AACE International

Decision Process for Value Management Proposals

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By definition, value management, whether value analysis (VA) or value engineering (VE) studies, generates numerous proposals for improvements to existing designs. Even after rejecting unacceptable proposals, there are usually many acceptable options for consideration by the project team, which must select the best option when many are mutually exclusive—if one option is accepted, many others are precluded. The team must evaluate the proposals expeditiously, since good proposals can be rejected because of the time required to evaluate them. A decision process has been developed that not only identifies the combination of proposals that provides the best value to the project but also shows the order in which the decisions must be made, thus providing the project team with a work plan to arrive at the optimum solution. By including a facilitated workshop after presenting the decision tree, the project team can adopt proposals much more readily.

Decision Process for Value Management Proposals

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Objective of Decision Process

- Presume audience familiar with the Value Methodology
- Value Management studies generate numerous Value Management proposals (VMP's)
- Many VMP's rejected during the Evaluation Phase but usually many acceptable VMP's

Objective of Decision Process

Review team should :

- Assist in selection of best option
- recognize many proposals mutually exclusive – if one accepted, others precluded
- expedite evaluation of proposals
- Avoid rejecting good proposals because of time required to evaluate

Objective of Decision Process

Develop a decision process that :

- identifies combination of proposals providing best value
- shows order that decisions must be made
- provides project team with a work plan
- includes workshop after presenting the accepted VMP's so project team can adopt proposals more readily

Background

- VM is collective reviews through project life cycle
- for implementation phase, use two-stage process
  - Value Analysis (VA) in early stages where maximum opportunity to modify scope of project (“the what”).
  - Value engineering (VE) in the detail design stage where still opportunity to modify materials, systems and implementation strategies.

Background

- Evaluation of VAP's uses life cycle costs
- provides the impact on capital costs as the secondary consideration
- VM not simply a method of cutting capital cost.

Background

- VM still not widely accepted by project teams
- expect some resistance to new ideas from external group
- concern of project teams was proposals that were either mutually exclusive or only valid when combined with another distinctive proposal.

Background

- perception that review could “blow the project design apart”
- project team has to study proposals and plan how to reconfigure project
- review team often had good idea how could be done
- needed a good method of communicating this information

Background

- Created a special type of proposal - an “enabler”
- Provides any additional investigation or negotiation required
- enabling activities often listed as disadvantage of VMP
- level of effort has to be quantified to determine cost to make change
- enablers not proposals to change

Background

- Decision guide sets VMP's in the appropriate sequence
- Guide becomes rough plan for dealing with the value proposals

Examples

- 4 studies selected to illustrate application of so-called Bramcon Diagrams (were Decision Guides, diagrams prepared by Bramcon)

- selected projects have a range of prior value reviews – some had VA after preliminary design, others had no value review but the detail design was already completed

Example 1
Combined VA/VE on Small Canal Crossing

- Detail design was complete when VA/VE initiated
- Outstanding value study for three reasons :
  - Scope drastically reconfigured to improve value
  - *Bramcon Diagram* developed to present diverse results of study
  - Study converted project manager from a “value antagonist” to internal champion of agency

Example 1
Combined VA/VE on Small Canal Crossing

- 33 VMP's generated in the creative workshop
- Following are 22 accepted proposals listed by the headings of functional analysis :

Example 1
Combined VA/VE on Small Canal Crossing

NEW CROSSING PROPOSALS

1 Reduce the canal width

3 Shift alignment of w/b for standard centre/centre

6 Construct 40 – 60 m clear span bridge.

7A-2 Replace w/b bridge & existing e/b with culvert

7B Construct a concrete-box culvert north of existing.

15 Collect and treat drain water from bridge deck.

16 Provide generic site condition report.

Example 1
Combined VA/VE on Small Canal Crossing

ROADWAY PROPOSALS

11 Eliminate topsoil over top granular material

12 Use Superpave asphalt mix design.

14A Eliminate the e/b entrance ramp at No. 1 Rd.

14B Eliminate the w/b exit ramp at No. 1 Road.

