ALBERTA TRANSPORTATION
Road Safety Audit Guidelines

Prepared by:

Geoffrey Ho, P.Eng.
Julian Rozental, P.Eng. (B.C.)

G. Ho Engineering Consultants
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1.0 Road Safety Audit Policy

Alberta Transportation has set its goal to undertake Road Safety Audits (RSA) on road transportation projects at the planning and design stages. This initiative was formalized in Alberta Transportation's business plan and goals tabled through the Legislative Council under "Core Business Objective One: *Manage Transportation Safety Programs*; Goal 2: *Enhance safety through highway system improvements*". In its statement to the Council, Alberta Transportation proposes to *"undertake safety audits at the planning and design stage to ensure overall integration of geometrics, traffic signals, pavement markings and other specialties ....."*

Road transportation projects under the jurisdiction of Alberta Transportation shall be subject to the Road Safety Audit (RSA) process as prescribed by these Guidelines.

2.0 The Purpose of the Guidelines

The purpose of these Guidelines is to:

- describe the subject of road safety audit;
- introduce a set of formal procedures for carrying out road safety audits for Alberta Transportation;
- provide guidance regarding level of effort required based on the type of project; and
- provide guidance on RSA Team requirements.

Road Safety Audits are required to be carried out generally in accordance with the Transportation Association of Canada (TAC) publication, Canadian Road Safety Audit Guide. The Alberta Transportation Guidelines supplement the road safety audit process and procedures described in the Canadian Road Safety Audit Guide and will be updated as practice develops. **It should be noted that irrespective of these guidelines, Alberta Transportation may choose to conduct a road safety audit on any project at any time.**

3.0 Road Safety Audit Objectives

The traditional approach to road safety engineering uses collision data to identify high collision locations and remedial measures to reduce the number and severity of collisions. Projects are then identified to reduce the specific collisions occurring at a site, on a corridor, or throughout an area.

A complementary methodology is collision prevention. With new roads or improvements to existing roads, collision occurrence can be reduced by adopting a proactive approach during the planning and design process. This system is the road safety audit and is described in more detail in Section 5.

A Road Safety Audit can best be described by both what it is and what it isn't. A road safety audit is a process for systematically assessing the safety of road transportation projects, based on sound road safety engineering principles and undertaken from the road users' perspectives. A road safety audit is an input to the design process that provides an independent assessment of the safety performance of a road transportation project, carried out at predetermined intervals by road safety specialists. A road safety audit is defined in the TAC Canadian Road Safety Audit Guide as follows:

> *A road safety audit is a formal and independent safety performance review of a road transportation project by an experienced team of safety specialists, addressing the safety for all road users.*

The objectives of a road safety audit are to:

- minimise the frequency and severity of preventable collisions;
- consider the safety of all road users, including vulnerable road users;
- ensure that collision mitigation measures that may eliminate or reduce potential safety problems are considered fully; and
- minimise potentially negative safety impacts both within and outside the project limits, i.e. to avoid introducing collisions elsewhere along the route or on the network.

The road safety audit is not a complete solution to the road safety problem. It does not replace other road safety strategies that Alberta Transportation may be undertaking. It is an additional tool that is used to further reduce the frequency and severity of collisions on Alberta roads. A road safety audit is not an opportunity to redesign a project or evaluate different options, nor a check for adherence to design guidelines.

4.0 Legal Issues

As suggested in the TAC Canadian Road Safety Audit Guide, Alberta Transportation has sought its own legal advice concerning liability issues with respect to road safety audits. It is important that a clear procedure for managing and organising road safety audit is established, and that the practice of undertaking and reporting road safety audit is clearly specified, and that the actions are fully and consistently documented.

Alberta Transportation should:

- maintain and document a formal set of road safety audit procedures;
- ensure that each road safety audit has clear terms of reference;
- ensure that staff and consultants in charge of the project are aware of their responsibilities in a road safety audit; and
- ensure that road safety audits are undertaken by competent road safety audit teams.

