MMM GROUP

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SOCIÉTÉ CANADIENNE DE L'ANALYSE DE LA VALEUR
CANADIAN SOCIETY OF VALUE ANALYSIS

SHARING VALUES WITH FIRST NATIONS THROUGH VALUE ENGINEERING

Case Study:
Value Engineering Study for the Intersection of Highway 11 and Highway 17
Lot 14, East of Nipigon, Ontario
Ministry of Transportation

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Presented by:
Dan Preley, MTO
Rob Kivi, MMM Group

Ontario

COMMUNITIES
TRANSPORTATION
BUILDINGS
INFRASTRUCTURE

Presentation Overview

- Application of Value Engineering to expedite decision making and build consensus with First Nations stakeholders
- Engineering solutions were required to support decision making
- Stakeholder participation was used to provide all parties an opportunity to input
- Recommended solution provided “win-win”

Presentation Overview

1. Study Background
   a) Existing conditions
   b) Reasons for initiating the VE study
   c) First Nation's Concerns/Issues
   d) Owner's objectives
2. Methodologies
   a) Relationship building
   b) Sharing of concerns and objectives
   c) Transparent and objective evaluation process
3. Study Results
4. Conclusions

Study Background

- Development of existing Red Rock Indian Band (RRIB) Reserve lands is approaching capacity
- RRIB expressed interest in acquiring land from MTO (Lot 14) to permit growth of their Reserve and support economic development
- MTO was protecting Lot 14 for construction of a future interchange at Highway 11 and Highway 17 and associated relocation of the existing Patrol Yard
- Property protection was conservatively based on a conceptual design that had not been fully developed
- The VE Study was conducted to review and refine the interchange concept to establish property protection requirements and support MTO decision making regarding surplus lands.

Study Background – Existing Conditions

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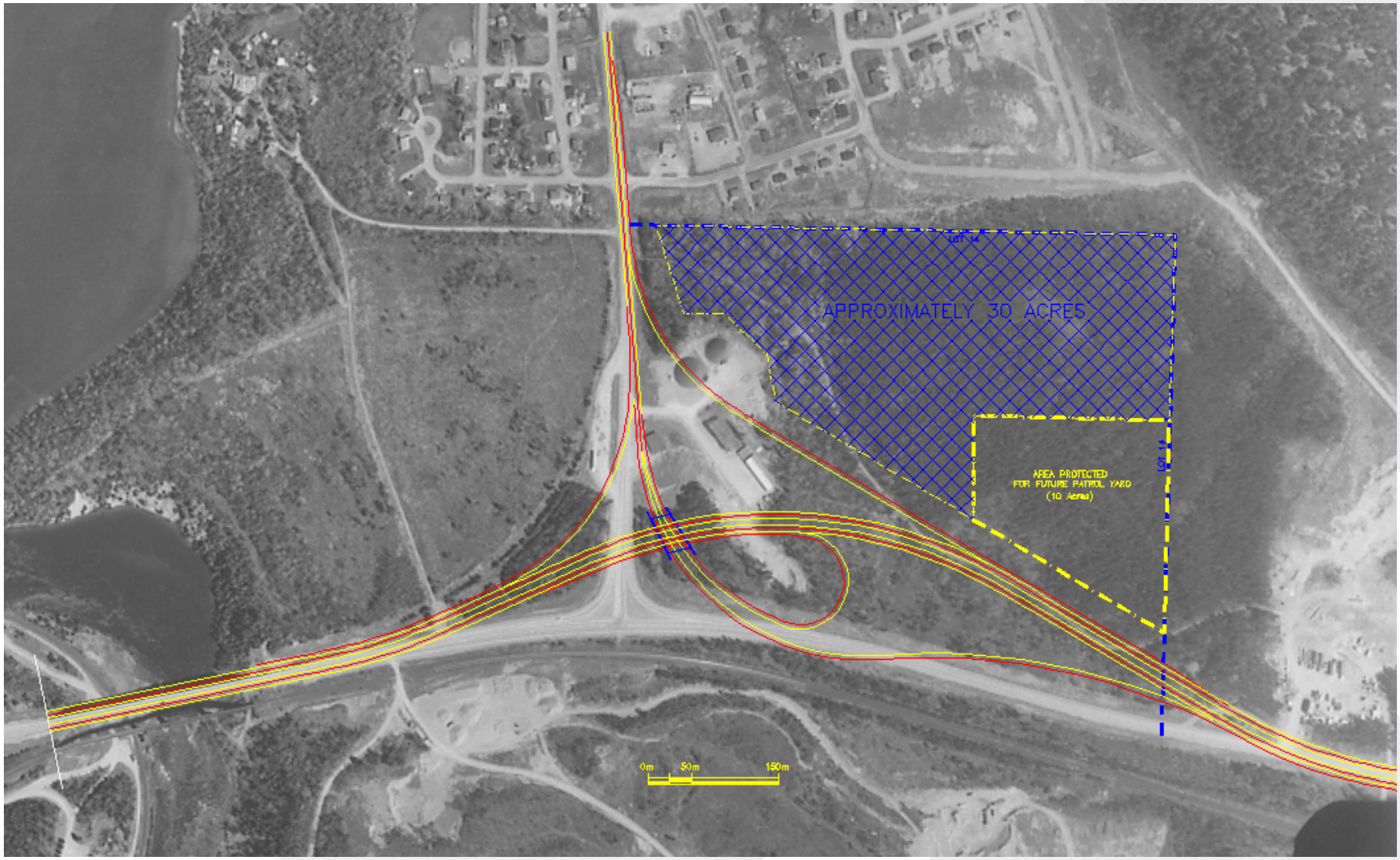
Study Background – Base Case Design

