Determination of Construction Duration: Project initiation through final design

Green Belt Project
Nancy Brandt
Ohio Department of Transportation
Team Members
Team Members

Matt Parrill, Planning & Engineering Administrator, D07
Dave Ley, Construction Administrator, D07
Matthew Blythe, Bridge Design Engineer, D07
Joshua Bowman, Area Construction Engineer, D07
Scott Boyer, Design Project Manager, D07
Scott LeBlanc, Area Construction Engineer, D07
Ben Wiltheiss, LPA Coordinator/Scoping Engineer, D07
Problem/Opportunity Statement

• There was no established process and/or team in District 7, to assure that both time constraints and project duration are identified and confirmed throughout project development.
Goal Statement

• Identify and document the process of establishing eligible construction projects, determine project duration, and project time constraints while in the design phase.

• Define team development criteria; develop standardized process documentation via a flowchart; and to develop an agile process that is easily modifiable to accommodate changes in the rules.
Top three intended outcomes

1) Identify the criteria for team member selection.

2) Identify and document, via flowchart, project process.

3) Establish criteria for project eligibility.
Process Map used to create flow chart
<table>
<thead>
<tr>
<th>Suppliers</th>
<th>Inputs</th>
<th>Process</th>
<th>Outputs</th>
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<td>Scoping Engineer</td>
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<td>Initial Project Baseline &amp; Planning Level</td>
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<td>Routine Review of Initial Project Baseline</td>
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<td>Construction Administration Concordance Email</td>
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| Subject Matter Experts | Traffic Volumes | Start Data | File | DDO |}

Note: The table above is a simplified representation of a SIPOC diagram, which is a tool used in Six Sigma to help identify the Suppliers, Inputs, Process, Outputs, and Customers of a process. This diagram includes specific elements such as project management details, design review, and various other elements relevant to construction or similar processes.
Flow Chart Brainstorming

1. Scope of project
   A. MOT (main of traffic)
   B. Material lead time
   C. Season
   D. Special events - tourism, school
   E. Boat and river restrictions, environmental
   F. Project complexities (what bridge replacement vs rehab)

2. Estimating - Sale Date 
   a. Feasibility
      b. Briefly
      c. May 1 to Dec 1 Construction season (single/multi-phased)
   d. Utilities
   e. Railroad

3. Funding
   a. System assessment - cost-benefit ratio
      i. Innovation contracting
      j. Toolbox of methodology (project delivery)
Flowchart
Project Initiation

1. PROJECT INITIATION

Begin Project Initiation → Complete Project Request Form → Programming Packet to SMEs → Complete Programming Packet → Run Regression Analysis → Enter Ellis Data

- Request Sale Date
- ROW Required?
- Environment Requirements
- Identify Conflicting Projects
- Design Path Chosen

- Field Review w/ SMEs
- Maintenance of Traffic (MOT) Scheme

Complete Project Initiation → Finalize Scope → End Project Initiation

Set Sale Date
Enter Initial Completion Date
Flowchart Design
Flowchart
Plan Package
### 1. PROJECT INITIATION

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### 3. PLAN PACKAGE

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TIME CONSTRAINTS

1.) Maintenance of Traffic (MOT)

Maintenance of traffic is the part of the design plans that dictates how a contractor will construct a project. Construct-ability requirements will define the maintenance of traffic phasing for individual projects. Time requirements for each MOT phase depends on the scope of work. Larger more complex projects with multiple work types or less complex projects with a large amount of work may dictate a multiple season project. The award date and beginning of construction will also have an impact on proposed MOT.

Factors to be considered are:

- Time
- Average daily traffic
- Percentage trucks
- Required lane widths
- Existing geometrics
- Set up and tear down times
- Temperature sensitive materials
- User costs
2.) Material Lead Time

The inclusion of fabricated items needs to be assessed as to the amount of lead time that is required prior to delivery. This should be accounted for in setting both the construction duration and sale date.