In undertaking road safety audits, Road Safety Auditors should:

- document what information has been received by the road safety audit team and subsequently used as information to assist with the road safety audit;
- ensure that, if applicable, safety issues raised at earlier stages which have not been addressed, are re-examined where and as appropriate;
- ensure that the road safety audit team members are aware of their responsibilities in undertaking a road safety audit; and
- maintain a record of the full documentation for each road safety audit undertaken.

5.0 Road Safety Audit Procedures

5.1 Introduction

This section is set out to provide a clear set of road safety audit procedures for Alberta Transportation.

The road safety audit procedures contain information on:

- Scope
- When to conduct road safety audits
- The type of project that requires road safety audits
- Road safety audit Team
- Road safety audit Report and the Response Report
- Road safety audit for Alternate Delivery Projects (Design/Build, P3, External Agency)

These Guidelines for road safety audits refer to the Executive Director of Technical Standards Branch as the final decision-maker or arbiter for the road safety audit process. The Technical Standards Branch should therefore carry ultimate responsibility for the road safety audit process. For project specific issues related to road safety audits, either the Regional Director or the Project Sponsor will be the final decision-maker. A road safety audit committee will monitor and review the road safety audit process on a regular basis, and make recommendations for changes if necessary.

5.2 Scope

The primary purpose of road safety audit is to identify potential road safety issues and make suggestions within a function plan, design, or prior to opening, of a highway transportation project for all road users, under all operating conditions.

Road safety audit should not consider structural integrity (i.e. non-operational safety issues), only those matters which have an adverse effect on road safety. Road safety audit is not a check of compliance with design standards or domains. A Road Safety Audit does not protect the designer or constructor of the project from non-compliance with design standards or domains. It should be noted that the project design team remains ultimately responsible for the design.

Suggestions for dealing with identified safety issues should be consistent with the stage of the project. For example, strategic decisions on route choice and intersection type and spacings reflect a balance of factors including safety. Suggestions requiring major changes in these areas are therefore unlikely to be acceptable after the planning or preliminary design stage.

These procedures do not cover road maintenance or temporary road projects unless a specific requirement to carry out a road safety audit has been specified in the project brief or contract.

In-service road safety audits are a sub-set, and can be considered a distinct stage of the road safety audit; they are conducted on roads in-service, and are proactive in nature compared to in-service road safety reviews. In-service road safety audits are most beneficial for jurisdictions where collision records are either not kept or difficult to obtain. **It was determined that the in-service road safety audit stage would not be undertaken by Alberta Transportation.**

5.3 When to conduct Road Safety Audits

The road safety audit stages described in the TAC Canadian Road Safety Audit Guide include planning, preliminary design, detailed design, construction and pre-opening. Alberta Transportation uses unique RSA terminology for various audit stages to avoid confusion with its engineering process. The road safety audit stages as defined by the TAC Guide and the Alberta Transportation equivalent are summarized in **Table 1**.

TABLE 1 Road Safety Audit Stage Equivalency Table

TAC Canadian RSA Guide Terminology	Alberta Transportation Equivalent
Planning Stage RSA	Stage 1 RSA
Preliminary Design Stage RSA	Stage 2 RSA
Detailed Design Stage RSA	Stage 3 RSA
Pre-opening Stage RSA	Pre-opening Stage RSA

An outline for each of the road safety audit stages and an illustrative summary of the type of issues that could be raised during the various road safety audit stages are provided in **Appendix A**.

The road safety audit requirements at the appropriate stages for various Alberta Transportation engineering processes provided in these Guidelines are exclusively for the traditional project delivery method involving design, tender and construction. Requirements for road safety audits for the Public-Private-Partnership (P3) or design-build delivery method are provided in **Appendix B** for reference.

5.3.1 Road Safety Audit Stages

Road safety audit should be conducted at the following stages of the life-cycle of a project:

A. Functional Planning

The road safety audit requirements for functional planning are different for projects initiated before 2004 and after 2004, and are described below.