Example 1
Combined VA/VE on Small Canal Crossing

EXISTING CROSSING PROPOSALS

7C Replace existing w/b bridge with expanded culvert

CONSTRUCTION PROPOSALS

17 Drive piles into densified material.

18 Eliminate one of the 2 sizes of piles.

20 Use untreated timber piles for densification

21 Use performance specification for the coffer dam.

Example 1
Combined VA/VE on Small Canal Crossing

PROJECT DELIVERY PROPOSALS

22 Use a single contract for the entire project

23 Use separate contract for work on west bank of canal

24A Eliminate excavation of material from canal bottom

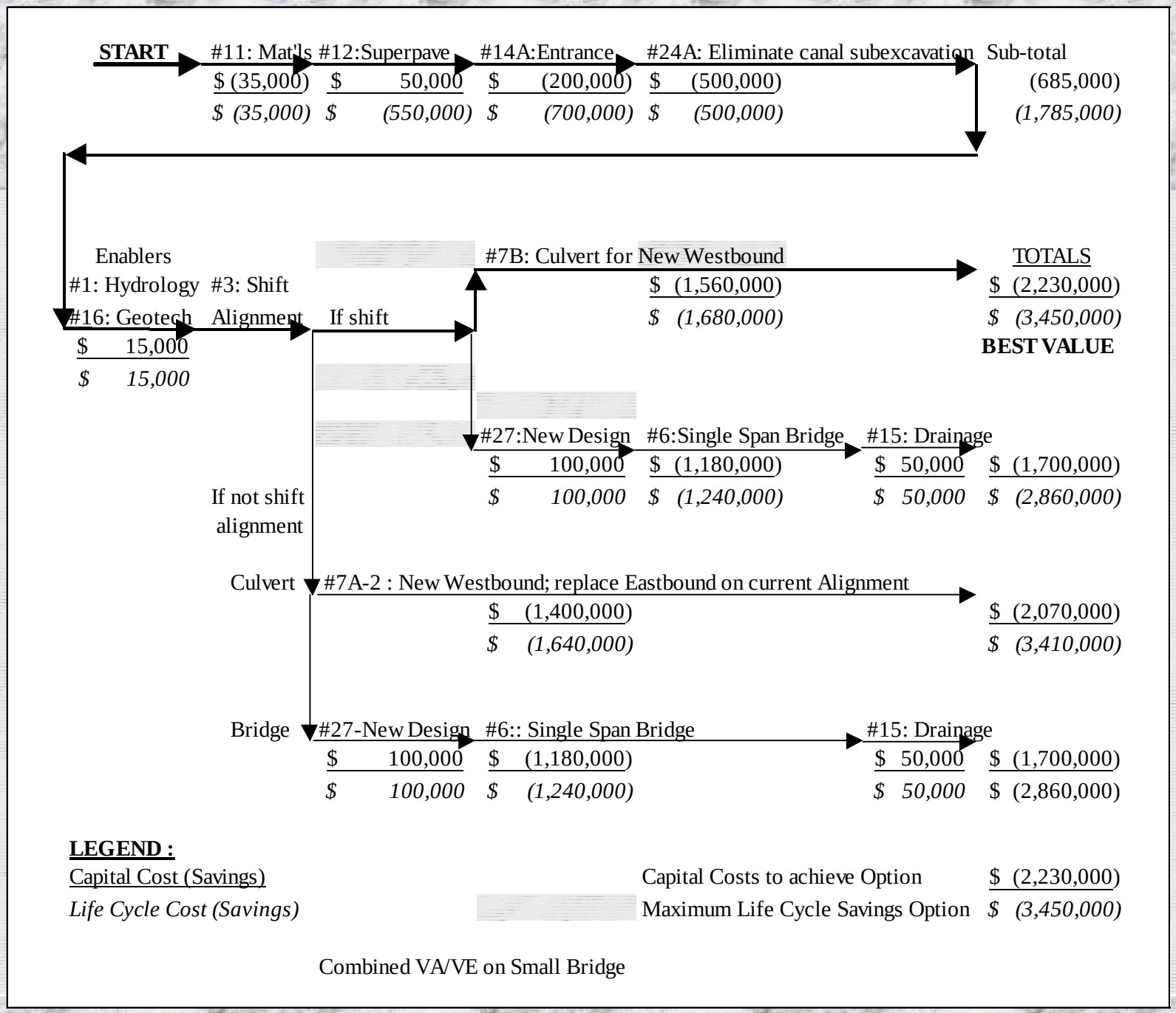
24B Eliminate designation of working platforms in specs

25 Use design-build on whole project or bridge only

Example 1
Combined VA/VE on Small Canal Crossing

One could determine how the project might be reconfigured with enhanced value by :

