

Walker Road and Howard Avenue CP Rail Grade Separation

VE and Risk Assessment Study



Toronto, October 24, 2006
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Walker Road and Howard Avenue CP Rail Grade Separation

- Value Engineering and Risk Assessment study
- Undertaken in May/June 2005
- For: City of Windsor
MTO
Transport Canada



Project History

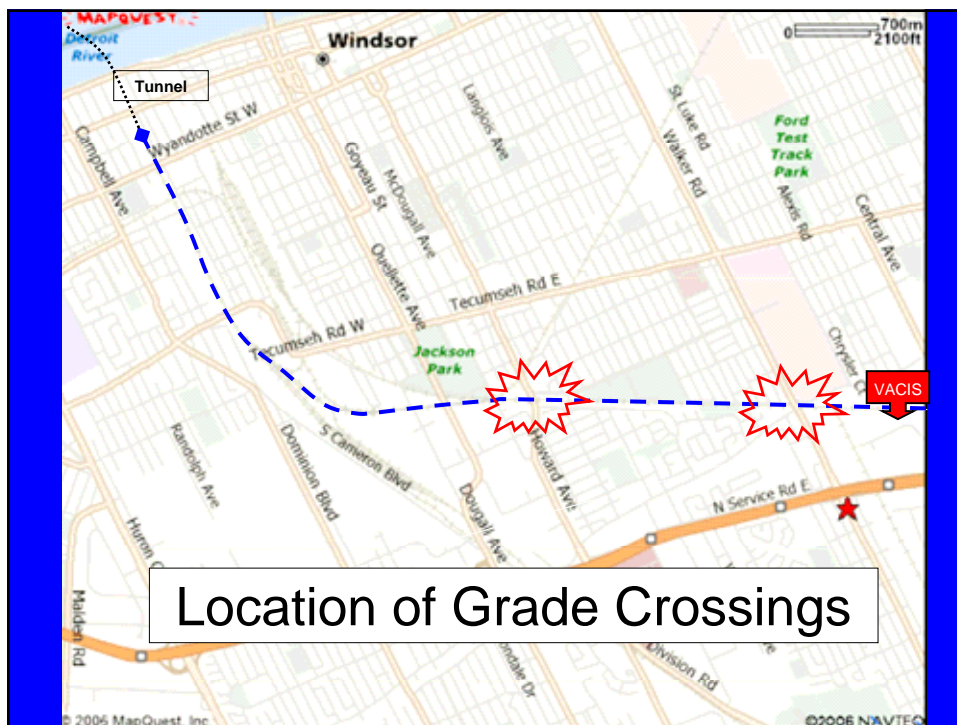
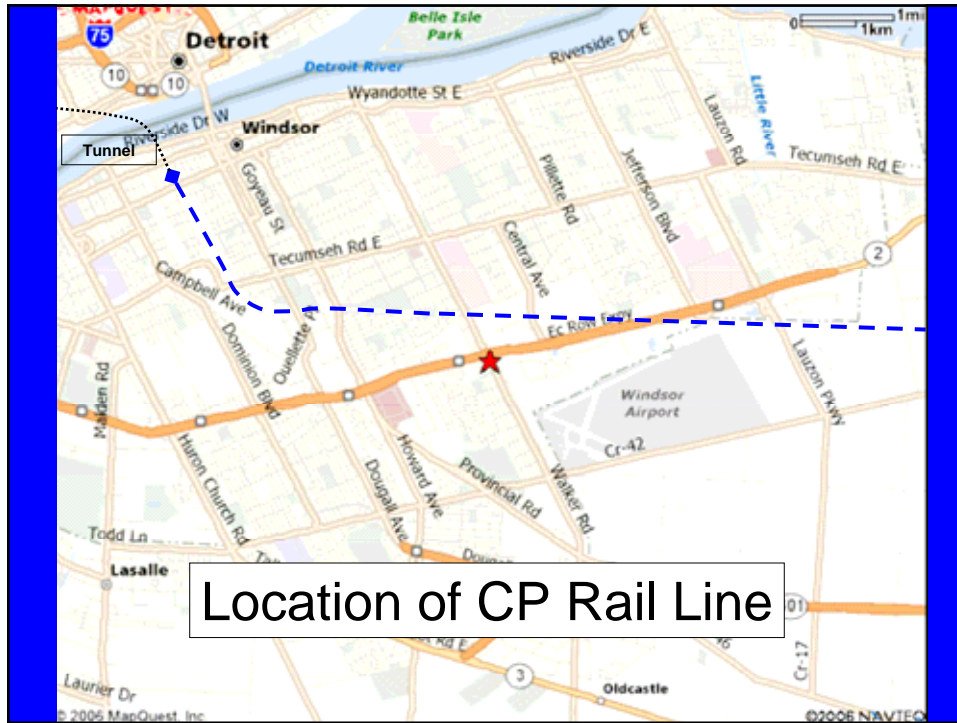
- Effects of 9-11 had a significant effect on US border security
- All rail cars are required to be X-Ray inspected (VACIS) before crossing the border
- X-Ray procedures require trains to move slowly past equipment
- Long slow trains cause significant impact to traffic circulation at grade road/rail crossings



