DMP (Decision Making Process)

Office of
Systems Analysis Planning
Road School
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Driving Indiana's Economic Growth

*** Please note: This is derived from the United States Military Decision Making Process.

DMP (Decision Making Process)

- Receive Project
- Project analysis
- Course of Action (COA) development
- COA Analysis
- COA Comparison
- COA Approval
- Project Revisions

*** Please note: italicized words are used to reference examples or scenarios.*

DMP (Decision Making Process)

- *This process is based on Military Decision Making Process*
  - *It is a tried and true process, it is not a brand new process*
  - *It uses the data available and helps to organize the thought process*

Why is it important

- Decision making process needs to be standardized because:
  - Decisions need to be made very quickly based on limited information
  - Provides a fundamental and common framework that standardizes the decision making process
  - Imagine this:
    - *You have been asked to evaluate a proposed project within 3 days for presentation to the Commissioner*
    - *The only information given is the location of the project*
    - *The Commissioner want to decide if the project should be done*
  - Standardized planning process facilitates rapid decisions.

Basic Problem Solving Model

- Identify the Problem:
  - I need a car
- Develop solutions:
  - Options,
    - New / used
    - Truck, van, sedan, SUV, or motorcycle
- Compare alternatives:
  - cost, gas mileage, reliability, etc.
- Decision:
  - used Huffy 3 speed

Project Analysis

- Why:
  - Must accurately define the problem
  - What am I trying to do, what is the problem I am trying to solve?
  - Sometimes problem identification is very easy, sometimes is it very difficult
  - End state of Project Analysis
    - is a clearly defined project statement which provides organizational focus.
  - Do I really need a car?

    OR
  - Do I really need transportation to/from work

Project Analysis Process

- Review project proposal and documentation
  - Who proposed the project
  - Type of project
  - General guidance
  - Policies/Standards
  - Existing plans/maps
- Determine: specified / implied / project essential tasks (PET)

Project Analysis Process

- *Scenario: Conduct a field check (FC)*
  - *Specified:*
    - *Type of field check (Preliminary, Final, etc.)*
    - *Set meeting time/location*
    - *Decide who is essential to project analysis success to invite*
  - *Implied:*
    - *Travel arrangements*
    - *Prepare agenda and any project plan sheets*
    - *Review project notes*
  - *Project Essential Tasks:*
    - *Contact Invitees*
    - *Conduct the field check*
    - *Prepare and distribute meeting notes*

Project Analysis Process Continued...

- Review available assets and constraints
  - Existing plans and maps
  - Condition data such as:
    - Pavement and Bridge condition
    - Accident and Traffic data
  - Standards (i.e. Green Book, INDOT Standard Drawings, Design Manual, etc.)
  - Subject matter experts within INDOT
  - Restrictions that limit the project:
    - Parameters you have to operate within
      - i.e. We must design to a certain standard
    - Often are redundant with specified tasks
      - i.e. field verifying the slope shown on the plans

Project Analysis Process Continued...

- *Field Check Scenario:*
  - *Time constraint: The field check must be completed before the project goes to letting.*
  - *Level of field check*
    - *If preliminary FC, possible to suggest different options*
    - *If final FC, limited to just reviewing*

Project Analysis Process Continued…

- Identify relevant facts and assumptions
  - Must be relevant to project.
  - Assumptions are used to fill-in information voids (must be realistic)
    - Don't want to adopt a specific course of action based on faulty and unrealistic assumptions.
    - Must be stated up front to ensure all planners are planning based on same approved assumptions
- Any requirements/conditions
  - Who requested project
  - Special time frame for project

Project Analysis Process Continued…

- *Field Check Scenario:*
  - *Facts:*
    - *Field check must be complete by a certain date*
    - *Cannot move to next step in design process*
  - *Assumptions:*
    - *Field check will fill in missing data required for design*

Project Analysis Process Continued...

- Determine project requirements
  - What information do I need to complete my project?
  - How can I best get that information?
  - Who is best suited to get the information?

Project Analysis Process Continued...

- *Field Check Scenario:*
  - *Need location information for field check meeting site*
  - *Project Requirements:*
    - *Check with local district / sub-district office for information*
      - *Special items such as: parking needs, special equipment, traffic control*
    - *Check video log for visual reference*
    - *Look at map for determining route to site*

Project Analysis Process Continued...

- Timing of project
  - When does the project need to be done
  - Plan use of available time
  - VERY IMPORTANT STEP

Project Analysis Process Continued...

- *Field Check Scenario*
  - *Final field check must be completed before project can go to start letting process*
  - *Select date for field check (must be 5 months before let date)*
  - *Notify invitees of date 4 weeks before field check and get commitments*
  - *Check on final design plans 3 weeks before field check and decide on what is needed on field check*
  - *Prepare copies of documentation and plans 1 week before field check*
  - *Establish meeting point for attendees 1 week before field check*
  - *Reserve cars 3 days before field check*
  - *Conduct field check*
  - *Send meeting notes within 1 week of field check*

Project Analysis Process Continued...

