required Individuals

Endorsement by management results in a specific approval and commitment of support for the PMP and the resources necessary to successfully deliver it. This may include managers from specialty groups and/or other organizations. Endorsement is ***not*** a one-time occurrence for most projects. The project team should gain new approval and commitment any time there are major changes to the PMP—scope, schedule, budget, sponsor, or team members.

- Review District/Central Office requirements for management approval and commitment requirements.
- Review the PMP and identify all organizational resources needed to complete the project.
- Review the Baseline Performance Schedule and identify the timing and levels of involvement for resources.
- Identify the appropriate management entities controlling all needed resources.

2. Establish a Schedule for the approval and Commitment Process

The commitment of the project team is required before the endorsement of management is sought. Obtaining management's approval and commitment as soon as possible will allow a smoother start to project delivery.

The first choice is to obtain management endorsement in a meeting when all the necessary management staff can attend, discuss the required commitments, and share their observations on the PMP and its execution.

If a meeting is not possible, management approval and commitment are gained individually or in groups and the resulting endorsements are sent to all participating managers by memo.

3. Obtain Management Approval and Commitment

The purpose of formal approval and commitment is to acquaint and inform the manager with the requirements, quantity, and timing for the resources being committed, and to document that commitment.

It is highly recommended that documentation of the agreement be made and shared among managers and the team. The main consideration should be the level of approval and commitment required and the need to document that approval and commitment. The most direct method is to have the manager sign the PMP or the cover letter.

Suggested process for earning management approval and commitment

1. *Identify* the required *individuals*

15

Prior to the meeting, the project manager should complete the following:

- Coordination with support offices/organizations
- Coordination with local agencies, cities, counties, police, emergency services, etc.
- Team-endorsed PMP

The endorsement meeting should be held as soon as possible after team approval and commitment.

- Use the PMP as the structure for the meeting agenda.
- Discuss team mission; roles and responsibilities; schedule; and resources to complete major deliverables.
- Discuss any outstanding issues.
- Review change management, risk planning, communication, quality, and transition/closure plans.

A rule-of-thumb is that those responsible for the resources should endorse the PMP. If higher levels of management approval and commitment are needed, those committing the resources should identify them.

Having managers visibly endorse the PMP is a team motivator – use it!

Don't let the endorsement process get stale. Make it part of the work planning process, not a separate task.

Project Performance Baseline

Once the PMP has been endorsed, a project manager saves the baseline of the project plan. This baselined plan is called the Project Performance Baseline.

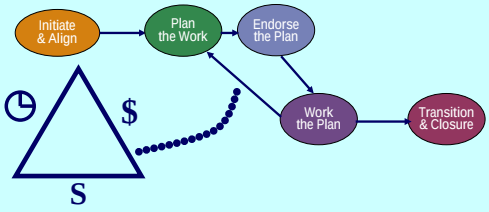
The project Performance Baseline is a tool to evaluate the progress of the project. To compare what was planned to what has actually taken place. It allows the project manager to identify potential problems and use proactive measures to manage project issues. Use of this progress evaluation tool is discussed further in Work the Plan.

Project performance baseline

Intend to evaluate project progress against what was planned and committed to

18

Changes to scope, schedule, or budget *require evaluation for re-endorsement*



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Step

4

Work the Plan

Roll up your sleeves; it is time to get to work!

The team successfully moved through the "Initiate & Align", "Plan the Work", and "Endorse the Plan" elements and processes. In other words, we have readied, taken aim, verified the target, now it's time to "Fire" or "Work the Plan." Failing to plan is planning to fail. We've taken time to plan our work, now lets work the plan to ensure project success (delivery on time, within budget, to customer's expectations)

The Project Management Body of Knowledge (PMBOK) Guide defines project management as the application of knowledge, skills, tools, and techniques to project activities to meet project requirements. Project management is accomplished through the use of the processes such as; initiating, planning, executing, controlling, and closing.

The project team manages the work of the projects, and the work typically involves:

- Competing demands for: scope, time, cost, risk, and quality.
- Stakeholders with differing needs and expectations.
- Identified requirements.

The more you know about your project, the better you are able to manage it. By developing a work plan, the team, project manager, and sponsors comprehensively define project requirements. Endorsement of the work plan represents commitment by key participants and ensures it is consistent with sponsor and customer expectations.

Working the plan is:

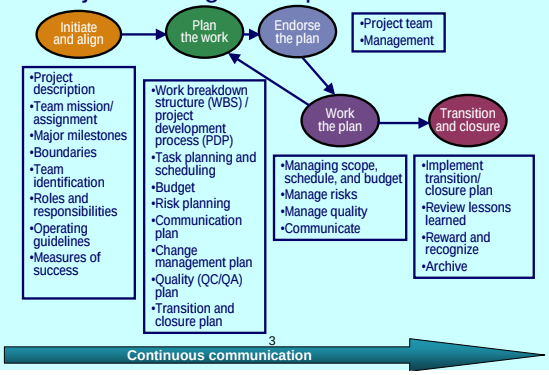
- Actively managing those planned elements, including the scope, schedule, and budget.
- Effectively communicating and building on relationships with the team, customers, and sponsors.
- Actively monitoring and managing identified risks and change.
- Communicating changes before they occur.

Recall the *"smart way"* to do a project twice:

- Plan the work
- Work the plan

2

Project management process



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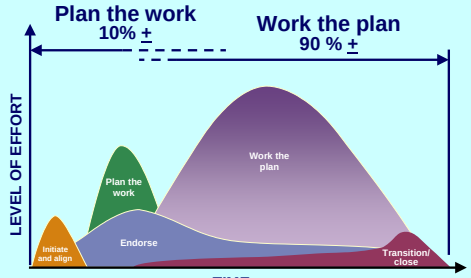
Step 4—Work the plan—is where we *invest most of our project resources*



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Manage Scope, Schedule, & Budget

So what does managing the scope, schedule, and budget mean?

Managing the project scope is ensuring that the projects includes all the work necessary and is performed according to expectations (specifications).

Managing the project schedule is ensuring that the project is completed in a timely manner and by the accepted or approved dates.

Managing the project budget is ensuring that the project is completed within the allotted or approved budget.

A project manager should be "large and in charge" and have an influence on all project parameters (requirements, time, cost).

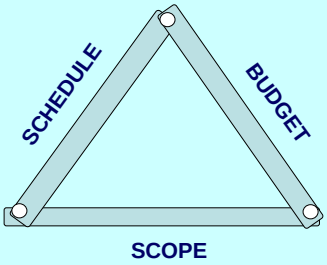
Steps for managing scope, schedule, and budget:

1. Project Performance Baseline

   The "Project Performance Baseline"—the project WBS, project baseline schedule, and project budgets—serves three critical functions in managing the project:

   - Provides the target metrics and measures that we use to gauge actual performance against plan.
   - Provides a basis for identifying and understanding the potential impact of performance problems.
   - Provides the background and basis for "testing" solutions to performance problems.

Recall the *three essential requirements* of a project:



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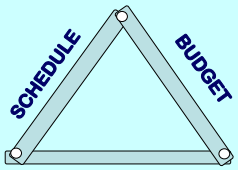
If one member gets longer



then at least one other member must get longer

8

The project manager must *monitor* scope, schedule, and budget and *take corrective action* when deviations occur

9

Ideas for monitoring scope, schedule, and budget:

1. Request *periodic written progress reports* from key project team members
2. *Conduct project team meetings*

10

3. *Compare tasks/deliverables* underway/completed to WBS/PDP
4. Compare actual *schedule* to Gantt (bar) chart and/or critical path
5. Compare costs incurred to *budget*

11

2. Maintain the baseline (scope, schedule, and budget)

   The effectiveness of the baseline to the project team is only as good as its accuracy. The project team should "freeze" the original baseline data and maintain a "current" baseline by updating it on a regular basis to incorporate changes and current information.

   Whenever scope, schedule, or assigned resources change, a corresponding budget change is required.

3. Monitor performance:

   Scope verification:

   - Configuration – The project team must verify that the products being produced in the pre-construction phase meet all of the requirements established for them and that they conform to INDOT standards and specifications and comply with INDOT policies.

   - Quality – The project quality plan should be frequently reviewed to verify that quality management actions are being performed as planned and with the results expected.

   Performance measurement: As a part of assessing project performance against the baseline, verify the following:

   - Actual work completed

   - Actual schedule consumed

   - Actual costs/budget consumed

   Districts and other entities may have specific methods and programs for measuring performance, including Earned Value Measurement. Discuss plans for measuring project performance with the District/Central Office.

4. Identify variances and their sources

   Review each component of the baseline and identify any significant differences between planned and actual performance. For each variance, determine the severity of impact and its source; i.e., the reasons why there was a variance and the conditions that led to it.

5. Forecast performance

   Before determining a course of action to correct a variance, evaluate the baseline for the remainder of the project and determine the probable outcome at

completion for each component. The re-evaluation of the work to be completed provides the understanding needed to develop and integrate recovery plans.

6. Manage variances

   Understanding the severity of the variance and its impact on the remainder of the work, the project team must decide how to adjust performance and conditions to avoid further impact and to recover from the variance.

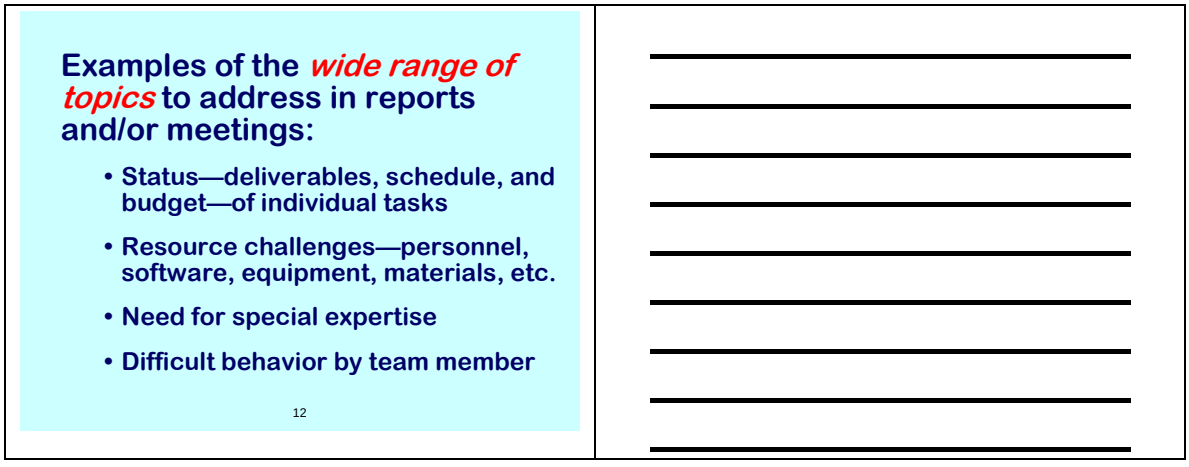
   Recovery plans should be developed in the context of the remaining work. For example, directing resources to complete work that has fallen behind schedule should not create resource problem with work yet to be completed; adding resources will impact the budget for completing the work (hence, budgets must be adjusted).

   Use the performance baseline to "test" the impact of recovery plans.

7. Obtain endorsement:

   - Project team
   - District/Central Office

   Only adjust the project performance baseline after the recovery plan has been endorsed.



- Vertical and horizontal control
- Identification of new risks
- Citizen concerns
- Unexpected field conditions—soils, weather, rock,…
- Status of permits
- Utility relocations
- Staging area
- Shop drawing review

13

- Phasing
- Traffic control
- Status of QC/QA
- Safety concerns
- Media reports
- Hazardous waste or toxic materials
- Stakeholder's satisfaction—are they getting what they want when they want it?

14

Ten tips to help the project manager conduct *productive* project team *meetings:*

1. Define purpose—is a meeting needed?
2. Send agenda to participants
3. Turn off cell phones/pagers
4. Start and stop on time

15

5. Follow the agenda—use "parking lot" for off-agenda topics
6. Expect everyone to contribute
7. Prevent anyone from dominating
8. Listen to minority views
9. Distribute minutes within three working days
10. Set example—be the kind of team member you want others to be

16

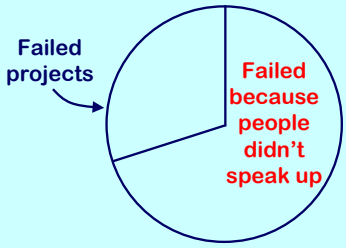
Encourage team members to *speak up!*

17

Seek out the *minority view*

18

Failure to speak up can result in *failed projects*



Source: *PM Network,* 2006 reporting on a study of approximately 10,000 projects at 35 *Fortune 500* firms.

19

Establish a *simple and firm* reporting system

"Keep the rules to a minimum
and
enforce the ones you have."

(Vince Dooley, University of Georgia football coach)

20

Some means for taking *corrective action* when scope/schedule/ budget deviate:

- **Reduce scope elsewhere**
- **Expand schedule**
- **Extend project into next budget cycle**
- **Add personnel/resources**
- **Replace project manager and/or selected personnel**
- **Refine/tighten labor/expense charges**
- **Modify the budget**
- **?**

21

Manage Risks

Risk planning is an integral component of day-to-day project management. Project teams implement and continuously evaluate risks throughout the project.

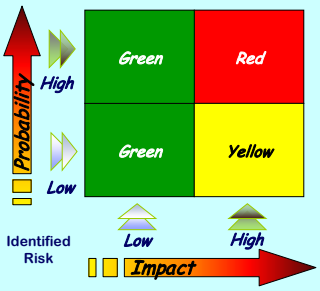
Primary risk planning functions include:

- Monitoring risk and opportunity elements
- Identifying new risk and opportunity elements
- Evaluating/upgrading probability of occurrence and potential impacts
- Devising and implementing response strategies
- Evaluating and documenting the effectiveness of response actions
- Reporting to Region/Organization Management and Stakeholders

Steps for Managing Project Risks:

- Brief each team member on the risks and the criteria for the execution of their responsibilities.
- Risk reviews should be a standing agenda item at all team meetings.
- Minimize risks and adjust risk responses as appropriate to provide visibility and understanding of current project conditions, status of risk events, and the potential overall impact on the project performance baseline.
- Report the status of risks to Management.

Planning the work included *risk identification*



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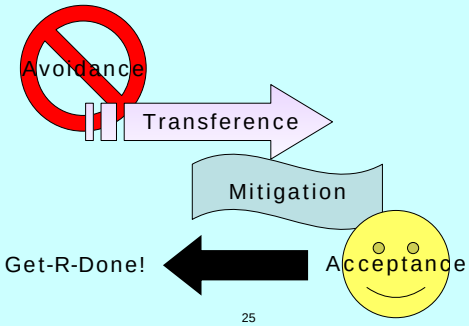
Identified risks can be addressed in *four possible ways*



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1. Monitor previously-identified risks:

    - Assign a team member to monitor and track each risk event.
    - Risk ratings and prioritization may change over the life of the project; changes may require additional analysis.
    - Identify and report changes in probability of occurrence and potential impact.

2. Identify new risks:

    - Charge team members with the responsibility to continuously review project work and conditions and to identify new risk events.
    - Add new risk events to the PMP and evaluate their probability of occurrence, potential impact, and timing.
    - Identify appropriate triggers.
    - Establish preliminary response strategies and, in keeping with monitoring previously-identified risks also monitor and control each new risk event.

3. Devise and implement responses if risks occur:

    As risk events reach the "imminent" stage:

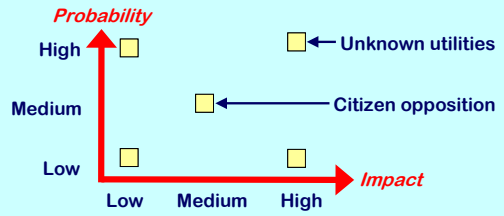
    - Review the planned response actions for appropriateness given current estimates of impacts and available resources.
    - Use the change management process to enact and implement response actions and adjust the project performance baseline—scope, schedule, and budgets—accordingly.
    - Make appropriate assignments and track performance of the response actions.
    - Monitor the effectiveness of each response action and adjust actions accordingly.
    - Avoid the simple measure of percentage of project completion compared to contingency funds committed. Risk events do not occur evenly throughout the project.

