

APPENDIX D: SURVEY FORM AND RESPONSE DATA RSAP Version 3.0.0

N C H R P 22-27

TRANSPORTATION RESEARCH BOARD
NAS-NRC
LIMITED USE DOCUMENT

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RoadSafe LLC
12 Main Street
Canton, Maine 04221

October 25, 2012

1. RSAP User Survey

1. Please provide the following OPTIONAL information about yourself.

Name:

Company:

Address:

Address 2:

City/Town:

State:

ZIP/Postal Code:

Country:

Email Address:

Phone Number:

2. What type of work do you do? (check all that apply)

- Roadside design
- Highway design
- Policy work
- Roadside research
- Highway design research
- Other (please specify)
-

3. Which highway design software tools does your company/organization use for design and plan production. (check all that apply)

- None
- AutoCAD Civil 3D
- Autodesk Land Development Desktop
- Bentley GeoPak
- Bentley InRoads
- Other (please specify)
-

4. Please list other software tools you use to assist with design decisions and cost analysis.

5. The Roadside Safety Analysis Program (RSAP) has been developed for risk analysis and cost-benefit analysis of roadside safety and design. It is distributed with the Roadside Design Guide. How frequently do you use RSAP?

- Never
- 1-5 times/year
- 6-10 times/year
- 10-20 times/year
- > 20 times/year

2. Used RSAP

1. What have you used RSAP to evaluate? (check all that apply)

- Specific project design alternatives.
- Policy alternatives.
- Other (please specify)

2. Do you like the RSAP user interface?

- Yes
- No

Suggestions for improvements or comment:

3. Do you like RSAP functionalities?

- Yes
- No

Suggestions for improvements or comment:

4. Do you find the RSAP default data tables appropriate?

- Yes
- No

Suggestions for improvements or comment:

5. Do you like the RSAP methodology?

- Yes
- No

Suggestions for improvements or comment:

6. Do you find the User's Manual helpful?

- Yes
- No

Suggestions for improvements or comment:

7. Do you find the Engineer's Manual helpful?

- Yes
- No

Suggestions for improvements or comment:

8. While using RSAP, have you encountered any incidents where your analysis results from RSAP were inconsistent with your experience/expectations/judgement?

9. Are you aware of reports or papers about RSAP documenting its use? Please list them here.

10. What improvements would you like to see made to RSAP?

11. Which features of RSAP would you like to see remain unchanged in the next release?

12. Do you see value in integrating RSAP with popular highway design software tools such as AutoCAD Civil 3D or Bentley InRoads?

- Yes
- No

Comment:

3. Never used RSAP

1. Do you see a potential use for evaluating the Cost/Benefit of roadside design alternatives using software integrated with your highway design software?

Yes

No

Other (please specify)

2. Do you believe safety, or the potential for crashes should be considered when designing highway improvements?

Yes

No

Other (please specify)

4. Last Page

1. Thank you for your time. If you would like to be a beta tester for the RSAP upgrade, please list your contact information, including your e-mail, here.

Survey Results

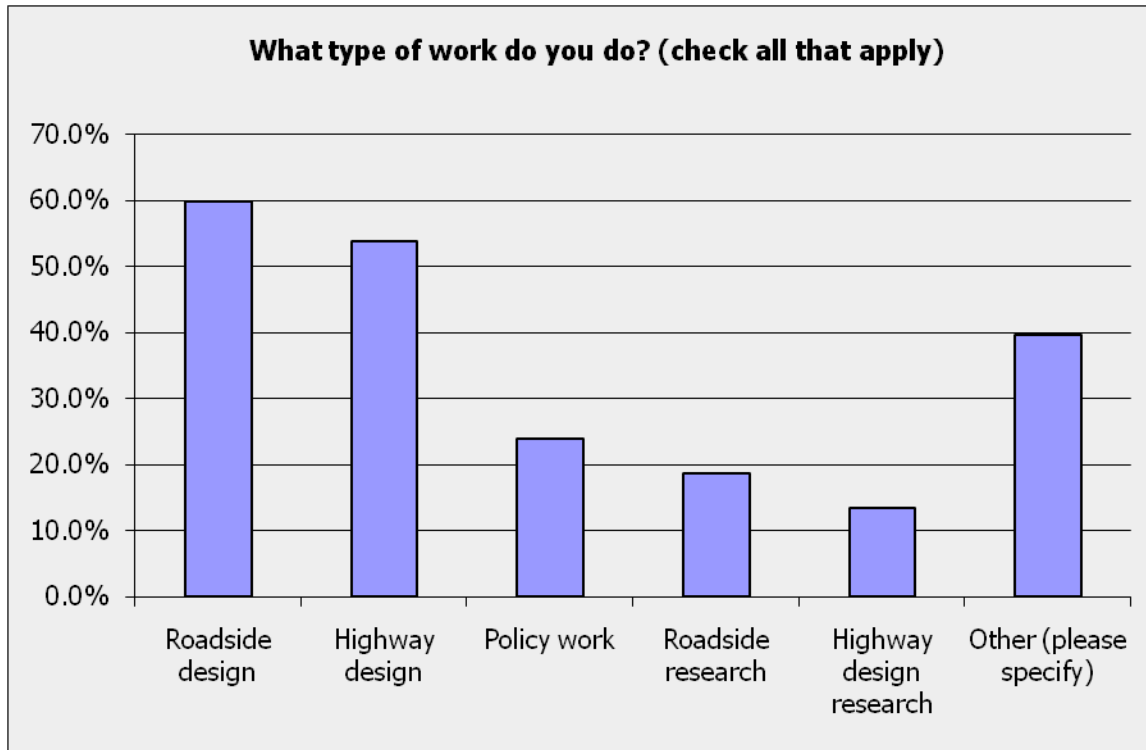
NCHRP Project 22-27

**ROADSIDE SAFETY ANALYSIS
PROGRAM (RSAP) UPDATE**

SR.1 Please provide the following OPTIONAL information about yourself.

Answer Options	Response Percent	Response Count
Name:	85.1%	86
Company:	85.1%	86
Address:	83.2%	84
Address 2:	19.8%	20
City/Town:	85.1%	86
State:	95.0%	96
ZIP/Postal Code:	86.1%	87
Country:	85.1%	86
Email Address:	77.2%	78
Phone Number:	70.3%	71
<i>answered question</i>		101
<i>skipped question</i>		35

SR.2 What type of work do you do? (check all that apply)

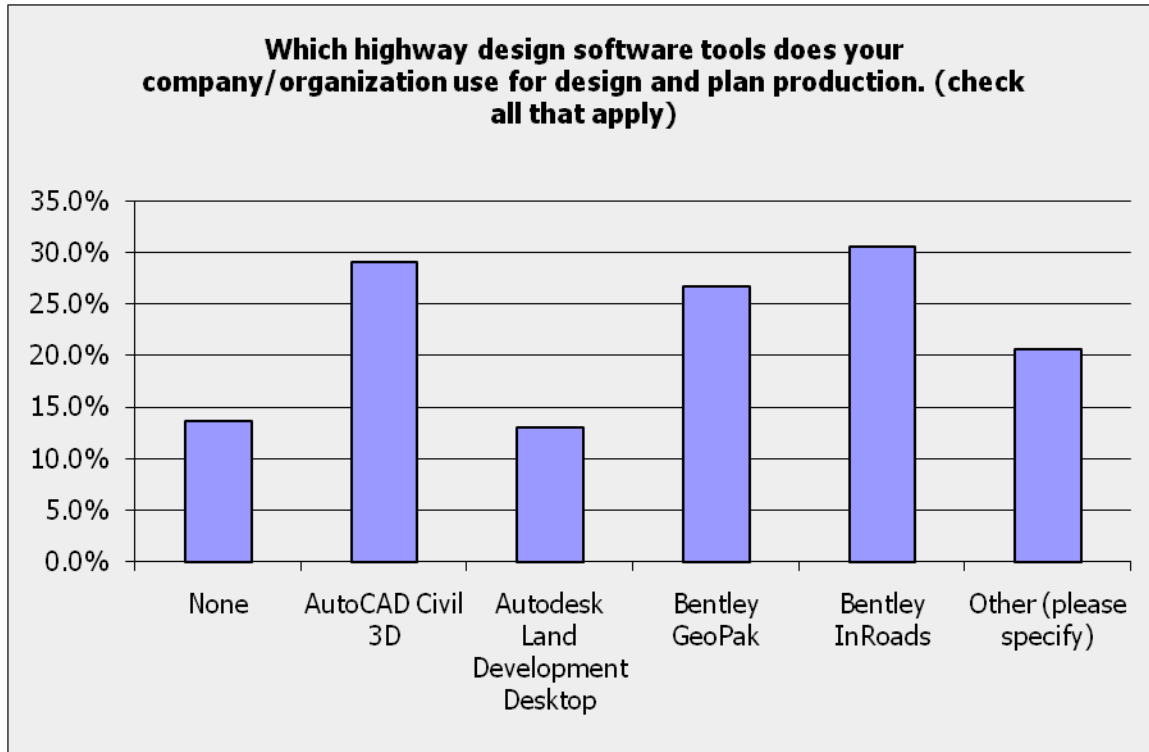


Other (please specify):

