INTEGRATION OF VALUE-BASED DESIGN IN THE COOPERTOWN LIFT STATION PROJECT

VALUE ANALYSIS CANADA SYMPOSIUM 2018

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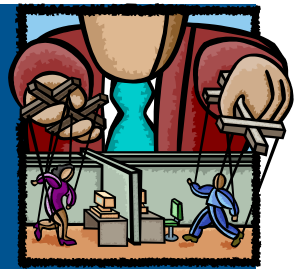
OUTLINE

- Project Management & Value Methodology
- Resistance to Value Methodology Implementation
- Value-Based Design Concept
- Coopertown Wastewater Servicing Project
- Remarks

PROJECT & PROJECT MANAGEMENT



WHAT IS A PROJECT?

"A temporary endeavor undertaken to create a unique product or service." *(PMBOK® Guide)*

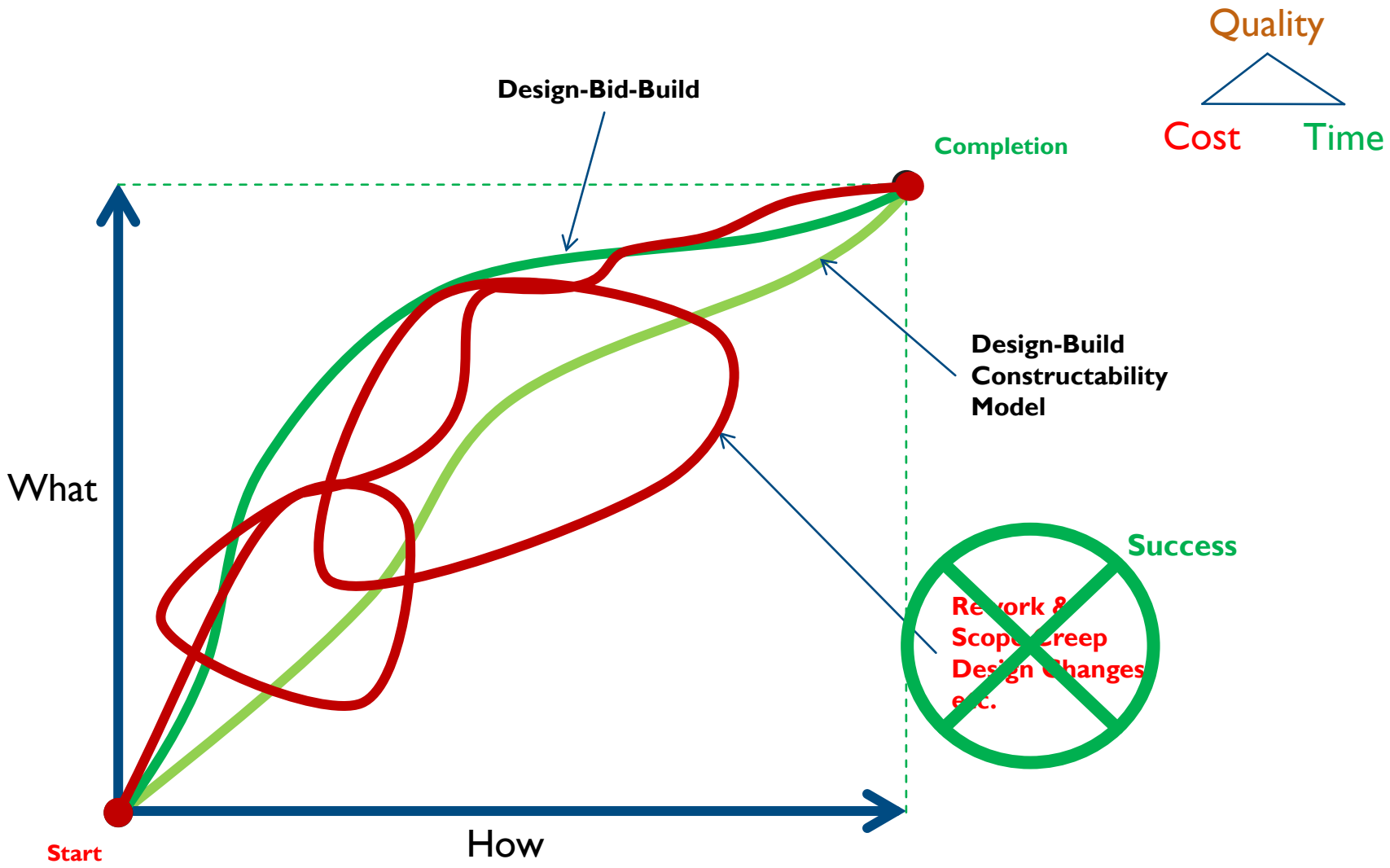
e.g. Building a hospital, road, bridge or interchange

- it has a beginning and an end
- it is one of a kind (unique)

WHAT IS PROJECT MANAGEMENT?

