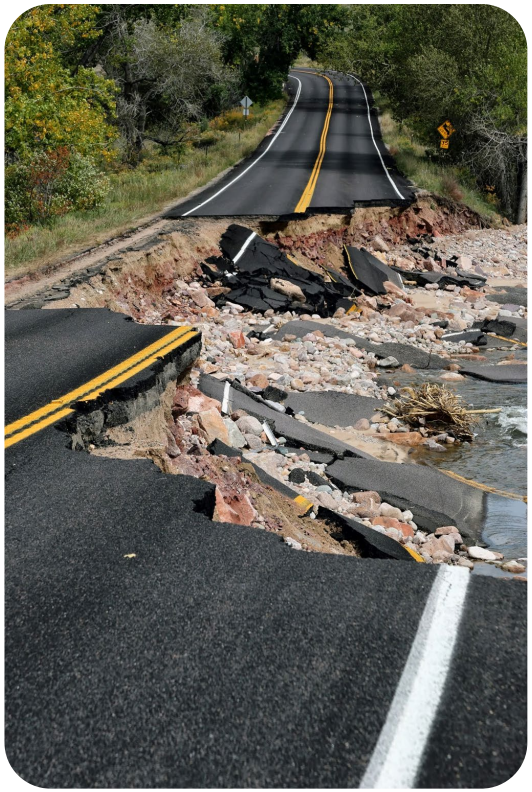
COLORADO
Department of Transportation



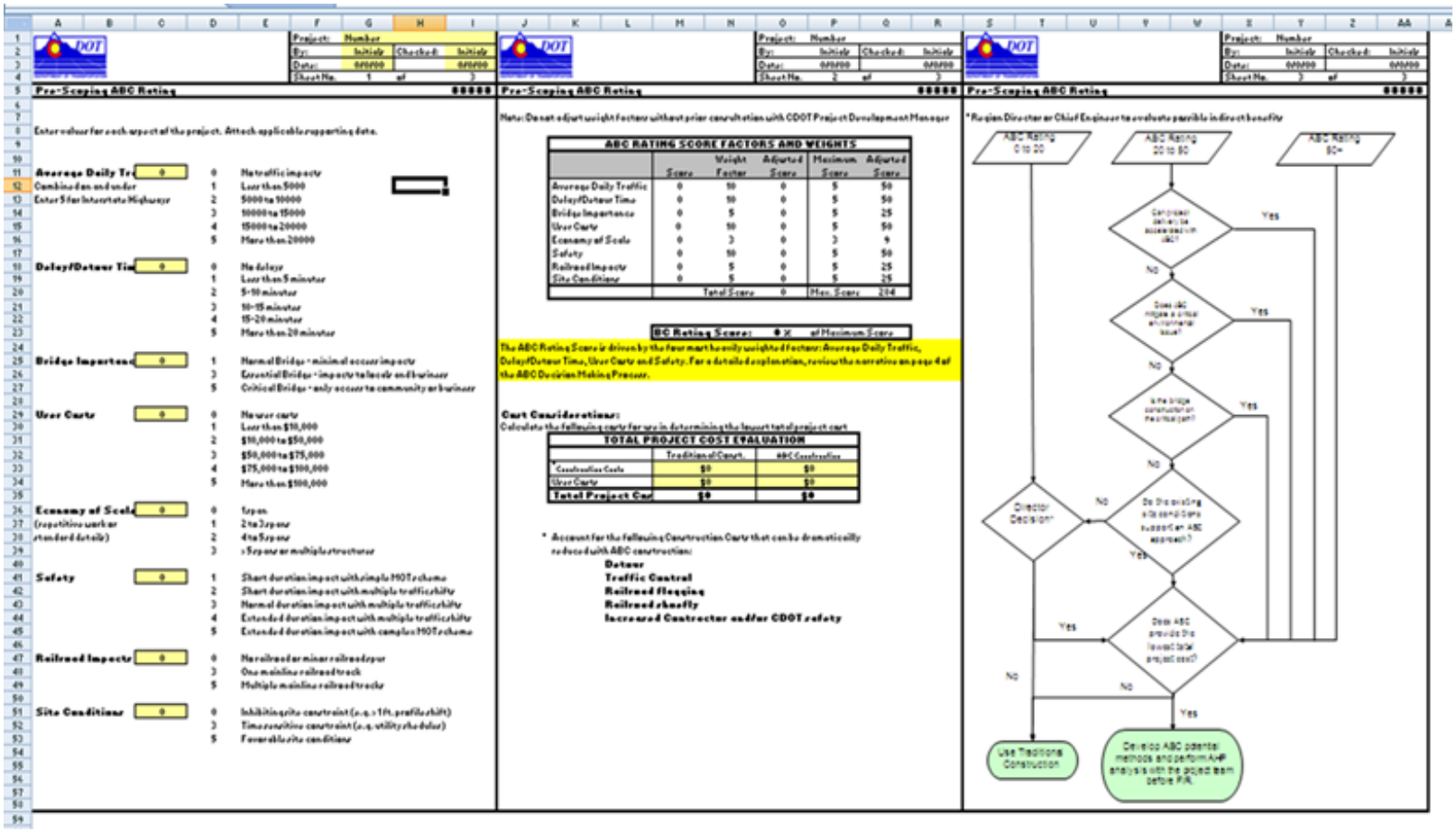
Accelerated Bridge Construction (ABC)