- Traffic analysis
- We specified some products for the road construction and design culverts
- Bridge design

bridge structures
Manufacturer of Roadside Safety Products
Consulting
Traffic Design
Land Development, Access Road Design
Fabricator of road side devices
Highway Construction
traffic control maintainer
Electrical systems for Highways
Traffic Studies
Geometrics/Standards Engineer for State
Bridge Design
Roadside hardware policy
City street design/construction
Design Standards Development
Roadside Design Training
Safety appurtance design and research
Geometric Design Guidelines
Guardrail design
Safety and design technical assistance
Training in Roadside Design
Traffic Engineering Design
MFG
Land Development with Entrance Improvements
Traffic Engineer
Review roadwa plans and constructor schedules
noise barrier manufacturer
Train sign crews for installations
Rail and Track Design
Highway construction
supply steel cable to mfgs of cable median barrier
Local roads
project management of traffic safety related projects
Mfg roadside Safety Hardware & Barrier
Construction management
Traffic Safety & Operations
work zone I.T.S.
Engineering Education
Stream restoration
Stream restoration
Establish roadside policy
Feasibility studies
Traffic/Accident Investigations
traffic safety reviews
Safety Investigation
Product Development
Investigate locations with significant collisions.
Highway Safety Engineering
MFG Highway Safety Products
Local streets design

SR.3 Which highway design software tools does your company/organization use for design and plan production. (check all that apply)



Other (please specify):

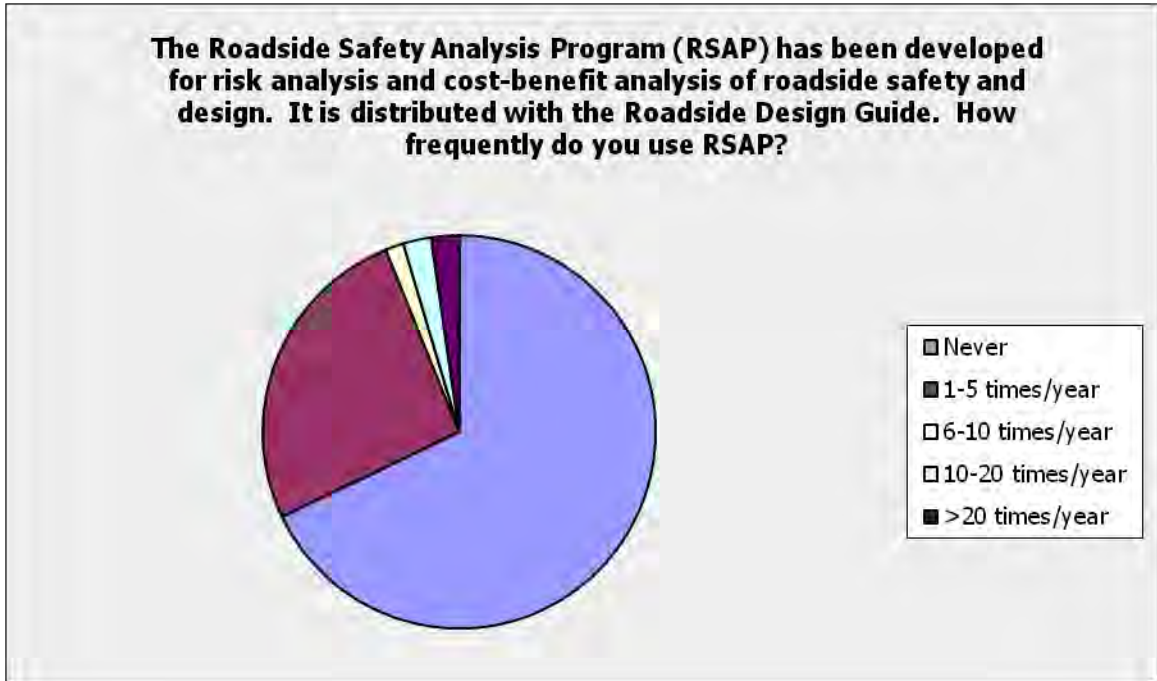
excell by Microsoft
 Bentley MX
 Bentley MX
 AutoCad LT, SignCad
 Bentley Microstation
 tapco sign it inventory software and sign making software
 DeSantis Engineering Software Programs
 SolidWorks
 Solidworks
 MicroStation Version 8 & Version XM
 CAiCE
 AutoCAD
 AutoCad and SolidWork
 Dyna 3D

Microstation
 Microstation
 DeSantis Engineering Software
 DeSantis Engineering Software
 Autocad LT
 Rapid Plan by Invarion
 Bentley Microstation
 Bently Microstation V8
 Microstation (Bently)
 2D Autocad
 Microstation, HydroCADD, ArcGIS, etc.
 Microstation, CAiCE,
 Microstation, Caice

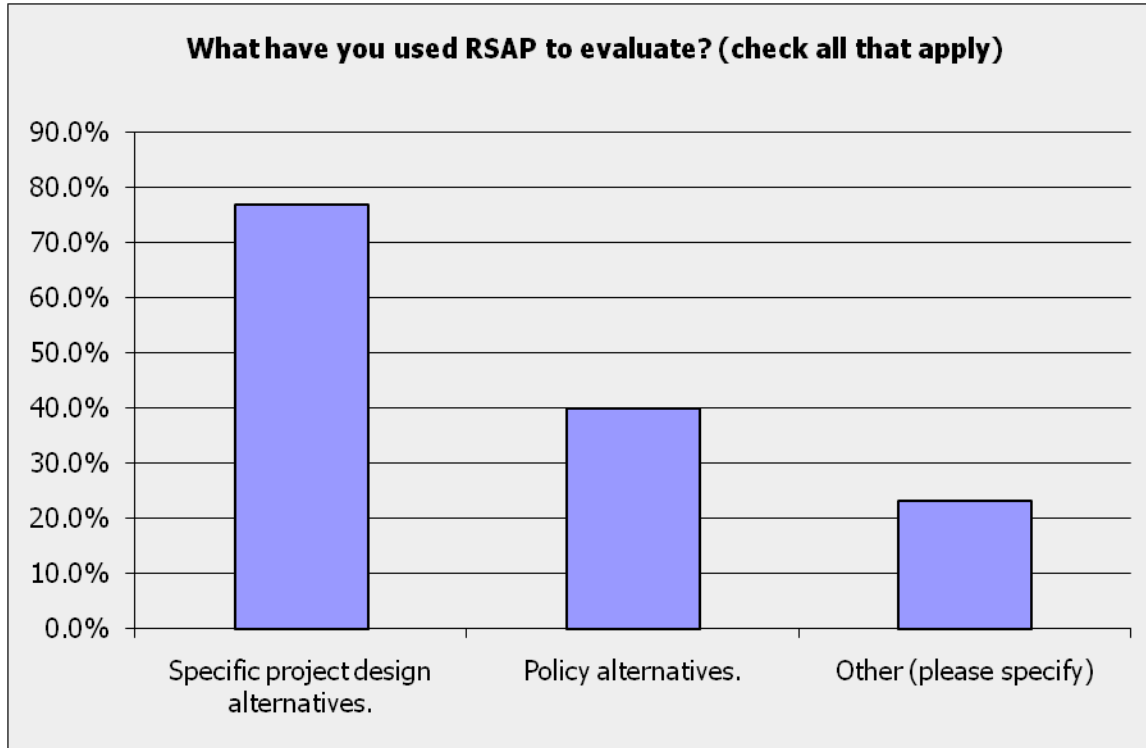
SR.4 Please list other software tools you use to assist with design decisions and cost analysis.

