

A Monitoring Strategy for Active Transportation Pilot Projects

Amy Ibrahim, P.Eng.

Ontario Ministry of Transportation,
Provincial Highway Management Division

Ray Bacquie, P.Eng.

Cole Engineering Group Ltd
Transportation

Paper prepared for presentation
at the Road Safety for Vulnerable Users Session
of the 2013 Conference of the
Transportation Association of Canada
Winnipeg, Manitoba

Abstract

Transportation agencies recognize the growing interest in Active Transportation (AT) and implement design features to integrate AT within roadway network. There are some instances where many design features include innovative markings, lane configurations, signage and road geometry that vary from standard design approaches. Often these features are implemented on a trial basis to determine the effectiveness of the approach or design. The question remains, what are acceptable or unacceptable operations for these trial designs?

The Ontario Ministry of Transportation is increasingly addressing a range of active transportation features on and across provincial highways. In some cases the Ministry has accepted and defined deviations from standard practice as 'pilot projects' initially as a trial feature at specific locations, conditional on monitoring these design options to evaluate the safety, operational efficiency and cost effectiveness.

Monitoring methodologies have been identified as a basis for assessing pilot projects. These methods focus on addressing the following questions:

- Do the operations meet the objectives of the transportation solution?
- Are there net benefits comparing 'Before' and 'After' operational conditions?
- Is there positive public perception of the solution?

Changes and/or deviations from standard practice would trigger conditions for monitoring for a period of time of at least 3 years to evaluate safety, operational conditions and cost effectiveness. The methodology for monitoring involves highway engineering, traffic operations and AT needs at each pilot project site, while recognizing overarching provincial policy objectives.

The Ontario Ministry of Transportation has documented a wide range of progressive active transportation design measures and defined triggers that would necessitate the need for monitoring:

- Engineering design options to integrate AT that deviate from existing design standards
- New types of AT features or facilities are introduced
- Where specific operational concerns have been identified.
- AT features with operational costs that may outweigh user benefits

The result of the Ontario Ministry of Transportation's efforts is a monitoring plan framework for consistent and technically sound evaluation of effectiveness of pedestrian and cycling facilities. It balances operational conditions for all road users. The process is inclusive of all operating departments through Value Engineering style workshops.

A Monitoring Strategy for Active Transportation Pilot Projects

Introduction

Transportation agencies recognize the growing interest in Active Transportation (AT) and implement design features to integrate AT within roadway network. The Ontario Ministry of Transportation (Ministry) is increasingly addressing a range of active transportation features on and across provincial highways. In some cases the Ministry has accepted and defined deviations from standard practice as 'pilot projects' initially as a trial feature at specific locations, conditional on monitoring these design options.

The monitoring plan is a strategy that measures the effectiveness of AT design features through a formalized process that evaluates safety, operational efficiency, costs and benefits. The methodology for monitoring addresses highway engineering, traffic operations and active transportation needs at each pilot project site, while recognizing overarching provincial policy objectives.

Monitoring provides an assessment to the Ministry in determining whether the goals and objectives are being achieved as related to AT accommodation and roadway operations and identification of any improvements as necessary. There are some instances where roadways accommodating AT facilities may include some unique design features that deviate from the existing design standards or require design concepts not yet implemented within the province. Examples may include new traffic control devices, innovative crossing treatments and roadway geometric changes.

Definition of Active Transportation Pilot Projects

Pilot projects can be defined as infrastructure or operational changes implemented as a trial to determine the effectiveness to road users. The Ministry has considered deviations from standard practice as 'pilot projects' initially as a trial feature at specific locations, conditional on monitoring these design options for a period of time to evaluate the safety, operational implications and cost effectiveness. Engineering design options to integrate AT comprise of a single unique design feature or a combination thereof conditional to monitoring. Monitoring and the success of the pilot project will provide the impetus to expand the implementation of AT design features and the consideration of new design features for incorporation into Ministry standards and policies.