What is it?

Why do it?

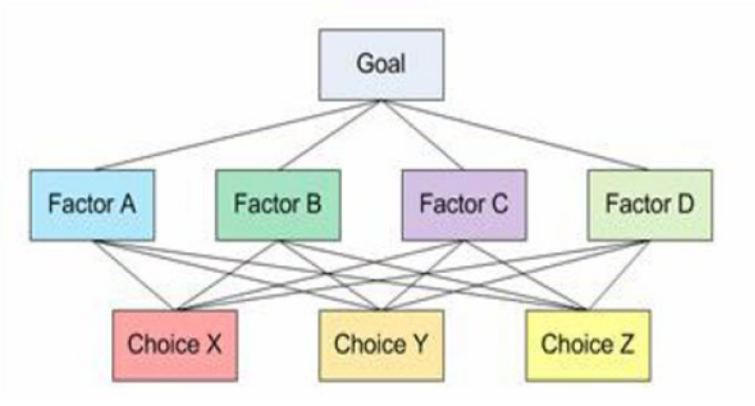
- Expensive or lengthy detour routes
- High user costs
- Improve work zone safety
- Waterway crossings

Decision Making Process - EASIER

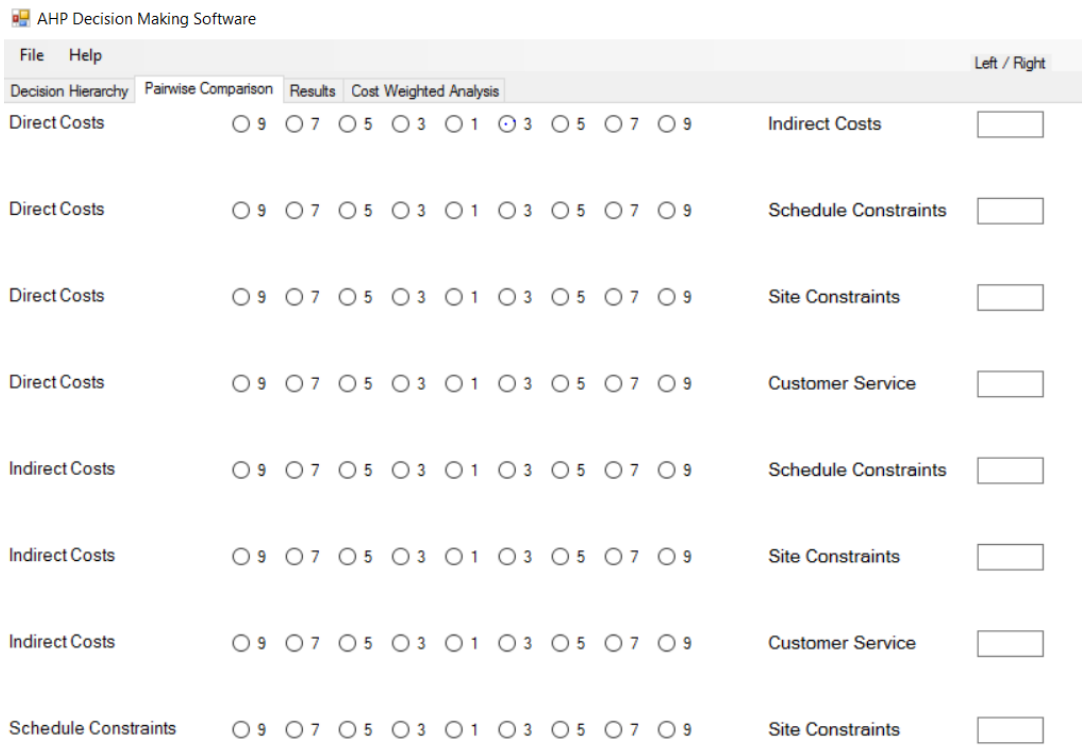


LESS EASIER
Analytic Hierarchy Process

- Decision making process
  - Simplifies numerous factors into pair-wise comparisons
- Project specific weight factors
- Compares ABC alternatives



Comparison Process



High- Level Criteria	Sub-Critieria
Direct Costs	Construction
	Maintenance of Traffic (MOT)
	Design and Construct Detours
	Right of Way (ROW)
	Project Design and Development
	Maintenance of Essential Services
	Construction Engineering
	Inspection, Maintenance and Preservation
	Toll Revenue
Other Costs	User Delay
	Freight Mobility
	Revenue Loss
	Livability During Construction
	Road Users Exposure
	Construction Personnel Exposure

High- Level Criteria	Sub-Critieria
Schedule Constraints	Event or Utility or RxR or Navigational or Weather
	Resource Availability
	Environmental
	Specification Constraint
Site Constraints	Bridge Span Configurations
	Horizontal/Vertical Obstructions
	Environmental
	Historical
	Archaeological Constraints
	Access to Materials
Customer Service	Public Perception
	Public Relations

Table 1: Scale of Relative Importances (according to Saaty, 1980)

Intensity of Importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	

ABC Options

PROJECT COMPLEXITY

Substructure	Approach, Embankment & Backfill	Superstructure	Super Structure placement
	Pre-fabricated approach slabs	Adjacent Girders[2]	
	Flowfill	Precast Deck Panels (partial depth)[2]	
Pre-fabricated Pier Caps	Expanded Polystyrene (EPS) Geofoam	Pre-fabricated pedestrian bridge[2]	
Pre-fabricated columns		Pre-fabricated box culvert[2]	
Pre-fabricated foundations		Precast Deck Panels (full depth)[2]	
Geosynthetic Reinforced Soil (GRS) Abutment[1]		Modular Girder and Deck elements[2]	
Pre-fabricated wingwalls/backwalls[2]		Post-tensioned concrete through beams[2]	Heavy Lift Cranes
Continuous Flight Auger Piles (CFA)		Pre-fabricated truss or arch span[2]	Skid or Slide In
			Longitudinal Bridge Launch
			Self Propelled Modular Transport (SPMT)