- reading the one page proposals which set out the advantages, disadvantages and life-cycle costs or
- reviewing the proposal combinations graphically as illustrated by the following figure


START
#11: Mat'ls
$ (35,000)
$ (35,000)
#12:Superpave
$ 50,000
$ (550,000)
#14A:Entrance
$ (200,000)
$ (700,000)
#24A: Eliminate canal subexcavation
$ (500,000)
$ (500,000)
Sub-total
(685,000)
(1,785,000)
Enablers
#1: Hydrology
#16: Geotech
$ 15,000
$ 15,000
#3: Shift Alignment
If shift
#7B: Culvert for New Westbound
$ (1,560,000)
$ (1,680,000)
TOTALS
$ (2,230,000)
$ (3,450,000)
BEST VALUE
#27:New Design
$ 100,000
$ 100,000
#6:Single Span Bridge
$ (1,180,000)
$ (1,240,000)
#15: Drainage
$ 50,000
$ 50,000
$ (1,700,000)
$ (2,860,000)
If not shift alignment
Culvert
#7A-2 : New Westbound; replace Eastbound on current Alignment
$ (1,400,000)
$ (1,640,000)
$ (2,070,000)
$ (3,410,000)
Bridge
#27-New Design
$ 100,000
$ 100,000
#6:: Single Span Bridge
$ (1,180,000)
$ (1,240,000)
#15: Drainage
$ 50,000
$ 50,000
$ (1,700,000)
$ (2,860,000)
LEGEND :
Capital Cost (Savings)
Life Cycle Cost (Savings)
Capital Costs to achieve Option
$ (2,230,000)
Maximum Life Cycle Savings Option
$ (3,450,000)
Combined VA/VE on Small Bridge

Example 2
VA on Major Bridge and Interchange

- preliminary design completed when VA initiated (appropriate)
- Many options had been considered
- one had well-developed scope and reasonably-detailed cost estimate

Example 2
VA on Major Bridge and Interchange

- VA study generated many options for the crossing - only one could be adopted
- study most benefit from format of the *Bramcon Diagram*.
- 65 VMP's generated in the creative workshop
- Following are 13 accepted VMP's listed by divisions in functional analysis :