Project History

- US Border security measures have a significant impact on the City of Windsor
- Three levels of Government commit to take action to fix the problems
- Road/Rail grade separations are proposed at Walker Rd. & Howard Ave.
- Deadlines in place and project is fast tracked
- Project cost estimates escalate dramatically
- Undertake VE study to evaluate cost effective solutions
- Undertake Cost Risk Analysis to bring greater certainty to cost estimates





Background - VACIS Issues

- Reduced rail speed from 25mph to 5mph.
- Length of trains 7,000-8,000 feet.
- Crossing delays increase up to 5-fold (+ 20min)
- 26 trains/day. Approx. 50% through VACIS
- Scheduled VACIS operations start in September 2005



Background - Walker Rd Issues

- 32,000 AADT, 2,253 pm peak hour.
- Lengthy delays to traffic
- Grand Marais Rd. intersection
- Access to Daimler Chrysler plant
 - 650 just in time truck deliveries/day + Shift workers
 - Relocation of main entrance to Grand Marais
- Utilities, utilities and more utilities
- Retaining wall required for Hydro duct (N-E quadrant)
- Detail Design on hold : 70-75% complete
- Two Advance Utility contract - on Hold
- Property acquisition/expropriation
- Parkdale Place improvements – revised EA
- Closure of Walker Rd. – detouring required



Walker Rd. Crossing



Walker Rd. Crossing



Walker Rd. Utilities



Study Objectives

- Identify Opportunities to improve value and process
- Identify Risks
- Improve Project Cost certainty



VALUE TARGET AREAS Walker Road

1) Roadworks	→ 20 ideas	→ 9 proposals
2) Retaining Walls	→ 18 ideas	→ 7 proposals
3) Bridge Structure	→ 22 ideas	→ 3 proposals
4) Utilities	→ 13 ideas	→ 0 proposals

60 ideas 19 proposals



VE Performance Criteria

- Traffic Operations
- Schedule
- Property



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				2.7
	Sub Total	101	263	500	863	36.6	23.5792	
SCENARIO 2	Rating 1-10	7.2	7.5	9.0				3
	Sub Total	108	263	450	821	36.3	22.6033	
SCENARIO 3	Rating 1-10	7.7	7.5	7.0				4.6
	Sub Total	116	263	350	728	34.7	20.9798	
SCENARIO 4	Rating 1-10	6.8	8.0	10.0				3.3
	Sub Total	102	280	500	882	36.0	24.5000	
SCENARIO 5	Rating 1-10	6.5	8.3	7.0				5.2
	Sub Total	98	291	350	738	34.1	21.6422	
SEEK THE BEST - NOT PERFECTION								

