Walker Road and Howard Avenue CP Rail Grade Separation

VE & Risk Analysis to the Rescue of Border Infrastructure!

Ontario Ministry of Transportation

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Outline

- Project in Crisis
- Workshop Planning
- Technical Challenges
- VE Studies
- Cost Risk Analysis
- Summary and Lessons Learned

Windsor-Detroit Border Crossing in Crisis

- Severe traffic problems in the City of Windsor as a result of post 9-11 security measures
- Intense public, media and political scrutiny
- All three levels of government in Canada committed to action on Windsor-Detroit gateway

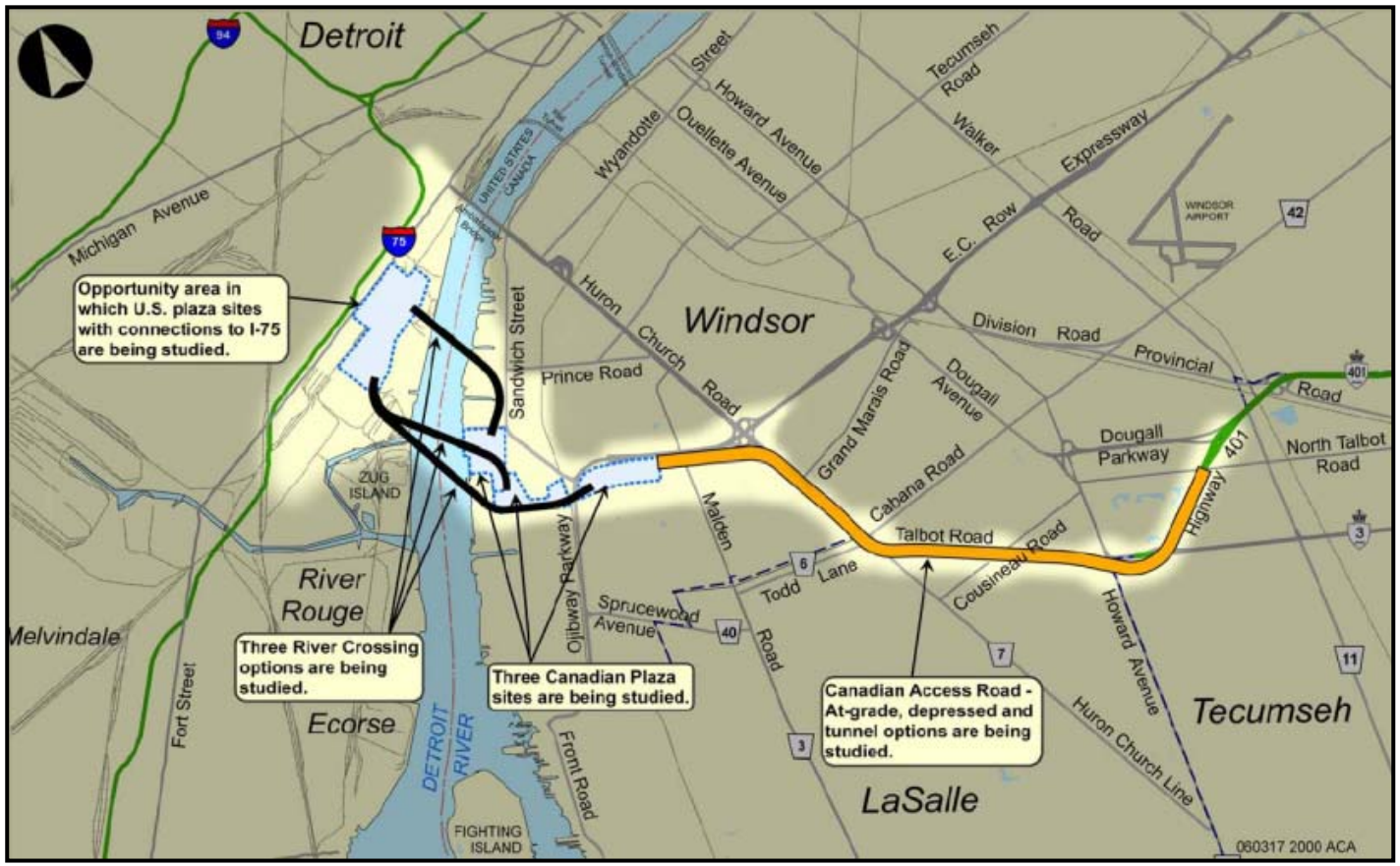
Walker Road Queue

Walker Road and Howard Avenue
CP Rail Grade Separation

Canada and Ontario Announce Major Steps to Improve the Windsor-Detroit Gateway

Walker Road and Howard Avenue
CP Rail Grade Separation

Bi-national Study: Crossing, Plaza and Route Alternatives



VE and Risk Analysis to the Rescue

- Significant cost escalation and challenging technical issues shed negative light on projects
- Combined VE and Risk studies were planned to put 3 projects back on track, June 2005
  - Walker Road CP rail Grade Separation *(focus of this presentation)*
  - Howard Avenue Grade/CP Rail Grade Separation
  - Detroit-Windsor Tunnel Plaza

Walker Road Queues

Catalyst for Grade Separation Projects

- Security measures required all rail cars destined to the United States be x-rayed prior to crossing the border
- Long slow trains cause significant traffic delays at grade road/rail crossings (+20 min)
- Governments committed to urgently construct road/rail grade separations.

Walker Road and Howard Avenue Grade Separations

Time Pressure

- Government commitment to take action