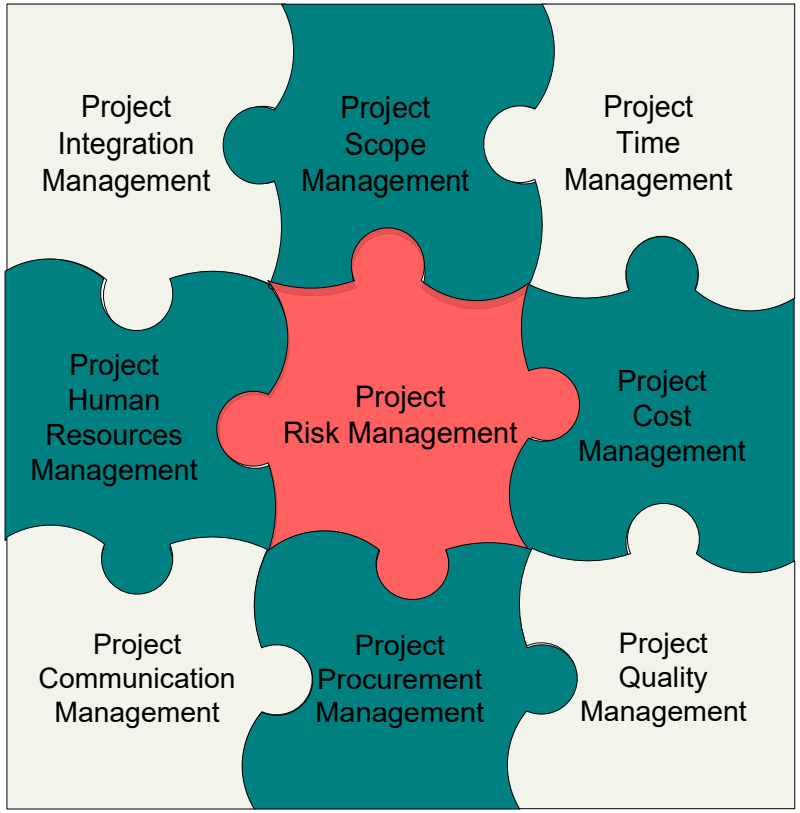
"The application of knowledge, skills, tools, and techniques to project activities to meet project requirements." *(PMBOK® Guide)*

PROJECT UNCERTAINTY & SUCCESS



PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK) 5TH EDITION

Ten Areas of Knowledge:



* Project Stakeholder Management

Where is Value Methodology???