Obtained from 1996 Planning Study Update and Preliminary Design Report:

- Four-lane divided Highway 17 west of the Nipigon River with a 7.5 m median;
- New bridge across the Nipigon River for westbound traffic;
- Initial at-grade intersection at Highway 11 and Highway 17;
- Potential future grade-separated Trumpet interchange;
- Replacement of existing Patrol Yard was assumed to occur within Lot 14, although a design concept was not developed.

Entire Lot 14 was being protected to accommodate the interchange and maintain flexibility to relocate Patrol Yard

Study Background – Base Case Design



VE Study Objectives

- To identify a preferred ultimate intersection design concept based on a grade-separated interchange, including identification of a preferred location for the Patrol Yard, to be used as the basis for MTO's property protection

- To expedite the decision making process

First Nation Concerns

- Development of existing RRIB Reserve lands is approaching capacity. Reserve population increasing. Desire for economic development opportunities.
- Reserve is bounded by Lake Helen on the west and a high escarpment on the west. Only contiguous expansion potential is to the south (Lot 14).
- Local (pedestrian and vehicular) traffic within the Reserve frequently uses and crosses Highway 11. RRIB has concerns about safety and operations on existing Highway 11.

Owner's Objectives

- Protection for future grade separated interchange, with a safe, efficient and constructible design;
- Provision for maintaining a Patrol Yard in the vicinity of the interchange

Study Methodology

- Met with RRIB in advance to explain VE process
- Full participation of RRIB representatives in the 5 day VE study
  - Opportunity for RRIB to express their concerns and present issues directly to the VE team
  - Opportunity for RRIB to input to the Function Analysis
  - Participation of all stakeholders in Creative, Development and Evaluation phases
  - Enhanced transparency of evaluation process
  - Opportunity for RRIB to experience the design development process and gain appreciation of standards, constraints and limitations
- RRIB provided opportunity to review and comment on draft Report

Study Methodology

- Information Phase was held at Red Rock Indian Band's Resource Centre
  - Team Introductions and familiarization
  - Overview of the Value Engineering process
  - Reviewed MTO's and RRIB goals and objectives
  - Reviewed Pre-Workshop Information Package
  - Presented Base Case
  - Reviewed constraints on VE recommendation
  - Developed Risk Register
  - Site visit and tour of RRIB, Patrol Yard (existing and potential sites), intersection of Highway 11 and Highway 17

Site Visit and Tour

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Study Methodology

Remaining phases of the study were conducted in Thunder Bay.

Two RRIB representatives participated for the full workshop.