- Project on hold pending VE study resolving cost and scope concerns

Study Planning

Problem	Solution
Get stakeholders to participate and agree on objectives and solutions	Use VE Process with performance measurements
Find value and cost effective solutions	Use VE process, work with designers, technical experts
Bring greater certainty to cost estimates	Risk-based cost workshop with VE studies

Facilitation Planning

Problem	Solution
Stakeholders had limited VE experience	Orientation Meeting, pre-workshop brief, experienced consultant VE team
Potential for disagreement on extent of objectives and solutions	Used performance measures; required to be sensitive to designers and local pressures; ice breaker dinner with team building trivia; kick-off speech from senior government officials
Study findings reported to multi-jurisdictional committee	Involved senior staff from agencies in workshops to facilitate communications with their agencies
Agreement from all parties required (funding)	Plan for best value, cost sharing was out of scope at workshop

Combining VE and Cost Risk Analysis (CRA)

- Work performed in parallel and in adjoining rooms
- The study lead was focused on the VE team
- CRA technical expertise was shared with VE team on an as needed basis
- CRA used expertise from many sources
- Teams came together at least once a day to report as a group
- VE team developed costs based on a traditional cost model and not CRA findings

VE / Risk Team

- Transport Canada – Federal Gov.
- MTO – Provincial Gov.
- City of Windsor – Municipal Gov.
- Consultant Team
  - Faithful+Gould
  - MMM Group Ltd.

Technical Challenges at Walker Road CPR Crossing

- Utilities, utilities and more utilities
- Partnerships with businesses, railway and the city
- Project costs doubled