- Project Statement
  - Develop restated project proposal/intent/scope
    - Your project analysis results in a proposed project statement answering: who, what, when, where, and why.

Project Analysis Process Continued...

- *Field Check Scenario*
  - *Who: Project Engineer*
  - *What: Conducts final field check*
  - *When: 5 months before let date*
  - *Where: Project Site*
  - *Why: To finalize design plans*

Course of Action

- Upon completion of Project Analysis, you should be able to develop COA's:
  - COA's to be considered
  - COA's not to be considered
    - Knowing what you don't want is just as valuable as knowing what you want.
- To maintain the project's intent each COA considered and developed must be:
  - Suitable - can accomplish project intent
  - Feasible - within capabilities of design resources
  - Acceptable - means justify the ends
  - Distinguishable - each COA must be distinguishable from the others

COA Development

- Analyze possible solutions
- Generate options
- Arrange design possibilities
- Develop methodology of executing project
- Prepare COA statements / sketches

COA Analysis

- Gather the information
  - Tools:
    - Maps, pictures, terrain analysis products
    - COA sketches
    - Data analysis
    - Video log
    - Matrix comparison
- List available information concerning project
  - Location, condition, traffic/accident /inventory data
- List assumptions
  - Review assumptions made during project analysis:
    - Are they still valid / relevant?
    - Do we need to make any additional assumptions?
    - Do we have any new information that will validate existing assumptions?

COA Analysis Continued…

- List known critical events and decision points
  - Critical events: key actions you know or anticipate will occur that warrant detailed analysis.
    - Other project in the area
    - Special events
  - Decision Points: key actions you know or anticipate that may require a significant decision.
    - Does a bridge need replacement or rehab
    - What year does the project need to be done

COA Analysis Continued…

- Determine evaluation criteria:
  - What criteria will you use to analyze and compare each COA.
  - How will you quantify each criteria?
  - Criteria typically include:
    - Does COA facilitate flexibility?
      - Once we reach a given point, do we have any options remaining?
    - Simplicity?
      - How simple / complex is our plan?
    - Does the COA accomplish the objective?

COA Analysis Continued…

- Select scoring methodology
  - Decision Matrix:
    - Lays out the information in a consistent and logical fashion
    - Records and documents why and how a decision was made
    - Results in a planning tool that you need/can use later
    - More time consuming
  - Review data for obvious results
    - All the data directs to one answer
- Evaluate and assess results

COA Comparison

		Pavement	Bridge	Congestion	Safety	Other1 Drainage	Other2 Relinquishment	Cost
I	4R-D	Score	Score	Score	Score			$$$$$
N	3R-D 3R-M	Score	Score	Score	Score			$$$$
	P-3R(S)W/ W/O	Score	Score	Score	Score			$$$
O	P-3R(F)W/ W/O	Score	Score	Score	Score			$$
	P-3R(PM)W/ W/O	Score	Score	Score	Score			$
	Other	Score	Score	Score	Score			$
	Do Nothing	Score	Score	Score	Score			0

Decision Brief

- Once COAs are developed and analyzed, and a recommended COA is decided, a decision brief is given to the decision maker.
- What is a Decision Brief?
  - It is a meeting with decision makers to obtain an answer or decision
  - It may be formal or informal depending on the circumstances
  - It provides information on a subject so the decision maker can make an informed decision
  - It provides a recommendation based on the analysis of the decision making process
  - It is included in the final documentation for the decision making process

Decision Brief Continued...

- What is in a decision brief
  - Introduction
    - Brief statement of problem/situation
    - **Recommended COA –Could End Here**
  - Body
    - Key facts about the problem
    - Pertinent facts that may affect the decision
    - Objective discussion about the positive and negative facts
    - Necessary assumptions required to fill in gaps in factual information
  - Courses of Action (COA)
    - Discussion of COA's considered that can resolve the problem

Decision Brief Continued...

- What is in a decision brief
  - Analysis
    - Criteria by which the COA's are evaluated (screening and evaluation)
    - The advantage and disvantage of each COA
  - Comparison
    - What are the criteria
    - How are the COA's against the screening and evaluation criteria
  - Conclusion
    - Discussion of why the selection COA is best
    - Ask for any questions
    - Restate recommendation and ask for a decision

Decision Brief Continued...