For functional planning projects initiated in 2004, the road safety audit requirements are:

- Provide safety input at the design criteria selection stage early in the planning process. This can be done by the same independent safety audit team that will provide safety audit services to the project;

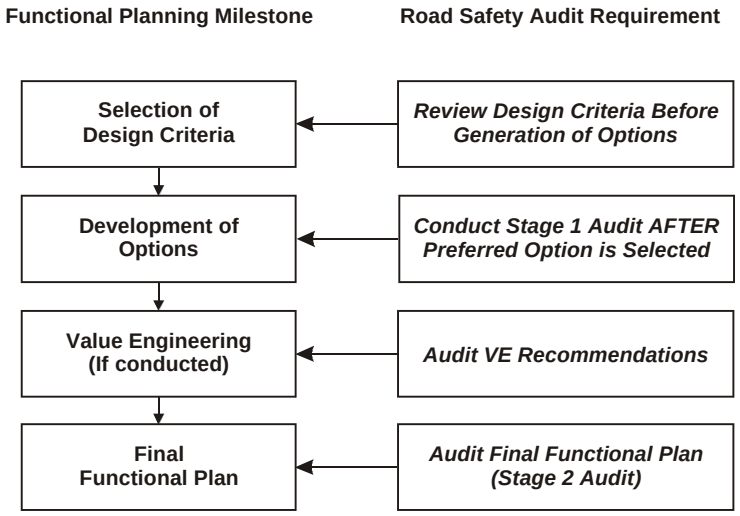
- A Stage 1 road safety audit to be conducted once the desired option is selected;

- If value engineering is undertaken on the preferred option, then a Stage 1 or 2 road safety audit (depending on when the value engineering is conducted) should be conducted on the preferred option and the associated VE proposals immediately after the value engineering is completed; and,

- A Stage 2 road safety audit should be conducted at the 95% stage of the Functional Plan before the final submission of the functional planning report, to allow for changes.

The recommended road safety activities for functional planning are illustrated in a flow chart in **Figure 1**.

FIGURE 1 Functional Planning Process and Recommended Road Safety Input/Audits



For functional planning projects initiated in 2003 or before, and functional planning projects that are already completed, a Stage 2 road safety audit is required **prior to the commencement of preliminary engineering,** and the process is illustrated in the flow chart in **Figure 2**. A road safety audit should be conducted if the project meets one or more of the following criteria, however, the need for an audit remains at the discretion of the project manager.

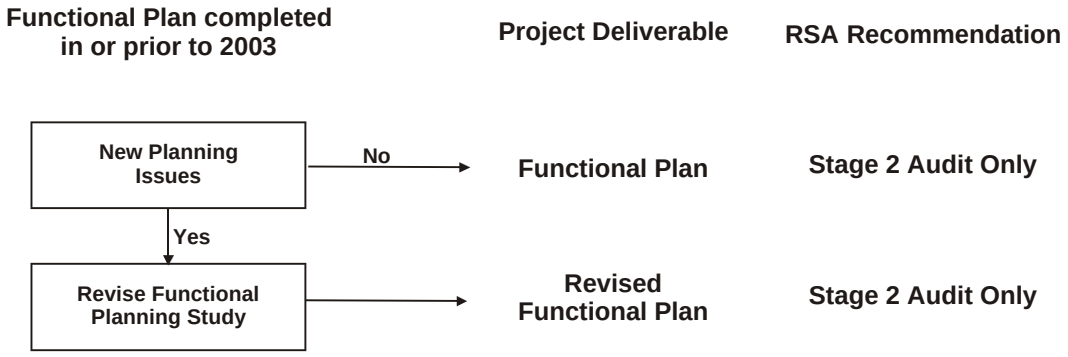
- **Complex Design** (interchanges, unconventional/complex intersections, curvilinear road segments, bridges etc…)

- **Introduce new road features** (new lanes, new traffic control devices, changes in alignment, etc…)

- **Significant presence of vulnerable road users** (elderly, children, cyclists, motorcyclists, etc…)

- **Significant presence of other interacting road transportation modes** (commercial vehicles, farm vehicles, railway crossings, horses, etc…)

FIGURE 2 Recommended Road Safety Audit Requirements for Functional Plans Completed in or Prior to 2003



B. Engineering Assessment

Engineering Assessments are conducted on projects three to five years in advance of construction. Engineering assessments are typically conducted to identify, prioritize and determine the scope of the project prior to detailed engineering work is undertaken. Road safety audits are not required for engineering assessment assignments.