Key Ideas - Walker Road

- Build only one superstructure – provide abutments
- Re-grade SE & SW quadrants to minimize retaining walls
- Eliminate median islands on Walker Rd.
- Use Steel wall system in lieu of Secant wall
- Shift Walker Road to the West to avoid secant wall
- Limit all roadwork to within profile change
- Eliminate S/B right turn lane at Parkdale Place
- ❖ Design Suggestion: confirm location of sanitary sewer from the bottom of the excavation



Background - Howard Ave Issues

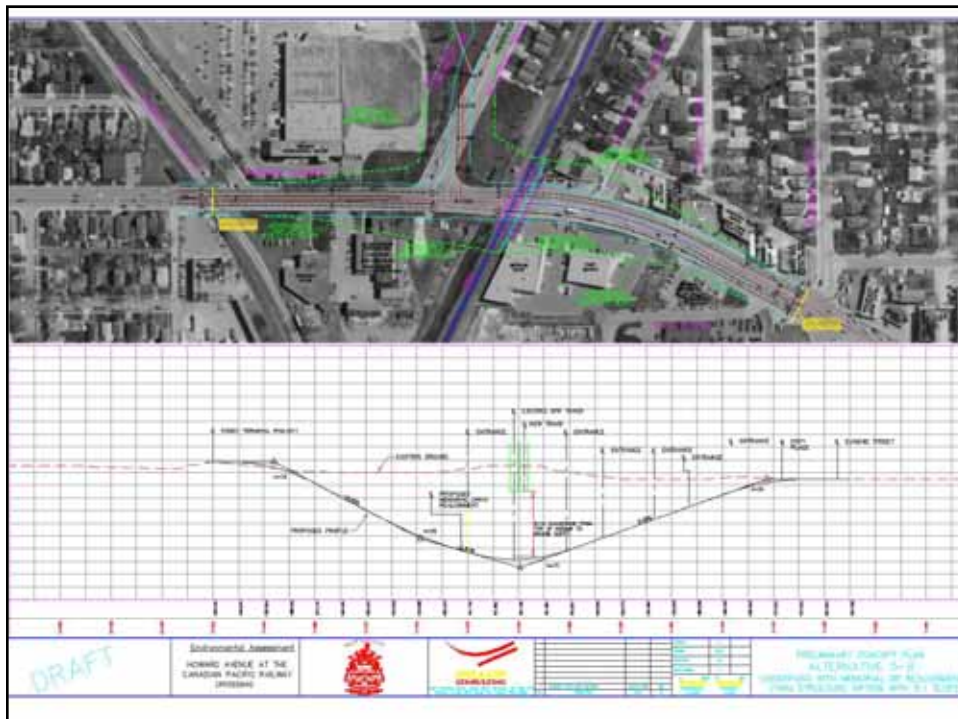
- Class EA study is underway
- 30,000 AADT, 2,900 pm peak hour
- Lengthy delays to traffic
- Significant north south arterial to City Centre and tunnel
- Major Property acquisition/expropriation required
- Significant impact to business community
- Construction to follow Walker Rd. grade separation
- Utility issues not defined at this stage
- Closure of Howard Ave. – detouring required



Howard Ave. Crossing



Howard Ave. Crossing



VALUE TARGET AREAS Howard Avenue

- 1) Roadworks → 12 ideas → 3 proposals
- 2) Retaining Walls → 7 ideas → 2 proposals
- 3) Bridge Structure → 8 ideas → 3 proposals

35 ideas 8 proposals



Key Ideas - Howard Avenue

- Build only one superstructure – provide abutments
- Provide graded slopes to eliminate or minimize retaining walls
- Eliminate median islands
- Shift Howard Avenue to the West to save buildings on the east side