The Ministry has documented a wide range of progressive AT design measures and defined triggers that would necessitate the need for monitoring:

- Engineering design options to integrate AT that deviate from existing design standards
- New types of AT features or facilities are introduced
- Where specific operational concerns have been identified.
- AT features with operational costs that may outweigh user benefits

Scope of the Monitoring Plan

The monitoring plan for pilot projects is intended to rationalize the evaluation process, given the different sites across the province. It recognizes site specific conditions and the need for local knowledge and professional judgment. The Monitoring Plan framework incorporates parameters that analyze both AT and other roadway users.

Monitoring methodologies have been identified as a basis for assessing pilot projects. These methods focus on addressing the following considerations:

- Achievement of pilot project goals as identified in the planning and design objectives.
- Safety and efficiency impacts, i.e. conflict reduction, new/potential conflicts, appropriate use of features (as intended).
- Public perception of the effectiveness of the pilot project
- Determine the conditions upon which the pilot project should be retained permanently and the identification of features recommended for application in other locations.
- Public perception of the effectiveness of the pilot project

Monitoring of pilot projects can be identified in three categories as follows:

1. Project Objectives – Measure of planning and design objectives being met.
2. Before and After – Observation of conditions prior to and following implementation in considering all road users.
3. Public Opinion – Investigating public perception of improvements.

Monitoring Plan Process

Figure A illustrates the monitoring plan process for AT pilot projects. **Table A** provides specific actions and deliverables for the monitoring plan process common to all active transportation pilot projects.