US 34 BRIDGE REPLACEMENT EAST OF WRAY

Before

During

72 Hours Later

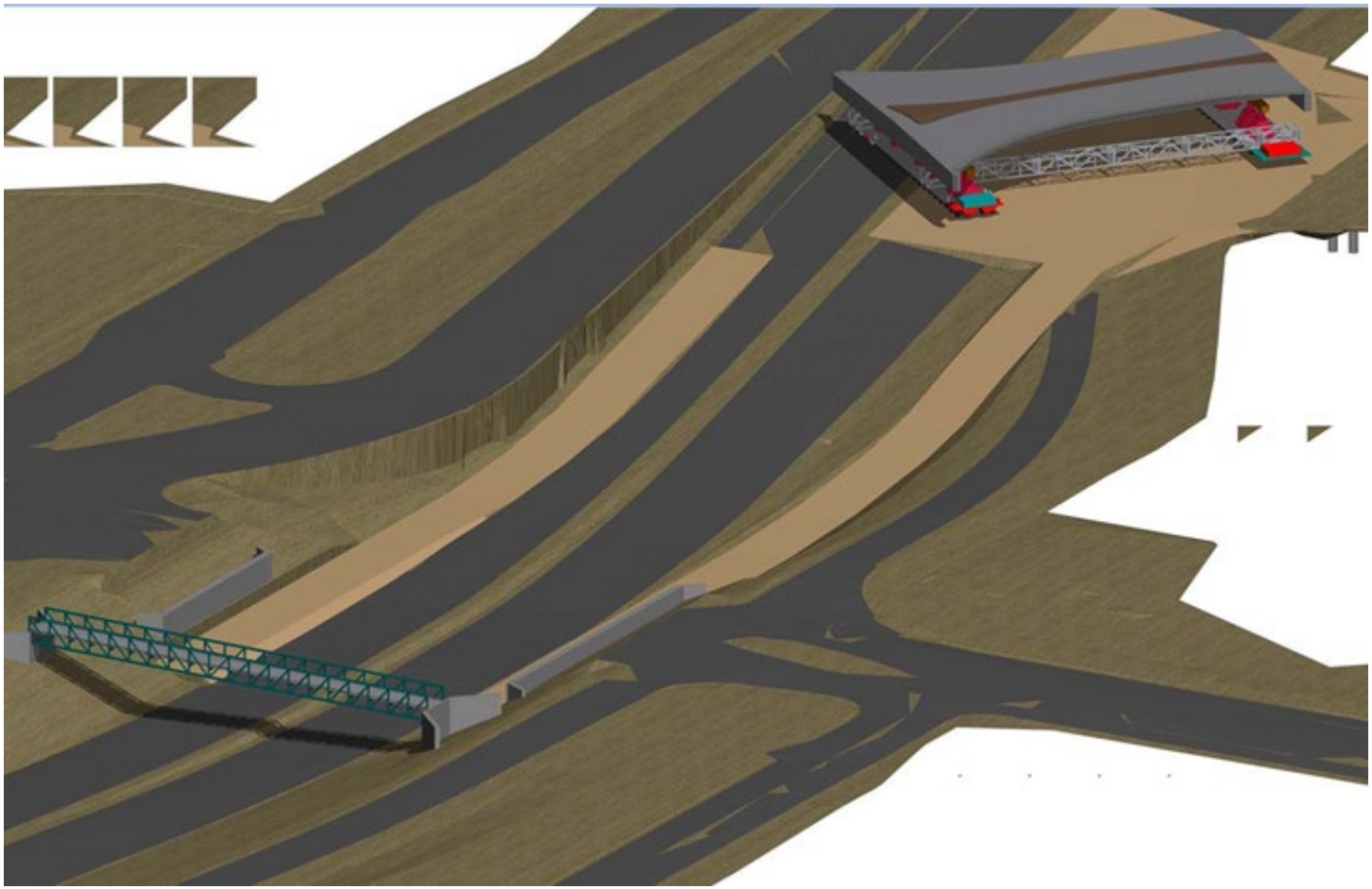
Rolling vs Sliding

ABC Will Not Always Be Cheapest Direct Costs

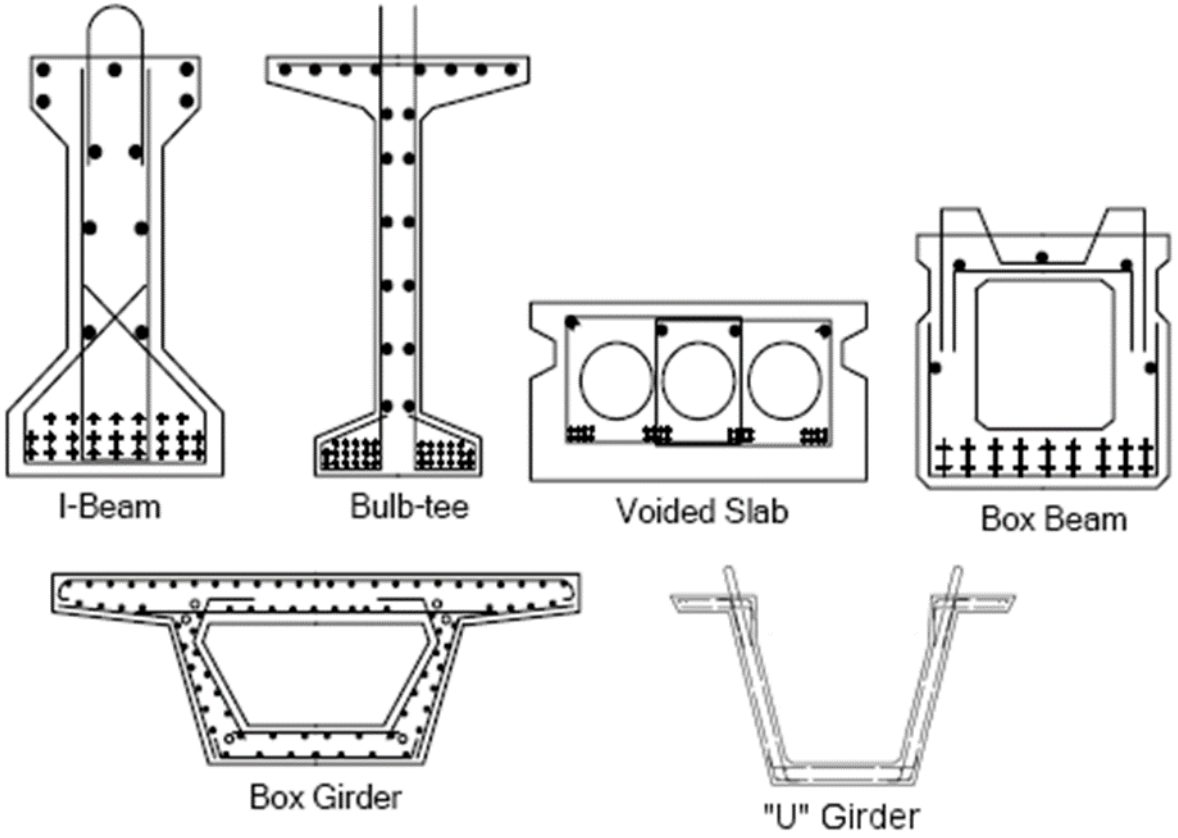
Construction Method	Engineer Estimate	User Costs	Total Cost
Complete Closure - Off Site Detour	$ 2,111,031	$ 4,320,000	$ 6,431,031
Complete Closure - On Site Detour to South	$ 2,629,011	$ -	$ 2,629,011
2 Phase construction - One Lane Traffic Open During Construction	$ 2,382,539	$ -	$ 2,382,539