4. Document

    - Document each risk event and response action implemented as a basis for future actions and as a reference for reporting Lessons Learned.

The project manager should:

1. ***Monitor*** **previously-identified risks**



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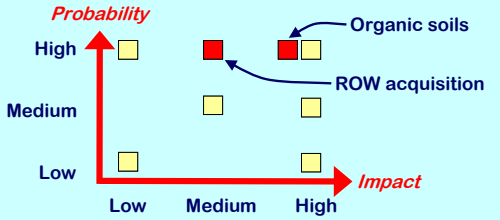
2. ***Identify*** **new risks**



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3. **Devise and implement *responses* if risks occur**

If…	Then…
Encounter organic soils	Increase borings to determine extent
Discover unexpected utilities	Increase coordination and develop incentives

4. ***Document***

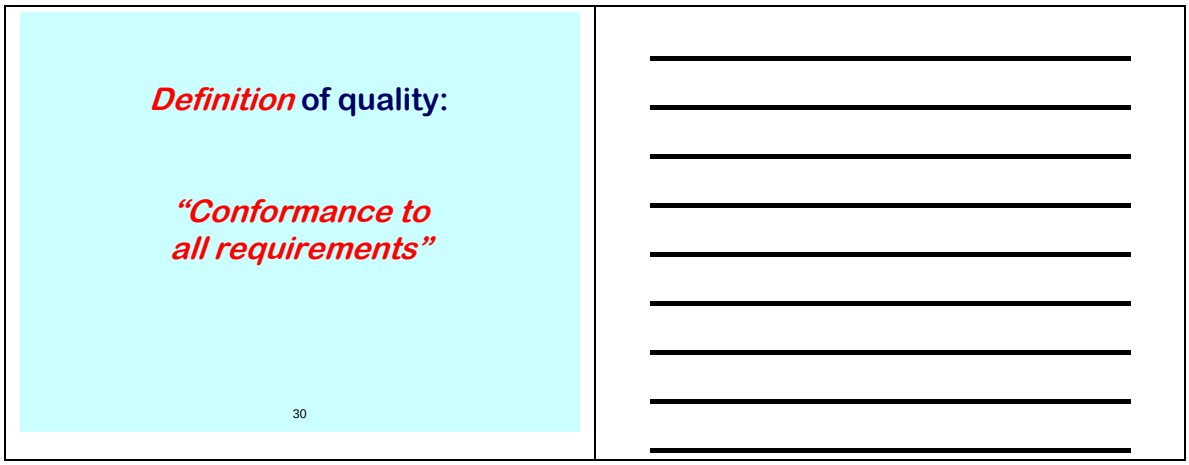
28

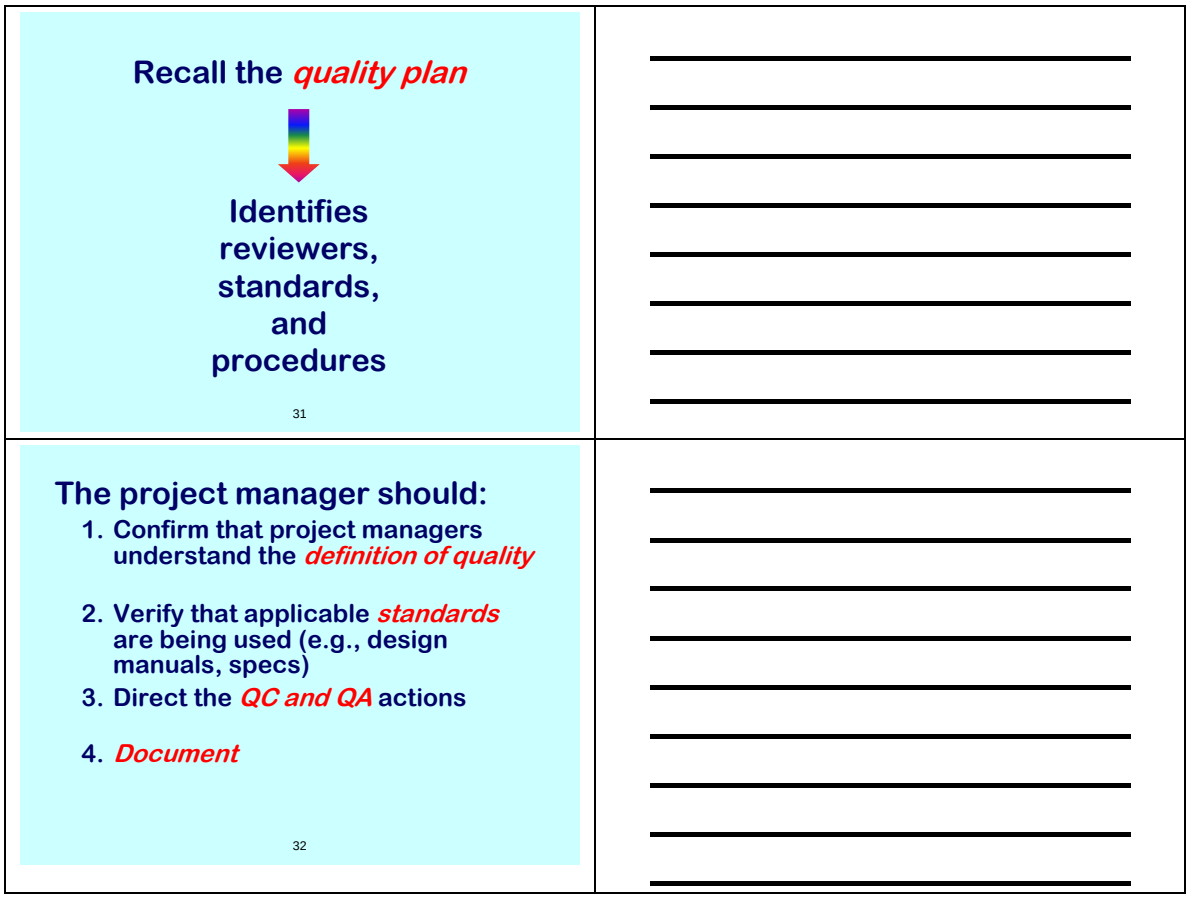
Manage Quality

Achieving quality requires much more than slogans and good intentions. For starters, achieving quality requires a definition of quality. INDOT defines quality a conformance to all requirements.

The project manager should:

1. Confirm that project managers understand the *definition of quality*
2. Verify that applicable *standards* are being used (e.g., design manuals, specs)
3. Direct the *QC* and *QA* actions
4. Document





Communicate

Working the plan is about actively managing the planned elements. Continue to foster customer relationships and communicate with the project team and sponsor(s).

Customer Relationships

Know and manage customer expectations. Involve the customers as they wish to be involved. Communicate progress as identified in the Communication Plan and resolve conflict as necessary.

Communication

Appropriate frequency and quality of communication between the project manager, team members, and sponsors is essential for project delivery. Facilitating the effective exchange of the necessary information between project participants and interested parties. Project managers and team members apply the Communication Plan endorsed for the project.

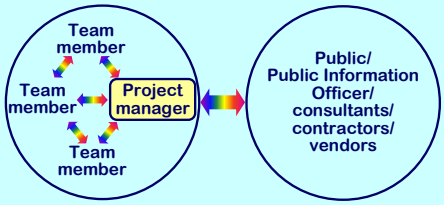
Team Building

Teams are dynamic; they must be built and sustained. As they move through the spectrum of team development they must be continually managed to attain high performance, produce results, and deliver the project.

A team:

- is a group of individuals who work for a common purpose to produce a specific outcome.
- continuously develops group and individual skills to enhance team performance.
- effectively develops and implements a reward and recognition strategy.
- works together to correct mistakes to minimize negative impacts.
- works together to learn from accomplishments and mistakes.

The project manager should *communicate progress and change*



Team member is broadly defined (e.g., includes relevant functional managers)

34

Recall the *communication plan*

Identifies internal and external stakeholders
and
how to communicate with them

35

Recall the *change management plan*

Describes how to identify, analyze, implement, and document change

36

Step

5

Transition & Closure

Transition and closure is the final project management process step and should be planned for from the beginning and throughout the life of the project. Transition and closure is the process of completing a major activity, phase, or the project itself. The elements of this process include; implementation of the Transition and Closure Plan, Lessons Learned, Consultant evaluation, Rewards & Recognition, and Archiving.

The Transition and Closure Plan is an integral part of the Project Management Plan and is implemented at appropriate points throughout the project. Although transition and closure is identified as a separate step in the project management process, managing it effectively requires the application of other steps within the process:

- Plan the Work – Development of the Transition and Closure Plan.
- Endorsement – Acceptance and approval of the plan.
- Work the Plan – Tracking and managing transition and closure activities.

Review the Project Performance Baseline to ensure all activities are performed as planned. Tracking and monitoring the schedule and budget are critical as you begin to close out activities. All transition and closure activities must be completed before the activity, phase or project is deemed “complete” and the project manager is released from responsibility for the project.

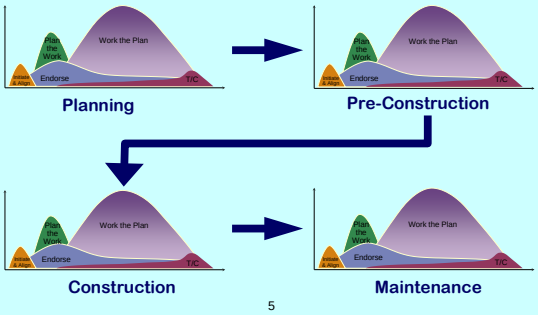
Recall definitions of *transition* and *closure:*

Transition – the process of changing from one phase to another

Closure – the act or process of closing, a finish or end

4

Step 5 is where we *transition* to the next phase, back to an earlier phase, or *close out* the project



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Steps for Transition and Closure

1. Continuously review and refine the activities and responsibilities associated with each transition event.

2. Use the PDP tool to maintain performance visibility of all transition and closure activities.

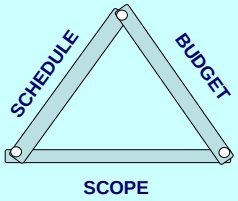
3. As the work leading up to the transition event proceeds, report progress and changes to those involved in the acceptance of work process.

   - Review acceptance criteria and checklist.
   - Establish detailed scheduling of acceptance activities.
   - Establish a date and procedures for formal acknowledgement of the acceptance of work.
   - Acceptance acknowledges the transfer of responsibility and should be formally acknowledged in writing.

4. Refine and complete plans for demobilizing staff, facilities, equipment, and services. Provide clear communication with affected staff. As the completion of work renders facilities, equipment, and services unneeded, expedite their cancellation, return or transfer to other uses in accordance with the Transition and Closure Plan.

5. Review the requirements and specific procedures for the financial closure of the activity, phase, or project with District/Central Office.

Compare project performance
to the baseline



How did we do?

7

Review acceptance *criteria*

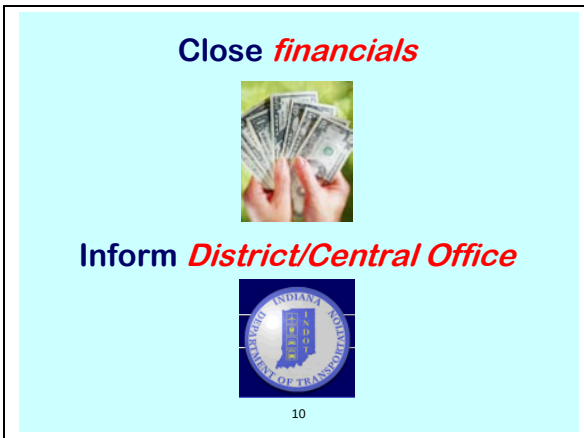
Establish *date* for transition/closure

8

Obtain, in writing, *acceptance* of work and assumption of responsibility

Demobilize

9



Review Lessons Learned

INDOT gathers, organizes, and uses lessons learned from past and current INDOT projects to continually improve INDOT methods and project delivery.

Lessons learned are reported and used continuously throughout the project, culminating in a final submittal of project lessons learned during the transition and closure stage. Documentation to capture and share lessons learned were developed during plan the work in the PMP and were maintained during work the plan.

Steps for Lessons Learned

1. Responsibilities for capturing lessons learned are documented in the PMP.

2. During the project or phase, the reporting of lessons learned should be a continuous sharing process and should be a standing agenda item in team meetings and workshops.

3. At completion of the phase or project, a formal meeting or workshop is held to review the lessons learned and assignments made for improvement and communication of best management practices.

Activities associated with capturing and documenting lessons learned can be placed in the project baseline schedule so they can be tracked and monitored.

Constructability Review Process

Constructability reviews are intended to improve the effectiveness of a set of plans, specifications and bid documents by having these reviewed by those with construction expertise. They should review issues that affect the contractor's ability to understand the plans and specifications well enough to provide well informed bids and meet INDOT's requirements during construction.

The basic purpose of the Constructability Review is to test INDPT's approach for the potential for errors, change orders, and claims. It seeks out overlooked problems that increase costs, impair the schedule, and decrease quality and safety margins.

- Eliminate construction requirements that are impossible or impractical to build.
- Maximize constructability, recognizing the availability and suitability of materials, the capability of labor resources, and the standards of practice of the construction resources.
- Verify accurate depictions of site conditions with regard to access, utilities, and general configuration.
- Make sure of the adaptation of designed structures and features to the project site conditions and constraints.
- Determine adequacy of work and storage space including contractor access to the site.
- Determine appropriate construction durations and milestones.
- Verify requirements for QA/QC during construction.
- Clearly define procedures for scheduling outages and the feasibility of utility interruptions.
- Determine requirements for Agency-provided materials, equipment, services, and utility connections.
- Make certain that designs can be constructed using methods, materials, and equipment common to the construction industry.
- Pay attention to the requirements of the public including adjacent land use functions, existing transit patrons, and persons with disabilities.

- Make sure coordination is included with all operating elements.

- Make certain adequate provisions are provided for access, staging, and storage of waste and supplies; parking for worker and construction vehicles; and mitigation of environmental impacts during construction.

Team Composition

The Constructability Review team shall consist of the Construction Manager (Area Engineer, Project Engineer/Supervisor) and the Project Manager with other additional team members as needed, depending on the size and complexity of the project.

Frequency of Reviews

Reviews will be conducted during design at 30%, 60%, and 90% completion. During construction, reviews will be made at pre-construction, mid-contract construction and post-construction. Forms for these different reviews are found in Appendix D.

Review Project Selection

INDOT may develop a number of major, intermediate, and minor projects for periodic reviews. Typical categories may include major highway construction, major interchange construction, bridge construction, bridge rehabilitation, resurfacing and the like in a three-level process.

Constructability Review Level 1 includes reviews at 30%, 60%, and 90% design stages for these types of projects:

- Larger, complex roadway improvements (including new construction, widening, or realignment projects with significant staging, and traffic handling requirements).

- Complex interchange construction or modification.

- Large rehabilitation projects that include widening and major structure replacement.

Constructability Review Level 2 includes 30% and 90% design stages for these types of projects:

- Less complex roadway projects (including widening projects with minimal staging/traffic handling.

- Less complex structure or interchange projects.

- Most rehabilitation projects, i.e. minor widening, drainage or safety improvements.

Constructability Review Level 3 includes a 90% design review for simple projects:

- Preventive maintenance overlay projects.

Location of Reviews

It is desirable to have the constructability review on site, so all can see the site conditions. Other options can be use of photos, videos, or other media tools to familiarize participants with the site.

Checklists

INDOT uses checklists of items that have historically caused constructability problems, project delays and cost overruns. The checklists serve as a means for reviewers to focus on the areas and issues of concerns.

Resolution Procedure

The Construction Manager and the Project Manager shall resolve the findings of the review jointly with the Program Manager or other appropriate authorities.

Review Follow Through/Dissemination of Review Comments

INDOT will develop a data collection process to store the lessons learned for future reference for designers, INDOT staff and local agencies. The key component of improving a project's design is the sharing of lessons learned from the various participants' experiences and expertise.

