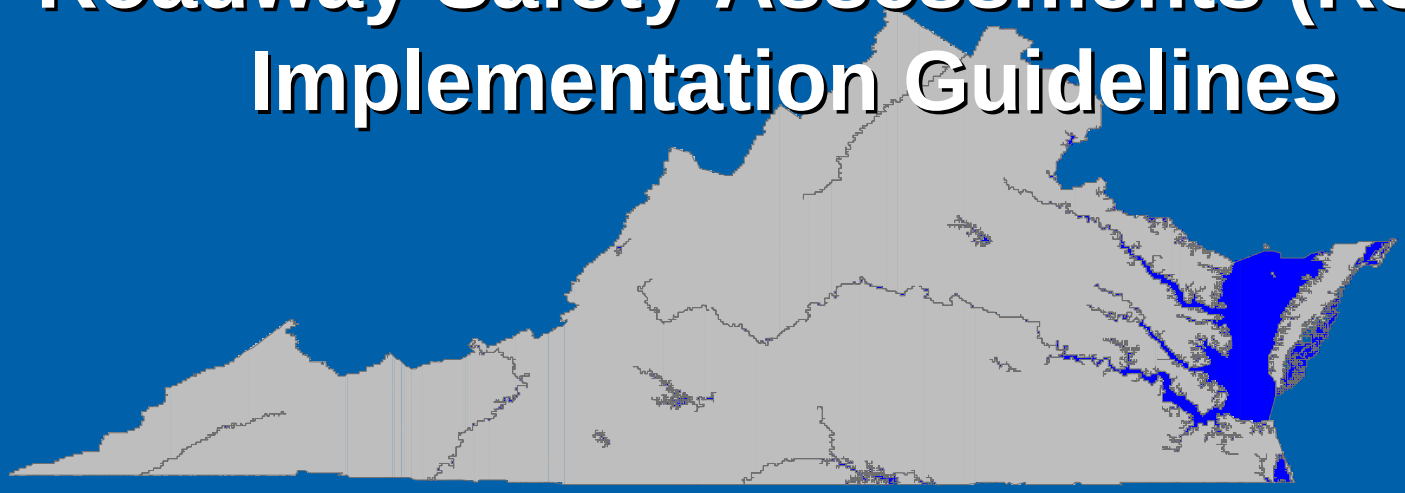
Roadway Safety Assessments (RSA): Implementation Guidelines



Highway Safety Improvement Program (HSIP)

Traffic Engineering Division

Two Notions of Highway Safety

- **Nominal Safety** is examined in reference to compliance with standards, warrants, guidelines and sanctioned design procedures

- **Substantive Safety** is the expected or actual crash frequency and severity for a highway section or intersection

Ezra Hauer, ITE Traffic Safety Toolbox Intro, 1999

Substantive Safety

An existing highway's substantive safety can be measured or characterized (i.e., define the nature and extent of the safety problem) by determining the frequency, type, severity, and other characteristics of crashes, as well as other information (most importantly, its traffic volume). Here, best practices call for comparing the actual performance of a road with some established benchmark or comparison figure.

The expected safety performance of any road is strongly related to its context, defined by the following:

- Traffic volume
- Location (rural, urban, suburban)
- Functional classification (controlled access, arterial, collector, local)
- Facility type (two-lane, multi-lane undivided, multi-lane divided)
- Terrain (mountainous, rolling, level)
- Roadway segment (mid-block or typical section, intersection, including type of intersection traffic control)
- Surrounding land use (number of driveways, commercial versus residential; associated pedestrian activity)

Kinds of Safety: Rural

Kinds of Safety: Urban

What is a RSA?

- Roadway Safety Assessments (RSA) are a formal safety performance examination of an existing or future roadway by an independent and qualified assessment team.