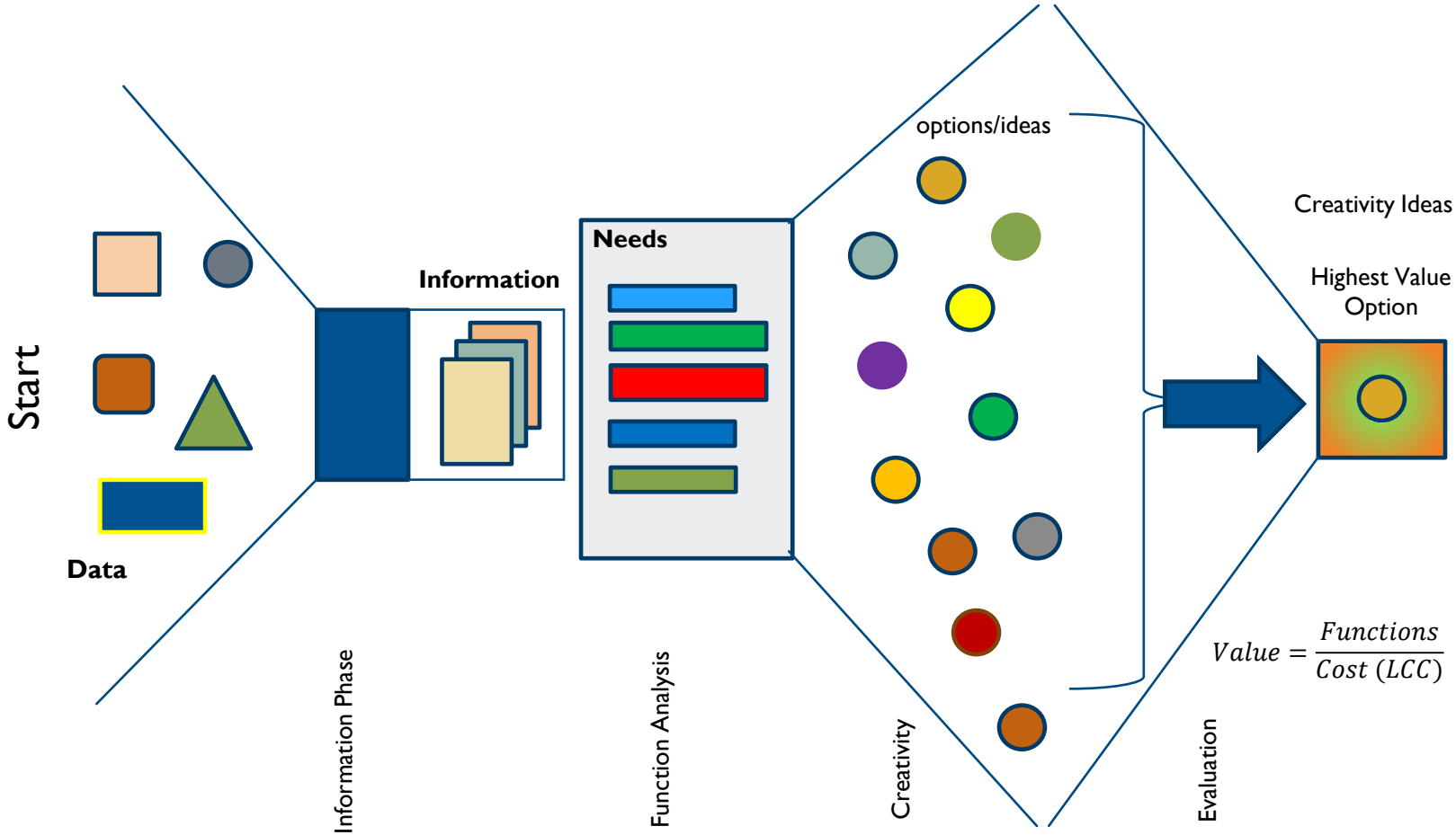
DEFINITIONS

- **Value Methodology*:** A systematic process used by a multidisciplinary team to improve the value of a project, product, or process through the analysis of its function
- **Value Analysis*:** The application of the Value Methodology to an existing project, product, or process to achieve value improvement.
- **Value Engineering**:* The application of the Value Methodology to a planned or conceptual project, product, or process to achieve value improvement.
- **Value:**

$$Value = \frac{Functions}{Cost\ (LCC)}$$

* Value Methodology Glossary ©2017 SAVE International®

VALUE ENGINEERING IN ACTION



BENEFITS OF VALUE METHODOLOGY (KEY)

- Ensure cost-effectiveness
- Reduce operating cost (LCC)
- Improve quality
- Foster innovation and improve productivity
- Improve constructability
- Resolve stakeholders issues (team building and secure buy-in)
- Communicate the owner needs and required functionality

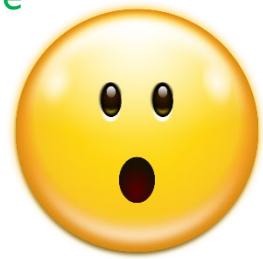
PROJECT MANAGEMENT BODY OF KNOWLEDGE (PMBOK) 5TH EDITION

Ten Areas of Knowledge:

* Project Stakeholder Management

We Can Apply Value Methodology???

Almost Everywhere



WHAT IS THE PROBLEM…

RESISTANCE TO VALUE ENGINEERING (1)

- Consultants and design team:
  - Ownership of ideas
  - VE perceived as design review
  - Project involvements (sentimental value)
  - Schedule & cost overrun concerns (rework, redesign, new IDEAS!)
  - "We spent 6 months designing the project." (how can a team redo the work in 5 days!)
  - "We will not have all required information to make decision in a few days." (so RISKY!)

RESISTANCE TO VALUE ENGINEERING (2)

- Stakeholders
  - "Is it a trick so that we change our mind?"
  - "Who are you and why are you getting involved at this time?"
  - "What's behind it?"
- Owner affiliates
  - "It's a waste of time and effort."
  - "We have the design team and experts on board."
  - "Why do we need it?"

VALUE METHODOLOGY IMPLEMENTATION

VE

Start

W Completion

Issues

Risk of Rework

Resistance

How to resolve this?