Measuring Constructability Review Results

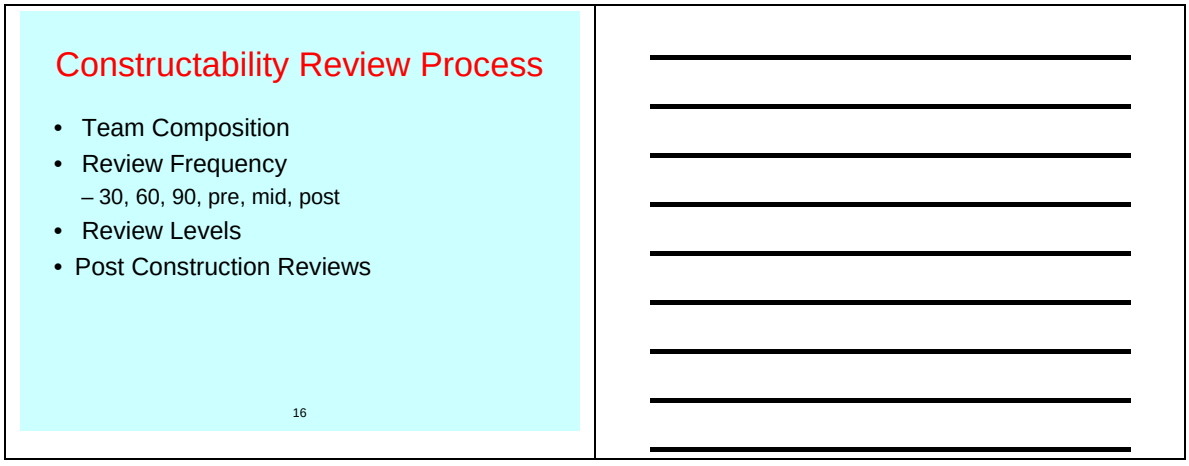
The measure of the reviews may be measured by the number of change orders, the change order amount, and the type.

Post-Construction Review

Conducting post-construction reviews allows INDOT to eliminate repeated mistakes that increase costs and affect project schedules. Post-construction reviews provide feedback to design and is an educational process for all parties in the transportation construction.

Depending on the Level of Review, INDOT should consider participation by members of these organizations in their post-construction reviews.

INDOT STAFF	EXTERNAL STAFF
Highway Design	Contractor Supervisor
Bridge Design	Contractor Estimator
Soils, Hydraulics	Key Subcontractors
Construction	Utility Companies
Environmental	IDEM/DNR
Traffic Engineer	Railroads
Maintenance Personnel	Local Municipality

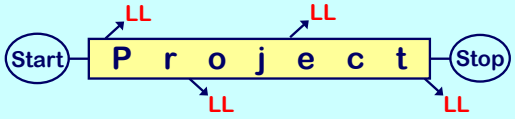


Consultant Review

During the Transition and closure phase the PM needs to fill out the Consultant Rating/Evaluation form. This will be used in the Consultant selection process.

What went well, *what* didn't, and *why*?

Do *throughout project,* not just at the end



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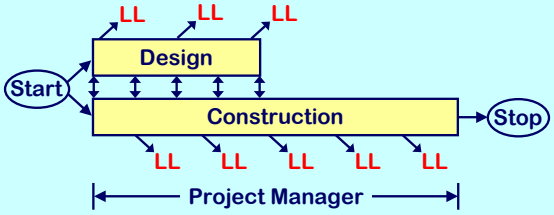
Even more lessons will be learned as a result of further integrating design and construction



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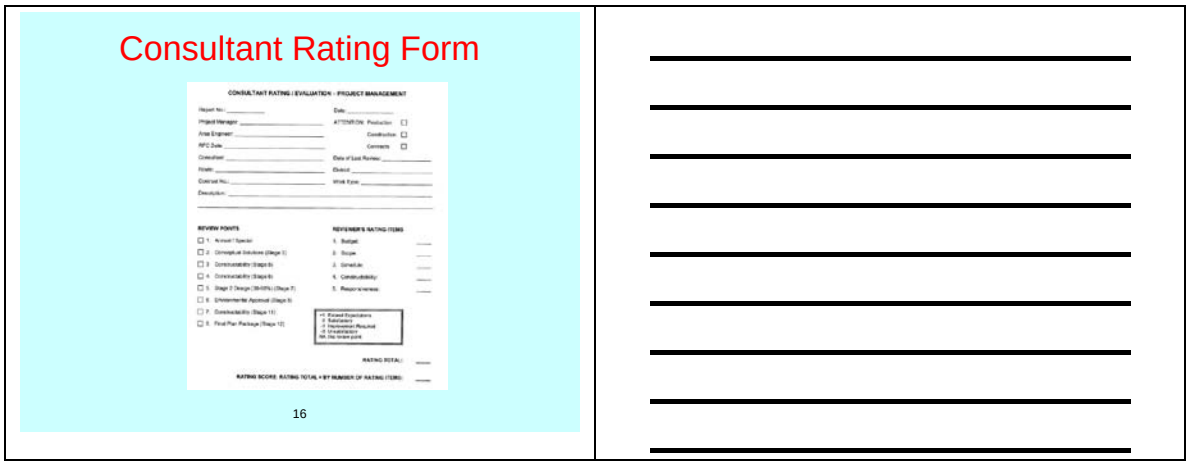
Document

Lessons Learned

Share

15



A copy of the Consultant Rating Form is in Appendix E.

Reward and Recognize

Maintaining positive energy and focus within the project team is a critical element of successful project delivery. Positive reinforcement through a project specific rewards and recognition program is one way to develop and maintain the team's "esprit de corps" during the project. Formal recognition of team and individual contributions to project success at completion enhances the sense of team accomplishment and encourages positive team behavior on other projects.

Steps for Reward and Recognize

1. The Transition and Closure Plan includes identification of "target" performance measures in "key" areas critical to project success. They are "stretch" targets that are achievable, but require significant "extra effort to accomplish.

2. Project rewards and recognition for exemplary performance are based on those "key" areas and "target" performance measures. Consider non-monetary recognition and rewards, as well as those requiring budget allocations.

3. During work the plan, track both the "target" performance measures and the status of the rewards and recognition program budget. Schedule special team events around "target" milestones as it becomes apparent they will be achieved.

4. Focus on individual and team accomplishments. If the project has strong stakeholder involvement look at ways to reward their contributions.

Senior management should be closely involved in development and endorsement of the rewards and recognition program. They need to establish a leadership role in the program if the desired motivation is to be achieved.

Never underestimate the power of a simple and sincere handwritten note.

When a project is *going well:*

Look out the *window*

Not at the *mirror*

Source: Collins, 2001

18

Methods for rewarding/recognizing

Personal comment

Note

Token

Financial

19

"Timing is everything" when commenting or writing about a person's contributions

Do it now

Be specific

20

Archive

Archiving is the process of collecting, organizing, and storing contract and project files. Preparation of project files for archiving is mandatory and must be completed before the demobilization process is completed. The requirements for the archiving process are established in the Transition and Closure Plan. Budgets and schedules for the performance of archiving activities are tracked and managed like all other project activities.

Steps for Archiving

1. During plan the work, the Transition and Closure Plan identified current archiving requirements.

2. Collect all project materials, files, and records (e.g., project reports, historical documentation, drawings, contract documents, manuals, electronic data, photographs) from the project team.

3. Remove inappropriate or incomplete material from the file (e.g., retain final documents; and remove drafts, internal review comments or handwritten notes, working drafts, and duplicate copies of documents).

4. Consolidate files and sort them into an organized record according to District/Central Office filing requirements.

5. Create an inventory of all files and their contents; perform a quality check of the files; then package and transport them to the appropriate storage area.

Steps should be taken to organize files and prepare them for archiving during the course of the project. SiteManager will contain much of the contract data, therefore reducing project closeout time. Waiting until the end of the project to start collecting the files will make the task ineffective and much more difficult.

Definition of archiving:

Collect, organize, and store project documents



22

Follow the process described in the *transition/closure plan*

Filing as the project proceeds simplifies and shortens end-of-project archiving

Create a *summary inventory*

23

Appendix

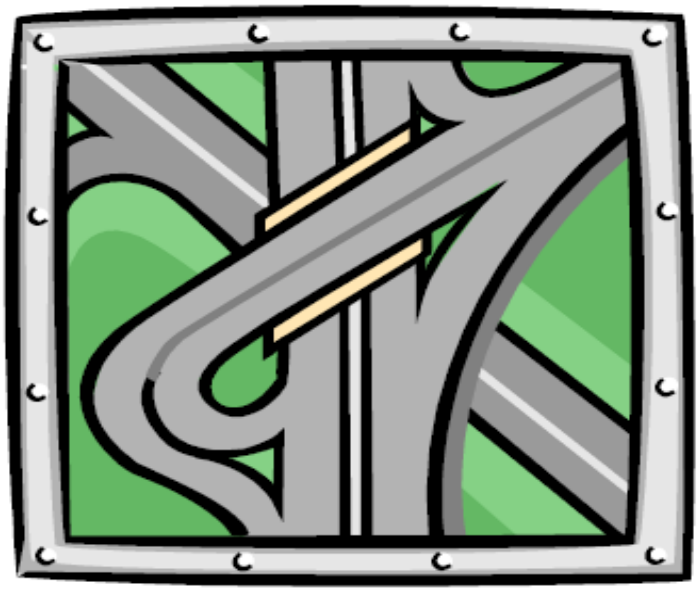
A

I-74 and US 421 Project Management Plan

Project Management Plan

I 74 and US 421

Interchange Modification



Indiana

Department of Transportation

February 28, 2007

Project Description

Because of the inherent operational and geometric deficiencies of the existing partial interchange it is recommended that the existing unconventional, substandard interchange be modified to a new partial cloverleaf Type-A interchange. Twin bridges on the interchange crossroad are recommended. The crossroad typical sections show open drainage and paved shoulders. The crossroad will have full limited access right-of-way. There will be six new interchange ramps.

The new interchange will connect to newly constructed US 421 (Five Lane Section) and Old US 421 (Four Lane Section) urban section roadways to the south and to a newly constructed two lane local roadway to the north.

Team Mission/Assignment

Deliver a PS&E package and all supporting documents and approvals required to advertise the I 74/US 421 Interchange Modification project. Meet the following criteria:

- A construction project that minimizes impacts to the public and environment
- An improved facility that is responsive to the needs of and meets the requirements and expectations of all stakeholders.
- Within funding limits.
- By the agreed upon RFC date.

Phase of the project assigned? (*Check the phase that applies for the team you are initiating for this effort):*

☐ Scoping ☒ Preliminary Engineering ☐ Construction

Major Milestones

The project team tracks major milestones, which provide an overview and status to the INDOT Management & Project Team, state and local government representatives, and the public. The following is a selection of the major milestones that will apply:

☒	*Project Definition Complete*	6/10/2006
☒	*Begin Preliminary Engineering*	7/5/2006
☒	*Environmental Documentation Complete*	1/24/2007
☒	*Right of Way Certification*	1/24/2007
☒	*Advertisement (Ad date)*	7/2/2007
☒	*Bid Opening*	8/15/2007
☒	*Award*	8/29/2007
☒	*Execution*	11/1/2007
☒	*Construction Start*	11/16/2007
☒	*Operationally Complete*	4/13/2009
☒	*Final Contract Completion*	6/23/2009

These milestones are included in the Gantt chart and must be tracked in the project schedule. See the PDP Manual for major milestone definitions.

Boundaries

- Physical project limits are:
  - South – 1000 ft. south of intersection between Old US 421 and US 421.
  - North – 200ft. North of intersection between Local Service Road #2 and US 421.
  - East – not specific, but east of new US 421 crossover bridges.
  - West – not specific, but west of new US 421 crossover bridges.

- Design consistent with appropriate jurisdictional (INDOT, Greensburg, Decatur County) design standards and policies.
- Meet access control requirements for US 421.

Team Identification

The project team consists of the project manager, design team members and all specialty groups that need to be involved in the development of the project. Specialty groups must be involved in project work planning, schedule development and maintenance, and endorsement of the work plan.

The following specialty groups could be involved:

☒ *Land Survey*	☒ *Bridge & Structures*
☒ *Materials*	☒ *Construction*
☒ *Program Management*	☒ *Pavement Design*
☒ *Public Information Office*	☒ *Road Review*
☒ *Real Estate*	☒ *Environmental/Permits*
☒ *District Traffic*	☒ *Geotechnical Services*
☒ *Highways & Local LPA Programs*	☒ *District Planning*
☒ *Hydraulics*	☒ *Utilities*
☒ *District Planning*	☒ *Railroads*
☒ *Community Action Group*	☒ *Planning Central Office*

Roles & Responsibilities

Production Team Leader/Consultant/Project Manager

- Coordinate design team operations and incorporate products from specialty groups to the Design File & PS&E.
- Design oversight; including meeting requirements of the Design Manual, other manuals, and the Team Mission.
- Engineer of Record
- Provide technical advice regarding individual design elements.
- Develop and provide project information as needed by specialty groups.
- Bring concerns from the design team to the management team.
- Update the design team on decisions/recommendations of management.
- Communicate status in the design process, obstacles encountered, and data required.
- Maintain the project schedule and budget.

District Traffic Analysis and Traffic Forecasting Representatives/Design Team Traffic Engineer

- Provide technical traffic operations information.
- Provide traffic data and projections necessary for interchange design.

- Provide a finished PS&E for signing, illumination, and signalization.
- Act as an advocate for the District by communicating concerns/issues between the design team and the District traffic office.

Environmental Coordinator

- Provide environmental documentation and applicable permits for project RFC.
- Coordinate any mitigation to address environmental impacts.
- Communicate with the appropriate State, Local, and Federal agencies to obtain the appropriate permits required.
- Act as an advocate for the Environmental office by communicating concerns/issues between the design team and the Environmental office.

Real Estate Services Representative

- Provide input and data (title information, permits, etc.) to the Design Team, Environmental Team, Utilities Team, and others.
- Appraise property and/or property rights.
- Acquire the necessary property and/or property rights (including access).
- Communicate and coordinate with other teams to clear right of way.
- Act as an advocate for the RES office by communicating concerns/issues between the design team and the RES office.

Bridge/Structures Representative

- Provide structural guidance; such as bridge type, bridge span, etc.
- Provide alternative schemes or options.
- Prepare the Bridge Design Plans.
- Act as an advocate for the Bridge office by communicating concerns/issues between the design team and the Bridge office.

Production Team Member

- Assist with the preparation of the Design File, and PS&E.
- See that design meets the requirements of the Design Manual, other manuals, and the Team Mission.
- Prepare displays for public meetings.
- Provide information, as needed, to specialty groups.
- Bring concerns to the Design Team Leaders attention.

Project Manager

- Project Manager for the I-74 and US 421 Interchange project.
- Liaison between the Project Delivery Team and the Management Team.
- Work with local agencies to resolve any issues or roadblocks.
- Maintain the direction of Purpose and Mission.
- As the project progresses, set goals and provide guidance and advice.
- Monitor the schedule and budget and report status to IPOC for any changes and updates.

Management & Customer Team (CAG)

- The Management & Customer Team provides leadership and oversight for delivery of the Region construction program. In this role, the team provides a forum for reviewing the status of and delivery plans for projects. This team is intended to coordinate and prioritize application of resources at a regional level, remove roadblocks, pursue adequate funding, and facilitate communication both internally and externally.

Utilities Coordinator

- Provide environmental documentation and applicable permits for project RFC.
- Coordinate any mitigation to address environmental impacts.
- Communicate with the appropriate State, Local, and Federal agencies to obtain the appropriate permits required.
- Act as an advocate for the Environmental office by communicating concerns/issues between the design team and the Environmental office.

Seymour District Planning Administrator (County Surveyor, County Engineer, City Engineer)

- Work with local agencies and to resolve any issues or roadblocks.
- Maintain the direction of Purpose and Mission.
- Monitor the schedule and budget.
- As the project progresses, set goals and provide guidance and advice.

District Construction Engineer

- Provide guidance and advise during the design phase to the Project Delivery Team on constructability issues.
- Set goals as the project progresses.

Operations Engineer

- Provide guidance and advise during the design phase to the Project Delivery Team on maintainability issues.
- Clarification of jurisdictional (State & City) maintenance responsibilities after construction.
- Set goals as the project progresses.

City of Greensburg Transportation Manager/Decatur County Engineer

- As advocates for the City of Greensburg and Decatur County, ensure the project meets the needs and standards of the City/County.
- Coordinate participation of funding through City of Greensburg or Decatur County.
- Work with INDOT and District to resolve any issues or roadblocks.
- As the project progresses, set goals and provide guidance and advice.