Phases:

- Functional Analysis
- Creative
- Evaluation
- Development
- Scenario
- Presentation

Workshop

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Major Project Risks

- Risk of not getting future Environmental Approvals for decisions made now
- Risk of adverse impacts on area businesses
- Unknown soil conditions
- Potential for environmental impacts on Gapen's Pool fish habitat
- Safety risk associated with providing high speed ramp entering RRIB community
- Limitation on potential development opportunity at RRIB
- Failure to protect adequate footprint for future interchange

Performance Measures

- Patrol Yard Location
- Development Opportunities
- Traffic Safety and Operations
- Sustainability

Value Target Areas

- Interchange Configuration
- Patrol Yard
- Development Opportunity
- Highway 11 Alignment

VE Ideas

MMM Group / Faithful+Gould				
SUMMARY OF CREATIVE IDEAS				
Value Target Area	**No. Of Ideas Generated**	**No. of VE Proposals**	**No. of Planning or Design Suggestions**	**No. of Ideas Dismissed**
Development Opportunity	7	2	1	4
Highway 11 Alignment	12	2	0	10
Interchange Configuration	23	12	1	10
Patrol Yard	13	7	0	6
	55	**23**	**2**	**30**

VE Ideas and Scenarios

- VE Ideas developed and evaluated with input from all study participants
- Ideas put forward by RRIB were developed by the VE team for evaluation
- VE proposals were combined into four Design Scenarios (including Base Case) for development and evaluation
- All scenarios included both interchange and Patrol Yard

Study Results - Evaluation

HOW WELL DOES EACH SCENARIO SATISFY THE VARIOUS PERFORMANCE CRITERIA? INDICATE BY ENTERING THE SCORE (5,4,3,2,1) IN THE APPROPRIATE BOX IN PLACE OF E, VG, G, F, OR P, RESPECTIVELY.	PERFORMANCE CRITERIA	PATROL YARD LOCATION	COMMUNITY DEVELOPMENT OPPORTUNITIES	TRAFFIC OPERATIONS AND SAFETY	SUSTAINABILITY			TOTAL PERFORMANCE SCORE	TOTAL CAPITAL COST ($M)	PERFORMANCE = P / C COST
SCENARIOS	WEIGHT →	ASSIGNED WEIGHTS (%)						TOTAL 100%		
		20	30	40	10					
BASE CASE	5	E	E	E	E	E	E			
	4	VG	VG	VG	VG	VG	VG			
	3	G	G	G	G	G	G			
	2	2	F	F	2	F	F			
	1	P	1	1	P	P	P			
	SUBTOT.	40	30	40	20	0	0	130	$41.10	3.16
SCENARIO 1: Improvements to Base Case	5	E	E	E	E	E	E			
	4	VG	VG	VG	VG	VG	VG			
	3	G	G	G	3	G	G			
	2	2	F	2	F	F	F			
	1	P	1	P	P	P	P			
	SUBTOT.	40	30	80	30	0	0	180	$38.60	4.66
SCENARIO 2: Diamond Interchange east of existing Highway 11	5	5	E	E	E	E	E			
	4	VG	4	4	4	VG	VG			
	3	G	G	G	G	G	G			
	2	F	F	F	F	F	F			
	1	P	P	P	P	P	P			
	SUBTOT.	100	120	160	40	0	0	420	$26.80	15.67
SCENARIO 3: Diamond Interchange at existing Highway 11	5	5	E	E	E	E	E			
	4	VG	VG	VG	4	VG	VG			
	3	G	3	3	G	G	G			
	2	F	F	F	F	F	F			
	1	P	P	P	P	P	P			
	SUBTOT.	100	90	120	40	0	0	350	$30.20	11.59
SEEK THE BEST - NOT PERFECTION										