WaterCAD, Pond Pack, Flowmaster, Culvertmaster
staad pro, signit,
None
See the list of software at http://www.sddot.com/pe/roaddesign/office_software.asp
Microsoft Excell
besides RSAP none
ESRI ArcMap 9.3
SYNCHRO, CorSim, Vissim, HCS, Microsoft Project
There is a need to give the District offices a better awareness of the IHSDM as well as RSAP.
AutoTurn
DeSantis Engineering Software Programs - High Mast; Span; End Frame; Mast Arm; Cantilever Sign;
Base Plate; Handhole
Microsoft Excel, TxDOT programs (PSTRS14, BGS, etc.), MDX, RISA
Excel, Fortran, Matlab, AutoCAD, RSAP, LS-DYNA, BARRIER VII
RSAP, BARRIER VII, LS-DYNA
Microsoft Visio, Excel, WSDOT Internal data bases.
Excel and some in-house produced software
GuideSign, Autoturn
iPM, PCES
PathTracker in-house vehicle off-tracking software.
None
Excell, Hawkeye, iRAPtools
AutoTurn, Synchro, HCM
Dyna 3d
TransLink
AutoTurn
AASHTO Estimating software
InRail
Autocad
Excel
In house excel spreadsheets
Autoturn
AutoTrack, Bentley Storm & Sanitary
MS Excel
Microstation
Synchro; AutoTurn; HCS; aaSIDRA; SimTraffic
Our internal B/C program
Excel
Microsoft Excel
Microsoft Excel
Synchro, Promics, Traffix
Headquarters software that analyze cost benefit factors.
Estimate using estimator, bid price histories, means, etc. We estimate accident reductions using published ARF's and NYSDOT's accident reduction factors. We use willingness to pay to estimate the savings per FHWA T7570.1. MS Excel to perform B/C ratios per FHWA approved methodology.
EXCEL, Roadview Player by Mandli, Google Maps

SR.5 The Roadside Safety Analysis Program (RSAP) has been developed for risk analysis and cost-benefit analysis of roadside safety and design. It is distributed with the Roadside Design Guide. How frequently do you use RSAP?



SR.6 What have you used RSAP to evaluate? (check all that apply)



Other (please specify):

program usability and reliability

We sometimes used the warrants in the Roadside Design Guided and State Design Manual, which I understand were derived using RSAP or similar application.

Treatment of hazard classes dependent on roadway characteristics, treatment of general hazard classes on low-volume roadways, evaluation of different guardrail designs for varying hazards and roadside configurations

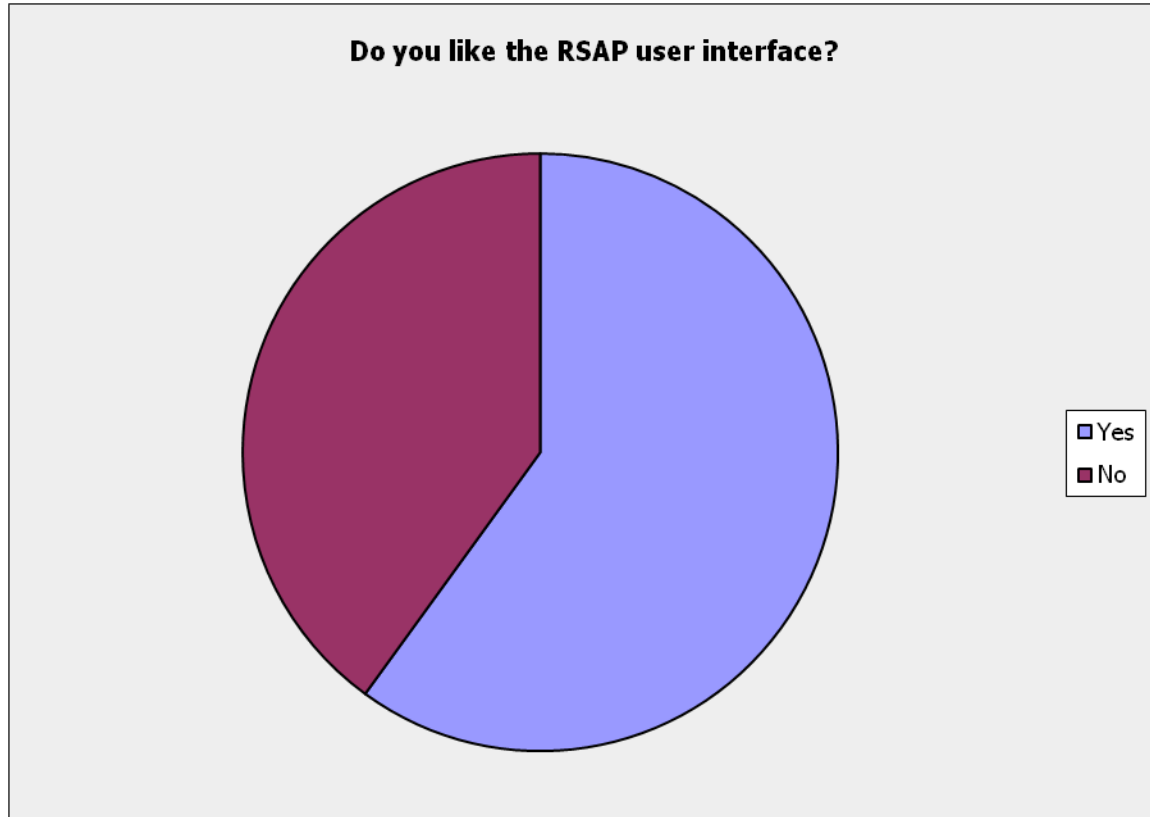
Instructing others on how to perform B/C analyses

Used RSAP only for checking out the software. Do not use it for my work. Others (Planning Engineers) have used the software for work related planning issues.

Research

Sample problems in training courses.

SR.7 Do you like the RSAP user interface?