Figure A - Active Transportation Pilot Projects Monitoring Process

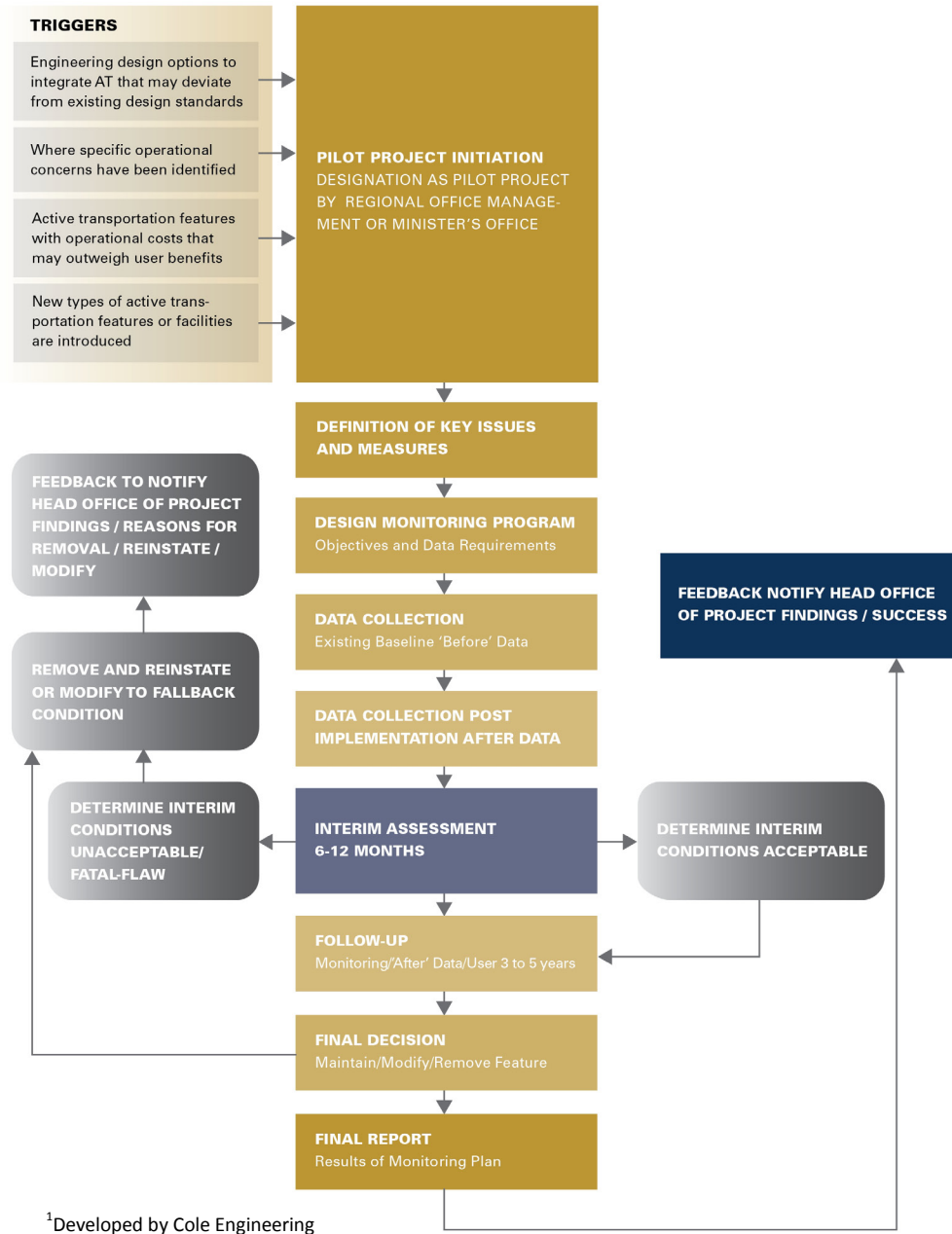


Table A – Monitoring Plan Process

Monitoring Plan Process	Actions	Deliverables
1. Pilot Project Initiation	<ul style="list-style-type: none"> ▪ Collection of corridor information to prepare pilot project rationale ▪ Designation of Pilot Project by Regional Management or Minister's Office ▪ Establish Agreement/ Memorandum of Understanding with municipality (if applicable) to set out terms and responsibilities (e.g. cost-sharing, maintenance, data collection) 	<ul style="list-style-type: none"> ▪ Notification of Pilot Project - Minister's letter, media release or notice (newspaper, website) ▪ Agreements/Memorandum of Understanding
2. Definition of Key Issues	<ul style="list-style-type: none"> ▪ Define key issues for monitoring active transportation pilot project ▪ Data collection times, number of days, etc. 	<ul style="list-style-type: none"> ▪ Terms of reference
3. Determine Key Measures	<ul style="list-style-type: none"> ▪ Use key measures based on active transportation pilot project needs ▪ Determine phasing of monitoring 	<ul style="list-style-type: none"> ▪ Documentation of monitoring framework ▪ Monitoring timeframes (phases)
4. Data Collection	<ul style="list-style-type: none"> ▪ Gather existing/baseline/'before' relevant data, including but not limited to: <ul style="list-style-type: none"> - Collision Data - Speed Data - Volumes - Observed/perceived deficiencies 	<ul style="list-style-type: none"> ▪ Existing/baseline/'before' data
5. Monitoring and After Data Collection	<ul style="list-style-type: none"> ▪ Establish protocol for data collection and carrying out monitoring ▪ Collect and Review, relevant data including but not limited to the data as outlined in 4 (for before-and-after comparison): <ul style="list-style-type: none"> - Collision Data - Speed Data - Volumes - Observations of active transportation use, motor vehicle operations - Attitudinal/user surveys 	<ul style="list-style-type: none"> ▪ Review and documentation of collected data during monitoring phase
6. Interim Assessment (6 – 12 months)	<ul style="list-style-type: none"> ▪ Mitigation measures (as necessary) ▪ Determine if acceptable or unacceptable conditions ▪ Documentation of monitoring 	<ul style="list-style-type: none"> ▪ Documentation of changes (for follow-up and final report)
7. Follow-up	<ul style="list-style-type: none"> ▪ Monitoring/"after" data/user input 	<ul style="list-style-type: none"> ▪ Progress reports
8. Final Decision	<ul style="list-style-type: none"> ▪ Compare before-and-after data as well as engineering judgment and local knowledge 	<ul style="list-style-type: none"> ▪ Document rationale for maintaining/modification/removal of pilot project features
9. Final Report	<ul style="list-style-type: none"> ▪ Finalize results based on data collection and review 	<ul style="list-style-type: none"> ▪ Provide final report to MTO Offices documenting lessons learned

Implementation

Table B includes the key measures that are selected for consideration throughout the study area. It is important that these measures should be considered only if the resultant impacts can be attributable in some manner to the design changes associated with the pilot project.