Example 2
VA on Major Bridge and Interchange

Increase Highway Mobility

03 New four-lane bridge – demo old bridge

04 New 4-lane bridge with full lane, not taper sections

10 New 5-lane bridge – keep old bridge for recreation

24A New 3-lane bridge; old bridge connects 5th Ave/ NNR

24B New 4-lane bridge; old bridgeconnects 5th Ave/ NNR

25 Modify north end interchange to avoid IRL buildings

33 Use local streets for access from NNR to Hwy.

39 New 3-lane bridge; replace old bridge super-structure

47 Eliminate direct accesses to Hwy southbound

Example 2
VA on Major Bridge and Interchange

Transition to South Intersection

T2 Use a 3-lane south off bridge and make right turn only

Maintain Access to NNR

A4 Raise NNR grade to clear the flood plain

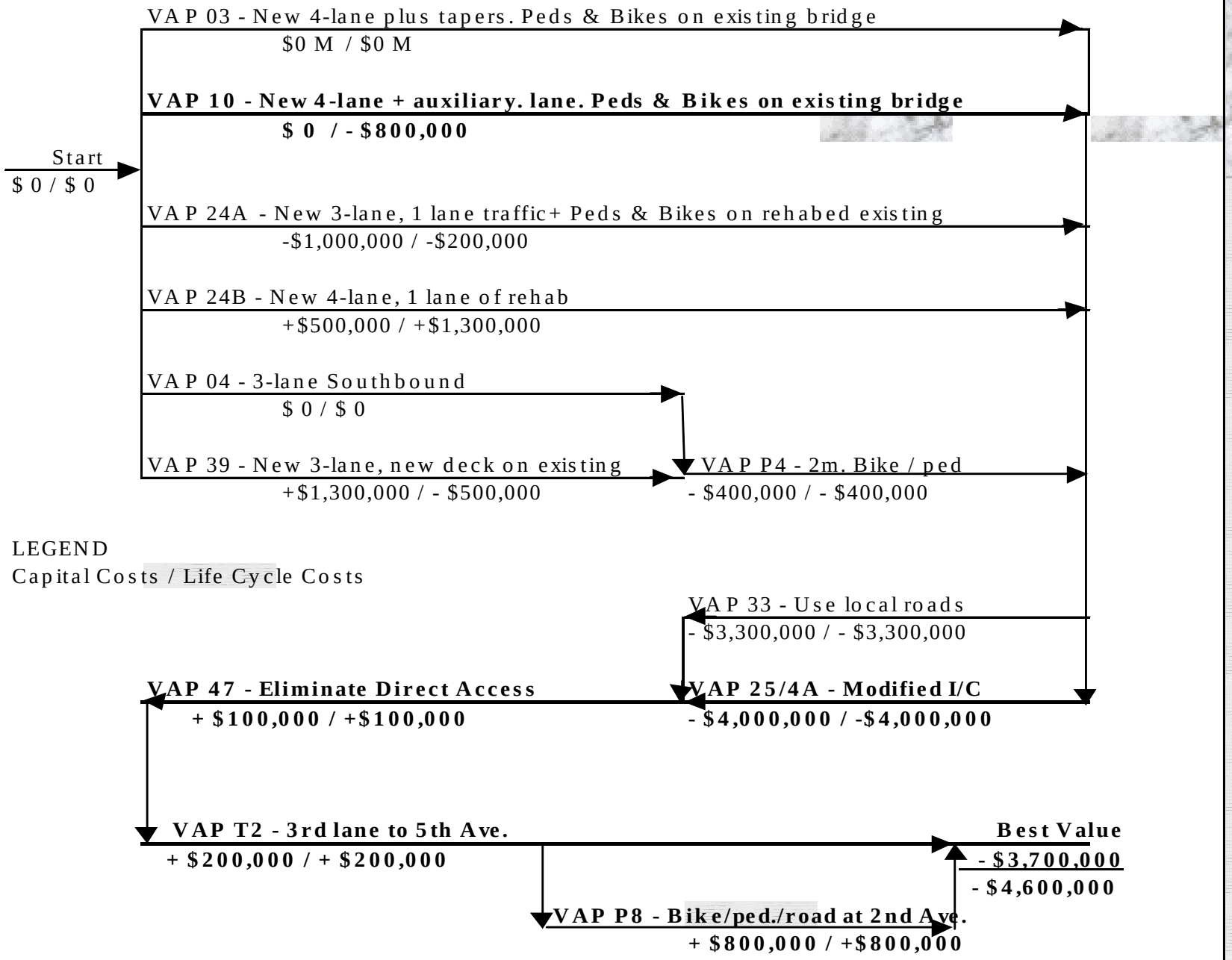
Accommodate Pedestrians & Bikes

P4 Narrow bike/pedestrian lane on the bridge to 2 metres

P8 Consider a 2nd Avenue bike/pedestrian bridge

Example 2
VA on Major Bridge and Interchange

- With 47 VMP's for *Increasing Mobility*, dominates chart
- Start by choosing one of six bridge deck options
- some subsequent VAP's only apply to one or two specific VMP's
- series of VMP's that offer maximum value are indicated by the bold line



VA on Major Bridge and Interchange

Example 3
VE, Major Bridge

- Possible that only Bramcon studies accommodate use of diagram ?
- charted results of study conducted by others
- detail design completed; work out for tender when study commissioned
- study not pursue value analysis options (alternative concepts to widening)

Example 3
VE, Major Bridge

- 96 VMP's generated in creative workshop
- Following are 14 accepted VMP's listed by divisions of functional analysis :

Example 3
VE, Major Bridge

WIDENING

W1 Add lane by extending caps, adding outrigger girders

W4 Reduce lane width and build within current structure.

W15 Reduce scope of contract – eliminate non-essential

W22 Use a high containment barrier for the arch portion

W25 At arch joint – demolish vertically at curb face.

W27 Use a friction grip connect at bottom of new strut.

W35 Design bracket connection without tension loading stiffener

Example 3
VE, Major Bridge

MAINTENANCE

M1 Use the top flange of box beam as walk-way across arch

M1(2) Reduce lane widths to avoid steel girders.

M2 Provide inspection platform to critical points only

M15 Install sensors for fatigue detection

Example 3
VE, Major Bridge

PAINT STRUCTURE

P1 Use weathering steel.