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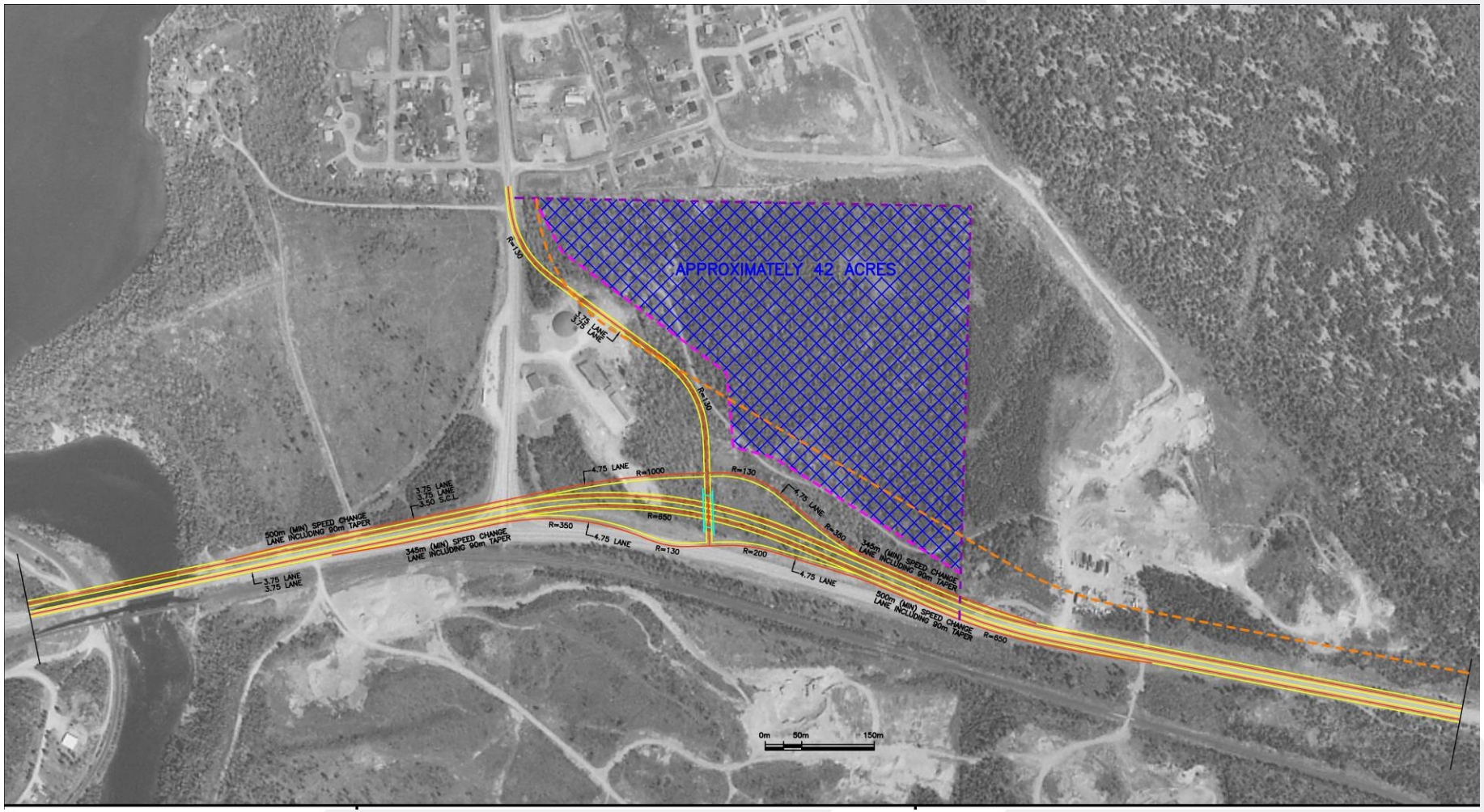
Study Results - Evaluation

Scenario 2 was identified by the team as the recommended scenario

- Scored equal to or better than other scenarios in all performance criteria
- Lowest estimated capital cost
- Largest area of developable land

A sensitivity analysis using a range of performance criteria weightings did not change the outcome of the evaluation

Study Results - Recommended Scenario



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Study Results - Recommended Scenario

- Improved mainline Highway 17 alignment
  - Higher design speed curves
  - Reduced number of curves (2) and smaller deflections
- Improved interchange geometry
  - Tight Parclo B exit ramp eliminated
  - Full speed change lane lengths achieved
- Consistent with desired Highway 11 operating characteristics
  - Geometry discourages high speed traffic through RRIB community
  - Creates potential access opportunities for future development
- Allows existing Patrol Yard to be retained
  - Some modifications required
  - Good access provided to both highways

Conclusions

- Including First Nations stakeholders in the full VE process helps to build consensus by allowing them to:
  - Present their concerns directly to the VE team
  - Participate in the Function Analysis and ensure that their needs are included
  - Contribute to the Creative and Evaluation phases and witness that their ideas are given serious consideration by the VE Team
  - Witness/participate in the Development phase and gain an appreciation for the engineering standards and constraints that impact the feasibility of various ideas
  - Recognize that their concerns are taken seriously and balanced appropriately with other evaluation criteria
  - Better appreciate that a fair and transparent evaluation is used in selecting the preferred alternative

Questions?

For further information:

- Rob Kivi – KiviR@mmm.ca
- Dan Preley- Dan.Preley@ontario.ca

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