- Roadway Safety Assessments (RSA) are a tool that
  - Is a formal structured process not a cursory review
  - Is an independent process by a qualified professionals
  - Focuses solely on safety issues
  - Considers all road users and environmental conditions
  - Proactive review of observed and potential safety issues to reduce risk

- However, RSAs will ***NOT***
  - redesign an ongoing/planned project
  - be just for high cost projects
  - be informal reviews or inspections
  - be viewed as simple check of standard design compliance or determine the presence of existing traffic control devices

http://safety.fhwa.dot.gov/rsa/index.htm

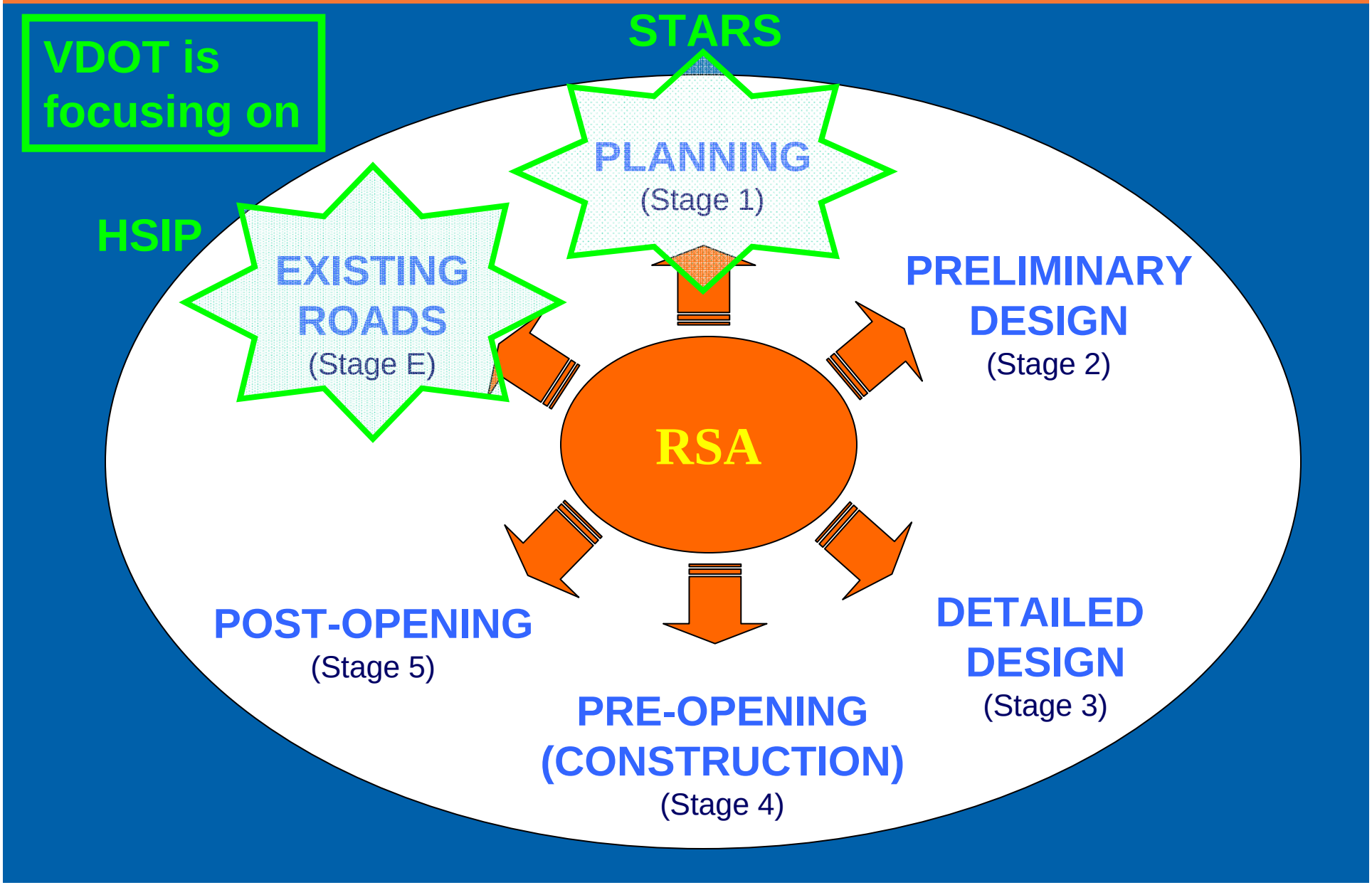
What are the differences between Traditional Safety Reviews and RSA ?