Value Engineering

Value-Based Design

Options Development

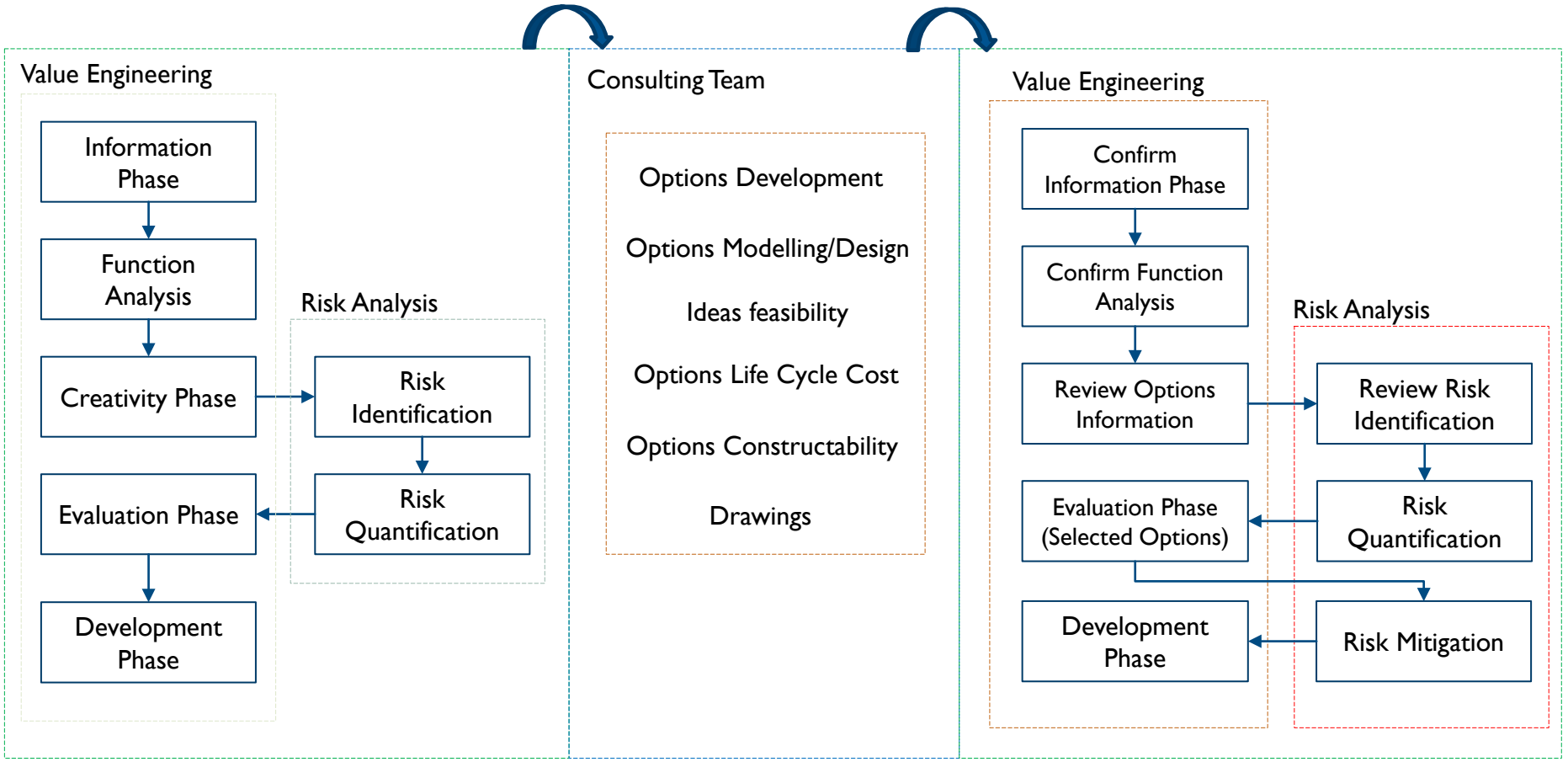
W#1

W#2

Risk of Rework

Potentially Higher Value

VALUE-BASED DESIGN CONCEPT



First Workshop

Top few (3-5) options
Creativity ideas (↓$,↑F)

Design Development

Second Workshop

Select highest-valued option
Creativity ideas (↓$,↑F)

Workshop Participants: Owner, Experts, Stakeholders, Design Team

RESOLVING RESISTANCE WITH VALUE-BASED DESIGN (1)

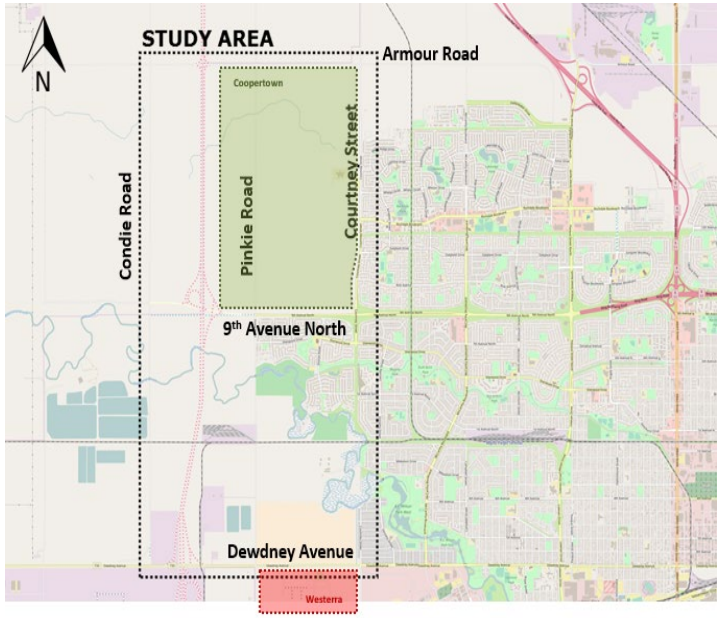
- Team Members' resistance:
  - Consultants and design team:
    - Ownership of ideas: no longer valid
    - VE perceived as design review: no longer valid
    - Project involvements (sentimental value): no longer valid
    - Schedule & cost overrun concerns (rework, redesign, new IDEAS!): no longer valid
    - "We spent 6 months designing the project." (how can a team redo the work in 5 days!): no longer valid
    - "We will not have all required information to make decision in a few days." (so RISKY!): no longer valid

RESOLVING RESISTANCE WITH VALUE-BASED DESIGN (2)

- Team Members' resistance:
  - Stakeholders
    - "Is it a trick so we change our mind?": VE is part of the work plan.
    - "Who are you and why are you getting involved at this time?": VE is part of the work plan.
    - "What's behind it?": Building consensus; providing high value; reducing cost; all other benefits.
  - Owner affiliates
    - "It's a waste of time and effort.": Not really – high value, reduced cost, and all other benefits.
    - "We have the design team and experts on board.": Better utilization of experts; high value, reduced cost, and all other benefits.
    - "Why do we need it?": High value, reduced cost, and all other benefits.