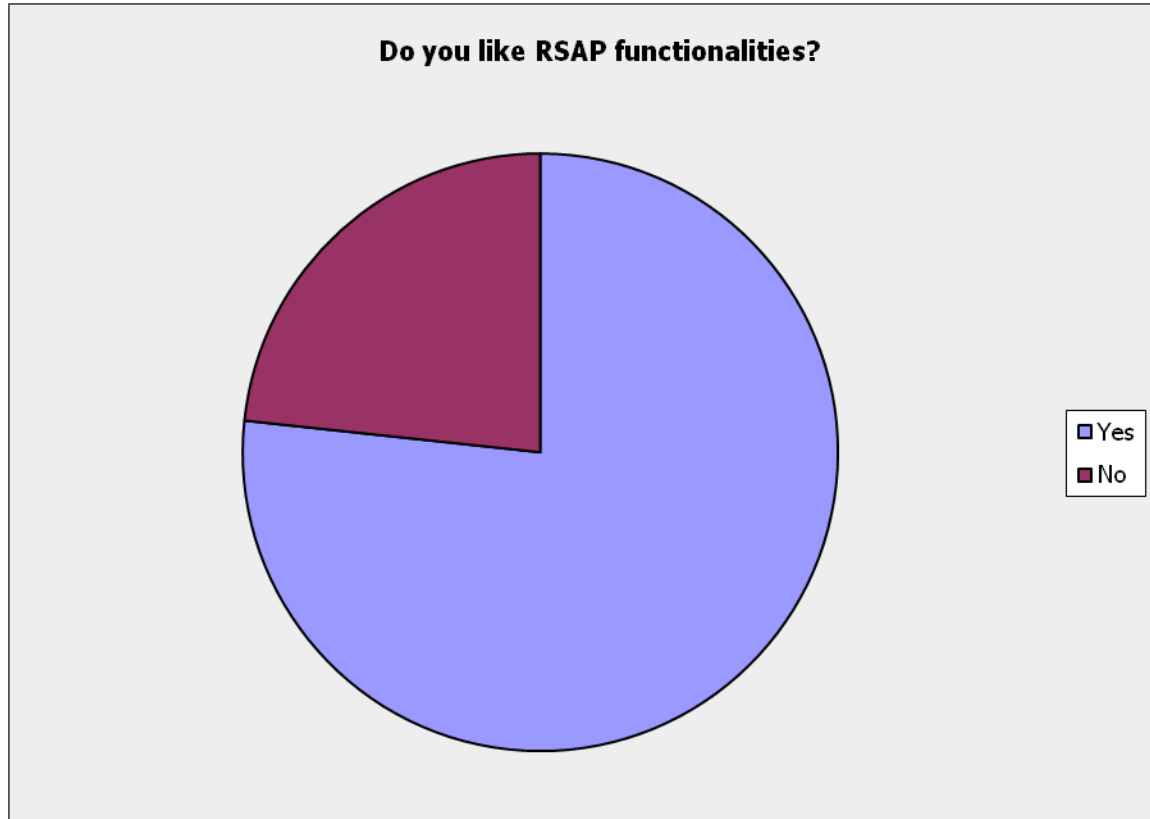


Suggestions for improvements or comment:

- Generally it is OK to use. I would like to see the program automatically input the previous segment length or offset width entered so I don't have to remember the value to avoid an overlap.
- The unit settings within the project don't save, it defaults back to SI units making things frustrating.
- it's way dated
- Time consuming to enter in data and make sure that the data is correct.
Difficult to run analysis over various ADDTs, roadway types, or truck volumes
- I am not sure if it is an interface issue or a terminology issue. Some confusion on filling forms.
- Needs a graphical interface.
- visual representation of model - graphics
- See bullet 8 below.
- The "Window's style" is okay but the arrangement of the UI is not intuitive, it takes users too long to figure it out and it's too long between uses for them to remember it the next time around. It probably needs to be broken down into more screens instead of consolidating all the data input into the larger screens.
- 1. A visual representation of the model would be appreciated. This would be optimized if you can select visual components to build the landscape and the program was intelligent enough to determine the appropriate lengths and offsets to apply for each hazard selected. This would be even better if the program could automatically select depths of slopes or any incrementation of hazards that may be required.
- I would prefer a web-based interface.

- sort of clunking
- There are options like 2.5:1 slopes that are not available to select. Also it would be nice to enter dollar amounts for the different type of guardrail and terminals that way when multiple options are run, it can calculate the installation costs. Same goes for the maintenance for the Guardrail \$ per ft/year. If these were to be inserted in the beginning it would make the program work much better and be more user friendly.
- I have used RSAP enough to get used to the current interface. It could be improved for the beginner or the infrequent user. The default metric values should be revised to english units. A graphical interface would be a good improvement. Picking the barriers, MES, headwalls and side slope graphically would be a suggestion.
- Hard to understand
- I'm such an infrequent user that I haven't developed a familiarity with the interface.

SR.8 Do you like RSAP functionalities?



Suggestions for improvements or comment:

- Making the functionalities more specific, with more availability to detail situations and have a more accurate model of the alternatives you are trying to evaluate.
- Though some are okay, like the data tables
- Because it is difficult to input data it is hard to check and make sure that this is correct, Some type of graphical interface for cross section data would be appreciated
- The comparison on accendent cost is easy to understand -- the benifit cost ratio (B/C), questionable and loses a lot of people. Some question at to whether the B/C is working properly.
- See bullet 8 below.
- The program should be redesigned to work around the standard industry practice for building roads that uses a control line of stationing to define the longitudinal location of features. All of our data is based on this method including profile grades, locations of features, survey data, right-of-way, etc. The RSAP currently requires us to build a spreadsheet that correlates all of the data we gather using the control line method to the "distance from beginning of project" method used by the programmer. It is the most important thing that needs to be changed in order for this product to be accepted by the industry.
- 1. Along with the inclusion of the visual aspect (2D or 3D view of scenario), hazards are commonly not perfectly aligned with the roadway, but are angled wrt the road. While the importance of this angle is unknown, it leads to a different type of geometry than is currently modeled. A point-based approach may be better for modeling sign stands, for example.

2. Slope-and-hazard combinations are not realistic as currently defined in RSAP. I believe an improvement in this module would be possible if slope hazards were dependent on lateral

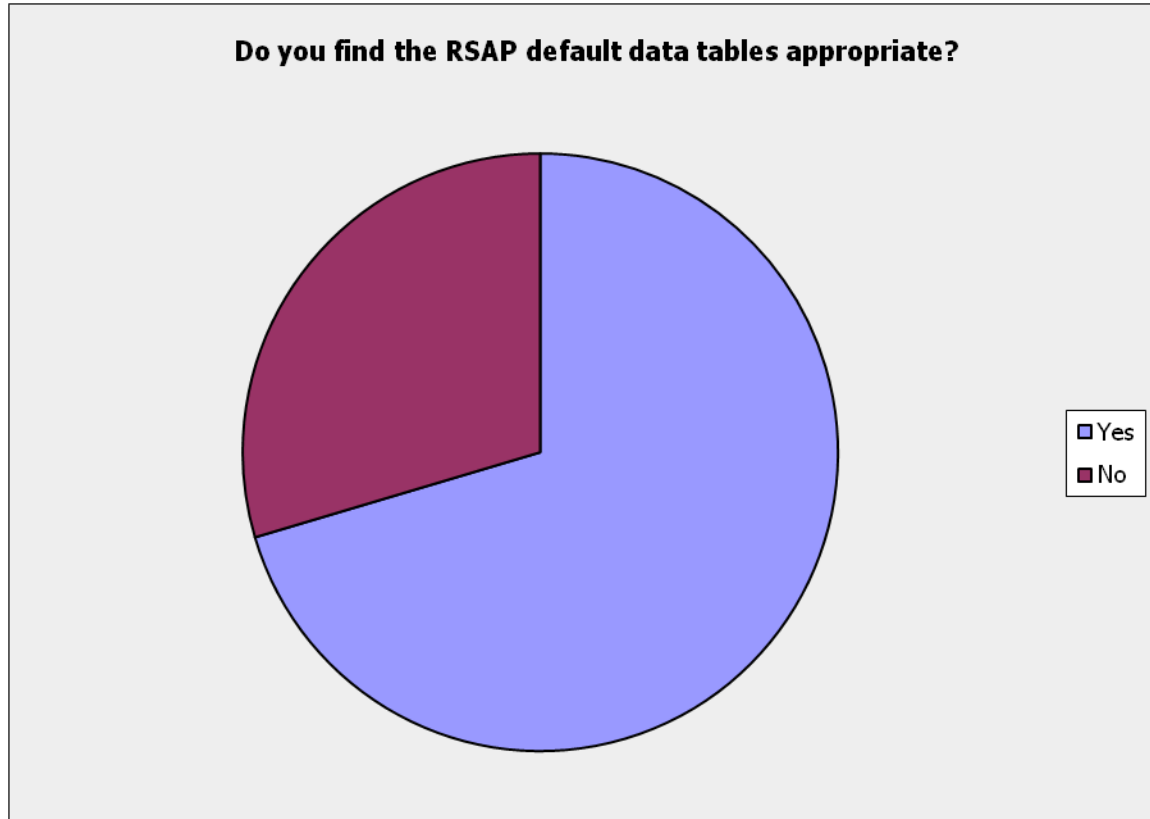
encroachment of the trajectory on the slope rather than an often arbitrary "slope height". Since the steepest slopes are not very hazardous if a vehicle only encroaches 1 ft onto the slopes, inclusion of lateral encroachment effects increases accuracy. Either that, or with the visual aspect, when introducing slopes, appropriate slope depths are incremented laterally from the road based on slope depth; i.e. on a 2:1 slope, a 1-ft drop is present initially, 4-6 ft laterally from the SBP is a 2:1 slope with a 3-ft drop, 10-14 ft laterally from the SBP is a 2:1 slope with a 7 ft drop, 17-20 ft laterally from the SBP is a 2:1 slope with a 10 ft drop etc. to accurately model vehicle trajectory on the perimeters of the slopes without excessive manual input.