Measures of Success

What the team must accomplish for this project to be successful:

- A clearly defined product (RFC, PS&E, R/W certification and permits), scope, and schedule, and manage change effectively.
- Maintain open, effective and timely communication within the team, with sponsors, other agencies, stakeholders, and the public.
- Conduct timely and meaningful public involvement as identified in the communication plan.
- Understand all our stakeholders' needs and concerns, mediating issues to an acceptable conclusion.
- Gathered stakeholder needs and concerns are through interviews and CAG Public Information Meetings: tabulate, evaluate, and address prior to the Design Hearing.
- We effectively manage our resources, including funding, by comparing and reporting work order expenditures to the planned budget.
- Regularly recognize and celebrate accomplishments and successes.

Operating Guidelines

Operating guidelines describe how the team will govern itself.

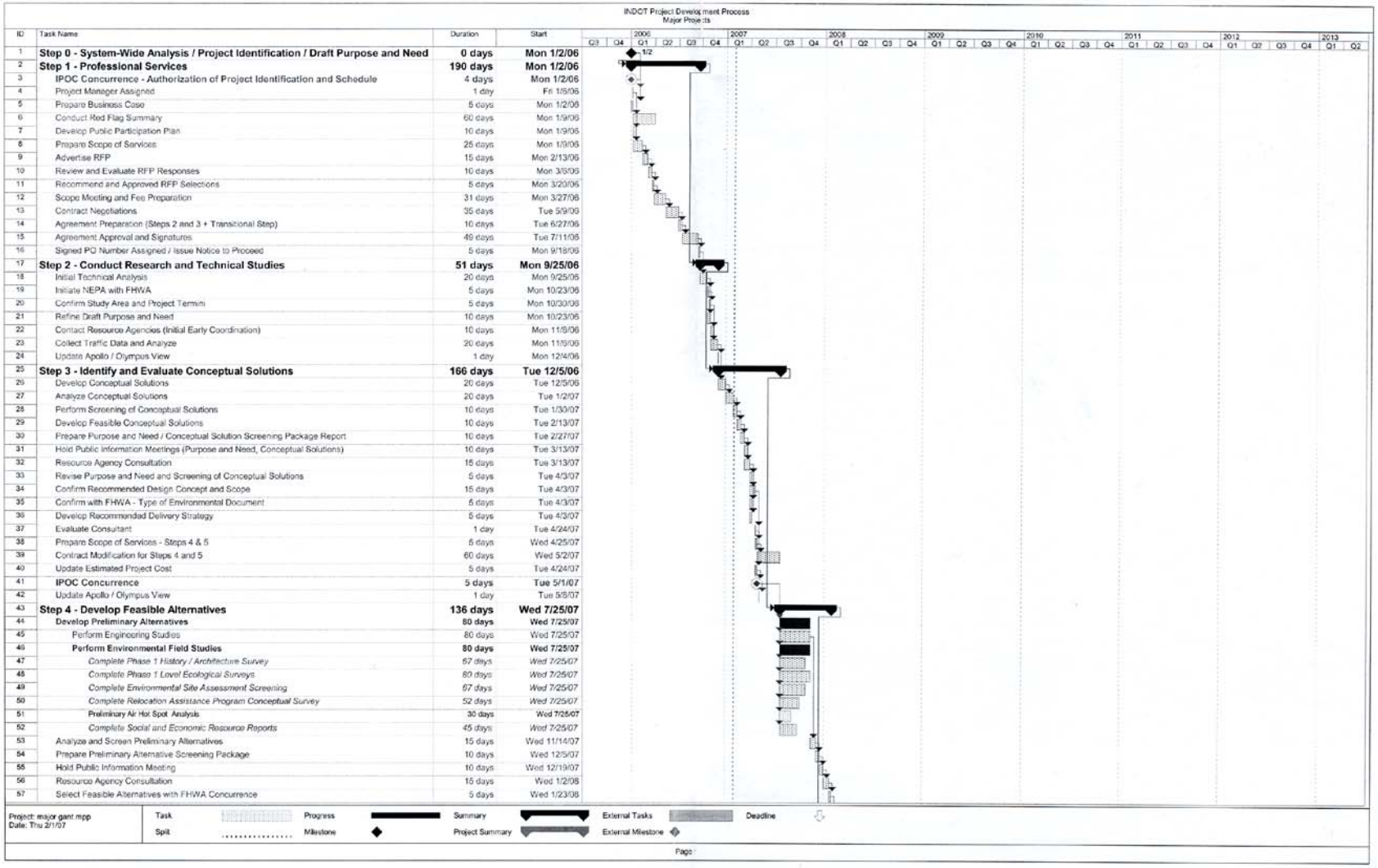
- Team decision-making process
  - Voice and respect each other's opinions
  - Voting by thumbs up, sideways and down, 2/3 majority rules.

    - All team members support final team decisions.
    - Resolve conflicts
    - Early & continued involvement of key players (internal and external)
- *Team meetings (frequency, who should attend, etc.)*
    - Team will meet monthly to review project status, progress and manage change.
- *Communication (methods, frequency, chain of command, etc.)*
    - Refer **Communication Plan**.
- *Manage team change*
    - Communicate change in a timely manner.

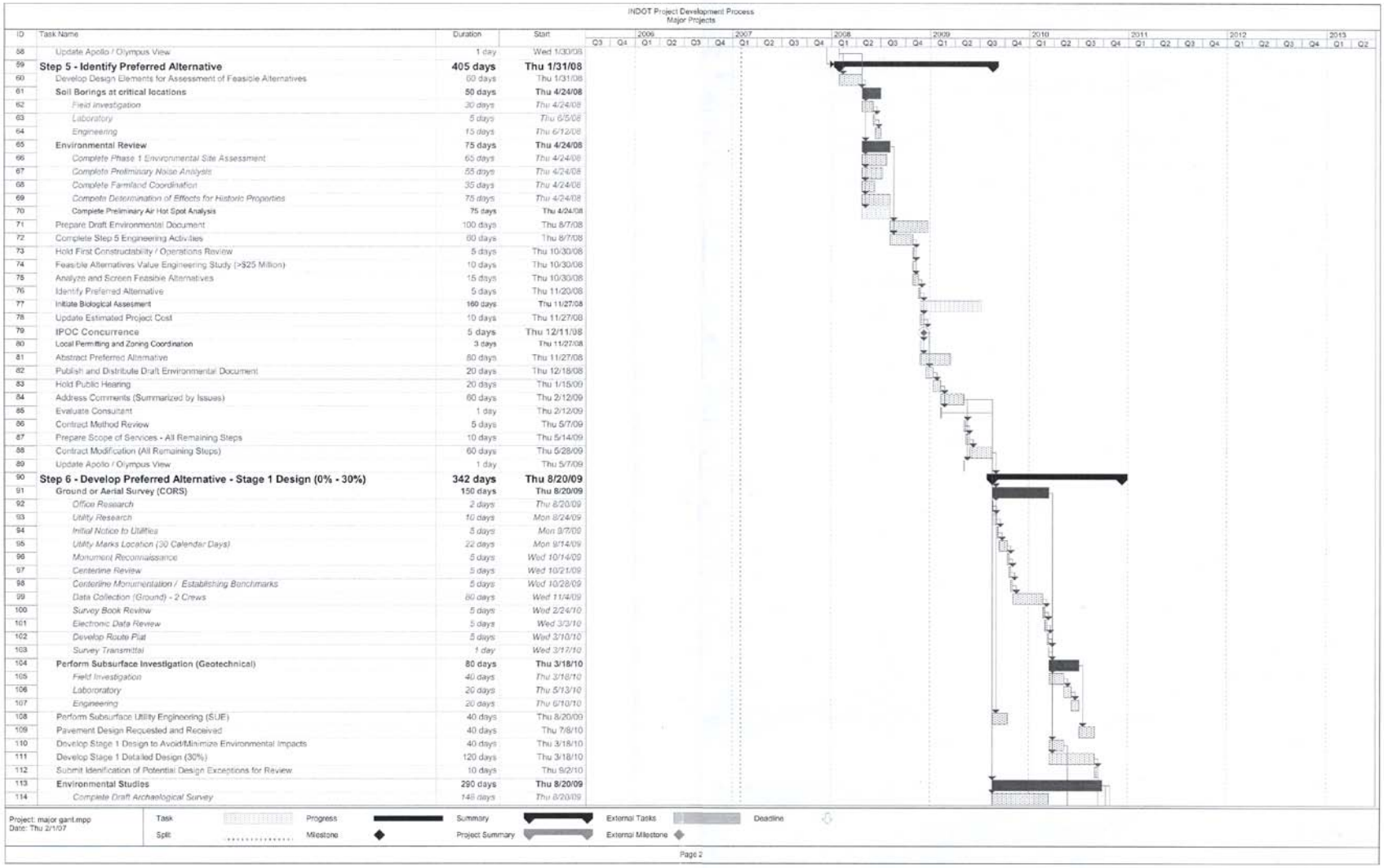
Appendix

B

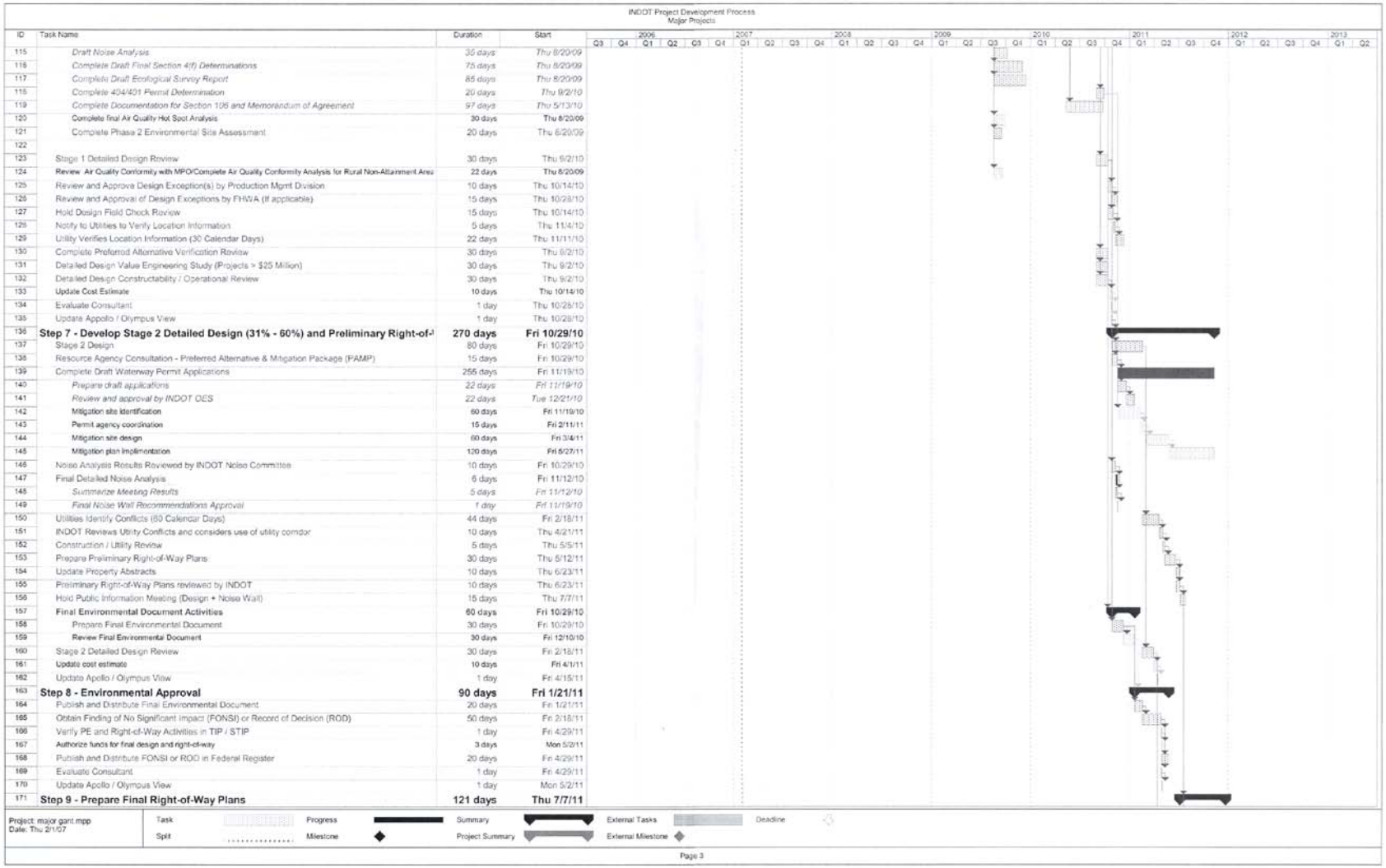
INDOT Project Development Plan (PDP)