		Traditional Safety Reviews	Roadway Safety Assessments
Team Member		▪ 1-2 people with design expertise	✓ 3-5 people with multi-disciplinary expertise
Objectivity		▪ Team members usually belong to the design team	✓ Team members are independent from the design team
Safety Review	**on Field**	▪ Not required	✓ Required
	Based on	▪ Compliance with design standards	✓RSA check list of geometry, traffic and operational relationship
	Focus on	▪ Automobile drivers	✓ All roadway users including pedestrians, cyclists and automobile drivers
	Analysis with	▪ Number of crashes and fatalities	✓ All factors which may contribute to a crash including human errors, traffic and road physical conditions, weather and other possible issues
Safety Approach Methods		▪ **Reactive**	✓ **Proactive**

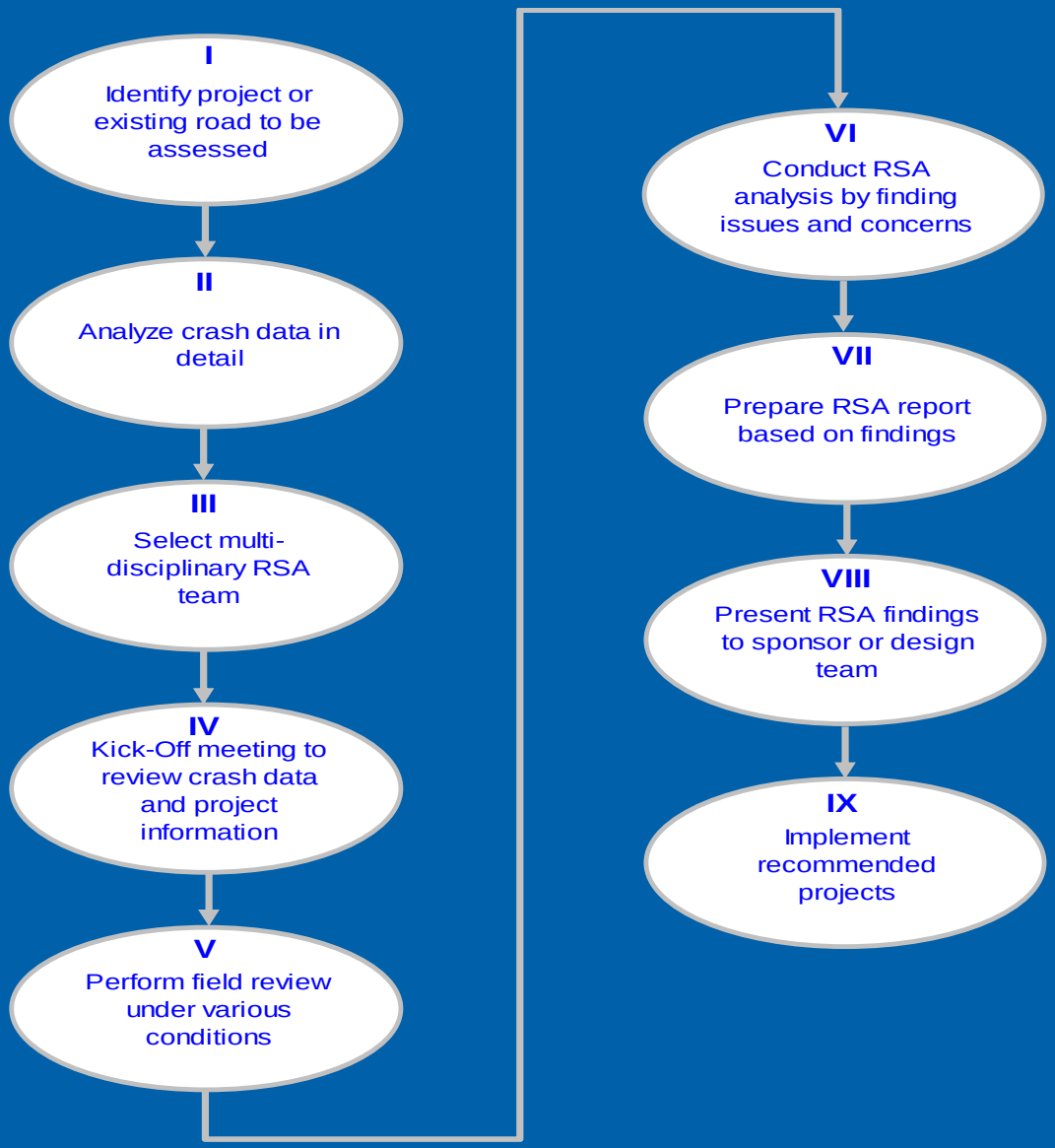
VA Strategic Highway Safety Plan

- Engineering Emphasis Areas & Strategies
  - Intersections : IS-2 (RSA), 4, 5, 7
  - Roadway Departure : RD-2 (RSA), 4, 5 and 6
  - Bike and Pedestrian Safety : PB-2 (RSA), 7, 10 and 11
  - Human Factors : AD-7, SD-4, LE-4, CV-2
- **http://www.vdot.virginia.gov/info/hwysafetyplan.asp**

When RSA can be performed ?



RSA Process Steps



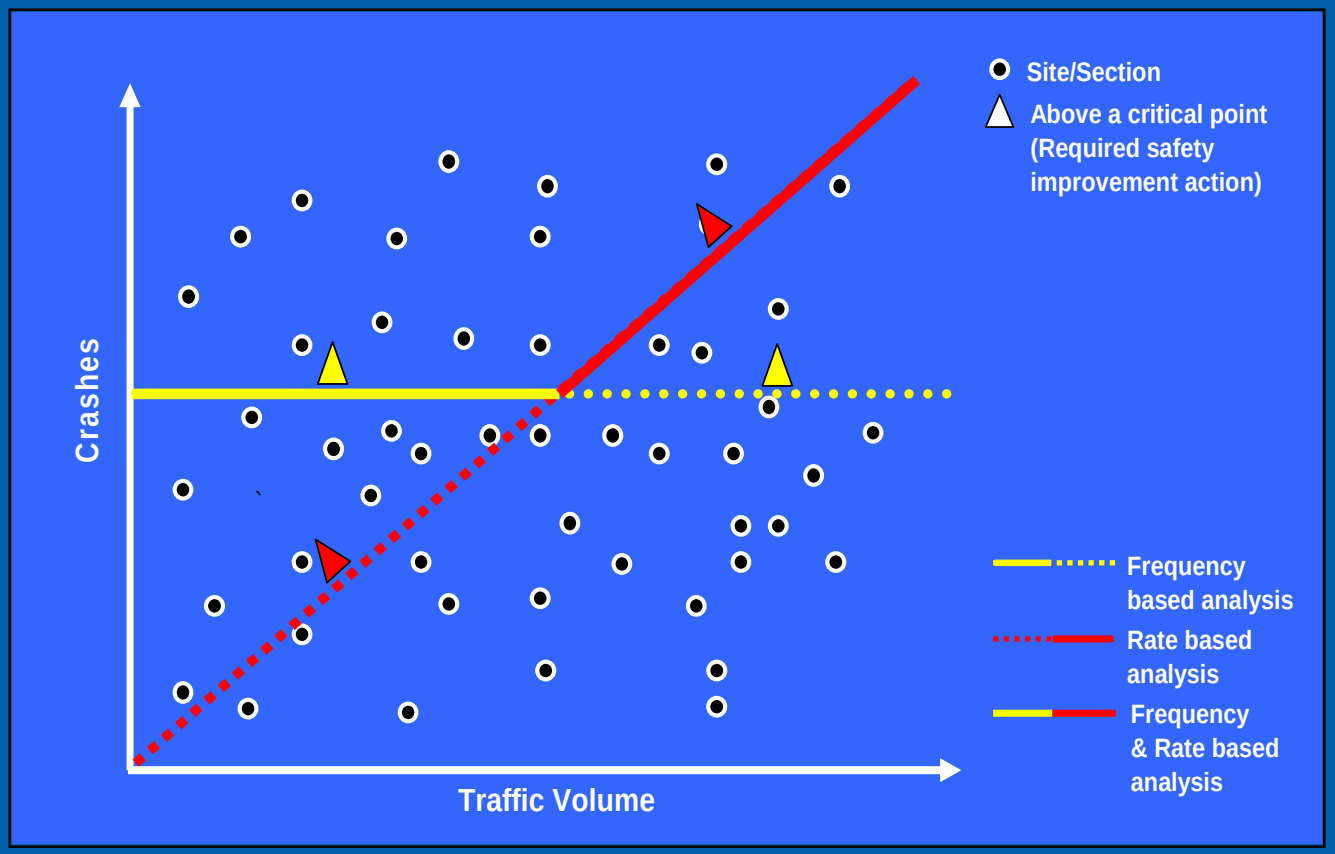
- VDOT RSA sponsor will be responsible to lead/conduct
  - Step I
  - Step IX
- RSA team is responsible to conduct
  - Steps II – VIII