Other Value Opportunities

- Consider cost sharing opportunities with:
 - CPR
 - Utilities
 - Daimler-Chrysler
- Advance Voluntary Property purchases
- Residual property value – not factored into estimates



Cost Risk Analysis



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



Risk – Scenario Development

- Scenario 1: Assumes approval to proceed to acquire / expropriate all outstanding property June 20th 2005
- Scenario 2: Assumes approval to proceed to acquire / expropriate all outstanding property September 30th 2005

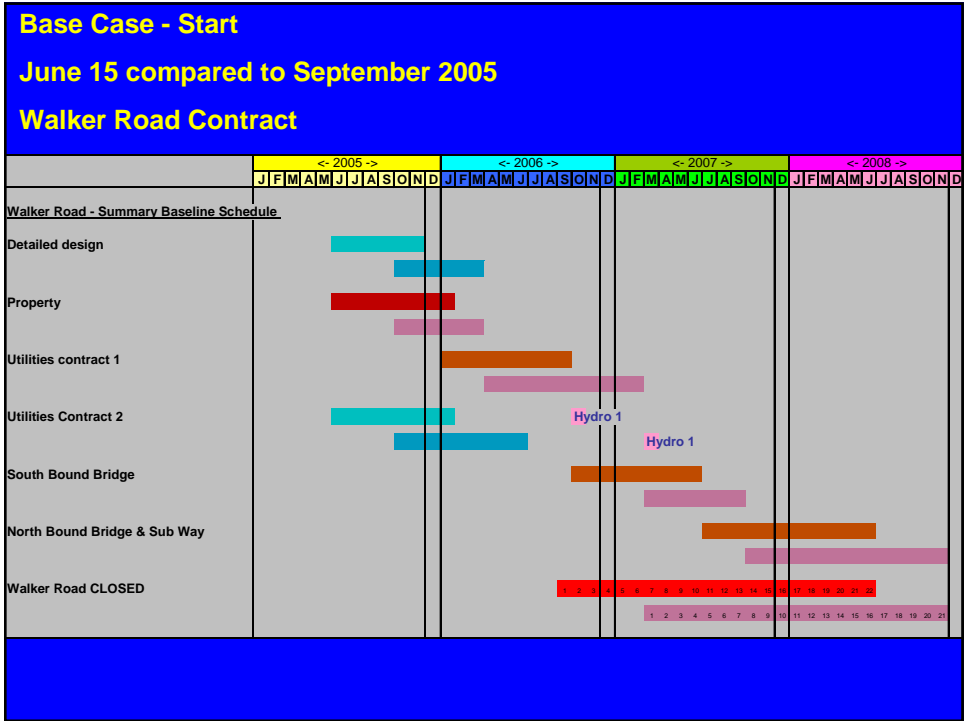


Base Case
Start
June 15, 2005

Walker Road and Howard Avenue Grade Separation		Order to proceed June 15, 2005	
Base Estimate - Elemental Cost Comparison		Base Estimate January 2005	
	Walker Road	Howard Avenue	Variance
Utility diversions and relocations			
Utilities	2,778,015	1,750,000	4,693,015
Utility Company expenditures	3,665,000		in above
Roadworks and Traffic Improvements			
Roadworks	6,002,203	3,200,000	3,404,003
Road Improvements	1,754,300	-	in above
Traffic Improvements	255,000	1,407,500	in above
Retaining walls			
Walls	8,513,930	3,624,000	4,889,930
Structures			
Rail Bridges	5,738,563	6,035,000	(296,437)
Flagging	360,000	300,000	60,000
Landscaping and finishings			
Landscaping and finishings	100,000	21,750	78,250
Other costs			
Design and Project management	4,375,052	2,450,738	1,924,314
GST after recovery	-	-	-
	33,542,063	18,788,988	14,753,075
Property			
Acquisitions	4,056,912	8,408,225	(4,351,313)
Miscellaneous Costs	781,037	2,300,000	(1,518,963)
Associated costs			
Canadian Pacific Rail direct costs	375,000	375,000	-
EA and Permits	100,000	525,000	(425,000)
Consultation / community affairs	150,000	50,000	100,000
City Staff Costs	250,000	250,000	-
	39,255,012	30,697,213	8,557,799
Escalation			
	5,391,531	6,954,235	(1,562,704)
	44,646,543	37,651,448	6,995,095
Total Estimate			
Contingency (as risk analysis 80% confidence)	6,022,557	5,440,772	581,785
Total Estimate Cost YOE	50,669,100	43,092,220	7,576,880