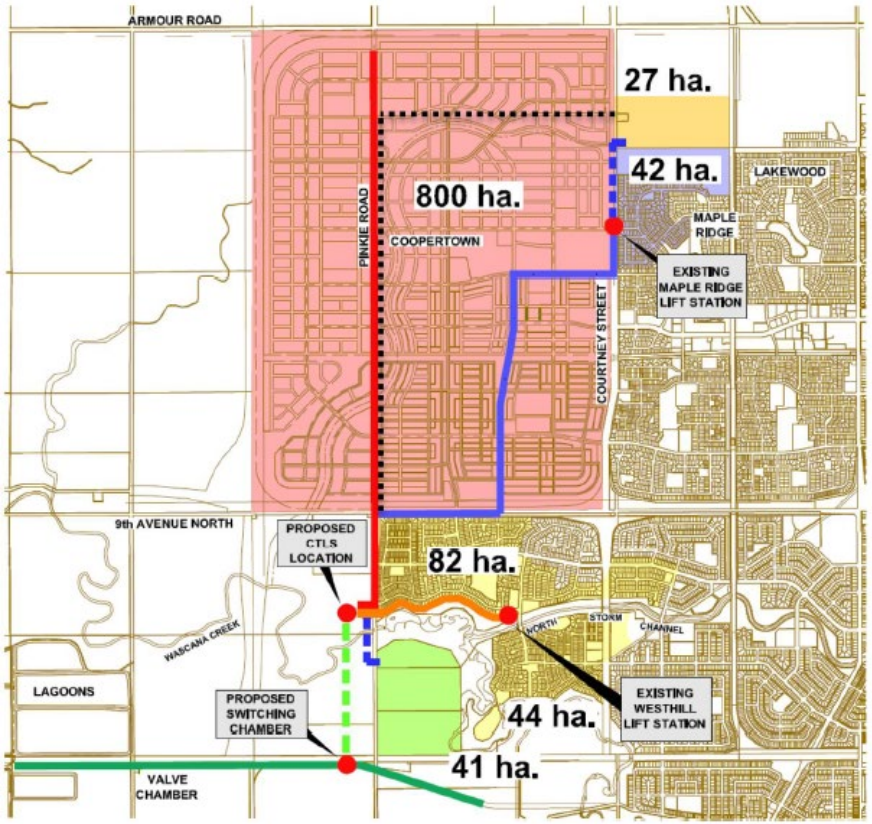
COOPERTOWN WASTEWATER SERVICING PROJECT

- The story began in another workshop (2017)
  - Regina bypass @ 9th Avenue
  - Involving:
    - The City of Regina
    - Saskatchewan Ministry of Highways and Infrastructure
    - Associated Engineering
    - Dream Developments
    - Harvard Developments
    - ISL Engineering