- The decision needs to documented and circulated
  - Other personnel may need to implement the decision
  - When questions arising concerning why and how a decision is made
  - There needs to be written documentation concerning the decision made
- It is up to the decision maker to make the final recommendation

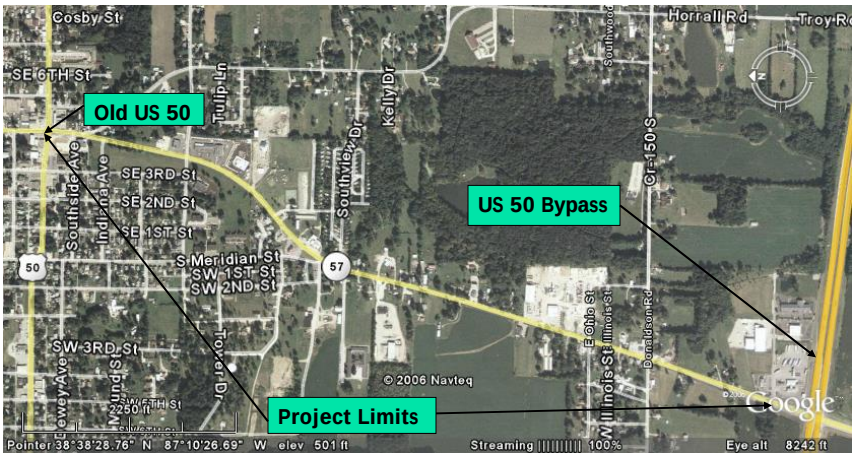
Example

Lets considered the following example

SR 57 Median Project

- Median construction project on SR 57 between the US 50 bypass and old US 50 on the south side of Washington, Daviess County, IN
  - Two 12’ lanes with 4’ shoulders on each side of the road.
  - Drainage: Open ditch that flows along the side of the road
  - No exclusive turn lanes are provided except at the US 50 bypass & Old US 50
  - Functional Class: Rural Minor Arterial
  - National Highway System (NHS) Route
  - Population: approximately 11,380 (Year 2000)
  - The I-69 corridor runs parallel with this route.

SR 57 Median Project



SR 57 Median Project

Videolog

SR 57 Median Project

- Alternatives Considered
  - Median Construction
  - Do-nothing
  - Spot improvements

SR 57 Median Project

- Evaluation Parameters Used
  - Crash History
  - Congestion/Traffic
  - Pavement Condition
  - Project Cost
  - Right of Way Impacts
  - Social impacts

SR 57 Median Project

- Crash History
  - Safety can be prime reason to do a median construction.

Year	Collision Type							
	HEAD ON	LEFT TURN	RAN OFF ROAD	REAR END	RIGHT ANGLE	(blank)	BACKING CRASH	Grand Total
2003 Total	1		1		3	1		6
2004 Total	2			3	8			13
2005 Total	2	3			1		1	7
Grand Total	5	3	1	3	12	1	1	26

Crash data provided by INODT's Safety Management Unit using the Vehicle Crash Records System

SR 57 Median Project

- Crash History Analysis

Severity	Year			Grand Total
	2003	2004	2005	
INJURY	2	4	3	9
PDO	4	9	4	17
Grand Total	6	13	7	26

Project Crash Frequency Rate			
Project Length	1.555 Miles		
Number of Years of Crashes	3	VMT = Vehicle miles traveled	20,348,930
Crash Rate/100 Million VMT/Year	128	Avg Crashes Per Year	9

2004 MOTOR VEHICLE CRASH RATES								
System	Fatal Crashes	Fatal Crashes per 100 M VMT	Injury Crashes	Injury Crashes per 100 M VMT	PDO Crashes	PDO Crashes per 100 M VMT	All Crashes	All Crashes per 100 M VMT
Statewide	857	1.15	43,867	58.85	162,589	218.13	207,313	278.13
SR	201	2.04	6,769	68.79	20,989	213.29	27,959	284.12
Crash rates from INDOT's Safety Management Unit								

SR 57 Median Project

- Crash History

Crash Freqency Rate Index			
I_{Cf}=(A-a*Y)/SqRoot(A+a²*Y²*D) =	-0.179	Where:	
A = Number of crashes during years	26	Y = Number of years in the analyzed period in years	3
a = Typical crash frequency calculated using Table 4.1* ($a = 0.733*L*Q^{0.917}$)	11	D = Over-dispersion parameter	1.459
L = Length of Section in Miles	1.555	Q = AADT along the road segment, in thousand vehicles per day	11.951
*Table 4.1 Safety Performance Functions on page 12, JTRP-2003/ 19 Final Report "Hazard Elimination Program – Manual on Improving Safety of Indiana Road Intersection and Sections"			

- Expected Average Number of Crashes = 11
- Actual Average Number of Crashes = 9
- There is not a serious crash problem along this section
- Several crashes occurred at Highland Ave – May be reasonable to do an intersection improvement at this location