3. Continuous slope hazards, contingent on trajectory dependence rather than fixed-location hazard envelopes, would be desirable. Example: some severity is present for a 2 ft lateral encroachment on a 2:1 slope, a higher severity is present for a 10 ft encroachment, and a higher severity for a 30 ft encroachment etc. It should be both longitudinally and laterally-dependent for severity estimation.

4. A multiple-run option should be included to allow users to name the parameters to be updated and multiple analyses conducted without intensive user input. Reducing the effort required to run multiple jobs will save time and money in the evaluation, and will reduce the number of user-caused errors in the evaluations.

- However, I do have to create user-defined features quite often.

SR.9 Do you find the RSAP default data tables appropriate?



Suggestions for improvements or comment:

- Cooper's data is the best data set. Not sure if the angle data for various different types of roadways is very useful (although there is a difference, the difference appears small). Recommend using results of the NCHRP "real world accident data base for severities.
- We used a different accident base rate table. Also, table associated with different hazards is sometime confussing and questionable as to how it is applied.
- need to be updated with current data - costs, vehicle trajectories, damages
- See bullet 8 below.
- You need to include a means for printing them out. They are critical to the cost/benefit analysis but there is no way of easily including them in a final report so managers and posterity have the details of what the decisions are based on. Plus, we use the severity index tables for other purposes and the only way we can refer to them is in an out-dated edition of the RDG (1995 I think).
- 1. Modeled severities of vertical drops are incorrect. Slope drop-off severities should be the same for the same height of drop-off for both intersecting slopes and foreslopes.

2. Some rigid object hazard rates are too low. The severities of some rigid object classes, from small size to large, were less than guardrail severities - analysis of treatments for those hazards will never recommend guardrail installation.

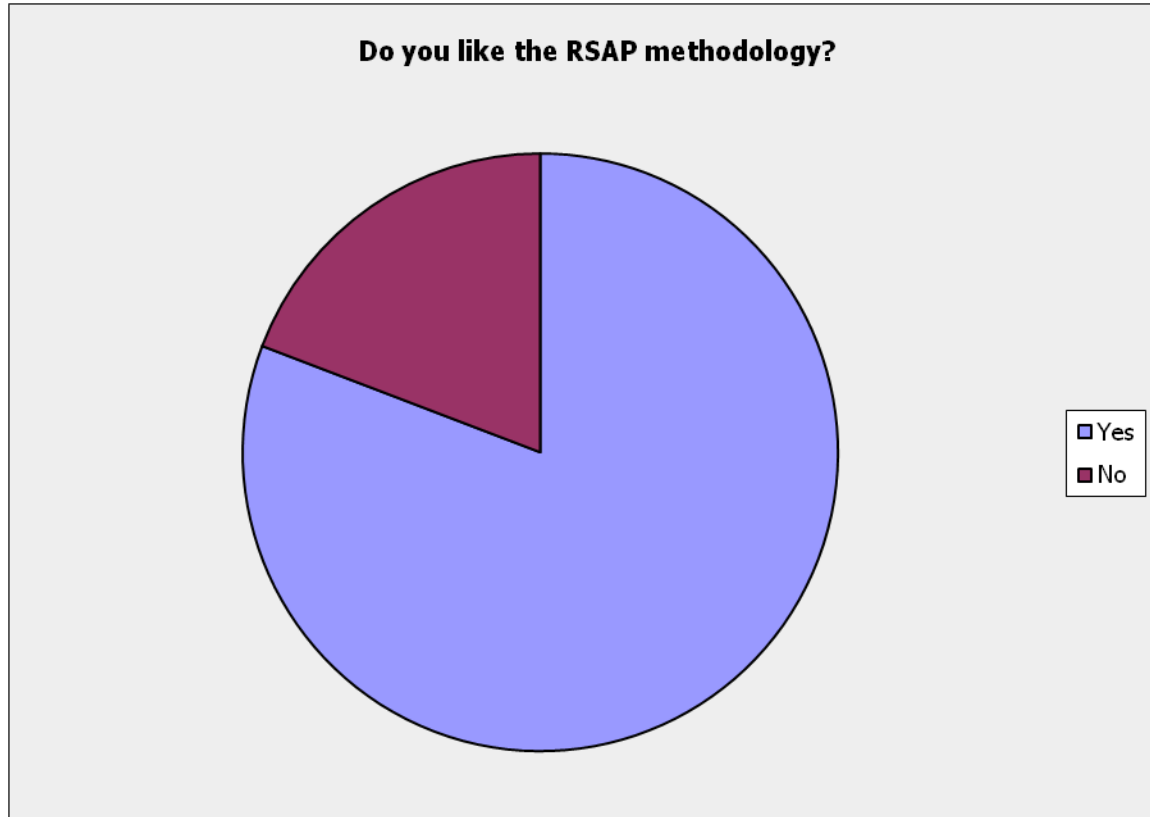
3. Rigid object sizes are very large; there should be some smaller rigid-object size classifications.

4. Tree severities are likely overstated. However, this does lead to a conservative analysis, and

since trees are one of the single most significant hazards for fixed-object ROR fatalities, overstatement of the severity of trees may lead to more trees being cut down than economics may currently indicate; however, this may save considerably more lives than the model would predict as well, with a lower resulting accident cost to the state.

9. Culvert grates ought to be investigated as an additional hazard class.
- In particular, the Severity Indices are incomplete and what is there needs updating.
 - Crash costs should reflect more recent data.
 - It would be nice to state the best alternative based on the B/C.
 - The injury and fatal crash costs need to be updated to reflect current FHWA crash costs.
 - Data on which it is based is flawed
 - Severity indices need work

SR.10 Do you like the RSAP methodology?



Suggestions for improvements or comment:

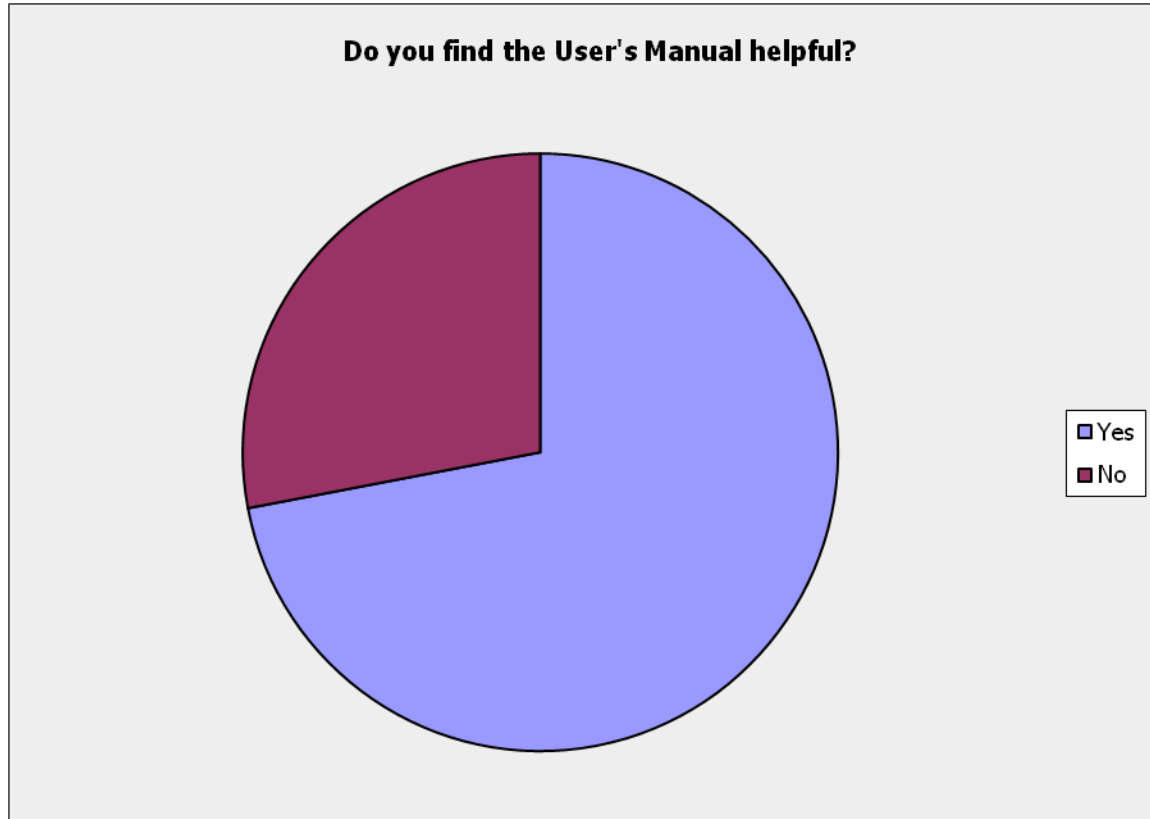
- Make it clearer in the reports section in the ranking of alternatives as they are compared to each other.
- You could do a better job explaining the methodology so that the results can be relayed to others.
- it's a bit of a secret, too black box. need to be more transparent to the user
- I think the bases of what RSAP is trying to accomplish and the methodology appropriate.
- See bullet 8 below.
- We were able to get the Monte Carlo simulation module to accurately model existing (known) conditions before we used it to predict future incidents.
- 1. Incorporation of scaling effects based yaw degree from impact should be incorporated. For example, scale severities of rigid objects when impacted in the side by a factor of 1.5; this may overrepresent the severity of side-impact crashes, but it will lead to possibly more accurate severity indices for most other object types through in-service evaluations and validation rather than a fixed severity regardless of yaw angle.