Complete Closure - Lateral Roll-In	$ 2,323,735	$ 96,000	$ 2,419,735
Complete Closure - In Place Accelerated Bridge Construction	$ 2,335,517	$ 672,000	$ 3,007,517

Self Propelled Mobile Transport

Self Propelled Mobile Transport



Simple ABC – Precast Girders

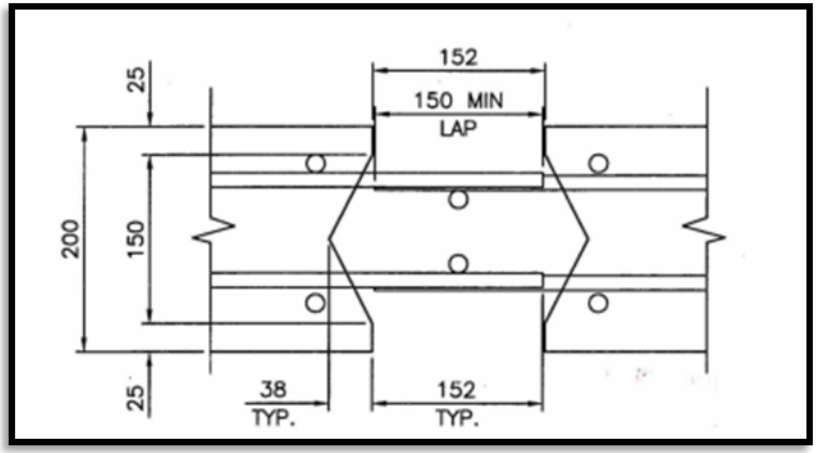


ABC Examples – Precast Girders

ABC Examples-
Partial Depth Precast Deck Panels

ABC Examples-
Full Depth Precast Deck Panels

Precast Items & UHPC



Questions?