Material lead times may take up to 16 weeks on the items below:

- light/sign poles
- sign structures
- structural steel items
- bridge components
3.) Season - Time of Year

The season and time of year both need to be considered when determining the project sale date. Depending on the project type, it could greatly influence how the completion date is set. So consider the following project types:

- **Bridge Replacement** - Bridge work can be done for the most part all year long, although weather does affect the completion date. For example, if the project sells in the spring and it's considered a one (1) season project, the time for the total project duration should be considered to complete at the end of the year. However, if the project is programmed to sell later in the summer, an early spring completion date the next year would be the most logical time period. Additionally, if the structure is over a river, a completion date of mid-summer may be chosen due to environmental restrictions, etc.

- **Maintenance Resurfacing** - These are routinely single season projects that typically have duration of around 3 months.

- **Major Reconstruction** - Usually these projects have multiple MOT phases with the surface asphalt being placed at the end of the project. Although these projects may be substantially complete by the winter shut down, the contractor typically has to come back in the spring to place the surface asphalt.

- **Large Excavation / Embankment Projects** - The sale date for these projects is critical when determining the completion date. The contractor can only perform excavation and embankment work when the weather allows; typically up to December 1st. So if the project sells late in the year and requires a lot of embankment work, consideration needs to be taken as to how much can reasonably be done the first year. There may be a time period over the winter that needs to be considered as non-work, because the weather will not allow this type of work.

- **Bridge Painting** - Projects with bridge painting and sealing need to be analyzed for a reasonable complete date. According to the specification, the contractor cannot paint steel bridges after October 31st. If structural steel painting is required, allow a four week buffer for painting.
4.) Special Events

In addition to regular holidays, consideration should be made for special local events when determining project duration and completion dates. Closures in advance of holidays and special local events that have parades or festivals involving influx of traffic from outside the community should be avoided until after the event. While some local events may be proprietary (run by a business), they may result in significant disruption to free flow of traffic and should also be considered. However, ODOT policy does not generally recognize these in fairness to other local businesses. There should be communication with the ODOT County Manager and Local Public Administrator for any events which may be a consideration. In addition, the local school superintendent should be contacted for periods when school will not be in session to plan construction activity with the least disruption to nearby schools.

- School
- Special Events
- Holidays
5.) Environmental Considerations

a. Indiana & northern long-eared bat restrictions

- The IB & NLEB are federally-listed endangered species and consideration of habitat protection is required under the Endangered Species Act. In general, it should be assumed that projects requiring the removal of trees over 3” in diameter will be subject to the tree removal restriction dates: No trees removed from April 1 to September 30, when these bats would be using the trees for roost or forage habitat. That is, all tree removals over 3” must occur between October 1 and March 30.

b. Waterway restrictions

- Waterways and wetlands are protected under the Clean Water Act. All exceptional warm water habitats, cold water habitats, warm water habitats and waterways with a drainage area of greater than 20 square miles will be subject to in stream restriction dates: No in stream activities from April 15 to June 30. Work from an established work pad installed outside of those dates may proceed during the restricted period, but the causeway may not be removed during that timeframe. USACOE may further impose a restriction requiring that in stream work only occur during the low flow period, typically recognized as August 1 to October 30.

- All national scenic rivers are protected under the Scenic Rivers Act. State scenic rivers are protected under Ohio Revised Code. In stream work may only occur from August 1 to October 30.

- Percid and salmonid streams are also subject to specific in stream restriction dates.
6.) Project Complexity

The range of complexity depends on the project's scope of work and work type. Work usually deals with pavements, bridges, culverts, guardrail, traffic control devices and roadside. More complex projects will have the greatest impact on the motoring public. The level of impact is usually directly proportional to the amount of time to complete a project. Project locations can add to the complexity.

7.) Adjacent Projects

- Adjacent projects can be defined as a project within the work limits of another project, or a project in close proximity such that the maintenance of traffic for each project overlaps. These projects will require detailed and specific notes to ensure good coordination between contractors.

Examples include: Projects that are on each other’s planned detour route; Bridge overhead projects requiring the use of shoulders on roadway projects below; and, Abutting projects causing possible conflicting traffic shifts.
8.) Single or multiple seasons:

For single season projects, consideration needs to be given to weather sensitive features of work, such as:

- Asphalt
- Pavement striping
- Bridge painting

Work to complete these features prior to winter (late October or November) without specific reason, due to the increased risk of the project being pushed out to the following season.