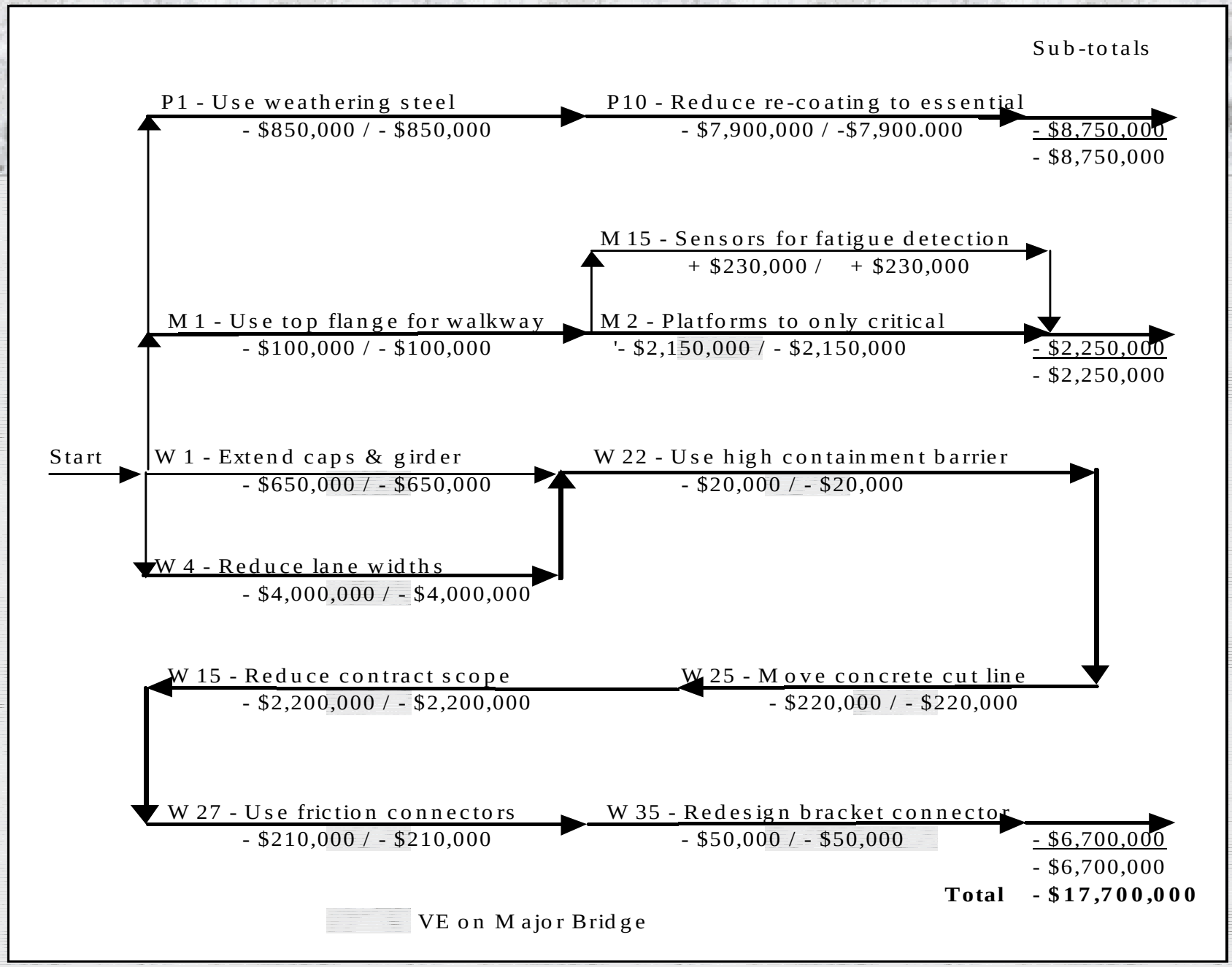
P10 Perform only essential coating needs at this time

UPGRADE SEISMIC

US3 Do portal and pier diaphragms now, not do rollers and bearings.