C. Bridge Planning

Bridge planning is recognized as a distinct engineering process in the Alberta Transportation project delivery process. A Stage 2 road safety audit should be conducted at the 95% stage of the Design Data Drawing (DD Drawing) stage prior to completion.

For DD Drawings already completed before 2004 and where a RSA was not conducted, the department should consider conducting a Stage 2 RSA prior to proceeding with the design.

D. Design

The Alberta Transportation Highway Engineering projects proceed to the design stage with preliminary engineering and detailed design. A consultant is typically hired to conduct the design. The deliverables from the consultant will be a tender package submitted to the project sponsor. The road safety audit requirements are:

- A **Stage 3 road safety audit** should be conducted prior to the Milestone "Modify Design Based on Recommendations from Others" (before 75% completion of the project and is the equivalent of the 90% to 95% stage of the design) by the consultant. The Stage 3 road safety audit provides a final input to the proposed design before it is finalized for tender.

At the Stage 3 audit, it may also be appropriate to audit the traffic accommodation plans, when complex projects are involved with significant detours and construction staging. The project manager should decide whether an audit of the traffic accommodation plan is required. It should be noted that the daily management of construction detour should remain the responsibilities of the contractor.

If a design / tender package was completed prior to 2004, and no road safety audit has been conducted, it is desirable to conduct a Stage 3 RSA if time and budget allows, otherwise only a pre-opening stage RSA will be required.

E. Tender and Construction

Once the detailed engineering and design is completed, the project is tendered and proceeds to construction. The road safety audit requirements at this stage are:

- Road safety audits should be considered at the pre-opening/post-construction stage.

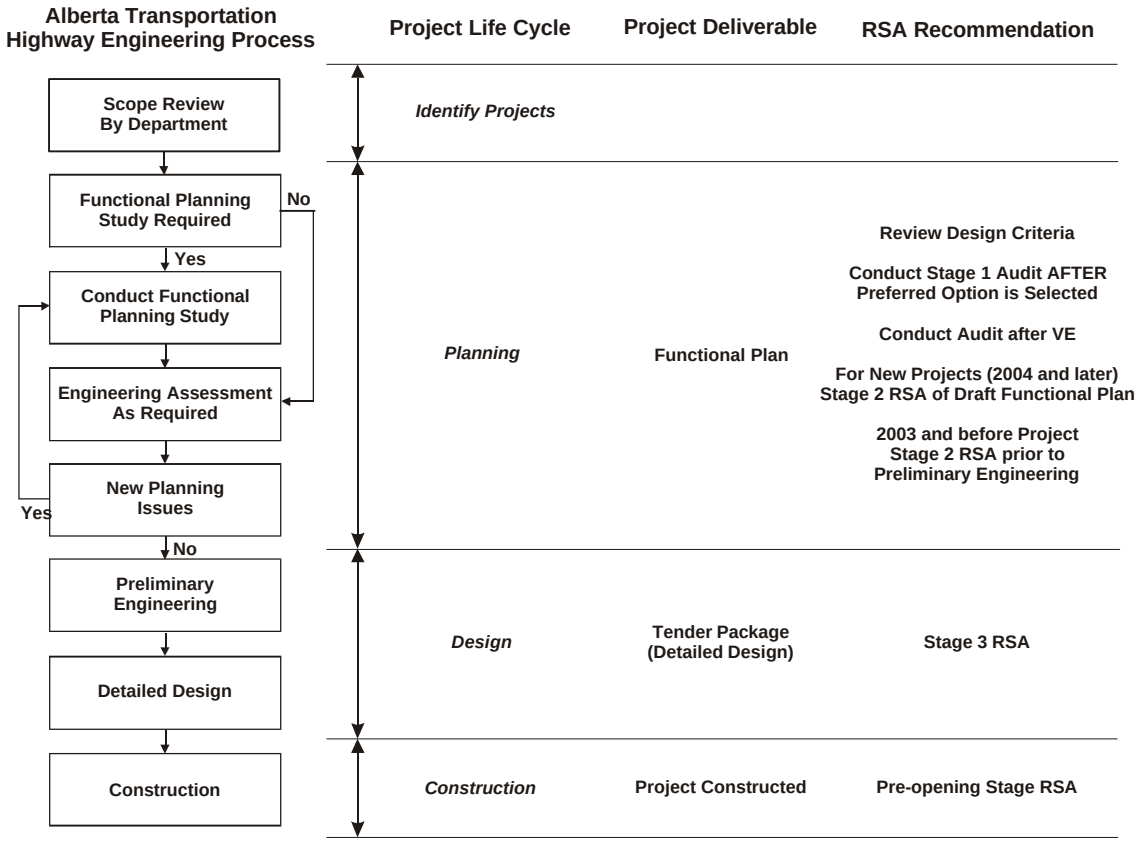
- Pre-opening stage audits should be mandatory if the project is a new road construction (i.e. green-field project).