RSA Step I : Identify High Crash Locations

- Find high crash corridors with systematic issues.
- Perform more detailed analysis of roadway spots or sections with:
  - Higher crash rates than similar type of roadway average rate or
  - Higher death + injury densities than similar types of roadway average rate or
  - Repeating same pattern of collision type or
  - Unique geometric design or
  - Less forgiving environment for drivers inattention or error than similar roadway

Place no limitation on above !!!

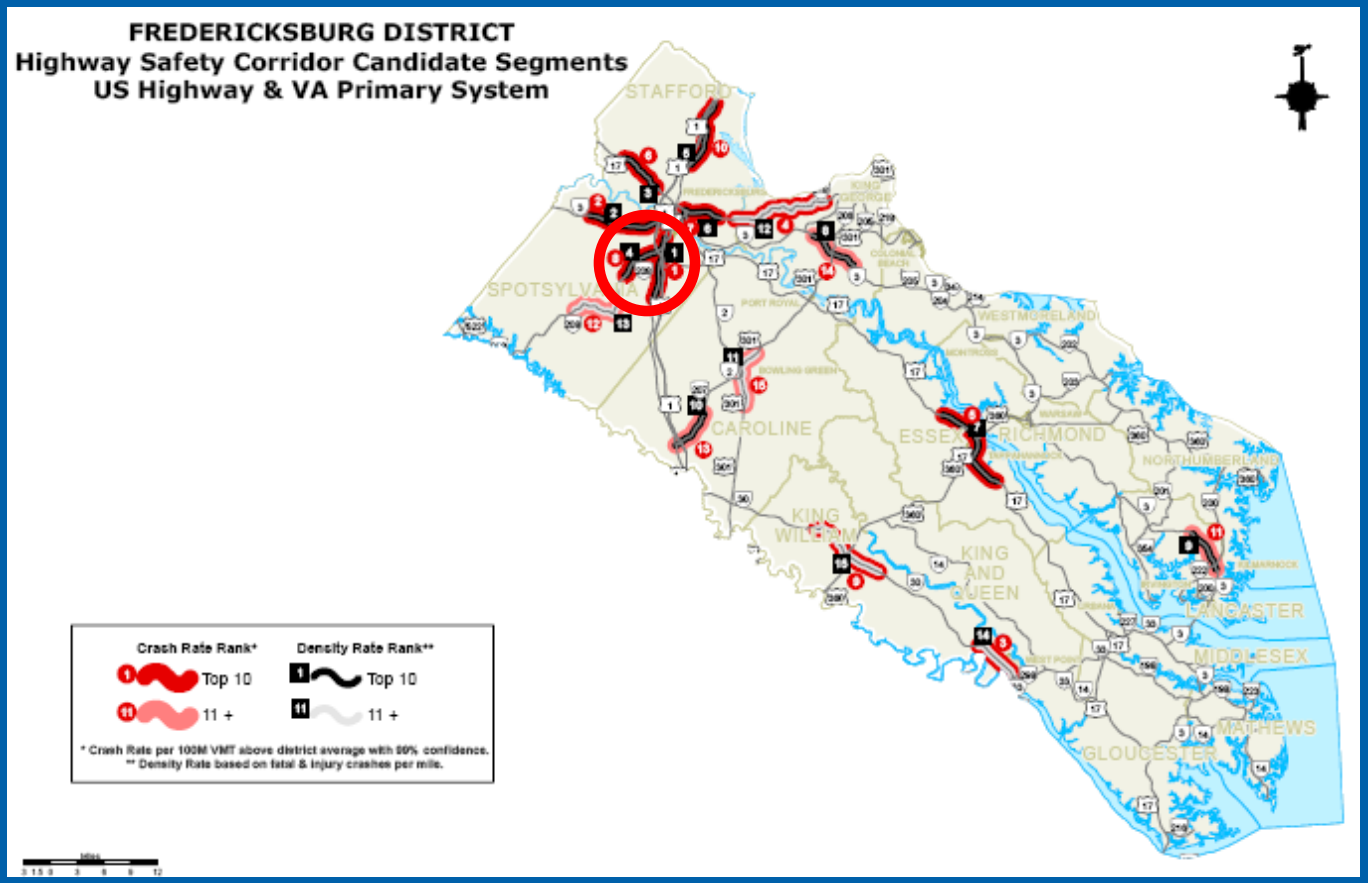
RSA Step I : High Crash Locations



- Spots and/or sections require more detailed crash analysis if it has:
  - Higher crash rate than statewide /district critical crash rate by quality control method
  - Higher Death + Inj. crash density than critical density
- Crash rate or density at spots or sections compares with similar roadway class, cross-sections and environment
- Quality control method uses 95% confidence limits for Poisson

Prioritize High Crash Corridors

- Use candidate Interstate and Primary system Highway Safety Corridors
- Focus on corridors with highest death + injury densities



http://insidevdot/sites/TrafficEngineeringDivisionTeamSite/SafetyAnalysis/SafetyAnalysis/HighwaySafetyCorridors/PrimarySystem/Fredericksburg_Map.pdf