Example 3
VE, Major Bridge

- Acceptance rate of VMP's only 15% (67% in Example 1)
- Following *Bramcon Chart* shows logic for combinations and sequencing of the accepted VMP's :


Sub-totals
P1 - Use weathering steel
- $850,000 / - $850,000
P10 - Reduce re-coating to essential
- $7,900,000 / -$7,900.000
- $8,750,000
- $8,750,000
M 15 - Sensors for fatigue detection
+ $230,000 / + $230,000
M 1 - Use top flange for walkway
- $100,000 / - $100,000
M 2 - Platforms to only critical
'- $2,150,000 / - $2,150,000
- $2,250,000
- $2,250,000
Start
W 1 - Extend caps & girder
- $650,000 / - $650,000
W 22 - Use high containment barrier
- $20,000 / - $20,000
W 4 - Reduce lane widths
- $4,000,000 / - $4,000,000
W 15 - Reduce contract scope
- $2,200,000 / - $2,200,000
W 25 - Move concrete cut line
- $220,000 / - $220,000
W 27 - Use friction connectors
- $210,000 / - $210,000
W 35 - Redesign bracket connector
- $50,000 / - $50,000
- $6,700,000
- $6,700,000
Total - $17,700,000
VE on Major Bridge

Example 3
VE, Major Bridge

- most of the accepted proposals can be incorporated into the project, not that they were
- not the number of mutually-exclusive proposals seen in Examples 1 and 2
- appears not get same benefit out of the chart for VE studies as for VA studies

Example 4
VE on Highway Interchange

- VA study, completed prior to detail design, identified a more-economical layout
- configuration of elements not challenged in the subsequent VE study
- project was under very tight financial constraints
- project was designed to pre-established budget, not designed and subsequently costed

Example 4
VE on Highway Interchange

- 72 VMP's generated in the creative workshop
- Following are 10 accepted VMP's listed by divisions from functional analysis :

Example 4
VE on Highway Interchange

CATEGORY: 700 Line

12 Add temporary New Jersey barrier at terminal of existing Hwy 3 off-ramp

13 Move pedestrian crossing to be perpendicular to off-ramp

15 Consider leaving 400 line at existing location rather than relocating

16 Do not remove one inch material under the existing pavement

Example 4
VE on Highway Interchange

CATEGORY:

Project Delivery / Contract Strategy

48 Use Lump Sum Contracts, Traffic Management Plan after award.

Example 4
VE on Highway Interchange

CATEGORY: Traffic Management

56 Include traffic management strategy; Contractor provide traffic plan after award

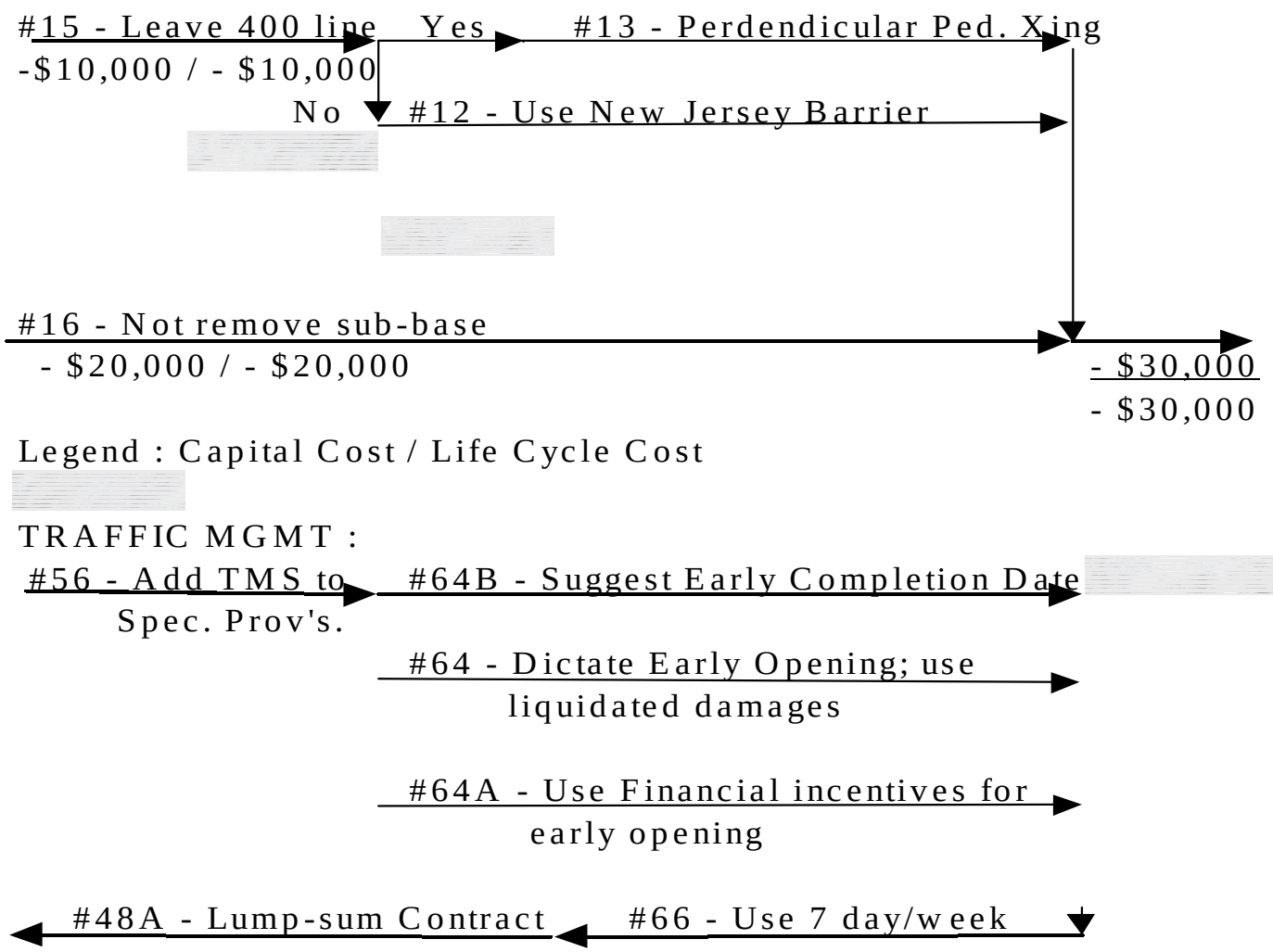
64 Dictate completion date for C Ave. before summer