- For retrofit projects, consider conducting pre-opening stage audits when the project is substantially completed (i.e. pavement markings and signing are installed, but project still has budget to address issues raised by the road safety audits).

- If value engineering is conducted on the design at the post-tendered/pre-construction stage, the value engineering proposals should also be audited and the road safety audit should be included in the VE proposal.

Figure 3 summarized the recommended road safety audits stages at various stages of a project.

FIGURE 3 Required Road Safety Audit Stages



5.4 Road Safety Audit Requirements by Project Type

A summary of the required road safety audit stages by project types is provided in **Table 2**. A pilot program is recommended to determine whether it is cost effective to conduct road safety audits on other project types such as 3R/4R, bridge, culvert and site development projects. The pilot project requirements are provided in **Appendix C**. The final requirements will be updated once the pilot projects are evaluated to determine whether road safety audits are suitable.

TABLE 2 Summary of Road Safety Audit Requirements by Project Types and Locations

Project Type	Location	Road Safety Audit Stage			
		Stage 1	Stage 2	Stage 3	Pre-opening
Interchange	Urban	✓	✓	✓	✓
	Rural	✓	✓	✓	✓
Widening	Urban	✓	✓	✓	✓
	Rural		✓	✓	✓
Intersection Improvements	Urban		✓	✓	✓
	Rural		✓	✓	✓
Edmonton/Calgary Ring Roads/NSTC	Urban	✓	✓	✓	✓
Reconstruction/ Realignment	Urban	✓	✓	✓	✓
	Rural		✓	✓	✓

✓ *denotes recommended road safety audit stage*

NSTC denotes North South Trade Corridor

In addition, for cost-shared projects with the Federal and local governments, the following requirements apply:

- Road safety audits are required for projects funded by the Federal Government regardless of project type as required by Transport Canada.

5.5 Road Safety Audit Team

For general road safety audit team requirements, refer to the TAC Canadian Road Safety Audit Guide. In addition, the following specific requirements apply:

- The road safety audit team shall consist of a minimum of **two** people.

- The road safety audit should be carried out by **specialist consultants** trained in RSA practice. Alberta Transportation will pre-qualify a list for RSA consultants, and the planning/design teams must choose from the pre-qualified list and include in their proposal.

- The road safety audit team should be retained as a sub-consultant by **the planning or design consultant** responsible for the project**,** as an independent team, and the RSA Team should be compensated through the prime consultant. The project design team will be required to demonstrate that the road safety audit has been carried out in accordance with these Procedures. In particular, the complete independence and the qualifications of the entire road safety audit team as prescribed below, shall be demonstrated. The proposal review and selection criteria will include adequacy of RSA Team credentials.

- For projects not undertaken by planning or design consultants, Alberta Transportation may choose a RSA Team from the pre-qualified list, and compensation will be provided through a service agreement with the department.

Appropriate experience for road safety auditors includes:

- Successful completion of a safety audit training course of at least 2 days duration recognized by Alberta Transportation;

- At least 5 years experience in relevant road safety, road design, or traffic engineering fields; and

- Kept their road safety audit experience current by undertaking at least one audit per year in the past two years.