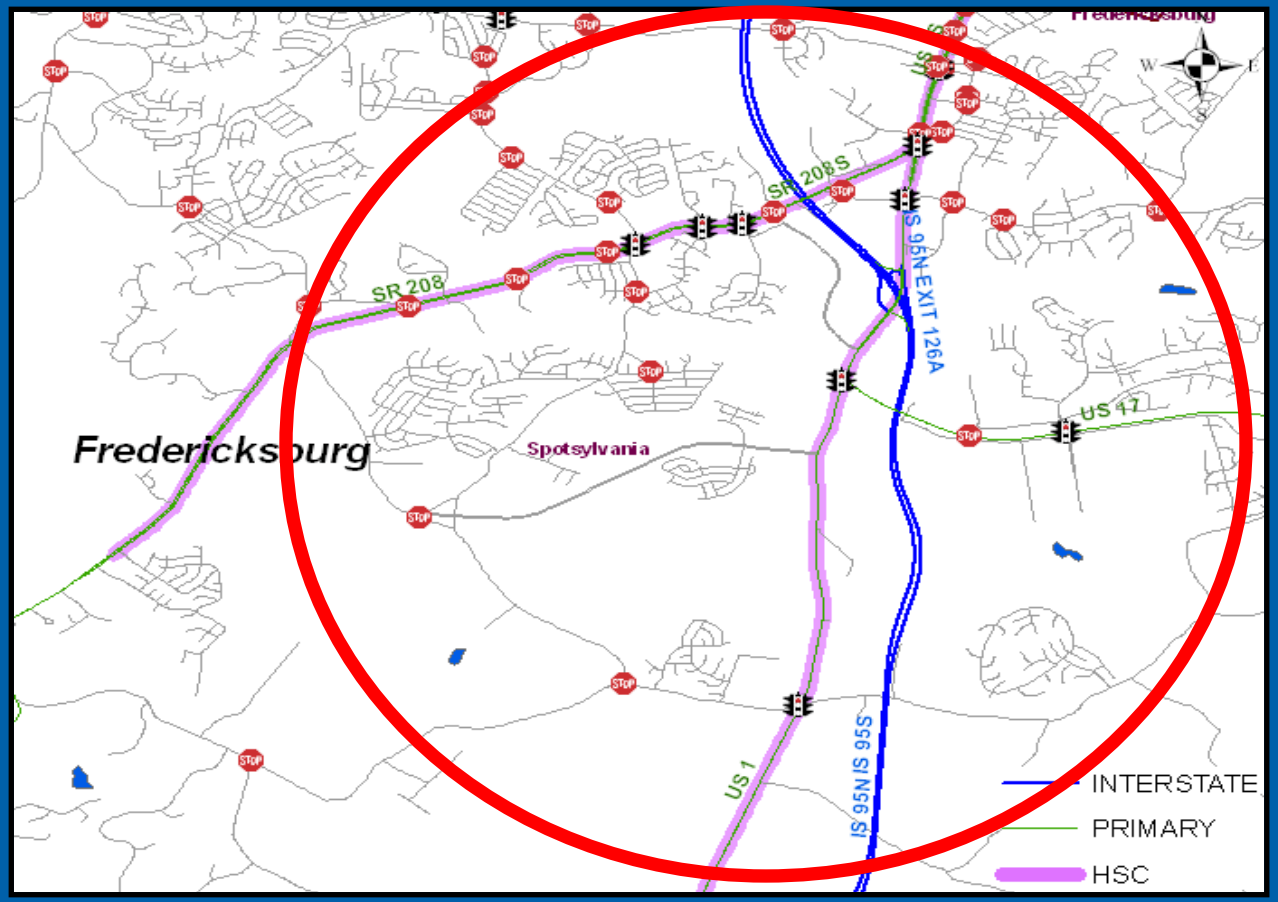
Richmond District Critical Intersections

Year	District	County	Crash.Rate	CR.Rate	Signal/Unsignal	Cfg	Num Crashes	Fatal Crashes	Inj Crashes	PD Crashes	Node
2006	4	4	0.576	0.689	S	3	4	0	1	3	120309
2006	4	4	0.696	0.255	U	3	5	0	4	1	120013
2006	4	4	0.489	0.255	U	3	3	0	1	2	120326
2006	4	4	0.399	0.255	U	3	3	0	3	0	120327
2006	4	12	3.682	0.491	U	4	3	1	2	0	163200
2006	4	12	3.256	0.491	U	4	3	0	2	1	163033
2006	4	12	2.818	0.491	U	4	6	0	3	3	163590
2006	4	12	0.819	0.491	U	4	4	0	3	1	163336
2006	4	20	2.831	2.659	S	5	19	0	6	13	203048
2006	4	20	2.39	0.876	S	4	14	0	5	9	203823
2006	4	20	2.003	0.876	S	4	44	0	18	26	203653
2006	4	20	1.609	0.876	S	4	31	0	13	18	203057
2006	4	20	1.58	0.876	S	4	36	0	8	28	203679
2006	4	20	1.519	0.876	S	4	27	0	6	21	203440
2006	4	20	1.484	0.876	S	4	10	0	2	8	203291
2006	4	20	1.482	0.876	S	4	10	0	6	4	203447
2006	4	20	1.462	0.876	S	4	44	0	6	38	203488
2006	4	20	1.416	0.876	S	4	9	0	3	6	203410
2006	4	20	1.297	0.876	S	4	32	0	7	25	203506
2006	4	20	1.201	0.876	S	4	15	0	5	10	203285
2006	4	20	1.195	0.876	S	4	37	0	13	24	203487
2006	4	20	1.173	0.876	S	4	14	0	4	10	205064
2006	4	20	1.079	0.876	S	4	11	0	2	9	203148