64A Provide incentive for completion C Ave before summer

64B Suggest completion date C Ave. before summer

66 Allow seven days/week construction.

TECHNICAL :



Legend : Capital Cost / Life Cycle Cost

TRAFFIC MGMT :

VE on Highway Interchange

Example 4
VE on Highway Interchange

- about half of accepted proposals can be incorporated
- not get same benefit for VE study as for VA study
- very little savings identified in study, designed to budget
- value in knowing that project stayed within financial limitations
- project was constructed within the approved budget

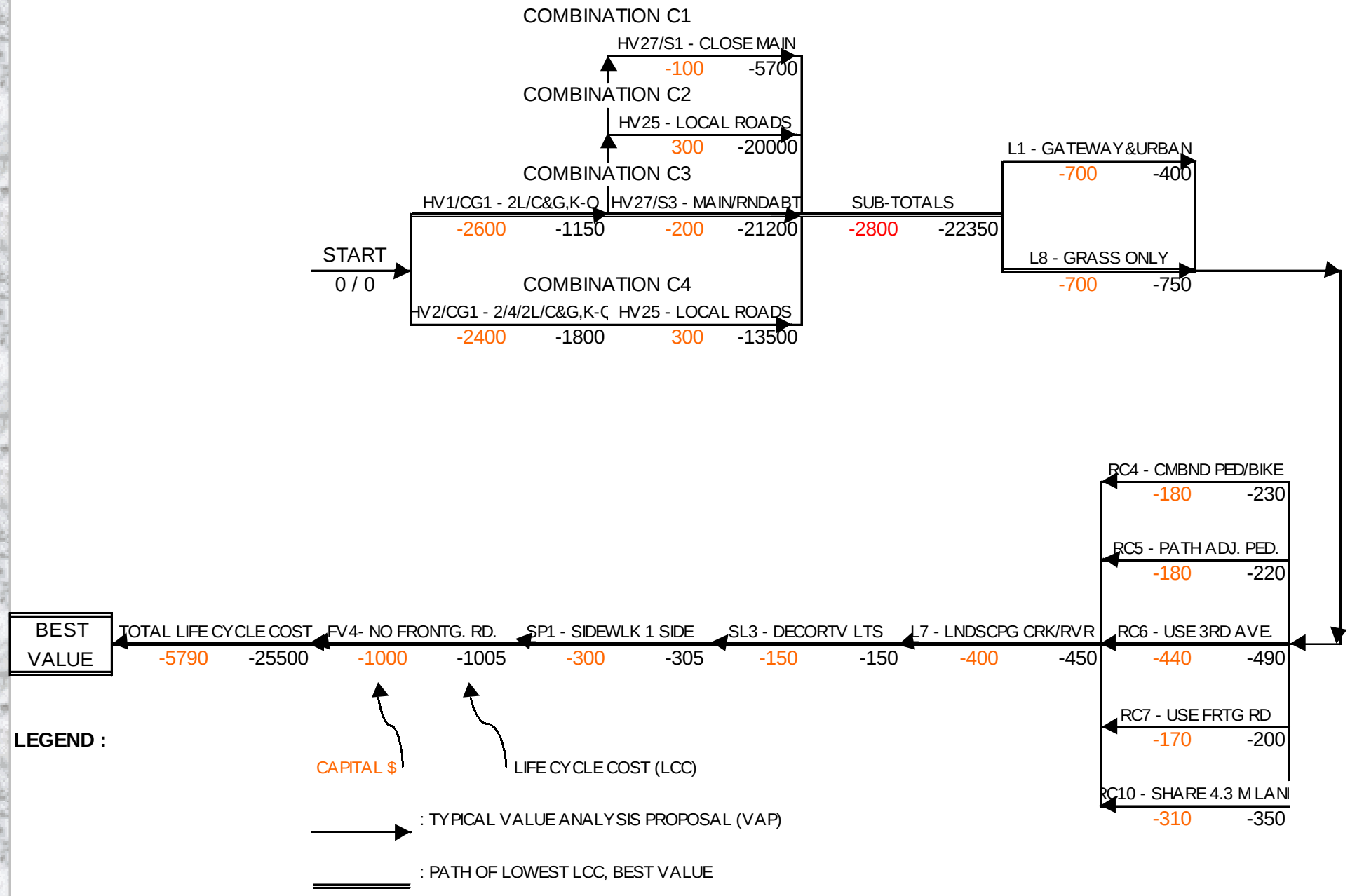
Advantages of the Diagram

- Better decisions as clearer view of cost implications
- Can choose optimum path – maximum life cycle cost savings or,
- can choose minimum capital cost path - life cycle cost consequences apparent
- could increase number proposals selected by providing work plan
- reduces multiple counting of savings by demonstrating the mutually-exclusive proposals
- provides more accurate assessment of outcome of study

Conclusions

1. *Bramcon Diagram* assists review team in generating options as combinations of VMP's