To be designated as the Team Leader, an individual has to also satisfy the following:

- Has undertaken at least five formal road safety audits in the past three years, including at least three audits conducted at design stages.

- For more complex projects, the Team Leader should have undertaken at least 10 road safety audits in the past three years, including at least five audits as Team Leader.

5.6 Road Safety Audit Report and the Response Report

5.6.1 Road Safety Audit Report

The road safety audit report should follow the procedures described in the TAC Canadian Road Safety Audit Guide. In addition, the following specific requirements apply:

The project team is responsible for obtaining a road safety audit report from the audit team. A copy of the road safety audit report must be made available to Alberta Transportation.

The timeline for producing the road safety audit report should be agreed between the project team and the road safety audit team. A reasonable time scales can range from 5 days for a simple report up to 20 days for a complex project.

5.6.2 Response Report

The response report should follow the procedures described in the TAC Canadian Road Safety Audit Guide. The project design team must provide a response report to the road safety audit within a reasonable period of time determined in consultation with Alberta Transportation. In preparing the response report, the project team should consult with the project sponsor. Possible responses are:

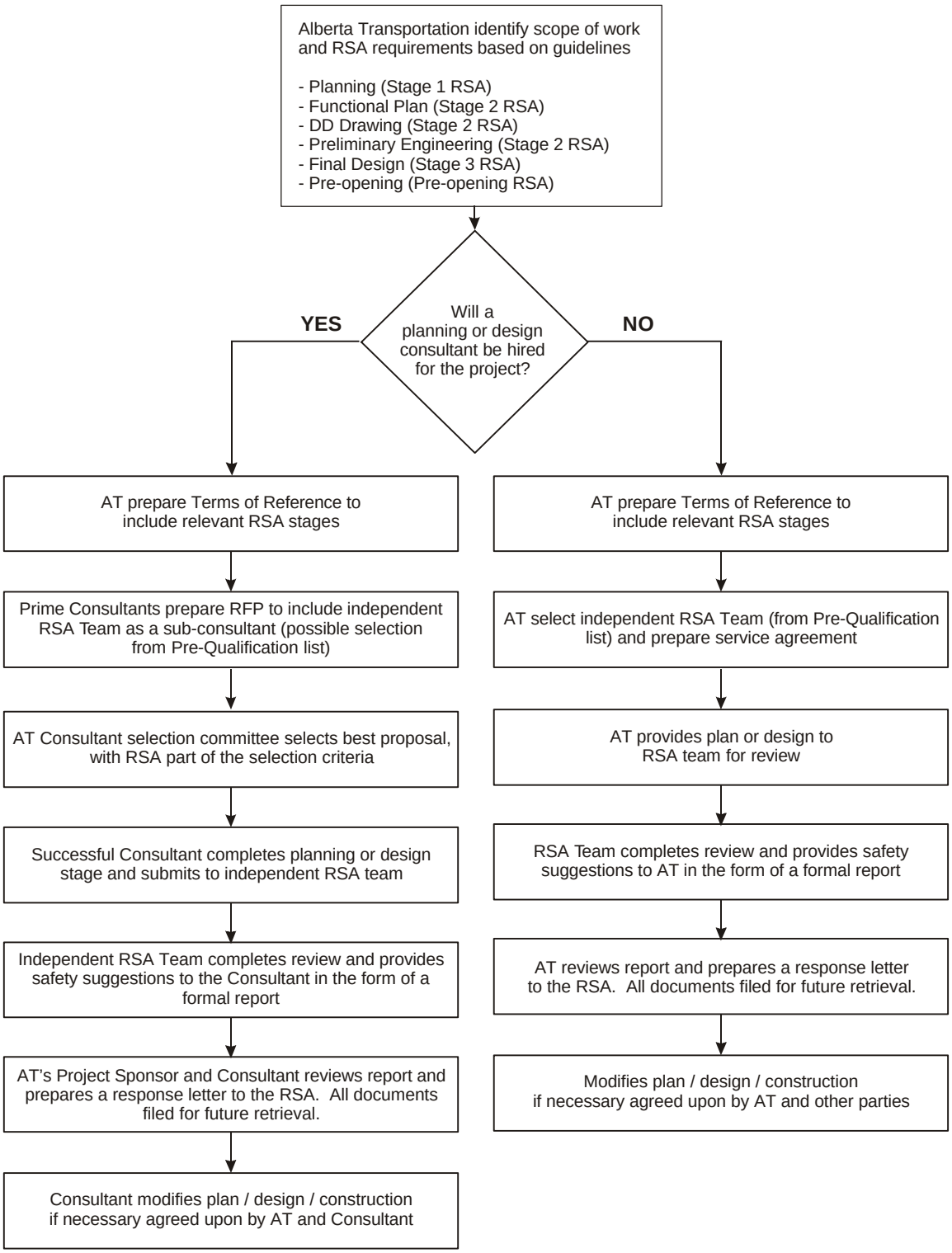
1. Accept in full and implement changes to project
2. Conditionally accept with modifications. The response report should document the reasons for the modifications
3. Reject with reason