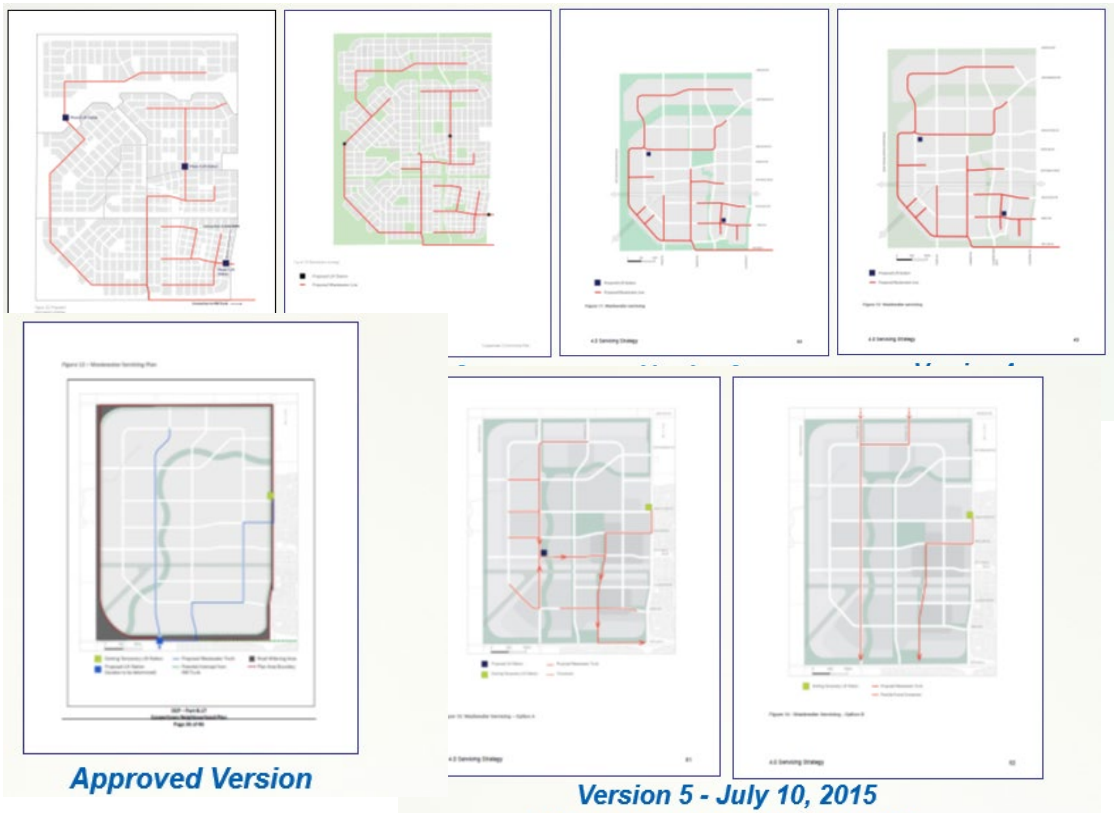
COOPERTOWN WASTEWATER SERVICING PROJECT

- Project scope
  - Providing wastewater servicing for Coopertown's area
  - The proposed solution should integrate with the ultimate development scenario (500k population), which includes:
    - Westbrook, Carry the Kettle area, Coopertown
    - Maple Ridge (Area Serviced by Maple Ridge Lift Station)
    - Westhill (Area Serviced by Westhill Lift Station)



PROJECT HISTORY

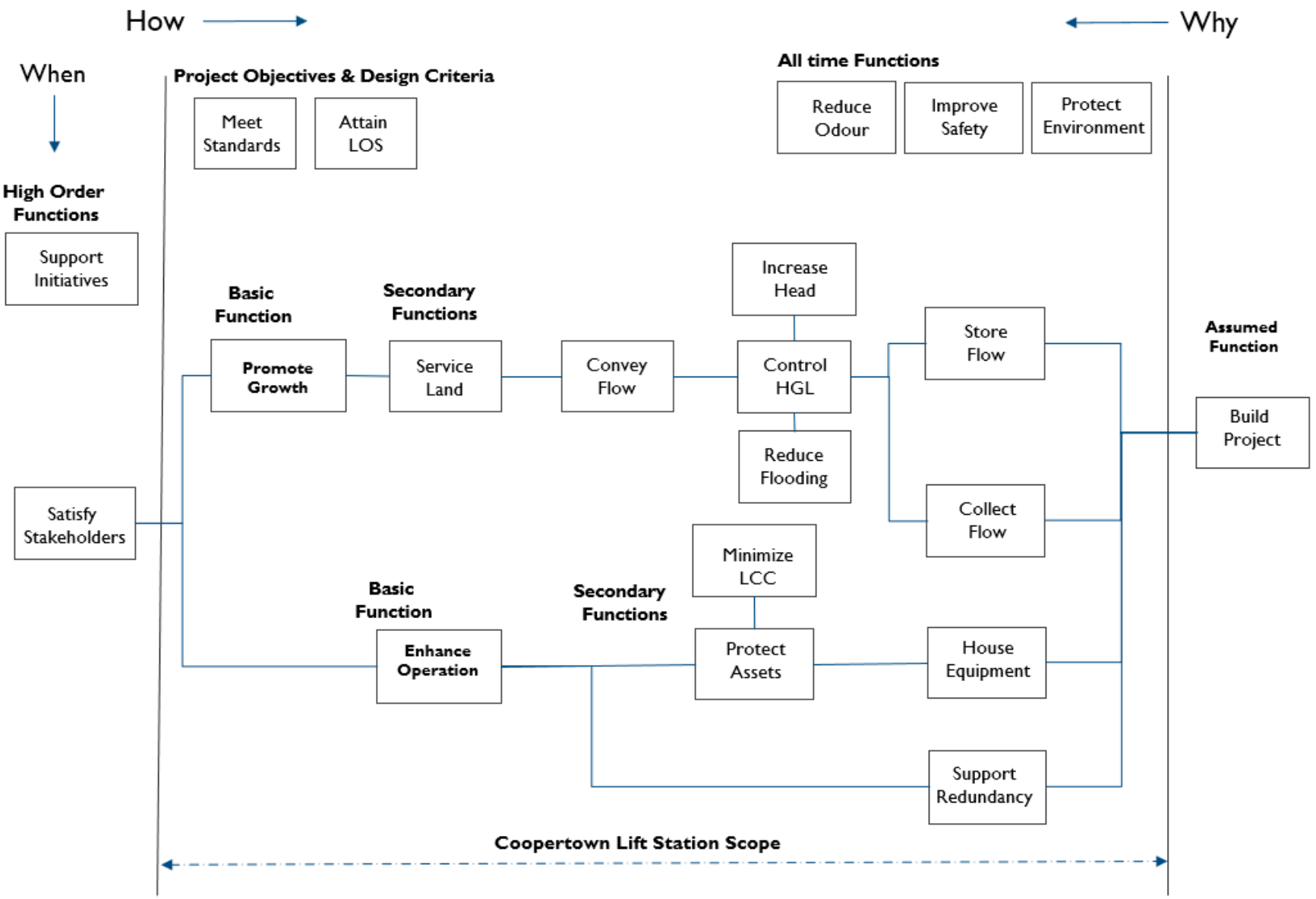
- A few studies….
- Need to finalize the concept design and move forward to prelim/detail design and construction
- The development needs to move forward...