Base Case
Start
Sept 30, 2005

Walker Road and Howard Avenue Grade Separation		Order to proceed September 30, 2005	
Base Estimate - Elemental Cost Comparison		Base Estimate January 2005	
	Walker Road	Howard Avenue	Variance
Utility diversions and relocations			
Utilities	2,778,015	1,750,000	4,693,015
Utility Company expenditures	3,665,000		in above
Roadworks and Traffic Improvements			
Roadworks	6,002,203	3,200,000	3,404,003
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Consultation / community affairs	150,000	50,000	100,000
City Staff Costs	250,000	250,000	-
	39,255,012	30,697,213	8,557,799
Escalation			
	5,891,214	7,377,369	(1,486,155)
	45,146,226	38,074,582	7,071,644
Total Estimate			
Contingency (as risk analysis 80% confidence)	6,332,795	5,787,408	545,387
Total Estimate Cost YOE	51,479,021	43,861,990	7,617,031



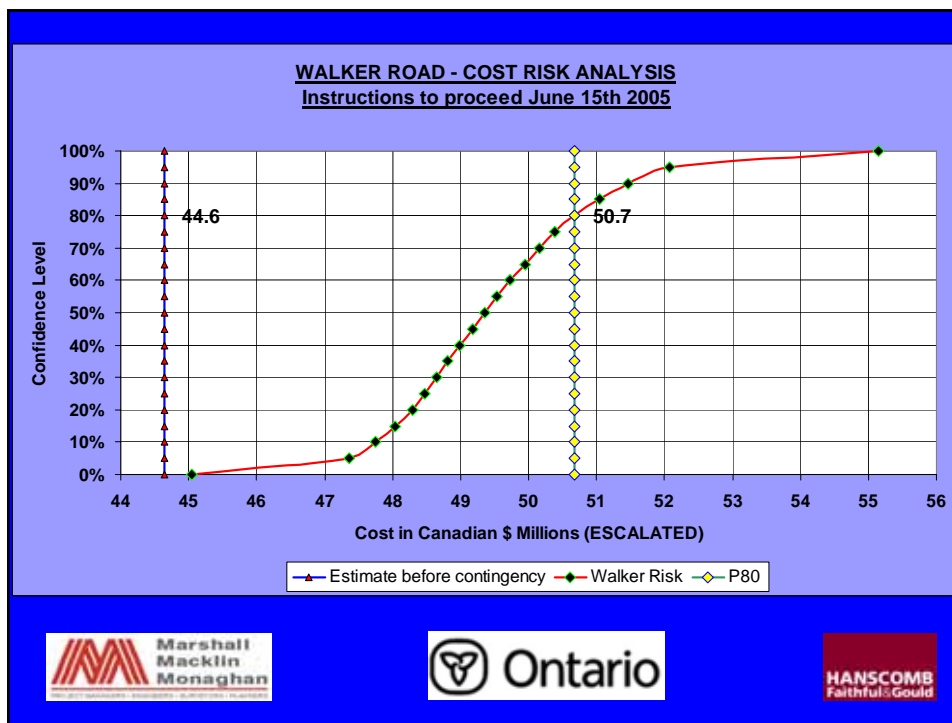
Top Risks

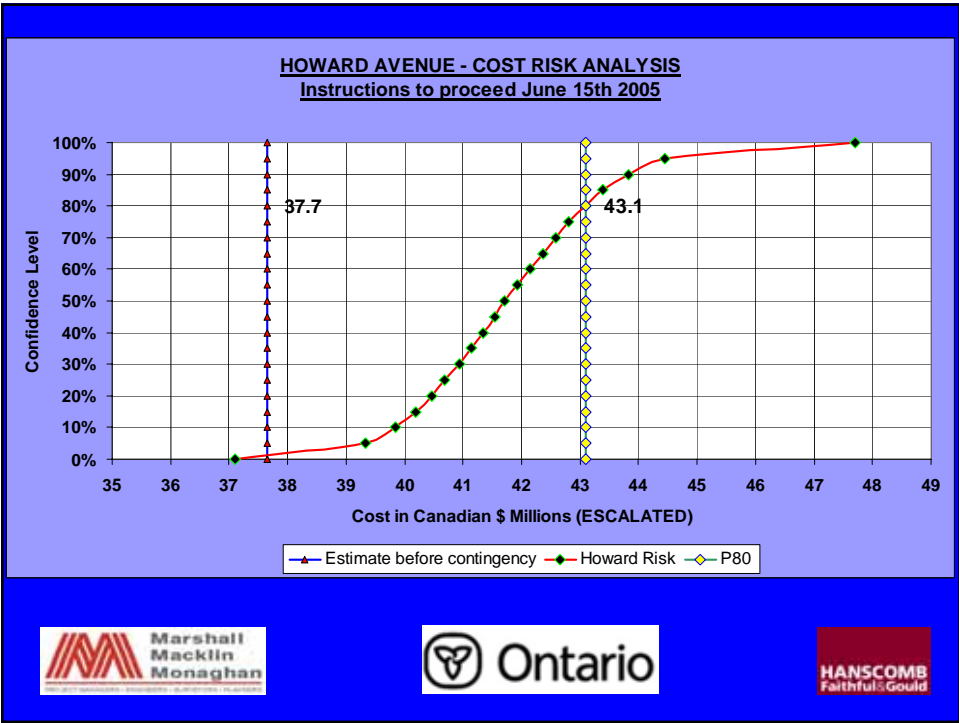
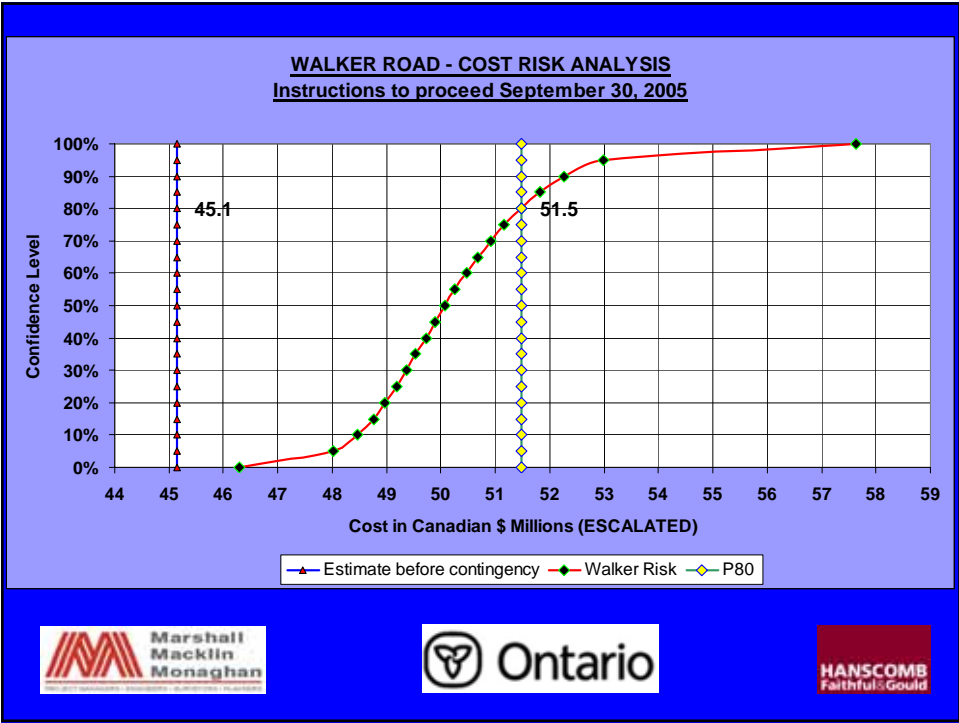
- 42 Top risks identified
- Top 7 Risks
 - Hydro One Outage missed at Walker Road
 - Foundations conflict with the sanitary sewer
 - Resolving property claims - Walker Rd contract
 - Expropriation process – Walker Rd contract
 - Howard delayed by late completion of Walker
 - Howard Utility relocations are unknown
 - Howard design based on Walker