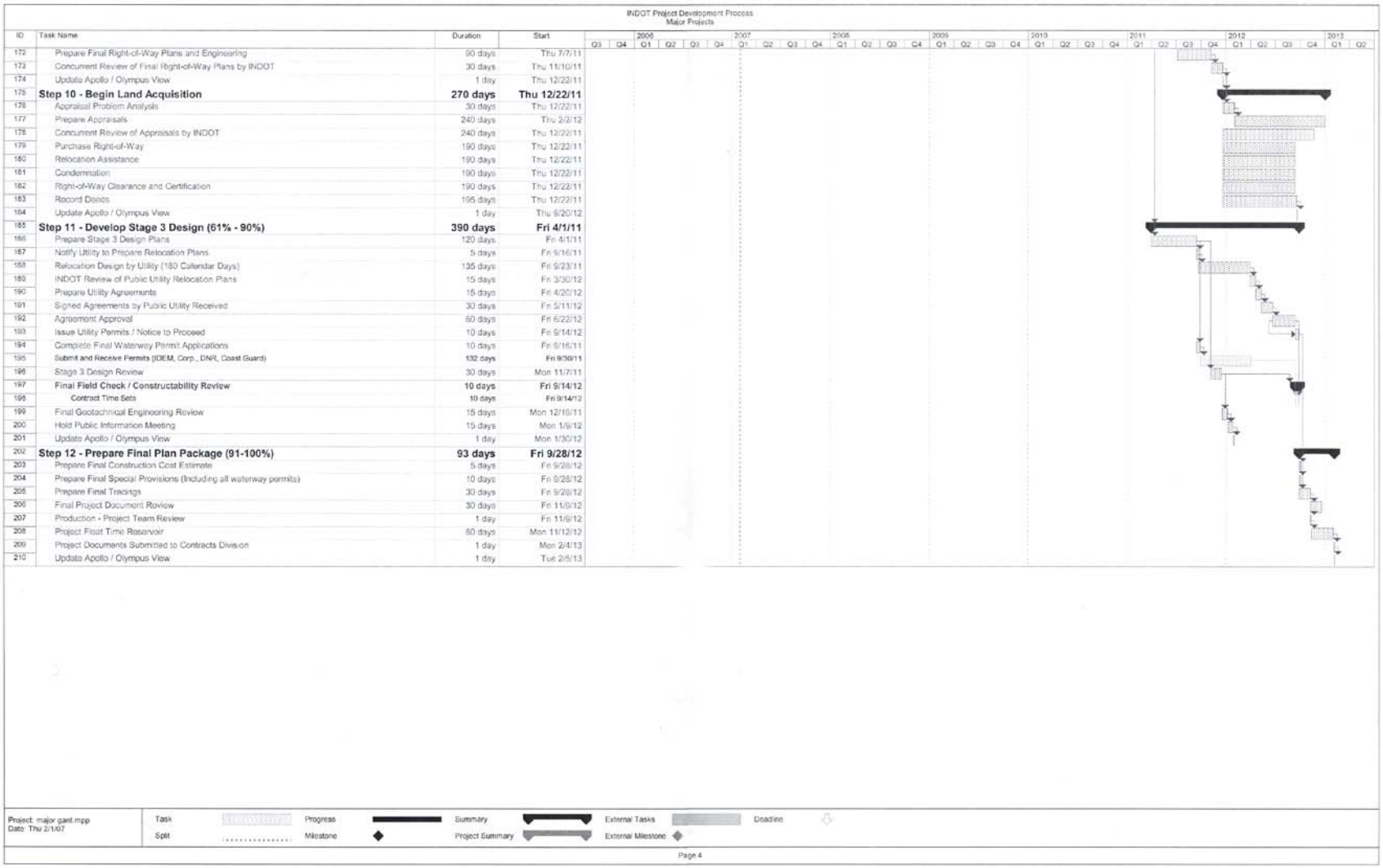
ID	Task Name	Duration	Start
1	**Step 0 - System-Wide Analysis / Project Identification / Draft Purpose and Need**	**0 days**	**Mon 1/2/06**
2	**Step 1 - Professional Services**	**190 days**	**Mon 1/2/06**
3	IPOC Concurrence - Authorization of Project Identification and Schedule	4 days	Mon 1/2/06
4	Project Manager Assigned	1 day	Fri 1/6/06
5	Prepare Business Case	5 days	Mon 1/2/06
6	Conduct Red Flag Summary	60 days	Mon 1/9/06
7	Develop Public Participation Plan	10 days	Mon 1/9/06
8	Prepare Scope of Services	25 days	Mon 1/9/06
9	Advertise RFP	15 days	Mon 2/13/06
10	Review and Evaluate RFP Responses	10 days	Mon 3/6/06
11	Recommend and Approved RFP Selections	5 days	Mon 3/20/06
12	Scope Meeting and Fee Preparation	31 days	Mon 3/27/06
13	Contract Negotiations	35 days	Tue 5/9/06
14	Agreement Preparation (Steps 2 and 3 + Transitional Step)	10 days	Tue 6/27/06
15	Agreement Approval and Signatures	49 days	Tue 7/11/06
16	Signed PO Number Assigned / Issue Notice to Proceed	5 days	Mon 9/18/06
17	**Step 2 - Conduct Research and Technical Studies**	**51 days**	**Mon 9/25/06**
18	Initial Technical Analysis	20 days	Mon 9/25/06
19	Initiate NEPA with FHWA	5 days	Mon 10/23/06
20	Confirm Study Area and Project Termini	5 days	Mon 10/30/06
21	Refine Draft Purpose and Need	10 days	Mon 10/23/06
22	Contact Resource Agencies (Initial Early Coordination)	10 days	Mon 11/6/06
23	Collect Traffic Data and Analyze	20 days	Mon 11/6/06
24	Update Apollo / Olympus View	1 day	Mon 12/4/06
25	**Step 3 - Identify and Evaluate Conceptual Solutions**	**166 days**	**Tue 12/5/06**
26	Develop Conceptual Solutions	20 days	Tue 12/5/06
27	Analyze Conceptual Solutions	20 days	Tue 1/2/07
28	Perform Screening of Conceptual Solutions	10 days	Tue 1/30/07
29	Develop Feasible Conceptual Solutions	10 days	Tue 2/13/07
30	Prepare Purpose and Need / Conceptual Solution Screening Package Report	10 days	Tue 2/27/07
31	Hold Public Information Meetings (Purpose and Need, Conceptual Solutions)	10 days	Tue 3/13/07
32	Resource Agency Consultation	15 days	Tue 3/13/07
33	Revise Purpose and Need and Screening of Conceptual Solutions	5 days	Tue 4/3/07
34	Confirm Recommended Design Concept and Scope	15 days	Tue 4/3/07
35	Confirm with FHWA - Type of Environmental Document	5 days	Tue 4/3/07
36	Develop Recommended Delivery Strategy	5 days	Tue 4/3/07
37	Evaluate Consultant	1 day	Tue 4/24/07
38	Prepare Scope of Services - Steps 4 & 5	5 days	Wed 4/25/07
39	Contract Modification for Steps 4 and 5	60 days	Wed 5/2/07
40	Update Estimated Project Cost	5 days	Tue 4/24/07
41	**IPOC Concurrence**	**5 days**	**Tue 5/1/07**
42	Update Apollo / Olympus View	1 day	Tue 5/8/07
43	**Step 4 - Develop Feasible Alternatives**	**136 days**	**Wed 7/25/07**
44	**Develop Preliminary Alternatives**	**80 days**	**Wed 7/25/07**
45	Perform Engineering Studies	80 days	Wed 7/25/07
46	**Perform Environmental Field Studies**	**80 days**	**Wed 7/25/07**
47	*Complete Phase 1 History / Architecture Survey*	*67 days*	*Wed 7/25/07*
48	*Complete Phase 1 Level Ecological Surveys*	*80 days*	*Wed 7/25/07*
49	*Complete Environmental Site Assessment Screening*	*67 days*	*Wed 7/25/07*
50	*Complete Relocation Assistance Program Conceptual Survey*	*52 days*	*Wed 7/25/07*
51	Preliminary Air Hot Spot Analysis	30 days	Wed 7/25/07
52	*Complete Social and Economic Resource Reports*	*45 days*	*Wed 7/25/07*
53	Analyze and Screen Preliminary Alternatives	15 days	Wed 11/14/07
54	Prepare Preliminary Alternative Screening Package	10 days	Wed 12/5/07
55	Hold Public Information Meeting	10 days	Wed 12/19/07
56	Resource Agency Consultation	15 days	Wed 1/2/08
57	Select Feasible Alternatives with FHWA Concurrence	5 days	Wed 1/23/08



ID	Task Name	Duration	Start
58	Update Apollo / Olympus View	1 day	Wed 1/30/08
59	**Step 5 - Identify Preferred Alternative**	**405 days**	**Thu 1/31/08**
60	Develop Design Elements for Assessment of Feasible Alternatives	60 days	Thu 1/31/08
61	**Soil Borings at critical locations**	**50 days**	**Thu 4/24/08**
62	*Field Investigation*	30 days	Thu 4/24/08
63	*Laboratory*	5 days	Thu 6/5/08
64	*Engineering*	15 days	Thu 6/12/08
65	**Environmental Review**	**75 days**	**Thu 4/24/08**
66	*Complete Phase 1 Environmental Site Assessment*	65 days	Thu 4/24/08
67	*Complete Preliminary Noise Analysis*	55 days	Thu 4/24/08
68	*Complete Farmland Coordination*	35 days	Thu 4/24/08
69	*Compete Determination of Effects for Historic Properties*	75 days	Thu 4/24/08
70	**Complete Preliminary Air Hot Spot Analysis**	**75 days**	**Thu 4/24/08**
71	Prepare Draft Environmental Document	100 days	Thu 8/7/08
72	Complete Step 5 Engineering Activities	60 days	Thu 8/7/08
73	Hold First Constructability / Operations Review	5 days	Thu 10/30/08
74	Feasible Alternatives Value Engineering Study (>$25 Million)	10 days	Thu 10/30/08
75	Analyze and Screen Feasible Alternatives	15 days	Thu 10/30/08
76	Identify Preferred Alternative	5 days	Thu 11/20/08
77	**Initiate Biological Assesment**	**160 days**	**Thu 11/27/08**
78	Update Estimated Project Cost	10 days	Thu 11/27/08
79	**IPOC Concurrence**	**5 days**	**Thu 12/11/08**
80	**Local Permitting and Zoning Coordination**	**3 days**	**Thu 11/27/08**
81	Abstract Preferred Alternative	60 days	Thu 11/27/08
82	Publish and Distribute Draft Environmental Document	20 days	Thu 12/18/08
83	Hold Public Hearing	20 days	Thu 1/15/09
84	Address Comments (Summarized by Issues)	60 days	Thu 2/12/09
85	Evaluate Consultant	1 day	Thu 2/12/09
86	Contract Method Review	5 days	Thu 5/7/09
87	Prepare Scope of Services - All Remaining Steps	10 days	Thu 5/14/09
88	Contract Modification (All Remaining Steps)	60 days	Thu 5/28/09
89	Update Apollo / Olympus View	1 day	Thu 5/7/09
90	**Step 6 - Develop Preferred Alternative - Stage 1 Design (0% - 30%)**	**342 days**	**Thu 8/20/09**
91	**Ground or Aerial Survey (CORS)**	**150 days**	**Thu 8/20/09**
92	*Office Research*	2 days	Thu 8/20/09
93	*Utility Research*	10 days	Mon 8/24/09
94	*Initial Notice to Utilities*	5 days	Mon 9/7/09
95	*Utility Marks Location (30 Calendar Days)*	22 days	Mon 9/14/09
96	*Monument Reconnaissance*	5 days	Wed 10/14/09
97	*Centerline Review*	5 days	Wed 10/21/09
98	*Centerline Monumentation / Establishing Benchmarks*	5 days	Wed 10/28/09
99	*Data Collection (Ground) - 2 Crews*	60 days	Wed 11/4/09
100	*Survey Book Review*	5 days	Wed 2/24/10
101	*Electronic Data Review*	5 days	Wed 3/3/10
102	*Develop Route Plat*	5 days	Wed 3/10/10
103	*Survey Transmittal*	1 day	Wed 3/17/10
104	**Perform Subsurface Investigation (Geotechnical)**	**80 days**	**Thu 3/18/10**
105	*Field Investigation*	40 days	Thu 3/18/10
106	*Labororatory*	20 days	Thu 5/13/10
107	*Engineering*	20 days	Thu 6/10/10
108	Perform Subsurface Utility Engineering (SUE)	40 days	Thu 8/20/09
109	Pavement Design Requested and Received	40 days	Thu 7/8/10
110	Develop Stage 1 Design to Avoid/Minimize Environmental Impacts	40 days	Thu 3/18/10
111	Develop Stage 1 Detailed Design (30%)	120 days	Thu 3/18/10
112	Submit Identification of Potential Design Exceptions for Review	10 days	Thu 9/2/10
113	**Environmental Studies**	**290 days**	**Thu 8/20/09**
114	*Complete Draft Archaeological Survey*	148 days	Thu 8/20/09



ID	Task Name	Duration	Start
115	*Draft Noise Analysis*	*35 days*	*Thu 8/20/09*
116	*Complete Draft Final Section 4(f) Determinations*	*75 days*	*Thu 8/20/09*
117	*Complete Draft Ecological Survey Report*	*85 days*	*Thu 8/20/09*
118	*Complete 404/401 Permit Determination*	*20 days*	*Thu 9/2/10*
119	*Complete Documentation for Section 106 and Memorandum of Agreement*	*97 days*	*Thu 5/13/10*
120	Complete final Air Quality Hot Spot Analysis	30 days	Thu 8/20/09
121	Complete Phase 2 Environmental Site Assessment	20 days	Thu 8/20/09
122			
123	Stage 1 Detailed Design Review	30 days	Thu 6/2/10
124	Review Air Quality Conformity with MPO/Complete Air Quality Conformity Analysis for Rural Non-Attainment Area	22 days	Thu 8/20/09
125	Review and Approve Design Exception(s) by Production Mgmt Division	10 days	Thu 10/14/10
126	Review and Approval of Design Exceptions by FHWA (If applicable)	15 days	Thu 10/28/10
127	Hold Design Field Check Review	15 days	Thu 10/14/10
128	Notify to Utilities to Verify Location Information	5 days	Thu 11/4/10
129	Utility Verifies Location Information (30 Calendar Days)	22 days	Thu 11/11/10
130	Complete Preferred Alternative Verification Review	30 days	Thu 6/2/10
131	Detailed Design Value Engineering Study (Projects > $25 Million)	30 days	Thu 9/2/10
132	Detailed Design Constructability / Operational Review	30 days	Thu 9/2/10
133	Update Cost Estimate	10 days	Thu 10/14/10
134	Evaluate Consultant	1 day	Thu 10/28/10
135	Update Apollo / Olympus View	1 day	Thu 10/28/10
136	**Step 7 - Develop Stage 2 Detailed Design (31% - 60%) and Preliminary Right-of-**	**270 days**	**Fri 10/29/10**
137	Stage 2 Design	80 days	Fri 10/29/10
138	Resource Agency Consultation - Preferred Alternative & Mitigation Package (FAMP)	15 days	Fri 10/29/10
139	Complete Draft Waterway Permit Applications	255 days	Fri 11/19/10
140	*Prepare draft applications*	*22 days*	*Fri 11/19/10*
141	*Review and approval by INDOT OES*	*22 days*	*Tue 12/21/10*
142	Mitigation site identification	60 days	Fri 11/19/10
143	Permit agency coordination	15 days	Fri 2/11/11
144	Mitigation site design	60 days	Fri 3/4/11
145	Mitigation plan implementation	120 days	Fri 5/27/11
146	Noise Analysis Results Reviewed by INDOT Noise Committee	10 days	Fri 10/29/10
147	Final Detailed Noise Analysis	6 days	Fri 11/12/10
148	*Summerize Meeting Results*	*5 days*	*Fri 11/12/10*
149	*Final Noise Wall Recommendations Approval*	*1 day*	*Fri 11/19/10*
150	Utilities Identify Conflicts (60 Calendar Days)	44 days	Fri 2/18/11
151	INDOT Reviews Utility Conflicts and considers use of utility corridor	10 days	Thu 4/21/11
152	Construction / Utility Review	5 days	Thu 5/5/11
153	Prepare Preliminary Right-of-Way Plans	30 days	Thu 5/12/11
154	Update Property Abstracts	10 days	Thu 6/23/11
155	Preliminary Right-of-Way Plans reviewed by INDOT	10 days	Thu 6/23/11
156	Hold Public Information Meeting (Design + Noise Wall)	15 days	Thu 7/7/11
157	**Final Environmental Document Activities**	**60 days**	**Fri 10/29/10**
158	Prepare Final Environmental Document	30 days	Fri 10/29/10
159	Review Final Environmental Document	30 days	Fri 12/10/10
160	Stage 2 Detailed Design Review	30 days	Fri 2/18/11
161	Update cost estimate	10 days	Fri 4/1/11
162	Update Apollo / Olympus View	1 day	Fri 4/15/11
163	**Step 8 - Environmental Approval**	**90 days**	**Fri 1/21/11**
164	Publish and Distribute Final Environmental Document	20 days	Fri 1/21/11
165	Obtain Finding of No Significant Impact (FONSI) or Record of Decision (ROD)	50 days	Fri 2/18/11
166	Verify PE and Right-of-Way Activities in TIP / STIP	1 day	Fri 4/29/11
167	Authorize funds for final design and right-of-way	3 days	Mon 5/2/11
168	Publish and Distribute FONSI or ROD in Federal Register	20 days	Fri 4/29/11
169	Evaluate Consultant	1 day	Fri 4/29/11
170	Update Apollo / Olympus View	1 day	Mon 5/2/11
171	**Step 9 - Prepare Final Right-of-Way Plans**	**121 days**	**Thu 7/7/11**


INDOT Project Development Process
Major Projects
ID
Task Name
Duration
Start
2006
2007
2008
2009
2010
2011
2012
2013
172 Prepare Final Right-of-Way Plans and Engineering 90 days Thu 7/7/11
173 Concurrent Review of Final Right-of-Way Plans by INDOT 30 days Thu 11/10/11
174 Update Apollo / Olympus View 1 day Thu 12/22/11
175 Step 10 - Begin Land Acquisition 270 days Thu 12/22/11
176 Appraisal Problem Analysis 30 days Thu 12/22/11
177 Prepare Appraisals 240 days Thu 2/2/12
178 Concurrent Review of Appraisals by INDOT 240 days Thu 12/22/11
179 Purchase Right-of-Way 190 days Thu 12/22/11
180 Relocation Assistance 190 days Thu 12/22/11
181 Condemnation 190 days Thu 12/22/11
182 Right-of-Way Clearance and Certification 190 days Thu 12/22/11
183 Record Deeds 195 days Thu 12/22/11
184 Update Apollo / Olympus View 1 day Thu 9/20/12
185 Step 11 - Develop Stage 3 Design (61% - 90%) 390 days Fri 4/1/11
186 Prepare Stage 3 Design Plans 120 days Fri 4/1/11
187 Notify Utility to Prepare Relocation Plans 5 days Fri 9/16/11
188 Relocation Design by Utility (180 Calendar Days) 135 days Fri 9/23/11
189 INDOT Review of Public Utility Relocation Plans 15 days Fri 3/30/12
190 Prepare Utility Agreements 15 days Fri 4/20/12
191 Signed Agreements by Public Utility Received 30 days Fri 5/11/12
192 Agreement Approval 60 days Fri 6/22/12
193 Issue Utility Permits / Notice to Proceed 10 days Fri 9/14/12
194 Complete Final Waterway Permit Applications 10 days Fri 9/16/11
195 Submit and Receive Permits (IDEM, Corp., DNR, Coast Guard) 132 days Fri 9/30/11
196 Stage 3 Design Review 30 days Mon 11/7/11
197 Final Field Check / Constructability Review 10 days Fri 9/14/12
198 Contract Time Sets 10 days Fri 9/14/12
199 Final Geotechnical Engineering Review 15 days Mon 12/19/11
200 Hold Public Information Meeting 15 days Mon 1/9/12
201 Update Apollo / Olympus View 1 day Mon 1/30/12
202 Step 12 - Prepare Final Plan Package (91-100%) 93 days Fri 9/28/12
203 Prepare Final Construction Cost Estimate 5 days Fri 9/28/12
204 Prepare Final Special Provisions (Including all waterway permits) 10 days Fri 9/28/12
205 Prepare Final Tracings 30 days Fri 9/28/12
206 Final Project Document Review 30 days Fri 11/9/12
207 Production - Project Team Review 1 day Fri 11/9/12
208 Project Float Time Reservoir 60 days Mon 11/12/12
209 Project Documents Submitted to Contracts Division 1 day Mon 2/4/13
210 Update Apollo / Olympus View 1 day Tue 2/5/13
Project: major gant.mpp
Date: Thu 2/1/07
Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline
Page 4

Appendix

C

Change Management Plan

Communication Plan

QA/QC Plan

Transition and Closure Plan

Change Management Plan

I-74 and US 421 Interchange Improvement

Project Manager: Joe Smith

July 19, 2006

During the life of the I-74 and US 421 Interchange Improvement project changes to the project scope, schedule, and resources may occur. The sources of these changes may be internal or external initiated by the customers. External changes can also result from other stakeholders, availability of resources, changes in technologies, etc.