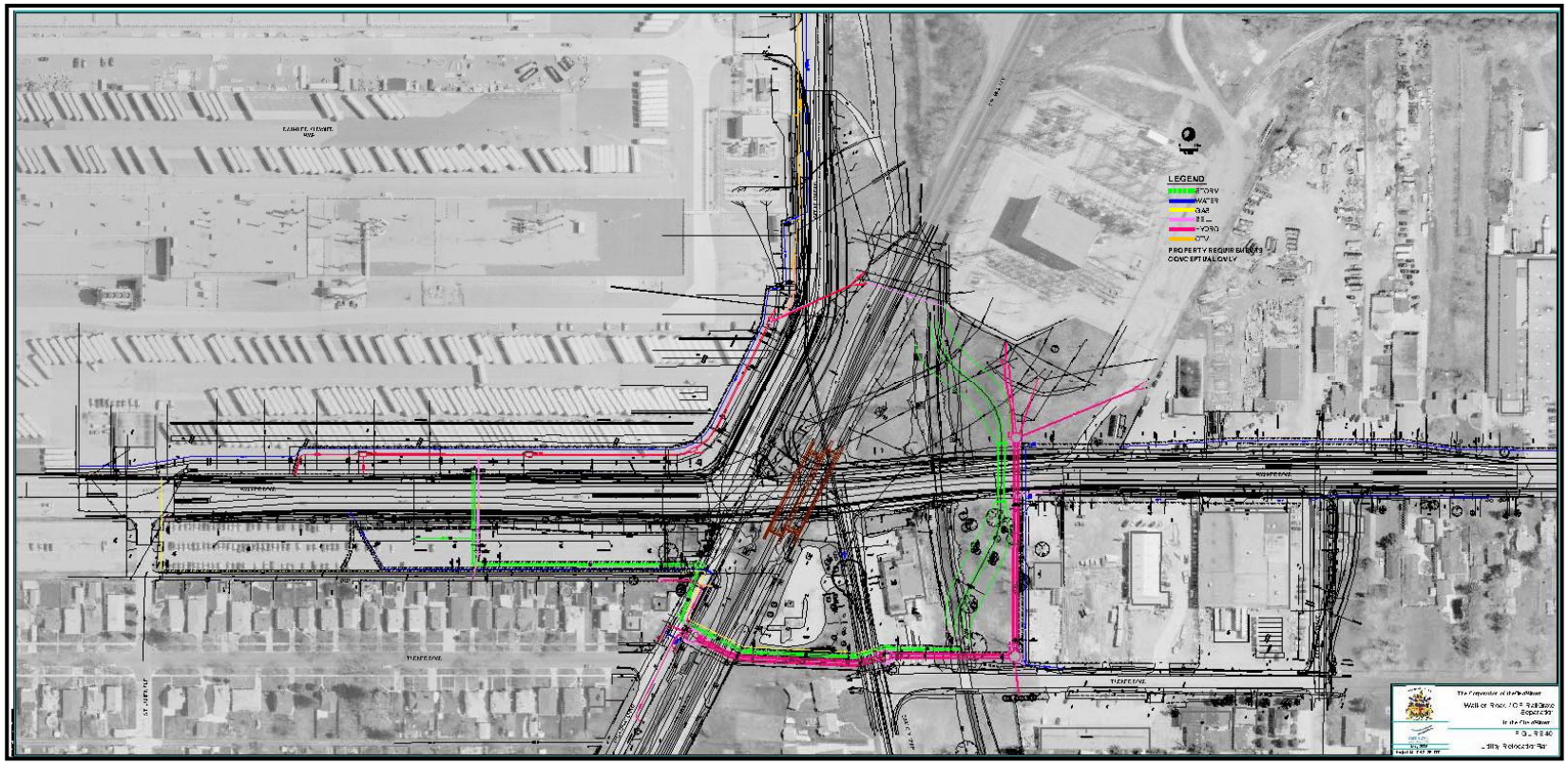
Traffic, Traffic, Traffic

- Walker Road is a major arterial with 30,000 AADT
- Major truck route to border – 10,000 HV per day
- DaimlerChrysler's largest assembly plant in North America (~5,200 employees)
- 650 just-in-time truck deliveries per day