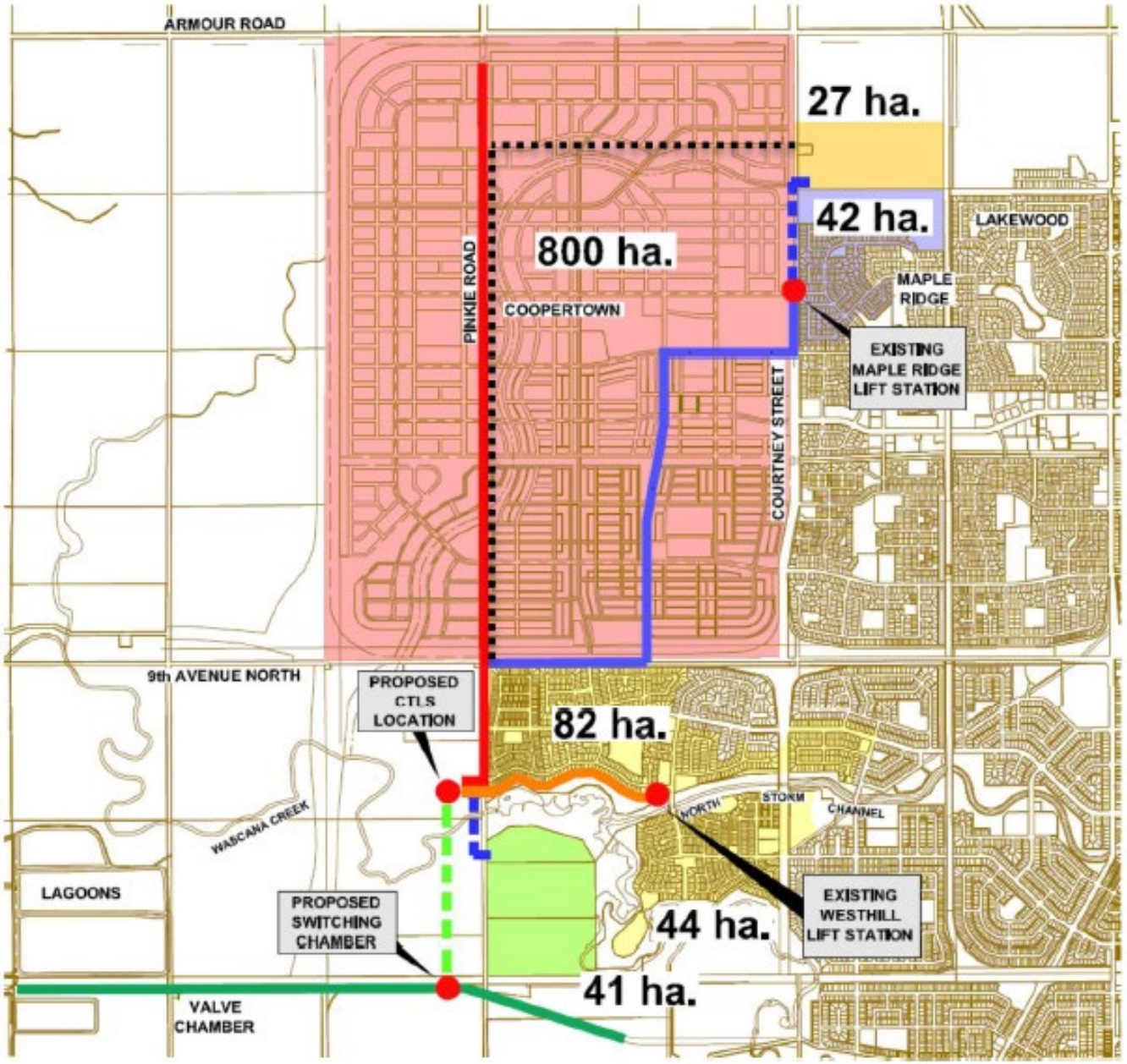
Approved Version

Version 5 - July 10, 2015
Version 6 - September 17, 2015

FAST Diagram



It is Simple:
How
Why
When
What



VALUE-BASED DESIGN (DELIVERY)