Whether the effects of changes are positive or negative, managing change is an important factor for success. Managing change will require planning, discipline, and communication among the project team, customers and stakeholders. As the Change Management Plan is executed, the following should occur. Improved relationship with customers, improved financial performance, reduced project delays, better project teamwork, and improved management of project quality. The following defines the plan this team will use to manage change.

Types of Change that can be anticipated on this project:

- Scope creep
- Staff changes
- Schedule change
- Change in deliverables
- Technical change
- Process/policy change
- Resources/technologies/materials changes

Step-by-Step Process to Manage Change

Use these steps, and sub-steps, as determined for the specific change proposed/encountered.

1. Identify source and nature of the change

- Determine the type of change (work plan, schedule, technical, etc.)
- Determine the potential impact and process (formal/informal)
- Document origin of change (who initiated it, what precipitated it)
- Identify potentially effected customers and suppliers
- Identify who should lead the analysis/rest of process
- Communicate potential to rest of team as needed

2. Verify and Analyze the Change

Concurrence of the change condition will be obtained from the Project Manager. If a change condition exists analyze the effects of the change to the project.

- Evaluate and quantify the impact to the project performance baseline (scope, schedule, and/or budget)
- Does it introduce additional risks to the project?
- Evaluate the effects on other project tasks or deliverables.
- Identify and coordinate with effected specialty groups, contractors, consultants, etc.
- Brainstorm, analyze, and prioritize strategies for change management.
- When necessary, consult with subject matter experts.

3. Develop a Mitigation/Recovery Strategy.

A response strategy is the process of developing options and determining actions to enhance positive changes and to reduce threats to project objectives. Document the analysis:

- What needs to be done, who will do it, and by when?
- Formally establish the scope of the change & direction for incorporating the changed work or conditions.
- Formally establish required adjustments to the project performance baseline.
- Identify level of authority for endorsement.
- Provide appropriate notifications to team members affected by the change.

4. Gain endorsement for the change

- Notify and consult with Region Management, Region Program Management, and Project Control and Reporting regarding the change and its impacts.
- Obtain endorsement from the appropriate level of authority

5. Update the Project Performance Baseline and monitor the effects of change.

- Update the Project Management Plan and Project Performance Baseline to document the change.
- Identify responsibilities and timelines for carrying out
- Monitor and evaluate implementation

COMMUNICATIONS PLAN

A communications plan is important for projects that impact the local community or businesses, are of potential interest to the media, and where there are political stakeholders. The figure below sets out basic guidelines for managing communications in each of these areas.

Guidelines for Managing Communications

Audience	Communications Guidelines
Local Community and Business Groups	● Identify project impacts of concern to local community and business groups ● Communicate frequently and timely on the status of the project and associated impacts (community meetings, informational newssheets) ● Demonstrate sincere empathy and understanding on adverse impacts. ● Mitigate adverse impacts (limit construction at nights/weekends, provide temporary signage where access to business is impacted during construction).
Media	● Limit media contact to designated Agency personnel. ● Require contractors to refer all media comment to the Agency. ● Establish the Agency's position and message on project issues. ● Address media questions so as to communicate the Agency's message. ● Cultivate the media to present positive news on project events.
Political Stakeholders	● Above all else make certain a political stakeholder is not taken by surprise by a project event, good or bad. ● Regularly brief political stakeholders on project events and

	issues. ● Discuss project issues with political stakeholders before they have to comment or decide on them in public such as at a board meeting or media interview. ● Include political stakeholders in project milestone events so that their support and contributions can be recognized.

Although communications management is usually thought of as managing damage control when bad things happen, communications management also manages good news on the project such as:

- Announcing the project to promote its benefits
- Holding milestone events to celebrate progress such as:
    - ° Unveiling the design of a new facility
    - ° A groundbreaking to mark the start of construction
    - ° Inaugurating the start-up of a completed facility.
- Publicizing any awards or industry recognition achieved by the project or the project team.

Public participation is an important element of all INDOT projects, from planning and PD&E through design and construction. During planning and PD&E the emphasis is on participation in the decision-making process concerning the need for a project and its basic concepts. In the design phase, the emphasis changes to one of informing the public of the project. People are much more likely to tolerate the inconvenience of a construction project if they understand the need for the work and have good information about the project. Therefore, the emphasis during the design and construction phases is on communicating with the community. During design there are also opportunities to work out details of the project in an effort to minimize negative impacts.

Each design project should have a Community Awareness Plan (CAP) that will carry forward into the construction phase. This plan can be part of the consultant scope of services or it can be developed by the INDOT PM. The CAP should explain the activities that will take place to keep the community informed of the project and to minimize negative impacts. The scope and complexity of a CAP will vary according to the

community concern that is expected about a project. Projects can be grouped into one of four levels of public concern that they are likely to generate.

- **Level 1.** Project is not controversial, causes negligible access impacts and traffic disruption. Examples are work outside the roadway, simple rural resurfacing, some signal work, pavement markings, bridge and other maintenance.

- **Level 2.** Project has general public acceptance, little impact on access and reasonable degree of traffic disruption. Examples are urban resurfacing, bridge repairs and median revisions (not access control) that require lane closures.

- **Level 3.** Project is controversial, will significantly impact traffic flow or will adversely affect access to properties (temporary or permanent). Examples are parking removal, median opening closures, traffic signal removal, roadway widening, major reconstruction and projects requiring a detour.

- **Level 4.** Project involves interstate work including maintenance work, road widening, temporary ramp closures, construction of new interchanges and major reconstruction. All projects that require total closure (either temporary or permanent) of roadways, bridges or railroad crossings.

Phase I of plan development is the most important for CAP activities. Decisions affecting access management, Maintenance of Traffic (MOT), possible interruptions of utility service and drainage are almost always of concern to the public. The PM must have a good understanding of the impacts on the community and the concerns and needs of the public. Changes in vertical alignment are likely to create access problems during construction. Drainage during construction can also be affected.

A CAP should, as a minimum, include the following:

- Date of the plan and each revision.

- Name of person initiating the plan.

- A description of the project and anticipated level of public concern.

- Identification of city, county and other local officials that may be involved in the project and how they will be kept informed of project activities.

- A summary of expected traffic impacts during construction.

- A description of the community and properties affected by the project.

- A discussion of removal of street parking (if any) and how it will affect adjacent properties and businesses.

- Special features and amenities that will be included in the project, including landscaping and esthetic treatments.

- Construction schedule, contract time and consideration for alternative contracting methods.

- A list of known community concerns and a strategy for addressing each of them. The PD&E Report will be a good place to begin this list.

- A list of all PD&E and right of way commitments made to the public and how they are to be addressed.

- A plan for news media relations (for Level 4 and possibly Level 3 projects), developed in cooperation with the district Public Information Office. A public information campaign may be appropriate for very large projects.

The media can be of great assistance to the Department in encouraging citizen input and keeping the public informed about a project. Project Managers should work with their district PIO to develop and implement a CAP.

Quality Control and Quality Assurance Plan

I-74 and US 421 Interchange Modification

Project Manager: Joe Smith

July 19, 2006

Project WBS work elements were reviewed and the following ones identified for applicable standards for each product, process, service, and deliverable.

Quality Control Plan Items

- Reviewers will be identified and assigned
- The project will be executed in accordance with applicable INDOT Manuals.
- Communication with team members (may lead to decision documents)
- Reviews to be scheduled
    - Monthly status and quarterly reviews will be communicated.
    - Plans will be reviewed to establish consistency in the documentation prior to Ad.
    - Scope, Schedule, and Budget will be reviewed periodically for progress.
    - Quarterly review
    - Status reviews
    - Milestone reviews
    - Deliverable reviews
    - Customer feedback
    - Process reviews

Quality Control Matrix Items

QA/QC Item	Checked	Approved	Standard(s) or References	Date scheduled	Date executed
Identification & Assignment Meeting		Yes	N/A	10/12/05	10/12/05
Gather as-built information and drawings for smooth and consistent transitions		Yes	N/A	10/13/05	10/13/05
Field visits to verify as-built		Yes	N/A	10/14/05	10/14/05

Existing utilities located on site and on plan				11/01/05	
Value Engineering and CEVP as appropriate.			DM ch.315	12/02/05	
Design will be reviewed and approved prior to the completion of the PS&E package			DM ch. 330	04/01/06	
Constructability review 1				02/02/06	
Constructability review 2					
Maintenance review		Yes	N/A	10/14/05	10/14/05
Management review					

Transition & Closure Plan

I-74 and US 421 Interchange Modification

Project Manager: Joe Smith

July 19, 2006

Optimal success for this project – realization of the project purpose – requires delivery of a quality product resulting in satisfied customers and conducting a deliberate closure – including an effective "hand-off" to the subsequent phase (construction) and team.

Key parts of the closure plan are:

1.Transition Points

> This project will be transferred to the Project Construction Office at the completion of the PS&E. The major milestones that will be accomplished are Environmental Documentation Complete, Right of Way Certification, Advertisement (Ad Date).

2. Acceptance of Work

> The work will be accepted after all formal reviews are complete.

3. Demobilize staff and resources.

> The next project for the Design team will be identified one-month prior to the Ad Date for this project. Team members will transition to the new project as their individual tasks are completed.

4. Close technical elements of the project

All of the activities, steps and requirements for demobilizing, returning or terminating facilities, equipment and services will be complete.

Project closure meeting of INDOT's design and management team

- Expectations

- Lessons learned from this project – Based on the requirements of the INDOT

  Lessons Learned process, establish specific project team activities and responsibilities for identifying, documenting, reporting and compiling Lessons Learned during the course of the project and, as each transition point is reached, compiling and reporting the complete Lessons Learned file for the appropriate area or phase of the work.

Evaluate, reward and recognize team members.

Review requirements and policies regarding rewards and recognition with Region/Organization Management.

Based on the work, the conditions under which it will be performed, and the roles, responsibilities and performance expectations of team members, identify "target"

7. Archive

Review current archiving policies with Region/Organization Management and determine the specific archiving requirements for the project.

- Develop specific record keeping instructions for document management during the course of the project. Include instructions for maintaining hardcopy and electronic files, sequestering original documents, dates and project information on documents, copying documents, and the maintenance of document logs.

- Develop file structures that allow preparing the appropriate files (including electronic files) for archiving as each transition event or final closure is achieved, including projects to shelf.

Appendix

D

Constructability Review Forms

Indiana Department of Transportation

Area Engineer Evaluation

CONSTRUCTABILITY REVIEW (30% PLANS)

Report No.: _____ Date: _____

Project Manager: _____ Area Engineer: _____

Consultant: _____ District: _____

Route: _____ County/City/Town _____

Contract No.: _____ Work Type: _____

Description: _____

_____

Evaluation of Project Constructability Quality

Evaluation Criteria	Yes	No	More Information Needed
BIDDABILITY			
1. Information sufficient to avoid major field changes?			
2. Identified appropriate agencies/parties for coordination?			
3. All necessary permits identified?			
4. MOT conceptual scheme identified?			
5. Cross referencing between various plan sets consistent?			
CONSTRUCTABILITY			
A. Site Investigation			
1. Sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?			
2. Current site survey (horizontal & vertical controls)?			
3. Subsurface exploration?			
4. Utilities shown on the plans properly?			
5. Structural investigation needs identified?			
6. Emergency/interim structural repair needs and schedule been considered?			
B. Right of Way			
1. Sufficient R/W available for all operations?			
2. Access requirements?			
3. Access to work areas?			

Evaluation Criteria	Yes	No	More Information Needed
C. Construction Staging			
1. Number of stages determined and reasonable work areas and access provided?			
2. Does staging cause special conditions (i.e. structural adequacy/stability)?			
3. Proposed adjacent contracts, restrictions, constraints identified?			
D. M.O.T. Traffic Control			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Adequate provisions for access for pedestrians and abutting properties?			
4. Can construction operations be carried out safely under M.O.T. and staging?			
5. Design adequate for averting delays/congestion?			
6. Is detour necessary for averting delays/congestion?			
E. Schedule			
1. Regulatory permit restrictions?			
2. Relationship with adjacent contracts identified?			
F. Special Materials/Conditions			
1. Any special (unique/proprietary) materials, methods or technologies required for contract?			
2. Special coordination required, RR, Permits, Regulatory?			
3. Presence of asbestos, hazardous waste or toxic materials?			
4. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			

Additional Comments: _____

Indiana Department of Transportation

Area Engineer Evaluation

CONSTRUCTABILITY REVIEW (60% PLANS)

Report No.: _____ Date: _____

Project Manager: _____ Area Engineer: _____

Consultant: _____ District: _____

Route: _____ County/City/Town _____

Contract No.: _____ Work Type: _____

Description: _____

_____

Evaluation of Project Constructability Quality

Evaluation Criteria	Yes	No	More Information Needed
BIDDABILITY			
1. Information sufficient to avoid major field changes?			
2. Coordination and agreements with appropriate agencies/parties?			
3. Permits been identified and sufficient time allowed to secure (time frames and applications are in place)?			
4. MOT plans adequate and near completion?			
5. MOT plans too restrictive (also consider time restrictions)?			
6. All major quantities identified?			
7. Cross referencing between various contract documents consistent (including special provisions)?			
CONSTRUCTABILITY			
A. Site Investigation			
1. Sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?			
2. Current site survey (horizontal & vertical controls)?			
3. Subsurface exploration?			
4. Utility investigation (including proposed relocation plans)?			
5. Current traffic counts?			
6. Structural investigation with proposed changes?			
7. Emergency/interim structural repairs and proposed schedule been considered?			

Evaluation Criteria	Yes	No	More Information Needed
B. Right of Way			
1. Sufficient R/W available for all operations?			
2. Sufficient R/W for equipment and material storage?			
3. Staging needs met?			
4. Access requirements?			
5. Access to work areas?			
C. Construction Staging			
1. Phased to provide minimum number of stages and reasonable work areas and access?			
2. Are there areas with restricted access?			
3. Are widths of work zones and travel lanes adequate?			
4. Does staging cause special conditions (i.e. structural adequacy/stability)?			
5. Proposed adjacent contracts, restrictions, constraints identified and accounted for?			
6. Can these details as shown on the plans be constricted using standard industry practices, operations and equipment?			
D. M.O.T. Traffic Control			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Adequate provisions for access for pedestrians and abutting properties?			
4. Signing and traffic control adequate?			
5. Can construction operations be carried out safely under M.O.T. and staging?			
6. Design adequate for averting delays/congestion?			
7. Is detour necessary for averting delays/congestion?			
E. Schedule			
1. Length of time and production rates for work reasonable?			
2. Is sequence of construction reasonable?			
3. Seasonal limits on construction operations?			
4. Regulatory permit restrictions?			
5. Processing of shop drawings and related approvals?			
6. Restricted hours impact on production?			
7. All necessary construction operations identified?			
8. Relationship with adjacent contracts?			
9. Impact of additional work? Costs?			