2. It may be more accurate to incorporate a secondary trajectory algorithm, permitting a vehicle to "slide" along the direction of an object after impact. For example: if the vehicle's kinetic energy is less than the energy required to rupture a guardrail, then the vehicle "slides" along the guardrail system in the direction that the guardrail system is defined (parallel to road unless there is a flare) except on interior curves. This may permit the vehicle to strike multiple objects if one object redirects the vehicle rather than stopping it. This algorithm should be dependent on the energy and sine of the impact angle (IS equivalent).
- The encroachment data is a very weak link in the chain. Given this fundamental weakness, I

would prefer a program that is probabilistic-oriented, as opposed to the current deterministic style.

- User manual needs to be rewritten for the beginner or infrequent user. Knowing when and why to use the seed number is not clear.
- Cannot get realistic output
- The data input seems logical, but I don't use this often enough to be familiar with the methodology.

SR.11 Do you find the User's Manual helpful?



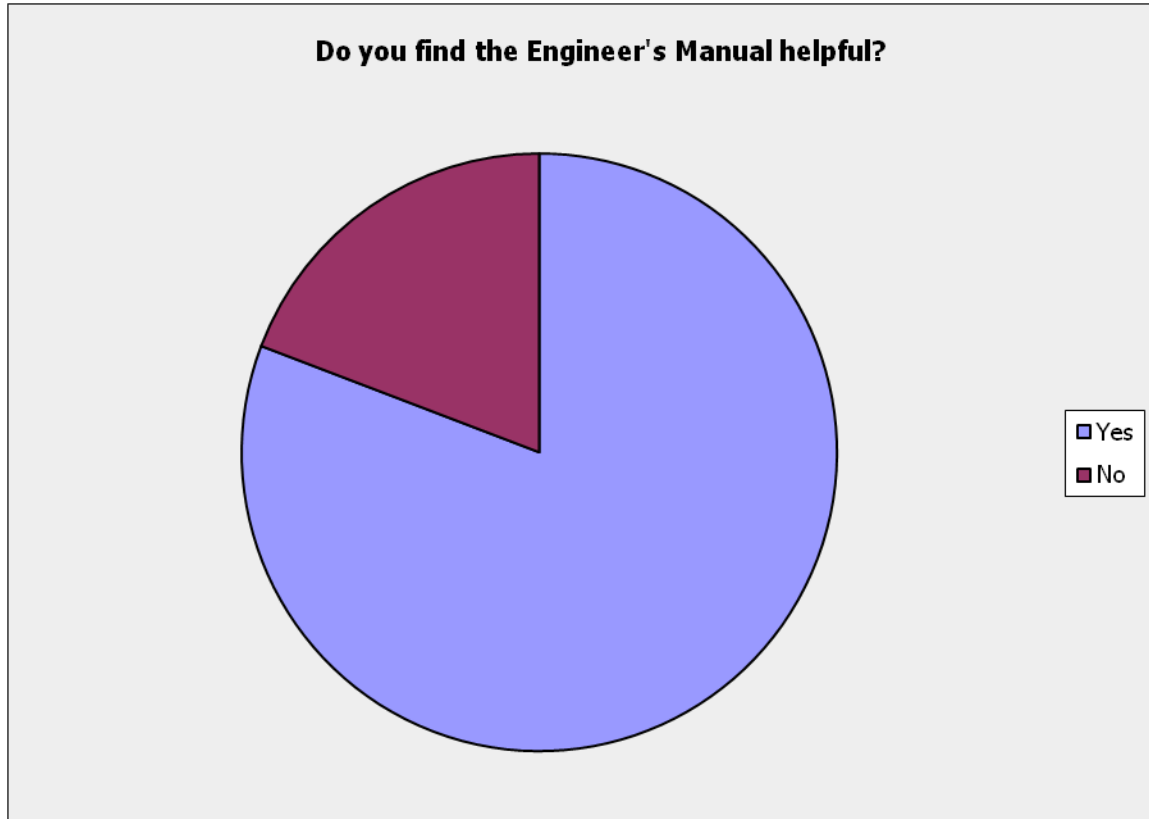
Suggestions for improvements or comment:

- More information as to how crash costs are determined would be helpful.
- Only marginally helpful. I have had to bug MwRSF to understand how to use the software.
- Pictures associated with different hazard/guardrail treatments would be helpful in the manual. Some confusion associated with how to key in distances related to alternatives and picking the right severity index.
- Needs more in-depth information.
- It was helpful, but it lacks a lot of information also. The best thing to do is after you make the modifications to the program and manual, sit down with several first time users and take copious notes as they work through the program using the manual. Then update the manual accordingly and repeat the process until the users can successfully accomplish the tasks with little or no help.
- More emphasis should be placed on the function of the RSAP code. It is difficult to understand exactly what is being computed at different times, and if the user's manual were more thorough in the computation of the different parameters, it would encourage more understanding and evaluation of the results. Furthermore, I believe the manual should discuss some of the limitations of RSAP and what is currently not incorporated or supported, so that researchers do not waste time and effort modeling a non-physical model that is not supported in RSAP; for example, it is difficult (if not impossible) to accurately model the placement of a fixed object on a slope. Accurate modeling of the slope requires incredible detail that the "average" person using RSAP, such as members of a DOT without extensive experience with the code, could never be expected to create with correct physical meaning and obtain meaningful results. While the intricacies of the code are not helpful for most users, the focus on the applications based on the hazards, as well as limitations and examples of "bypassing"

the limitaitons, would be helpful.

- Although it does not fully or completely explain all the bugs in the current software.
- See comment #6.
- Not enough detail
- Never used it

SR.12 Do you find the Engineer's Manual helpful?



Suggestions for improvements or comment:

- Only marginally helpful. I have had to bug MwRSF to understand how to use the software. I'm not sure when it is Ok to use foreslope and backslopes verses "parallel ditches".
When should/ how should a person decide to use "user defined features"
- Not aware of the Engineer's Manual -- just the User's Manual that is online.
- See my answer for 6 above.
- Have not read this.
- Add discussion on the use of RSAP for median applications for divided highway.
- Not enough detail
- Never used it
- I haven't used it.

SR.13 While using RSAP, have you encountered any incidents where your analysis results from RSAP were inconsistent with your experience/expectations/judgment?