- Dream Developments hired Stantec to undertake concept design.
- We had discussion with the project manager before developing work plan, and agreed to adopt "Value-based Design Approach".
- Schedule
  - Project started in May 2018
  - First workshop on May 30/31, 2018
  - Design team developed options/ideas
  - Second workshop on Sep. 5/6, 2018
- Workshop outcome
  - Identified a new highest-valued option
  - Reduced cost by approximate $4 Million
  - Secured buy-in from the City

REMARKS

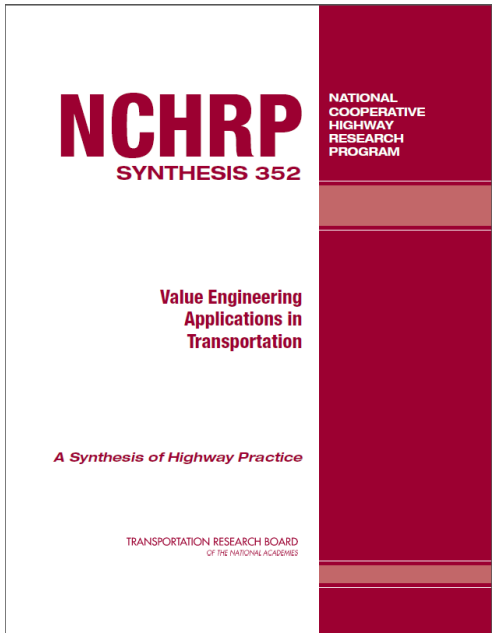
- Value methodology is a powerful technique that could be utilized to reduce rework, accelerate project delivery, and improve value.
- Integrating value methodology with design development defuses resistance.
- Follow the methodology and you will be successful!!
- Value Champion is the key for success in any organization.

BENEFITS OF VALUE ENGINEERING ($)

TABLE 1
FEDERAL-AID PROGRAM VALUE ENGINEERING SUMMARY, 1997–2003

VE Program Metrics	FY 1997[a]	FY 1998[a]	FY 1999[b]	FY 2000[a]	FY 2001[c]	FY 2002[c]	FY 2003[d]	Total/Avg.
No. of VE Studies	369	431	385	388	378	377	344	2,672
Cost of VE Studies Plus Administrative Costs	$5.10	$6.58	$7.47	$7.78	$7.29	$9.02	$8.45	$51.69
Estimated Construction Cost of Projects Studied	$10,093	$17,227	$18,837	$16,240	$18,882	$20,607	$19,241	$121,127
Total No. of Recommendations	N/A	2,003	2,082	2,017	2,013	2,344	2,144	12,603[e]
Total Value of Recommendations	N/A	$3,084	$3,227	$3,483	$2,375	$3,050	$3,163	$18,382[e]
No. of Approved Recommendations	N/A	743	848	1,057	1,017	969	914	5,548[e]
Value of Approved Recommendations	$540	$770	$846	$1,128	$865	$1,043	$1,016	$6,208
Return on Investment	106:1	117:1	113:1	145:1	119:1	116:1	120:1	120:1

Source: *Annual Federal-Aid Value Engineering Summary Reports* (*11*).
Notes: Amounts shown in millions of dollars. N/A = not available.
[a]52 agencies reported in fiscal year (50 states, District of Columbia, and Puerto Rico).
[b]53 agencies reported in fiscal year (50 states, District of Columbia, Puerto Rico, and Virgin Islands).
[c]53 agencies reported in fiscal year (50 states, District of Columbia, Puerto Rico, and FLH).
[d]50 agencies reported in fiscal year (47 states, District of Columbia, Puerto Rico, and FLH); Kentucky, Louisiana, and New Hampshire did not report results.
[e]Totals do not include results from FY 1997, which were unavailable.



BENEFITS OF VALUE ENGINEERING ($)

U.S. Department of Transportation
Federal Highway Administration

	FY 2015	FY 2014	FY 2013	FY 2012	FY 2011
Number of VE Studies	135	215	281	352	378
Cost to Conduct VE Studies and Program Administration	$6.4M	$8.7 M	$9.8 M	$12.0 M	$12.5 M
Estimated Construction Cost of Projects Studied	$14.1B	$20.9 B	$23.0 B	$30.3 B	$32.3 B
Total Number of Proposed Recommendations	1,233	1,664	2,381	2,905	2,950
Total Value of Proposed Recommendations	$2.5B	$3.0 B	$2.91 B	$3.78 B	$2.94 B
Number of Approved Recommendations	504	697	1,011	1,191	1,224
Value of Approved Recommendations	$831M	$1.73 B	$1.15 B	$1.15 B	$1.01 B
Percent of Project Cost Saved	5.9%	8.32%	5.01%	3.78%	3.12%
Return on Investment	129:1	200:1	118:1	96:1	80:1

https://www.fhwa.dot.gov/ve/