It should be noted that it is not the responsibility of the road safety auditor to decide whether the response is appropriate. That responsibility belongs to the project owner.

5.7 Summary Flowchart

A flowchart summarizing various road safety audit activities for administering road safety audits in Alberta Transportation projects is provided in Figure 4. The process and activities are slightly different for projects that will include a planning or design consultant and for projects that are already completed and no planning or design consultants will be hired.

FIGURE 4 Steps for Administering Road Safety Audits in Alberta Transportation Projects



Appendix A – Road Safety Audit Stage

An outline for each of the road safety audit stages is provided as follows:

STAGE 1 (PLANNING STAGE) AUDIT

At this stage the audit team would review the fundamental design/planning elements related to alignment, laning, facility classification, access management concept, project limits, design speed and design criteria.

STAGE 2 (PRELIMINARY DESIGN STAGE) AUDIT

At this stage the audit team would review the design elements that can still be changed, such as cross-section dimensions, interchange/intersection layout, traffic operations, access, drainage, clear zones and the interaction of road users.

STAGE 3 (DETAILED DESIGN STAGE) AUDIT

This audit would be undertaken just prior to the submission of the final design plans. This will provide an opportunity to address any remaining issues from the previous audits and to correct, if necessary, prior to construction.

PRE-OPENING STAGE AUDIT

The objective of this stage is to ensure that the results of the design and the design audits were correctly implemented. The focus is on the implementation details such as signing location and visibility, paintmarkings and delineation, visual impacts and connectivity with existing infrastructure.

Table A-1 provides an illustrative summary of the type of issues that could be raised during the various road safety audit stages.

Table A-1 Highlight of Potential Safety Issues at Various Road Safety Audit Stages

	Stage 1 (Planning)	Stage 2 (Prelim. Design)	Stage 3 (Detailed Design)	Pre-Opening Stage
Potential Safety Issues	Design Criteria	Design volume and traffic characteristics	Action taken as a result of previous audit	Action taken as a result of 90%-100% Design Audit
	Design Consistency	Design Speeds and Speed Limits	Road, Intersection, and Interchange Design Details	Intersection/Interchange Details
	Project Scope, function and traffic mix	Typical Cross Sections and Variations	Alignment Details	Alignment Details
	Route choice	Horizontal and vertical alignment	Signing and Pavement Markings	Signs and Pavement Markings Placement and Visibility
	Access management & Adjacent Developments	Visibility and Sight Distance	Shoulder Treatments, Clear zones, Roadside Features	Shoulder Treatments, Clear zones, Roadside Features
	Continuity with existing network	Vulnerable Road Users	Channelization	Access Management and Control
	Design speed, volume & traffic characteristics	Lighting	Lighting and Drainage	Lighting (night visit), Drainage
	Interchange/ Intersection Layouts & Traffic Controls	Drainage	Bridges and Culverts Treatment	Bridges and Culverts Treatment
	Interchange/ intersection Spacing	Shoulders & Clear Zone	Bridges and Culverts Treatment	Traffic Signals and Control
	Tie-ins with existing network	Driver Expectancy	Traffic Signals and Control	Vulnerable Road Users
	Deviation from Design Domains	Interaction with Road Users	Vulnerable Road Users	Roadside Hazards
	Future Works and Wider Network Effects	Signs	Barriers, Guard Rails, Utility Poles, and Obstructions	Street Furniture and Landscaping
	Environmental Constraints	Environmental Constraints	Street Furniture and Landscaping	