- yes
- Analyzing bridge rails with different shoulder widths gives the rail with the narrowest shoulder as the lowest user cost because the narrow shoulder presumably does not allow a higher impact angle. Intuitively, a wider shoulder should be better.
- no
- RDG indicates 4:1 to 4:1 ditches are not desirable. I would guess that RSAP would have a larger SI.
- Yes, the B/C number elude me. The application at best is +/- 20% (i.e. it is based on probability of encroachment, estimates for cost and best guess for traffic volumes). People sometimes get hung up on the decimal for a decision. Most inconsistencies were tied to user error relating to not how to input things correctly. I am not sure of field experience to validate the numbers coming out of the application.
- no
- not really
- Problems with RSAP Roadside Safety Analysis Program

1) Whenever the user attempts to run a one way one lane roadway an error message occurs that states "Unexpected Termination of Analysis Module". This makes it impossible to run one lane ramps.

2) Problems have been reported when attempting to run user defined features. When a user inputs small increases to the severity values at 100 km/hour, sometimes the output does not show increases in average severity or annual crash cost.

3) When crash costs are changed from User-Defined Costs- KABCO (with the values WSDOT uses) to the Roadside Design Guide's values the annual crash cost does not change significantly. WSDOT uses Fatal= \$3,895,000, Severe Injury = \$325,000, Moderate Injury = \$70,000, Minor Injury = \$ 35,000, Property Damage Only = \$ 6,500.

4) In order to enter English units the user must use the pull down menu under view-options, then change into metric units and back to English units. If the user does not do this step, the input screens will request input in feet and require the user to use metric values. Even though the input is in metric units, the output is in English units.

- Yes, but we were able to work around that once we developed a better understanding of how the input data was used by the processors.
- No
- Several times. As noted above, the rigid-object hazards were at times less severe than guardrail; by definition this seems absurd. Further, without extensive input and incrementation of a slope (e.g. a 20-ft deep 2:1 slope adjacent to a drop-off by a bridge requires coding increments of the drop-offs adjacent to the bridge, since otherwise the bridge drop-offs are not accurately modeled. Placement of the slope immediately next to the bridge results in an odd recommendation. Slopes in general are difficult since they are often large rectangular hazards with constant severity, though this is not physically observed in the field. For the most part, however, I found it to be relatively in line with expectations.

1. Flat ground "severity" should be automatically incorporated into the model everywhere that there is no other hazard. Else, the "flat ground" hazard will affect the results if included, as there is some flat ground severity resulting from bumps, sticks, small trees, brush etc. The flat ground hazard should also be highly-dependent on the vehicle's yaw angle relative to the path

of travel.

- Not sure. Need more time to evaluate
- Yes
- have never been able to get one-way one-lane option to work.
- Yes, when analyzing front slopes on a recent comparison of AASHTO criteria to FDOT criteria, we had some questions compared to the results using the Highway Safety Manual.
- No.
- Yes, most of the time
- No
- No
- Yes - but I don't recall the circumstance.

SR.14 Are you aware of reports or papers about RSAP documenting its use? Please list them here.

- no
- no
- MwRSF is working on using RSAP for various Poolfund reports. However reports are not published as of yet
- recent TRB paper by MwRSF
- No
- Yes, I developed one based on our experience here but unfortunately our working copy was lost during the remodel of the fourth floor, our design section, and we had not made any copies at the point.
- No
- See report list for Midwest Roadside Safety Facility - there are many in the works.
- N/A
- no
- NO
- No.
- No
- No
- No
- Yes
- No

SR.15 What improvements would you like to see made to RSAP?

- Report functionality; ability to produce PDF's of reprot;
- More detail, its a very basic program, if you could model situations with more detail it would produce more accurate results.
- Make the inputing of cross section data more graphical
- Better examples with diagrams/pictures. A break down on the B/C. Intergration of Length of Need calculations into the RSAP -- tools to design the guardrail treatment with tables associated with different guardrail hardware options. If the design tool was intiutive such that people preferred to use, than more people would used the analysis comparison.
- Add a graphical interface so you are sure that you modeled what you wanted to.
- [1] Base the data input and reporting off of a control line (line of stationing), [2] add an option to print out the severity index table and the table of costs for fatals and injuries, [3] Make the user interface more intuitive, [4] Make the manuals more comprehensive (detailed) and based on actual user experience, [5] providing one or more additional tweak factors to normalize the output that are tied to specific logic would be helpful. Currently there is only one and although we were able to use it to normalize the output, but if we were ever questioned on our use of the factor we would not have answers other than that we changed the value until the program accurately modeled the historical data. [6] You should probably strive for Windows certification in order to provide users with a GUI and functionality they are familiar with.
- Specifically the visual interface. In addition, the algorithms used to calculate the trajectory (a cubic function, for example) and yaw-related severity scaling.
- ?
- Address methodology weaknesses (i.e. S.I. and encroachment rates) and update the user interface to make it web-based so that it does not have to be installed on a network or individual PC.
- reporting information should be more concise. Now you have to look at multiple pages to get all of the information. All info about features should be displayed together.
- Add infor for guardrail costs and maitneance and truss costs
- Undate RSAP to include cable barrier.

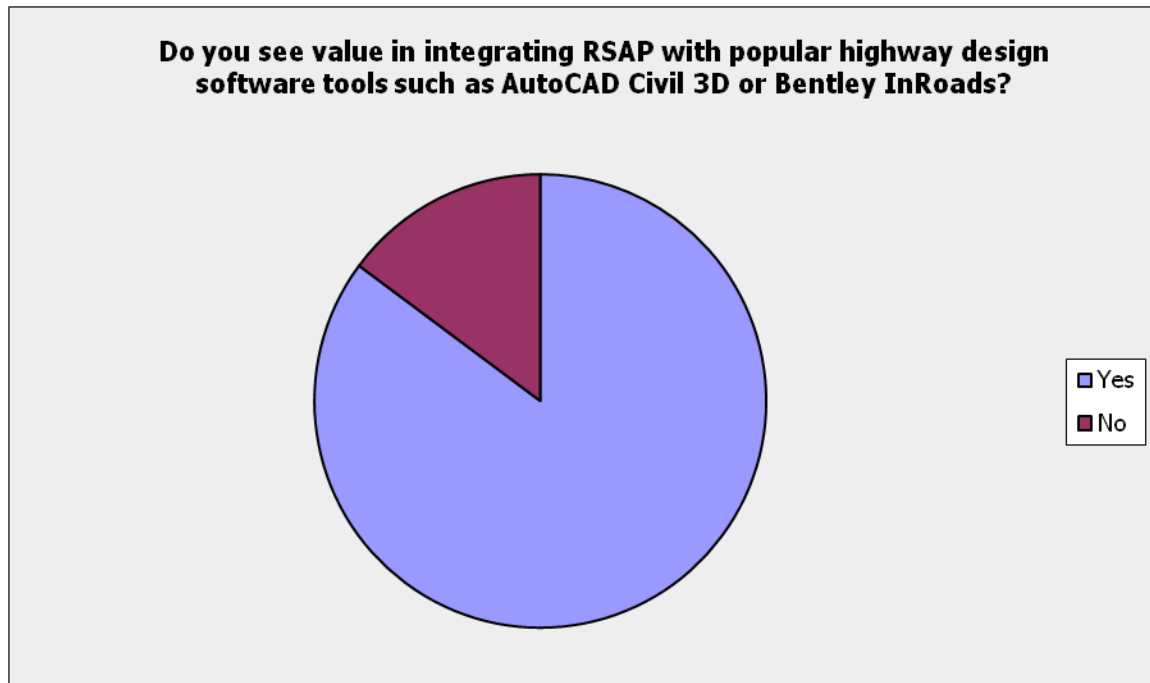
The output table shoulder be reformated. The incremental B/C is not easily explained to a beginner or the infrequent user.

- unsure
- Make it work properly and add a picture of Mac's scottish cow/steer
- I do not use it enough to have an opinion.
- No comments

SR.16 Which features of RSAP would you like to see remain unchanged in the next release?