SR 57 Median Project

- Congestion/Traffic
  - Average Annual Daily Traffic (AADT)
    - 2006 AADT = 12,000 vpd
    - 2026 AADT = 13,000 vpd
    - 2036 AADT = 14,000 vpd
      - Based on a 0.5% growth rate and construction year of 2016
  - Commercial/Truck Traffic
    - 22% south of US 50 (estimate 15% thru Washington)
    - I-69 will divert thru traffic
- Current design is adequate

SR 57 Median Project

- Pavement Condition

Average Pavement Condition								
Year	PQI_I	PQI_D	IRI_Avg_I	IRI_Avg_D	PCR_I	PCR_D	Rut_I(in)	Rut_D(in)
1999	66	63	146	153	88	88	0.31	0.34
2001	59	57	155	157	76	76	0.24	0.28
2003	73	74	138	141	94	94	0.24	0.22
2005	73	75	122	114	83	83	0.10	0.11
"_I" indicates pavement condition in the northbound direction and "_D" indicates pavement condition in the southbound direction Data from INDOT's pavement management system								

- Pavement can be maintain with resurfacing and preventive maintenance

SR 57 Median Project

- Cost & Right of Way (ROW) Impacts
  - Median Project would cost approximately $4 million plus ROW Costs
    - Need additional 15'+ ROW all along the section (both sides)
    - Would require total takes & relocations ($$$)
  - Spot Improvement such as an intersection improvement would cost approximately $800,000+/- plus ROW costs
    - Would required 4 corner cuts
    - Cost would depend on turn lane lengths
    - May resolve a possible crash problem
  - Do-Nothing would be normal maintenance costs

SR 57 Median Project

- Social Impacts
  - Washington is a city of approximately 12,000 people which is a small city.
  - The project area is a suburban type area with several homes, businesses, and open areas.
  - The area in general is in good condition.
  - Median Project (TWLT) lane
    - It could be rather significant in terms residential and business relocations required
    - Could be seen as dividing the south end of the city.
    - Could increase the speed of traffic in the project area which could cause problems with cross traffic and pedestrians.
    - Context sensitive design
  - If a spot improvement is done, such as an intersection improvement at Highland, there would be much less coordination required and the impacts would be much less.

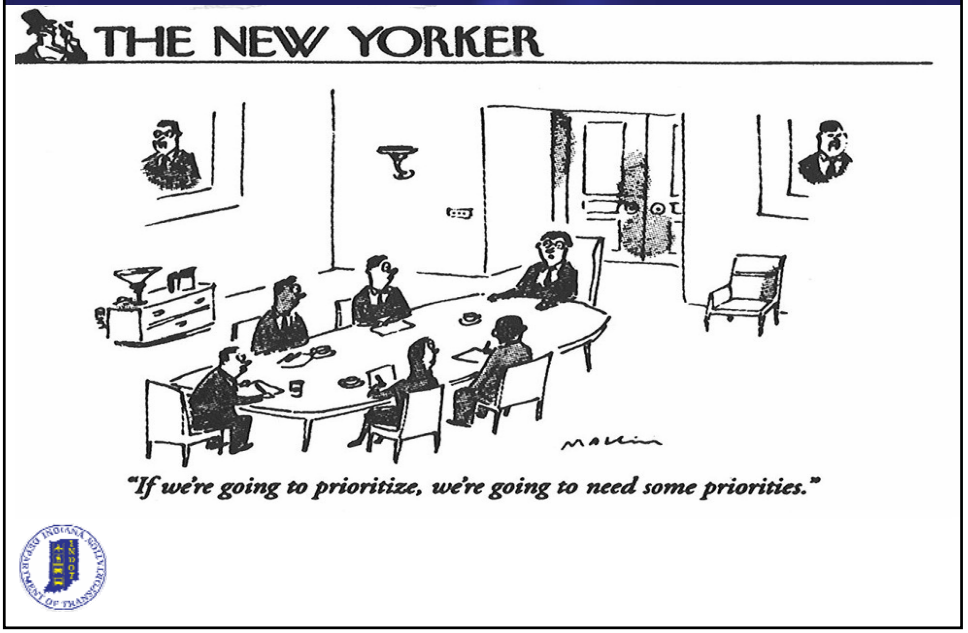
SR 57 Median Project

- In Conclusion,
  - For a Median Project
    - There doesn't appear to be a significant safety or traffic problem in the area
    - Pavement condition can be maintained for the long term by resurfacing,
    - Right of way and social impacts could be significant.
    - The costs of the project are high in both monetary and social terms with little benefit in terms of accident reduction and improved traffic flow.
  - For a Spot Improvement
    - It may make sense to improve the intersection at SR 57 and Highland.
    - The area had the most crashes along the project section and has no reserved left turn lanes.

SR 57 Median Project

- The final recommendation for this project would be to consider an intersection improvement with a resurface of the project area.

Questions???


THE NEW YORKER
"If we're going to prioritize, we're going to need some priorities."