Appendix B – Road Safety Audit Requirements for P3 Projects

Public-private partnership (P3) projects (sometimes referred to as design-build projects) is a project delivery model in which the private sector designer-builder forges a single contract with the project owner to provide engineering design and construction services. Greater efficiency can be achieved in P3 projects. Variations of P3 projects include Design-Build-Operate (DBO), Design-Build-Operate-Transfer (DBOT), Design-Build-Develop (DBD) among others.

For P3 projects, the following issues should be considered for incorporating road safety audits as part of the proponent's requirements, subject to the criteria set in this Guidelines:

1. Road safety audits should be considered as part of the P3 or Design-Build RFP, and it is the proponent's responsibility to hire the road safety audit team and administer the road safety audit process.

- If a road safety audit is required, a proponent's proposed road safety audit team should be identified in the Expression of Interest (EOI) together with details of each member's qualifications. Once a proponent has been short-listed, no changes to the proposed road safety audit team should be permitted, except by approval of the Owner. In this way, the qualifications issue does not have to be addressed during the RFP stage.

2. If a road safety audit is required, the RFP should require that proponents use the Alberta Transportation Guidelines and the TAC Canadian Road Safety Audit Guide in preparing the safety audit component of their proposals. Additional or alternative requirements that are specific to the needs of a particular project can be added by the Owner if necessary.

3. The RFP should include provisions that allow the Owner to negotiate the terms of the successful proponent's proposed road safety audit methodology and prices. This provision could be covered by a blanket provision in the RFP that covers negotiation ability on all aspects of a proponent's proposal.

4. If a road safety audit is required, the Owner must recognize that any audit findings, if accepted, could constitute changes in the scope of work as specified in the RFP, and may result in the design/build contractor claiming for additional compensation. At the same time, the Owner may want to minimize the potential for rejecting potentially advantageous safety proposals from consideration of cost alone.

   To minimize the likelihood of additional claims, the conceptual design that forms the basis of the RFP should either be well thought out or the scope of the potential changes well defined in advance. To this end, a stage 1 and 2 road safety audit could be done independently by the Owner on the conceptual design prior to the release of the RFP. The road safety audit report and the response by the Owner should then be

issued as part of the RFP. This will provide a basis to the proponent's team as to what features of the design can be realistically subjected to changes or to define the limits of such changes. In that case, the Owner may take certain responsibilities for the changes indicated in the pre-RFP road safety audit.
This is illustrated in the following table:

Issue raised in RFP	RFP audit suggestion	Consequence
Owner accepts it is an issue.	Owner accepts	Defined modification becomes part of the project
Owner accepts it is an issue	Owner accepts in principle	Specific modification to resolve the issue is the responsibility of the proponent as part of the project. Subsequent RSA may confirm the adequacy of the solution.
Rejects the issue	N/A	Owner takes responsibility and subsequent RSA may not need to address this issue.

Appendix C – RSA Pilot Program Summary

Project Type	Location	Road Safety Audit Stage				Comment
		Stage 1	**Stage 2**	**Stage 3**	**Pre-opening**	
3R/4R	**Urban**			✓	✓	**Pilot Project Candidate**
	Rural			✓	✓	
Bridge Replacement	**Urban**		✓	✓	✓	
	Rural		✓	✓	✓	
Site Development	**Urban**	✓	✓	✓	✓	
	Rural			✓	✓	
Bridge	**Urban**		✓	✓	✓	**Pilot Project Candidate for Stand-alone Projects Only**
	Rural		✓	✓	✓	
Culvert Replacement	**Urban**			✓	✓	
	Rural			✓	✓	
Grading	**Urban**			✓	✓	**Pilot Project Candidate for Stage 2 Grading Projects**
	Rural				✓	

✓ denotes recommended road safety audit stage