- the basic data input screens.
- use of cooper data
- The probabilities methods are excellent and the Monte Carlo simulation seems appropriate.
The Window's style GUI is somewhat familiar.
- ?
- Ability to customize the crash values.
- unsure
- Its name
- none

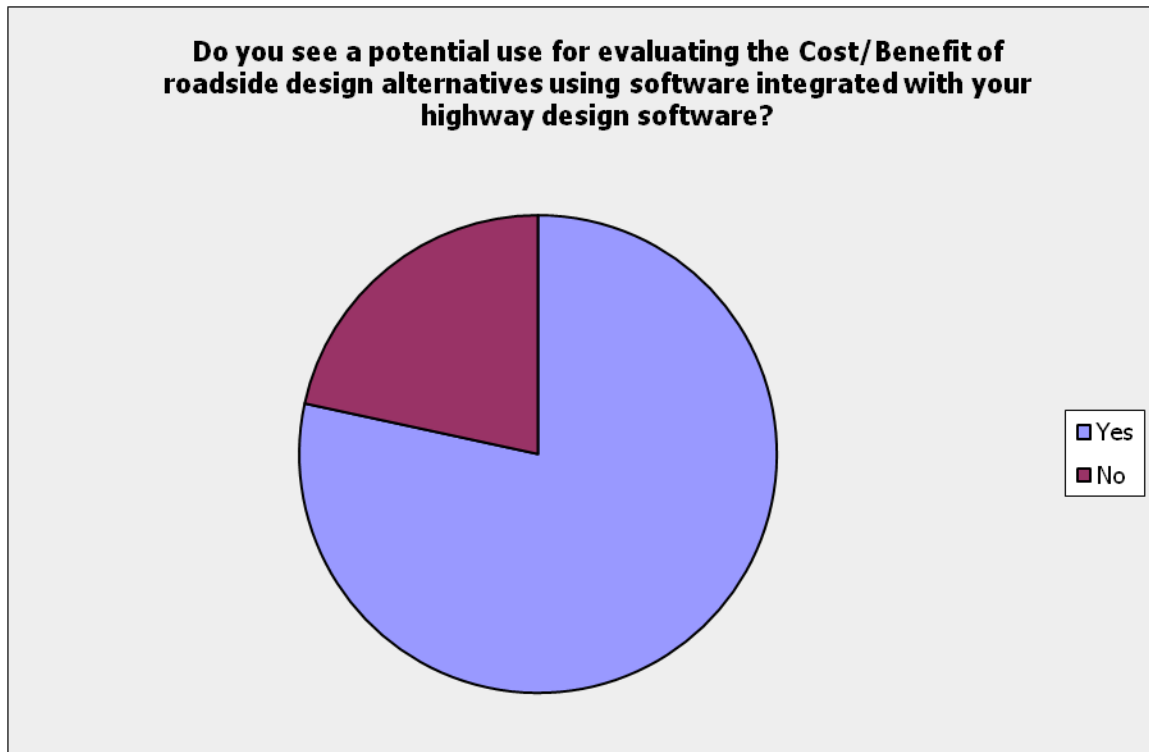
SR.17 Do you see value in integrating RSAP with popular highway design software tools such as AutoCAD Civil3D or Bentley InRoads?



Comments:

- It would give RSAP the ability to evaluate specific design features.
- It may be "easier" just to get RSAP linked to a CADD drawing program verses a larger design software. Just having visual picture of the cross section within a segment of roadway would be help full
- Maybe, -- as a designer using Microstation/InRoads combination it may be helpful to integrate RSAP into the CADD application. As a design check person that may not have access Microstation/InRoads, this direction may be restrictive. Microstation/InRoads are complex application for people that do not use them regularly -- not sure if integration would add another level of complexity that may restrict use .
- Something with Solidworks would be valuable too.
- A separate RSAP application would best meet WSDOT's needs. Many of the individuals that might use this tool do not have access to highway design software.
- If you can do this you will be doing a great service to the traveling public; and I do mean great.
- That would certainly fix the visual aspect of the program; plus accurate geometries of the hazards could be obtained. I would see significant improvement in the meaning of the results with this update.
- Or, perhaps even better, integrating it into the FHWA's Interactive Highway Safety Design Model program.
- Think it should be a stand alone software.
- unsure
- Seems like two separate tasks to me
- This would enhance its usefulness to the practitioner.
- Absolutely.

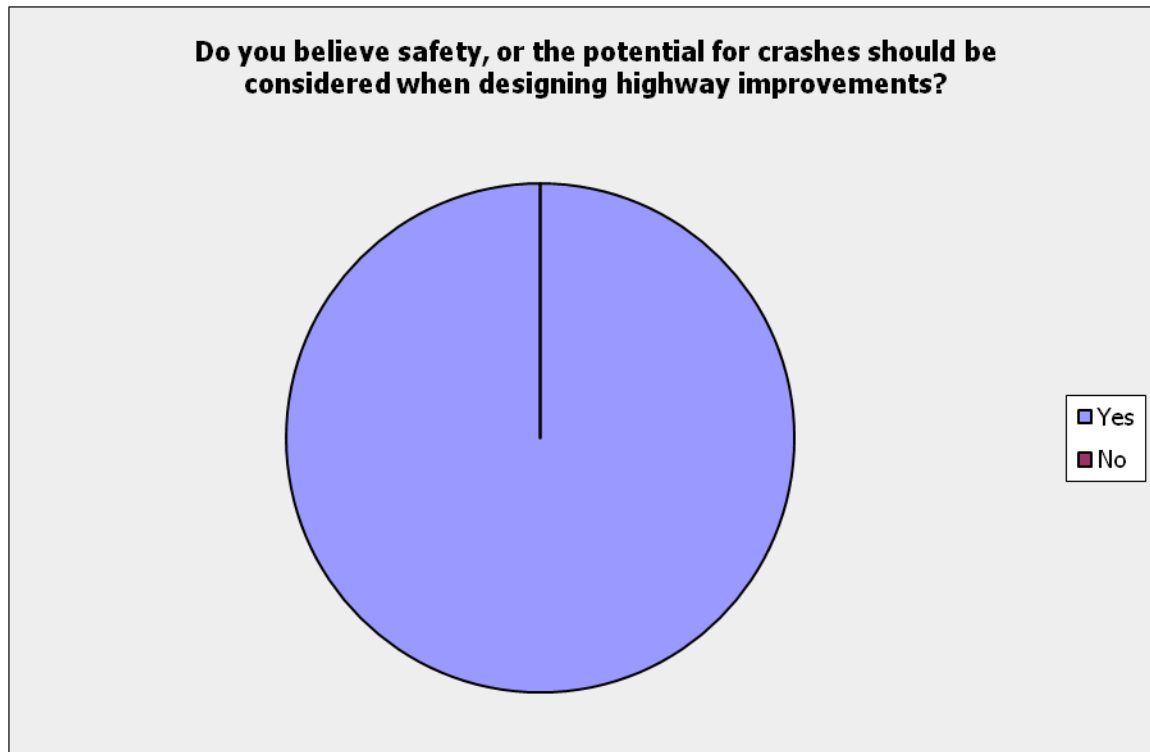
SR.18 Do you see a potential use for evaluating the Cost/Benefit of roadside design alternatives using software integrated with your highway design software?



Comments:

- I have only used RSAP during the development of the latest NHI training course on Roadside Design. I think it should be used by highway / roadside designers to develop roadside design policy and for individual hazard elimination scenarios.
- Need quick and simple tool for designers to get order of magnitude of B/C to compare roadside design options.
- KYTC tends to use the manual and justifies any judgments based on that information through required design documentation.
- Possibly
- Not sure how it applies to local streets.

SR.19 Do you believe safety, or the potential for crashes should be considered when designing highway improvements?



Comments:

- Need regular tools and processes to assist designers in making design decisions in the course of their work that explicitly include safety consequences.
- It should be "Considered" but not "Required".

SR.20 Thank you for your time. If you would like to be a beta tester for the RSAP upgrade, please list your contact information, including your e-mail, here.

Twenty four people provided contact information and volunteered to be beta testers for the RSAP2010 software.