Chrysler, Utilities, Railway, Local Road at same corner

Walker Rd. Crossing

Walker Rd. Utilities



Walker Road - Evaluation

EVALUATION MATRIX								
SCENARIOS	Performance Criteria	Performance Measure	Property Acquisition	Schedule	Traffic Operations	Total Performance (P)	Estimated Cost: $ M (C)	P/C
	Weight →		15	35	50			
PRESENT DESIGN	Rating 1-10		6.8	7.0	10.0			
	Sub Total		102	245	500	847	39.3	21.5522
SCENARIO 1	Rating 1-10		6.7	7.5	10.0			
	Sub Total		101	263	500	863	36.6	23.5792
SCENARIO 2	Rating 1-10		7.2	7.5	9.0			
	Sub Total		108	263	450	821	36.3	22.6033
SCENARIO 3	Rating 1-10		7.7	7.5	7.0			
	Sub Total		116	263	350	728	34.7	20.9798
SCENARIO 4	Rating 1-10		6.8	8.0	10.0			
	Sub Total		102	280	500	882	36.0	24.5000
SCENARIO 5	Rating 1-10		6.5	8.3	7.0			
	Sub Total		98	291	350	738	34.1	21.6422
SEEK THE BEST - NOT PERFECTION								

Walker Road – VE Results

- Build only one railway superstructure
- Shift Walker Road to the West to avoid secant wall and high voltage oil encased duct.
- Use steel wall system in lieu of Secant wall
- Re-grade SE & SW quadrants to minimize retaining walls
- Limit all roadwork to within area of profile change
- Eliminate median islands
- Eliminate S/B right turn lane at Parkdale Place

Walker Rd – Artist Rendition

Catalyst for Cost Risk Assessment (CRA)

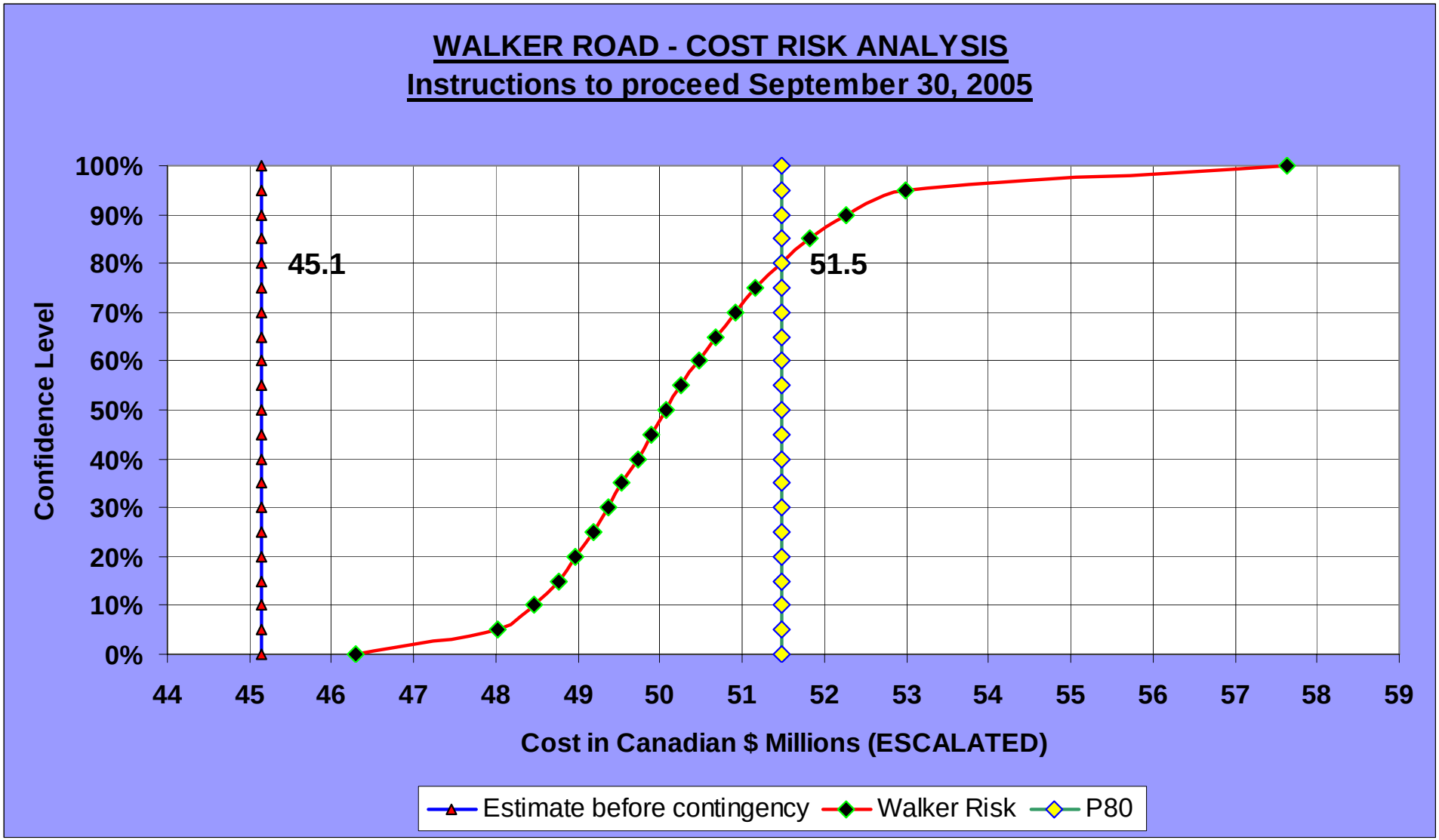
- Due to the rush to implement this grade separation, the engineering design was continually modified to address evolving issues
- Cost estimates continued to escalate dramatically
- Need to establish a greater degree of project cost certainty
- A Cost Risk Analysis was performed concurrently with the VE study