Evaluation Criteria	Yes	No	More Information Needed
F. Special Materials/Conditions			
1. Pertinent provisions and restrictions clearly indicated?			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
3. Special coordination required, RR, Permits, Regulatory?			
4. Presence of asbestos, hazardous waste or toxic materials?			
5. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			
6. Winter concreting?			
7. Soils stabilization?			

Additional Comments: _____

Indiana Department of Transportation

Area Engineer Evaluation

CONSTRUCTABILITY REVIEW (90% PLANS)

Report No.: _____ Date: _____

Project Manager: _____ Area Engineer: _____

Consultant: _____ District: _____

Route: _____ County/City/Town _____

Contract No.: _____ Work Type: _____

Description: _____

_____

Evaluation of Project Constructability Quality

Evaluation Criteria	Yes	No	More Information Needed
BIDDABILITY			
1. Are bidders restricted in their bids, or has a degree of flexibility included in the bidding documents?			
2. Information sufficient to avoid major field changes?			
3. Coordination and agreements with appropriate agencies/parties?			
4. Permits been identified and sufficient time allowed to secure?			
5. MOT plans adequate and complete?			
6. MOT plans too restrictive?			
7. Pay Items appropriate?			
8. Pay Items omitted?			
9. Quantities reliable and verifiable?			
10. Cross referencing between various contract documents consistent?			
CONSTRUCTABILITY			
A. Site Investigation			
1. Sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?			
2. Current site survey (horizontal & vertical controls)?			
3. Subsurface exploration?			
4. Sediment and erosion control?			
5. Utility investigation (verification of plans, schedule, and relocations)?			
6. Utilities/Probabilities of delays?			
7. Utilities/Number of conflicts?			

Evaluation Criteria	Yes	No	More Information Needed
8. Current traffic counts?			
9. Structural investigation?			
10. Structure rehabilitation?			
11. Sound walls?			
12. Emergency/interim structural repairs been considered?			
B. Right of Way			
1. Sufficient R/W available for all operations?			
2. Sufficient R?W for equipment and material storage?			
3. Staging needs met??			
4. Access requirements?			
5. Access to work areas?			
C. Construction Staging			
1. Phased to provide minimum number of stages and reasonable work areas and access?			
2. Are there areas with restricted access?			
3. Are widths of work zones and travel lanes adequate?			
4. Does staging cause special conditions (i.e. structural adequacy/stability)?			
5. Proposed adjacent contracts, restrictions, constraints identified and accounted for?			
6. Can these details as shown on the plans be constricted using standard industry practices, operations and equipment?			
D. M.O.T. Traffic Control			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Lane closure hours?			
4. Adequate provisions for access for pedestrians and abutting properties?			
5. Signing and traffic control adequate?			
6. Impact on existing signs?			
7. Impact on existing signals?			
8. Can construction operations be carried out safely under M.O.T. and staging?			
9. Design adequate for averting delays/congestion?			
10. Traffic/lighting?			
11. Is detour necessary for averting delays/congestion?			
12. State Police participation?			
E. Schedule			
1. Length of time and production rates for work reasonable?			
2. Is sequence of construction reasonable?			
3. Seasonal limits on construction operations?			
4. Utility relocation schedule reasonable?			
5. Regulatory permit restrictions?			
6. Processing of shop drawings and related approvals?			
7. Materials ordering, fabrication, and delivery requirements?			

Evaluation Criteria	Yes	No	More Information Needed
8. Restricted hours impact on production?			
9. All necessary construction operations identified?			
10. Relationship with adjacent contracts?			
11. Impact of additional work? Costs?			
12. Time related specs – completion/milestone realistic? Costs?			
13. Night and weekend work proposed and impacts considered? Costs?			
F. Special Materials/Conditions			
1. Pertinent provisions and restrictions clearly indicated?			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
3. Stormwater management?			
4. Risks of unsuitable materials?			
5. Risks of mines/sinkholes?			
6. Risks of peat?			
7. Soils stabilization?			
8. Winter concreting?			
9. Materials/procurement times			
10. Equipment/availability			
11. Equipment/access to worksite			
12. Local event conflicts			
13. Special coordination required, RR, Permits, Regulatory?			
14. Presence of asbestos, hazardous waste or toxic materials?			
15. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			

Additional Comments: _____

Indiana Department of Transportation

Area Engineer Evaluation

CONSTRUCTABILITY REVIEW (PRE-CONSTRUCTION)

Contractor: _____ Date: _____

PE/S: _____ Project Manager: _____

Area Engineer: _____ Consultant: _____

District: _____ Route: _____

County/City/Town _____ Contract No.: _____

Work Type: _____

Evaluation of Project Constructability Quality

Evaluation Criteria	Yes	No	More Information Needed
BIDDABILITY			
1. Are bidders restricted in their bids, or has a degree of flexibility included in the bidding documents?			
2. Information sufficient to avoid major field changes?			
3. Coordination and agreements with appropriate agencies/parties?			
4. Permits been identified and sufficient time allowed to secure?			
5. Pay Items appropriate?			
6. Pay Items omitted?			
7. Pay items accurate?			
8. Pay item descriptions accurate?			
9. Pay items consistent with specifications?			
10. Pay items consistent with special provisions?			
11. Quantities reliable and verifiable?			
12. Cross referencing between various contract documents consistent?			
13. Special provisions omitted?			
14. Special provisions reflect work to be performed?			
15. Special provisions include measurement and basis of payment?			
16. Billed materials tables accurate?			
17. Plans reflect field conditions?			
18. Current utility location on plans?			
19. New utility location on plans?			
20. Earthwork cross section accurately shown?			
21. Earthwork summary in the plans?			
22. Are control points included and accurate to mark the work with existing conditions?			

Evaluation Criteria	Yes	No	More Information Needed
CONSTRUCTABILITY			
A. Site Investigation			
1. Sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?			
2. Current site survey (horizontal & vertical controls)?			
3. Subsurface exploration?			
4. Utility investigation (verification of plans, schedule, and relocations)?			
5. Emergency/interim structural repairs been considered?			
B. Right of Way			
1. Sufficient R/W available for all operations?			
2. Sufficient R/W for equipment and material storage?			
3. Staging needs met?			
4. Access requirements?			
5. Access to work areas?			
C. Construction Staging			
1. Phased to provide minimum number of stages and reasonable work areas and access?			
2. Are there areas with restricted access?			
3. Are widths of work zones and travel lanes adequate?			
4. Does staging cause special conditions (i.e. structural adequacy/stability)?			
5. Proposed adjacent contracts, restrictions, constraints identified and accounted for?			
6. Can these details as shown on the plans be constricted using standard industry practices, operations and equipment?			
D. M.O.T. Traffic Control			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Adequate provisions for access for pedestrians and abutting properties?			
4. Signing and traffic control adequate?			
5. Can construction operations be carried out safely under M.O.T. and staging?			
6. Design adequate for averting delays/congestion?			
7. Is detour necessary for averting delays/congestion?			
E. Schedule			
1. Length of time and production rates for work reasonable?			
2. Is sequence of construction reasonable?			
3. Seasonal limits on construction operations?			
4. Utility relocation schedule reasonable?			
5. Regulatory permit restrictions?			
6. Processing of shop drawings and related approvals?			
7. Materials ordering, fabrication, and delivery requirements?			
8. Restricted hours impact on production?			

Evaluation Criteria	Yes	No	More Information Needed
9. All necessary construction operations identified?			
10. Relationship with adjacent contracts?			
11. Impact of additional work? Costs?			
12. Time related specs – completion/milestone realistic? Costs?			
13. Night and weekend work proposed and impacts considered? Costs?			
F. Special Materials/Conditions			
1. Pertinent provisions and restrictions clearly indicated?			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
3. Special coordination required, RR, Permits, Regulatory?			
4. Presence of asbestos, hazardous waste or toxic materials?			
5. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			
6. Winter concreting?			
7. Soils stabilization?			

Additional Comments: _____

Indiana Department of Transportation

Contractor Evaluation

CONSTRUCTABILITY REVIEW (PRE-CONSTRUCTION)

Contractor: _____ Date: _____

PE/S: _____ Project Manager: _____

Area Engineer: _____ Consultant: _____

District: _____ Route: _____

County/City/Town _____ Contract No.: _____

Work Type: _____

Evaluation of Project Constructability Quality

Evaluation Criteria	Yes	No	More Information Needed
BIDDABILITY			
1. Are bidders restricted in their bids, or has a degree of flexibility included in the bidding documents?			
2. Information sufficient to avoid major field changes?			
3. Coordination and agreements with appropriate agencies/parties?			
4. Permits been identified and sufficient time allowed to secure?			
5. Pay Items appropriate?			
6. Pay Items omitted?			
7. Pay items accurate?			
8. Pay item descriptions accurate?			
9. Pay items consistent with specifications?			
10. Pay items consistent with special provisions?			
11. Quantities reliable and verifiable?			
12. Cross referencing between various contract documents consistent?			
13. Special provisions omitted?			
14. Special provisions reflect work to be performed?			
15. Special provisions include measurement and basis of payment?			
16. Billed materials tables accurate?			
17. Plans reflect field conditions?			
18. Current utility location on plans?			
19. New utility location on plans?			
20. Earthwork cross section accurately shown?			
21. Earthwork summary in the plans?			
22. Are control points included and accurate to mark the work with existing conditions?			

Evaluation Criteria	Yes	No	More Information Needed
CONSTRUCTABILITY			
A. Site Investigation			
1. Sufficient field investigation been done to ascertain that contract work can be performed as shown on the plans?			
2. Current site survey (horizontal & vertical controls)?			
3. Subsurface exploration?			
4. Utility investigation (verification of plans, schedule, and relocations)?			
5. Emergency/interim structural repairs been considered?			
B. Right of Way			
1. Sufficient R/W available for all operations?			
2. Sufficient R/W for equipment and material storage?			
3. Staging needs met?			
4. Access requirements?			
5. Access to work areas?			
C. Construction Staging			
1. Phased to provide minimum number of stages and reasonable work areas and access?			
2. Are there areas with restricted access?			
3. Are widths of work zones and travel lanes adequate?			
4. Does staging cause special conditions (i.e. structural adequacy/stability)?			
5. Proposed adjacent contracts, restrictions, constraints identified and accounted for?			
6. Can these details as shown on the plans be constricted using standard industry practices, operations and equipment?			
D. M.O.T. Traffic Control			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Adequate provisions for access for pedestrians and abutting properties?			
4. Signing and traffic control adequate?			
5. Can construction operations be carried out safely under M.O.T. and staging?			
6. Design adequate for averting delays/congestion?			
7. Is detour necessary for averting delays/congestion?			
E. Schedule			
1. Length of time and production rates for work reasonable?			
2. Is sequence of construction reasonable?			
3. Seasonal limits on construction operations?			
4. Utility relocation schedule reasonable?			
5. Regulatory permit restrictions?			
6. Processing of shop drawings and related approvals?			
7. Materials ordering, fabrication, and delivery requirements?			
8. Restricted hours impact on production?			

Evaluation Criteria	Yes	No	More Information Needed
9. All necessary construction operations identified?			
10. Relationship with adjacent contracts?			
11. Impact of additional work? Costs?			
12. Time related specs – completion/milestone realistic? Costs?			
13. Night and weekend work proposed and impacts considered? Costs?			
F. Special Materials/Conditions			
1. Pertinent provisions and restrictions clearly indicated?			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
3. Special coordination required, RR, Permits, Regulatory?			
4. Presence of asbestos, hazardous waste or toxic materials?			
5. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			
6. Winter concreting?			
7. Soils stabilization?			

Additional Comments: _____

Indiana Department of Transportation **Project Engineer/Supervisor Evaluation**

CONSTRUCTABILITY REVIEW (MID-CONTRACT)

Contractor: _____ Date: _____

PE/S: _____ Project Manager: _____

Area Engineer: _____ Consultant: _____

District: _____ Route: _____

County/City/Town _____ Contract No.: _____

Work Type: _____

Evaluation of Project Constructability Quality

101 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – CONTRACT RELATED
Change Orders: Number _____ Amount _____

Evaluation Criteria	Yes	No	More Information Needed
1. Cross referencing between various contract documents consistent?			
2. Special provisions omitted?			
3. Special provisions reflect work to be performed?			
4. Special provisions include measurement and basis of payment?			
5. Billed materials tables accurate?			
6. Plans reflect field conditions?			

102 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – DESIGN RELATED
Change Orders: Number _____ Amount _____

1. Are bidders restricted in their bids, or has a degree of flexibility included in the bidding documents?			
2. Information sufficient to avoid major field changes?			
3. Billed materials tables accurate?			
4. Plans reflect field conditions?			
5. Current utility location on plans?			
6. Design adequate for averting delays/congestion?			

Evaluation Criteria	Yes	No	More Information Needed
103 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – ENVIRONMENTAL RELATED **Change Orders: Number _____ Amount _____**			
1. Presence of asbestos, hazardous waste or toxic materials?			
104 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – MATERIALS RELATED **Change Orders: Number _____ Amount _____**			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
105 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – PERMITS RELATED **Change Orders: Number _____ Amount _____**			
1. Permits been identified and sufficient time allowed to secure?			
2. Regulatory permit restrictions?			
106 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – QUANTITY RELATED **Change Orders: Number _____ Amount _____**			
1. Earthwork cross section accurately shown?			
2. Earthwork summary in the plans?			
3. Pay items consistent with specifications?			
4. Pay items consistent with special provisions?			
5. Quantities reliable and verifiable?			
6. Cross referencing between various contract documents consistent?			
7. Are control points included and accurate to mark the work with existing conditions?			
107 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – R/W RELATED **Change Orders: Number _____ Amount _____**			
1. Sufficient R/W available for all operations?			
2. Sufficient R/W for equipment and material storage?			
3. Access requirements?			
4. Access to work areas?			

Evaluation Criteria	Yes	No	More Information Needed
108 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – SOILS RELATED **Change Orders: Number _____ Amount _____**			
1. Utility investigation (verification of plans, schedule, and relocations)?			
109 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – STAGING RELATED **Change Orders: Number _____ Amount _____**			
1. Staging needs met?			
110 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – TRAFFIC CONTROL RELATED **Change Orders: Number _____ Amount _____**			
1. Adequate provisions for access for pedestrians and abutting properties?			
2. Signing and traffic control adequate?			
3. Design adequate for averting delays/congestion?			
4. Is detour necessary for averting delays/congestion?			
111 ERROR AND OMISSIONS – CONTRACT DOCUMENTS – UTILITIES RELATED **Change Orders: Number _____ Amount _____**			
1. Earthwork cross section accurately shown?			
2. Earthwork summary in the plans?			
201 CONSTRUCTABILITY – CONSTRUCTION RELATED **Change Orders: Number _____ Amount _____**			
1. Plans reflect field conditions?			
2. Are control points included and accurate to mark the work with existing conditions?			
3. Length of time and production rates for work reasonable?			
4. Is sequence of construction reasonable?			
5. Seasonal limits on construction operations?			
6. Regulatory permit restrictions?			
7. Restricted hours impact on production?			
8. All necessary construction operations identified?			
9. Relationship with adjacent contracts?			