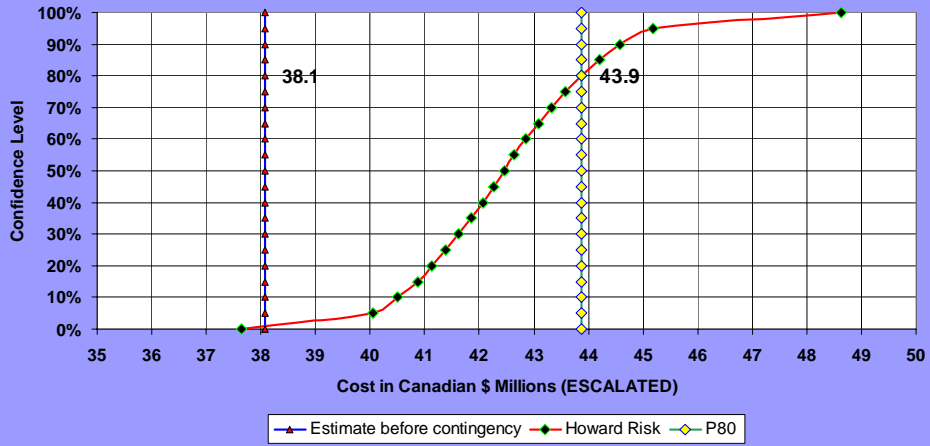
Significant Cost Risks

- 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 117KV line during wall construction - oil filled cables bank





HOWARD AVENUE - COST RISK ANALYSIS
Instructions to proceed September 30, 2005



Cost Analysis Summary

	Walker Road Canadian \$ M		Howard Avenue Canadian \$ M	
	June, 05	Sept, 05	June, 05	Sept, 05
5% Confidence	47.4	48.0	39.3	40.0
50% Confidence	49.4	50.1	41.7	42.5
80% Confidence (Baseline)	50.7	51.5	43.1	43.9
100% Confidence	55.2	57.6	47.7	48.6



Post Value Engineering Study



Post VE – Current Status

- MTO assumed project management of the projects in January 2006 in cooperation with the 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
- The VE and Risk Assessment study for these projects provided value moving forward



Post VE – Valuable VE Ideas

- Walker Road:
 - Shift road alignment west to avoid 115 kV hydro
 - Railway structure requirements
 - Slopes in lieu of retaining walls
 - Limit roadwork to grade separation initiative
- Howard Avenue:
 - Railway structure requirements
 - Slopes in lieu of retaining walls
 - Further developments →
 - closure of Howard not required, 115 kV hydro conflict



Post VE – Risk Assessment

- Risk Assessment proved valuable for this project involving three agencies and much scrutiny.
- Realistic estimate of time and costs set benchmarks for use in establishing agreements, dealing with media
- Many risks have remained and been mitigated, new risks have materialized



Post VE – Walker Road Construction



Post VE – Walker Road Construction



Post VE – Walker Road Construction