Risk Approach

- Identify objectives
- Characterize base estimate and schedule
- Identify constraints and interfaces
- Develop schedule and cost risk model
- Assign variability and risks to model
- Run analysis – develop range of outcomes
- Develop risk management & reduction ideas
- Two risk scenarios developed dependent on decision date (June & September)

Significant Cost Risks

- 19 high-cost risks (over $500K)
- Examples:
  - Inflation
  - Steel and other material price spikes
  - Overland flow system - scope may grow in detailed design
  - Settlement of 115KV line during wall construction - oil filled cables bank


WALKER ROAD - COST RISK ANALYSIS
Instructions to proceed September 30, 2005
Confidence Level
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
45.1
51.5
44
45
46
47
48
49
50
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57
58
59
Cost in Canadian $ Millions (ESCALATED)
Estimate before contingency
Walker Risk
P80

Summary

Post VE - Summary

- MTO assumed project management in January 2006 in cooperation with City of Windsor and Transport Canada
- VACIS implemented December 2005; traffic delays have increased
    - Total delay time up 50%
    - Number of delays > 20 minutes up from 1-3 to 6-9 / day
- Advance utility contracts complete.
- Structure and road contract tendered ($17.5M CDN)

Summary – VE Implementation

- VE recommendations were implemented at Walker Rd:
  - Shift road alignment west to avoid 115 kV hydro
  - Build only one superstructure
  - Slopes in lieu of retaining walls
  - Limit roadwork to grade crossing area
  - The cost saving of the VE recommendations was over $3 million or about 8% of the then estimated project cost

Walker Road Construction Utility Relocation

Summary – Cost Risk Assessment

- VE & Risk Assessment provided certainty for decision-making under scrutiny of three levels of government
- Realistic estimate of schedule and cost set benchmarks for:
    - Establishing agreements
    - Setting budgets
    - Media and public communication
- Current project cost is slightly below risk assessed value
- Current project schedule slightly ahead of estimated schedule
- Many VE identified risks been mitigated. Some new risks have materialized
- Project is on budget.

Lessons Learned

- Team members could contribute to both VE and CRA
- Too much work for CRA of more than base case during workshop
- Results of VE and risk-based estimating greatly improved project credibility, understanding and acceptance of cost issues, and team trust
- Risk estimator required extra post-workshop time and had to return for implementation meeting
- If you model a poor cost and schedule estimate you get poor results; need a good estimator

Summary

Combined VE and Cost Risk Analysis study was a success

- VE recommendations were applied to design
- Cost savings and additional value were achieved
- Cost Risk Analysis brought certainty to project
- All three levels of government agreed to and were satisfied with results
- Allowed project to proceed expeditiously
- Project costs and schedule are on target with CRA findings

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