Table B – AT Monitoring Plan Key Measures

Measures	Indicators	Data Requirement Analysis
Safety of All Road Users	▪ Change in collision rate or severity/pattern	▪ Before and after collision data collection
	▪ Illegal or undesirable movements	▪ Field observations
	▪ Change in AT-vehicle and vehicle-vehicle conflicts	▪ Before and after conflict data collection
Traffic Operations	▪ Intersection level of service	▪ Intersection counts ▪ Level of service analysis
	▪ Queuing or Weaving	▪ Field observations
	▪ 85th Percentile Speed	▪ Speed Surveys and summaries
Active Transportation Use	▪ Pedestrian usage and demand	▪ Classification counts at interchange/intersections
	▪ Cyclist usage and demand on-road	▪ Classification counts at interchange/intersections
	▪ Cyclist usage on-boulevard, sidewalk	▪ Classification counts at interchange/intersections
	▪ Non-compliance with rules of the road	▪ Field / Video Observations
Maintenance	▪ Adhere to snow removal requirements	▪ Identification of maintenance requirements of features ▪ Compliance with maintenance agreement
	▪ Road/sidewalk debris removal	▪ Compliance with maintenance agreement
	▪ Marking restriping /colored treatments, sign repair	▪ Costs of marking and signage replacement
Road User Opinion	▪ Public opinion / support	▪ User comfort level/ concerns
Cost Effectiveness	▪ Capital costs	▪ Ease of implementation
	▪ Maintenance costs	▪ Financial Costs

Monitoring for pilot projects should be conducted for a minimum of 3 years, during this time the key measures should be reviewed from time-to-time, and updated as required. A comprehensive approach should be taken to retain, modify or remove a facility and accordingly should be evaluated in a comprehensive manner.

Monitoring Plan Duration

Monitoring will be conducted for a minimum of 3 years to allow for statistically meaningful data and acquire a significant understanding of the AT pilot project safety, operation and cost-benefit impacts. While 'before' data collection is intended to be conducted prior to construction/modification as a result of pilot project initiation, actual monitoring in the 'after' condition should allow for an education period of 3 to 6 months to allow for adjustment and familiarization with AT features and to observe normalized roadway operations.

Locations for Monitoring

The locations for monitoring are dependent on the pilot project limits and key issues to be observed whether by a surveyor or video surveillance. Intersections, conflict points and other interfaces between motor vehicles and AT users are effective locations for monitoring. In reference to the key measures, specific locations should be determined from the outset of the monitoring plan. Adjustments can be made in the course of the monitoring process as issues arise and require attention.

Times for Monitoring

As the basis of the pilot projects is to accommodate AT users, consideration should be given to the peak periods when there is usage and demand for the purposes of carrying out the monitoring plan. The time of day, lighting, weather, road conditions, etc. all have an impact on AT users to a greater extent than motorists.

Seasonal Variation: Each season includes a distinct set of characteristics, such as level of light in a day, high and low temperatures, weather patterns and ecological functions, which impact AT usage and demand. Lower temperatures and snow may discourage cycling.

Weather: Climatic conditions have a significant bearing on AT users in most cases. Rain, snow and other precipitation creates potentially hazardous road conditions which may discourage cycling and walking.

Location: Adjacent land uses such as colleges and universities will attract students when school is in session and subsequently impacts the level of active transportation use. Hospitals may attract fewer AT users than other destinations, such as a shopping centre.

Time of Day: The time of day will impact the number of users, it can be anticipated that there are morning and evening commuting hours for active transportation users. Cyclists may prefer to use the roadways outside of the normal peak commuting times to avoid traffic.

Public Opinion

It will be important to manage public perception with respect to the pilot projects as public opinion often can determine the success of a project. For AT pilot projects, the expectation is a new facility will attract demand. The planning and design stage should determine the type of anticipated user (experienced vs. novice) however there are instances where unexpected users may be present. Roadside surveys may prove useful in gauging pedestrian and cyclist opinions of a facility both real and perceived.