For multiple season projects, in addition to the weather sensitive work issues addressed for single season projects, sale date and duration should be set to coordinate with non-weather sensitive work during the winter months (e.g. piling, substructure work, demolition, etc.). They will reduce the risk of delays and allow the contractor to effectively utilize the entire calendar, if possible.
9.) Utilities

Utilities are outsourcing more of their work which results in longer turnaround time for reviewing engineered plans, subsequent relocation coordination and fieldwork. Consider the following:

- Lead times for relocation work vary with each utility. ODOT strives to relocate all utilities prior to the sale of the project and ideally prior to filing the plans. Sometimes coordination is required during construction.
- Seasonal constraints per utility type are as follows:
  - Electrical: Optimal move times are October thru April (off season-low demand).
  - Gas: Optimal move times are May thru September (off season-low demand).
  - Telephone/Cable relocations from March thru November (when ground is not frozen).
- ODOT highway lighting and traffic signals are considered a utility
- Lead times (from the time the utility company receives plans to relocation) in general are:
  - Electrical/Gas: If easement is required 1 year is needed. Because of the change in OSHA standards from 10’ to 20’ clearance some of our right of way is very tight necessitating temporary or permanent right of way adding 9 months to the project prior to plan file. Then we must allow time for the utility to move after right of way is cleared. Typically, we would allow 3 months for the relocation.
  - Utility relocations will vary depending on the complexity of the work. Add a minimum of 6 months from receipt of construction plans as utilities must design relocation plans from our construction plans.
10.) Railroads

Projects involving railroads can be very dynamic in nature due to constraints required by the railroad company. Time constraints that need to be considered are as follows:

- Railroad design review time for structures over a railroad. Railroad companies require approval on all of the contractor's submittals for protection of the track above and around the railroad. Usually a memorandum of understanding of what the railroad requires is included in the proposal for a contract. This memo gives the various time frames required by the railroad for review purposes, etc.
- For structures that actually carry a railroad, the railroad company has 40 days to review shop drawings, etc.
- Number of trains that travel the tracks that are involved on a daily basis. This in itself could greatly influence the project duration due to the contractor being required to stop work as trains pass through the project.
- Flagging of the tracks is required for railroad involvement, which could impact the time duration of a project, due to availability of flaggers, etc.
1.) Sale Date

The project sale date is defined by the following:

- Need (system condition, safety)
- Funding allocation by the program manager
- Project development
- Lock-down
- Project coordination
2.) Innovative Contracting

When there is need to motivate Contractors to provide quality transportation facilities while minimizing travel delays and maintaining a competitive bidding process, an alternative to conventional contracting methods should be implemented. The Innovative Contracting Manual provides a toolbox of methods to reduce closure times on projects by enhanced performance by the contractor. The primary means of influencing Contractor performance is by the use of incentives and disincentives. Bulleted tools are provided below (definitions and use are spelled out in the manual):

- The following innovative methods allow for Incentive/ Disincentive payments:
  - Incentive/Disincentive Contract
  - Lump Sum Minus Contract
  - A+B and PN 125 - A+B Multiple Section Contracts

- The following innovative methods set a number of days without using an incentive:
  - Work Day Contract
  - Lane Value Contract
  - Window Contract

- The following innovative method can shorten the overall time for design and construction without using incentives:
  - Design-Build Contract
  - Value Based Design-Build Contract

- The last techniques can be selectively used in combination with other techniques:
  - Warranties
  - Value Engineering in Construction
  - Price Adjustment Exclusions
  - Adjustment Exclusions
  - Unauthorized Lane Use

You may also use the Traffic Engineering Manual to implement notes for time limitations on detours, weather time limitations and lanes open during holidays or special events.
Strategic Plan and Timeline

District 7 plans to utilize this process change immediately. P&E will insert the construction duration determination at the project initiation phase in the “Project Planning to Design” manual. The design phase will update the construction duration as part of the design reviews and P&E and Construction will continue to conduct “Construction Time Constraints” and “Innovative Contracting” meetings as a collaborative effort to improve constructability and to more accurately define construction duration to the traveling public. The project manager, design staff and the District Construction Administrator will make sure the plan file construction duration is as accurate as possible, based on this improved process that now resides within the project development process.