2. Providing work plan assists the project team select which option to adopt
3. *Bramcon Diagram* more applicable to front end VA process than subsequent VE process

BRAMCON DIAGRAM
VA HIGHWAY IMPROVEMENT



BRAMCON DIAGRAM
V.E. , BRIDGE

(NEW CONCEPTS, NEW PROCUREMENT PROCESSES)

2 USE EXISTING ALIGNMENT

CYCLE COSTS

#RS4 - USE EXISTING ROADS ON SOUTH
$ INCL IN B23, B27A

#B23 - NEW SINGLE LANE BRIDGE DOWNSTREAM EXISTING BRIDGE
- 4,000. K

- 4,000. K 2A

#B27A - NEW SINGLE LANE BRIDGE ON EXISTING ALIGNMENT
- 3,000. K

- 3,000. K 2B

3 USE MAIN STREET ALIGNMENT

ENABLER : NEGOT'NS. w / 1st NATIONS
>+$100 K,<+$500 K . USE +$250 K

#RS7 - CONNECT TO MAIN, REGRADE RANCHIERE
-$1,200. K

#B2/B6/B8 - 6% DECK w / ARCH SPAN
SAME

#RN2 - REDUCED FILLS
-$400 K

#B26 - REDUCED DECK WIDTH
-$150 K

#PD3 - DESIGN/BLD DELVRY
+$300 K

-$1,200 K 3A

ENABLER : SECURE DATE FOR HOSPITAL SITE
>$100 K,<$500 K. USE +$ 250 K

#RS2 - CONNECT TO MAIN; OVERPASS, RANCHIERE/FRASER
-$1,000. K

#B2/B6/B8 - 6% DECK w / ARCH SPAN
SAME

#RN2 - REDUCED FILLS
-$400 K

#B26 - REDUCED DECK WIDTH
-$150 K

#PD3 - USE DESIGN/BUILD DELIVERY
+$300 K

- $1,000 K 3B