User surveys assist in managing expectations and may be conducted at different times throughout the monitoring process. At the end of the monitoring period, public input may prove useful in placing value in retaining, modifying or removing the pilot project.

It is noted that the Ministry is selective in its application of roadside surveys. The traffic operational implications, potential safety issues and public privacy issues result in infrequent use of roadside surveys. However if roadside surveys are undertaken by municipal partners, the survey questions will typically collect a general understanding of the nature of the trip and identify specific operational issues.

Survey questions will vary depending on the type of innovative active transportation feature, examples are provided below:

- Purpose of Trip – Utilitarian / Recreational
- Have you walked/cycled more since the new facility was put in the place?
- Are there any points of conflict or safety concern? Where?
- Do you feel safer, less safe, the same since the introduction of the new facility?
- How long is your average cycling trip?
- Where is your trip origin? Where is your trip destination?

Evaluation of Collected Data/Interpretation of Monitoring Results

The measures and results of monitoring evaluation will inform whether to retain, modify or remove a pilot project features. The monitoring plan should be detailed into a report and presented with all data findings in an appendix. The report should be easily understood and practical, such that it can be referenced in the future. The monitoring plan in conjunction with the monitoring measures and thresholds, as aforementioned, should address the following questions:

- What are the specific design goals and objectives?
- Are the design goals and objectives reasonable and measurable?
- Has the project been implemented as planned?
- Does the design meet the operational objectives?
- Does the design result in adverse efficiency impacts (queuing, delay)?
- Does the design result in safety impacts (collisions, conflicts)?
- Does the design result in maintenance impacts, cost and risks?
- Do the achievements of the design outweigh impacts and costs?

- Is the operation sufficiently beneficial to allow continued operation?
- What can be learned from our monitoring and evaluation in order to improve future planning activities and also to improve future monitoring and evaluation efforts?

Conclusions and Recommendations

A monitoring plan provides a consistent, technically sound, efficient and defensible technical framework for evaluation of AT pilot projects. Through the establishment of measures of effectiveness, indicators, data and analysis and thresholds, these elements contribute to a rationale in carrying out monitoring in ensuring safety, operations and cost-benefit.

Recommendations for the monitoring plan process include:

1. AT pilot project workshops could be held for monitoring defining the design features for monitoring and determining of appropriate 'before' data.
2. Ensuring before and after data is available to be collected and measured on a consistent basis.
3. Monitoring measures to be implemented include indicators and specific data requirements determined from the outset.
4. Consideration of desirable and undesirable conditions associated with each of the Pilot Projects features shall be identified and documented.
5. The promotion of the pilot project will encourage AT users and increase awareness about safe usage of the facilities.
6. 'Before' data collected in the early phases of the pilot project should be contrasted with the 'after' conditions to justify and confirm the modification/full removal of the feature(s).
7. The decision to delegate data collection and assessment to a municipality/third-party provider is at the discretion of the Ministry. An agreement shall be prepared clearly outlining tasks, responsibilities, costing, resources, quality control and quality assurance. Complete or partial delegation of tasks may be based on cost-sharing considerations and where collected information would be best suited.

Monitoring for pilot projects should be conducted for a minimum of 3 years, during this time the key measures should be reviewed from time-to-time, and updated as required. A comprehensive approach should be taken to retain, modify or remove a facility and accordingly should be documented. The thresholds as identified for each of the criteria and measures should be evaluated in a comprehensive manner to make the decision to retain, modify or remove the pilot project features.

Following the completion of the monitoring plan, the decision to remove or modify the design features will require discussion within the Ministry and in consultation with municipalities. Where safety and operations are maintained at acceptable levels and there are no further issues identified, the pilot project site can be retained without any further monitoring.

If there are positive benefits resulting from the monitoring plan, there is a potential that innovative AT features be implemented at other locations or adopted as standard practice at the discretion of the Ministry as part of Design Standards updates.