Evaluation Criteria	Yes	No	More Information Needed
10. Impact of additional work? Costs?			
11. Special coordination required, RR, Permits, Regulatory?			
12. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			
13. Winter concreting?			
202 CONSTRUCTABILITY – DESIGN RELATED **Change Orders: Number _____ Amount _____**			
1. Adequate provisions for access for pedestrians and abutting properties?			
2. Design adequate for averting delays/congestion?			
3. Is detour necessary for averting delays/congestion?			
4. Time related specs – completion/milestone realistic? Costs?			
5. Night and weekend work proposed and impacts considered? Costs?			
6. Pertinent provisions and restrictions clearly indicated?			
7. Soils stabilization?			
203 CONSTRUCTABILITY – ENVIRONMENTAL RELATED **Change Orders: Number _____ Amount _____**			
1. Presence of asbestos, hazardous waste or toxic materials?			
204 CONSTRUCTABILITY – ENVIRONMENTAL RELATED **Change Orders: Number _____ Amount _____**			
1. Materials ordering, fabrication, and delivery requirements?			
2. Any special (unique/proprietary) materials, methods or technologies required for contract?			
205 CONSTRUCTABILITY – R/W RELATED **Change Orders: Number _____ Amount _____**			
1. Sufficient R/W available for all operations?			
2. Sufficient R/W for equipment and material storage?			
3. Access requirements?			
4. Access to work areas?			

Evaluation Criteria	Yes	No	More Information Needed
206 CONSTRUCTABILITY – SOILS RELATED **Change Orders: Number _____ Amount _____**			
1. Soils stabilization?			
207 CONSTRUCTABILITY – SOILS RELATED **Change Orders: Number _____ Amount _____**			
1. Staging needs met?			
2. Phased to provide minimum number of stages and reasonable work areas and access?			
3. Are there areas with restricted access?			
4. Are widths of work zones and travel lanes adequate?			
5. Does staging cause special conditions (i.e. structural adequacy/stability)?			
6. Proposed adjacent contracts, restrictions, constraints identified and accounted for?			
7. Can these details as shown on the plans be constricted using standard industry practices, operations and equipment?			
8. Special coordination required, RR, Permits, Regulatory?			
9. Safety requirements, fall protection, electric lines, and other utilities, RR requirements?			
208 CONSTRUCTABILITY – SOILS RELATED **Change Orders: Number _____ Amount _____**			
1. M.O.T. requirements realistic for site conditions?			
2. Are lane closures reasonable for traffic volumes?			
3. Can construction operations be carried out safely under M.O.T. and staging?			
209 CONSTRUCTABILITY – SOILS RELATED **Change Orders: Number _____ Amount _____**			
1. Utility investigation (verification of plans, schedule, and relocations)?			
2. Utility relocation schedule reasonable?			

Evaluation Criteria	Yes	No	More Information Needed
301 SCOPE CHANGES – FHWA **Change Orders: Number _____ Amount _____**			
302 SCOPE CHANGES – CENTRAL OFFICE CONSTRUCTION/TRAFFIC **Change Orders: Number _____ Amount _____**			
303 SCOPE CHANGES – DISTRICT/SUBDISTRICT **Change Orders: Number _____ Amount _____**			
304 SCOPE CHANGES – DISTRICT CONSTRUCTION ENGINEER **Change Orders: Number _____ Amount _____**			
305 SCOPE CHANGES – AREA ENGINEER **Change Orders: Number _____ Amount _____**			
306 SCOPE CHANGES – PROJECT ENGINEER/SUPERVISOR **Change Orders: Number _____ Amount _____**			
307 SCOPE CHANGES – TRAFFIC ENGINEER **Change Orders: Number _____ Amount _____**			
308 SCOPE CHANGES – LOCAL AGENCY REQUEST **Change Orders: Number _____ Amount _____**			
309 SCOPE CHANGES – PUBLIC/POLITICAL REQUEST **Change Orders: Number _____ Amount _____**			
401 CHANGED FIELD CONDITIONS – CONSTRUCTION RELATED **Change Orders: Number _____ Amount _____**			

Evaluation Criteria	Yes	No	More Information Needed
402 CHANGED FIELD CONDITIONS – ENVIRONMENTAL RELATED **Change Orders: Number _____ Amount _____**			
403 CHANGED FIELD CONDITIONS – MATERIALS RELATED **Change Orders: Number _____ Amount _____**			
404 CHANGED FIELD CONDITIONS – R/W RELATED **Change Orders: Number _____ Amount _____**			
405 CHANGED FIELD CONDITIONS – SOILS RELATED **Change Orders: Number _____ Amount _____**			
406 CHANGED FIELD CONDITIONS – STAGING RELATED **Change Orders: Number _____ Amount _____**			
407 CHANGED FIELD CONDITIONS – UTILITIES RELATED **Change Orders: Number _____ Amount _____**			
500 FAILED MATERIAL **Change Orders: Number _____ Amount _____**			
601 INCENTIVE/DISINCENTIVE – CONTRACT COMPLETION TIME **Change Orders: Number _____ Amount _____**			
602 INCENTIVE/DISINCENTIVE – CONTRACT PAYMENTS **Change Orders: Number _____ Amount _____**			
603 INCENTIVE/DISINCENTIVE – COST REDUCTION **Change Orders: Number _____ Amount _____**			

Evaluation Criteria	Yes	No	More Information Needed
604 INCENTIVE/DISINCENTIVE – A+B CONTRACT **Change Orders: Number _____ Amount _____**			
605 INCENTIVE/DISINCENTIVE – A+B+C CONTRACT **Change Orders: Number _____ Amount _____**			
701 STANDARDS/SPECS UPDATE OR CHANGES – CONTRACT COMPLETION TIME **Change Orders: Number _____ Amount _____**			
702 STANDARDS/SPECS UPDATE OR CHANGES – CONTRACT PAYMENTS **Change Orders: Number _____ Amount _____**			
703 STANDARDS/SPECS UPDATE OR CHANGES – OTHER **Change Orders: Number _____ Amount _____**			

Additional Comments: _____

Appendix

E

Consultant Rating Form

CONSULTANT RATING / EVALUATION – PROJECT MANAGEMENT

Report No.: _____ Date: _____

Project Manager: _____ ATTENTION: Production ☐

Area Engineer: _____ Construction ☐

RFC Date: _____ Contracts ☐

Consultant: _____ Date of Last Review: _____

Route: _____ District: _____

Contract No.: _____ Work Type: _____

Description: _____

_____

REVIEW POINTS

- ☐ 1. Annual / Special
- ☐ 2. Conceptual Solutions (Stage 3)
- ☐ 3 Constructability (Stage 5)
- ☐ 4. Constructability (Stage 6)
- ☐ 5. Stage 2 Design (30-60%) (Stage 7)
- ☐ 6. Environmental Approval (Stage 8)
- ☐ 7. Constructability (Stage 11)
- ☐ 8. Final Plan Package (Stage 12)

REVIEWER'S RATING ITEMS

1. Budget: _____
2. Scope: _____
3. Schedule: _____
4. Constructability: _____
5. Responsiveness: _____

+1	Exceed Expectations
0	Satisfactory
-1	Improvement Required
-3	Unsatisfactory
NA	this review point

RATING TOTAL: _____

RATING SCORE: RATING TOTAL ÷ BY NUMBER OF RATING ITEMS: _____

Reviewer's Signature: _____ Date: _____

Reviewer's Telephone: _____

Appendix

F

I-74 and US 421 Engineer's Summary

- PROJECT NEEDS:

    - The existing semi-directional interchange provides two access points (one exit point and one entrance point on I-74). Westbound I-74 traffic cannot access US 421 nor is there access from US 421 to eastbound I-74. The missing access to I-74 from US 421 requires traffic to use a circuitous route to the existing I-74/ SR 3 interchange.
    - The geometry of the existing interchange is deficient and includes a left hand merge from a fly-over ramp. The intersection of US 421 and old US 421 (Michigan Road) is located directly at the end of the US 421 eastbound ramp, a potential crash risk site due to substandard intersection geometrics. Currently, traffic on US 421 is only about 2,000 vpd. With the expected increase in traffic generated by the proposed industrial development adjacent to the interchange, the capacity of the existing interchange and intersections (ramp terminals) are not expected to be adequate.

- PURPOSE:
    - Provide all turning movements to I-74 from US 421.
    - Remove the deficient left side merge onto I-74 mainline from US 421.
    - Improve/upgrade the geometrics of existing local service road intersections.
    - Connect the county road system north of I-74 (no connection now exists between the north and south local service roads at the existing interchange) to local roads south of I-74.
    - Connect Interchange to the proposed Overpass Road.
    - Provide capacity to efficiently move the expected 2028 design year traffic.

- EXISTING CONDITIONS:

    - I-74 is an east-west four-lane divided interstate highway on the National Highway System (NHS). The posted speed on I-74 is 70 mph, 65 mph for truck over 13 tons gross weight. I-74 was constructed in 1961. I-74 within the study area is comprised of two 12' wide travel lanes, a 4' wide left shoulder, and a 10' wide right shoulder in both EB and WB directions. The EB and WB I-74 roadways are typically separated by a 60' wide grass median (dimension includes inside shoulders). The median widens at the I-74 / US 421 semi-directional interchange.
    - US 421 is a rural major collector. The interchange with I-74 was constructed in 1961. US 421 has a posted speed limit of 40 mph south (east) of Vandalia Rd and 55 mph north (or west). The typical cross section consists of 2-12' travel lanes with 4' paved shoulders and shallow V-ditches on each side. The apparent existing total R/W is 60' wide, widening to 120' near SR 3. The horizontal alignment of US 421 is tangent and vertical alignment mostly flat, with a crest curve at Vandalia Rd.
    - Old US 421 (Michigan Road) is a rural major collector with a posted speed limit of 55 mph. The typical cross section is 24' wide chip-and-seal, 1' wide earth usable shoulders with open roadside ditches. The apparent existing total R/W is 60'.
    - The I-74 local service roads (LSR, or frontage roads) are asphalt surfaced, 18' to 20' wide with shallow V-ditches ditches and a 1' wide or less usable shoulder.
    - An INDOT maintenance unit facility is located on a linear site between old US 421 and I-74 west of the I-74/US 421 interchange.
    - Bridges:
        - US 421 Bridge (76' long) over Muddy Fork Creek (No. 421-16-7387; NBI= 32110). It is a three-span continuous reinforced concrete slab structure with 46' clear roadway width, and was replaced in 1994.
        - The US 421 fly-over Bridge over I-74 EB (No. (421) I74-132-4327B NB; NBI= 32120).

        - I-74 EB Bridge over Muddy Fork Creek (No. I74-132-4328B EBL; NBI= 45070). three span continuously reinforced concrete girder bridge.
        - I-74 WB Bridge over Muddy Fork Creek (No. I-74-132-4328B WBL; NBI= 45080). three span continuously reinforced concrete girder bridge.
        - The local service road #2 Bridge over Muddy Fork Creek is a three span concrete girder bridge. The Bridge is located north of I-74.
- ASSUMPTIONS:
    - The area south of I-74 is expected to be annexed by the City of Greensburg by 2008.
    - Decatur County is expected to post 45 mph speed limits on roads nearby the interchange within the jurisdiction of the county.

- TRAFFIC:

  INDOT's Office of Urban & Corridor Planning has provided traffic data for this project, in the base year 2006, intermediate year 2008, and design year 2028. These data are available, but are not provided with the Engineer's Summary.

- RECOMMENDATIONS:

  Because of the inherent operational and geometric deficiencies of the existing partial interchange it is recommended that the existing unconventional, substandard interchange be modified to a standard, contemporary full-access interchange. Such an interchange will provide the essential movements between I-74, US 421, and old US 421 (Michigan Rd). In addition, the anticipated increase in traffic demand and commercial transport service requirements further support the need for improvement. Following development, review, and comparison of many interchange options (various layout forms), a partial cloverleaf Type-A is judged to be the most efficient and effective. Therefore, the suggested improvements are as follows (see attached drawing sheets and cross sections for details):

    - **Construct a new Partial Cloverleaf Type- A Interchange**
        - Incorporate twin bridges on the interchange crossroad over I-74(estimated clear roadway width to be 54' each; approach road cross section to incorporate 2-12' wide thru lanes, one 12' wide right turn lane, a 4' paved left shoulder, 10' right paved shoulder). Over I-74, the twin bridges are expected to completely span the I-74 median wetlands and provide an open cross section.
        - The crossroad typical cross sections show open drainage and paved shoulders throughout the interchange limits. The crossroad will have full limited access R/W.
        - Construct six new interchange ramps as shown on the drawings.

    - **Construct a new bridge on US 421 over Muddy Fork Creek** on relocated alignment replacing existing bridge No. 421-16-7387.

    - **Remove two of the travel lanes from existing US 421** which is located immediately adjacent to the existing interchange and convert the highway to a two lane local service road and construct a cul-de-sac. The remaining two lanes of current US 421 will act as a local service road to serve existing businesses and residences.

- **Construct the proposed Overpass Road**. The cross section for the overpass road connector is to be 2-12' travel lanes with an 8' paved shoulder, 11' usable shoulder and open ditches (a separate Engineer's Summary is available for this road).

- **Relocate Old US 421** to connect with a new at grade intersection of US 421 and Old US 421 approximately 600' south of the proposed interchange ramps. US 421 and old US 421 are to consist of 4- 12' travel lanes with a continuous median/ left turn lane and other necessary auxiliary turn lanes. The cross section is to consist of vertical curb and gutter with closed drainage. The relocated US 421 will have a sidewalk on both sides from Greensburg to the interchange and old US 421 continuing to the west will have a sidewalk on the south side only.

- **Raze the INDOT Maintenance Unit Facility** as part of this project. It will be rebuilt by INDOT in a different location as a separate project.

- **Relocate the existing local service road #1 in the NW interchange quadrant**.

- **Remove existing I-74 /US 421 interchange including the fly-over bridge** No. (421) I74-132-4327B over I-74 EB.

- **Widen bridges No. I74-132-4328B EBL and No. I74-132-4328B WBL** over Muddy Fork Creek for the interchange ramp construction.

- **Remove the existing local service road bridge north of I-74,over Muddy Fork Creek and relocate. Relocate local service road # 2** (environmental mitigation may be required for this Decatur County road bridge replacement). If necessary to expedite development of the interchange proper, the relocation and replacement of this LSR # 2 project can be completed after the proposed I-74 interchange is open to traffic.

- **Traffic signal control** may be necessary at the proposed 'T' intersection on the interchange crossroad, relocated US 421, and old US 421 and potentially at other intersections built as part of the interchange project. The Designer shall address the signal warrants in concert with the District Traffic Engineer.

- **Environmental Concerns**

    - Designer shall make every effort to avoid impacts to the existing properties in the interchange area. Also minimize any R/W acquisition from the proposed Industrial plant site.
    - Avoid, to the extent practicable, the wetlands located SW of the interchange.
    - Avoid, the extent practicable, the wetlands in the NE quadrant near the local service road #2 relocation site.
    - Endeavor to minimize construction activity along Muddy Fork Creek.

- Avoid impact to the historic site located on US 421in the SE quadrant of US 421 and Muddy Fork Creek. The proposed alignment of the separate US 421 expansion project form the interchange to SR 3 addresses this concern.

- **Estimated Cost** of the new interchange and its associated road improvement is $20 million.

- **Estimated Cost** of Old US 421 relocation is $2.5 million.

- R/W:
  - Estimated R/W for the interchange proper is 70 acres.
  - Estimated permanent R/W for improvements to relocated local roads and US 421 is 18 acres

- DESIGN ASPECTS:
  - For I-74 and mainline interchange elements use Table 53-1, *Freeways*, with a 70 mph design speed. Use 4R Standards with level terrain.
  - For the new US 421 interchange crossroad use Table 53-6, *Multi-lane Urban Arterials,* suburban, uncurbed with a 50 mph design speed. An urban design class is recommended based on near-term land use changes that are anticipated. Use 4R Standards; land use is suburban with level terrain.
  - For relocated US 421 and Old US 421 use Table 53-6, *Multi-lane Urban Arterials*, suburban curbed with a 45 mph design speed. An urban design class is recommended based on near-term land use changes that are anticipated. Use 4R Standards; land use is suburban with level terrain.
  - For the Overpass Road use Table 53-4, *Local Agency Rural Collector Roads* with a 60 mph design speed. Use 4R Standards; land use is suburban with level terrain.
  - For local service road #1 use Table 55-3D, *Rural Local Roads*. Decatur County favors use of 45 mph design speed on proposed road improvements in its jurisdiction. Use 3R Standards.
  - For local service road #2 use Table 55-3D, *Rural Local Roads*. Decatur County favors use of 45 mph design speed on proposed road improvements in its jurisdiction. Use 3R Standards.

- PROJECT LIMITS: The project limits are shown on the drawings.

- SURVEY LIMITS: The survey limits may be obtained from the drawings.