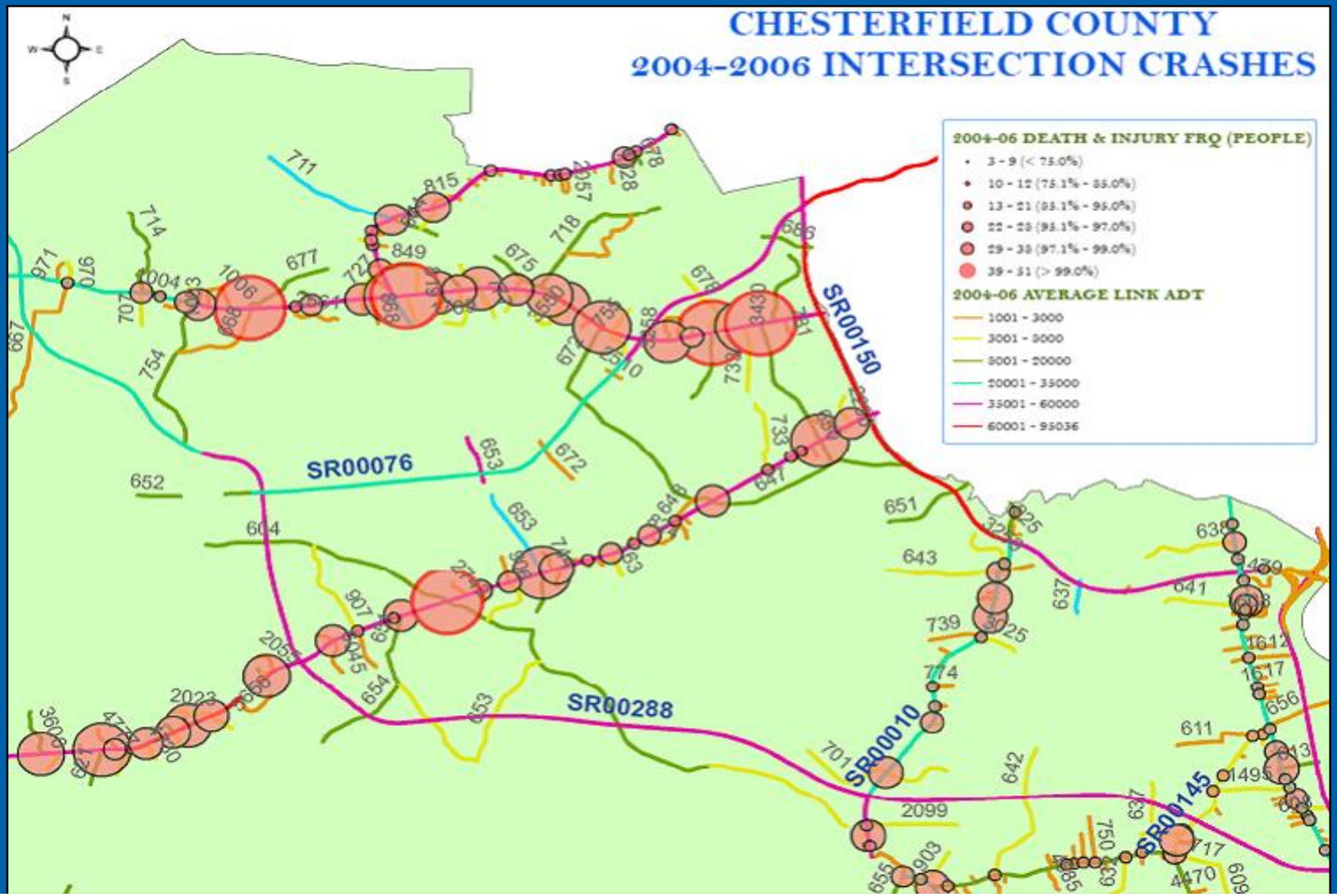
Prioritize High Crash Locations

- Use annual “critical rate” intersection and segment listing to target review locations
- Region maps of high crash intersections are available

High Crash Sig/Unsig Intersections at Spotsylvania county, Fredericksburg District



Intersection Crashes Deaths and Injuries in Chesterfield County (2004-2006)



STARS Severe Crash Intersections (2004-06)

Legend

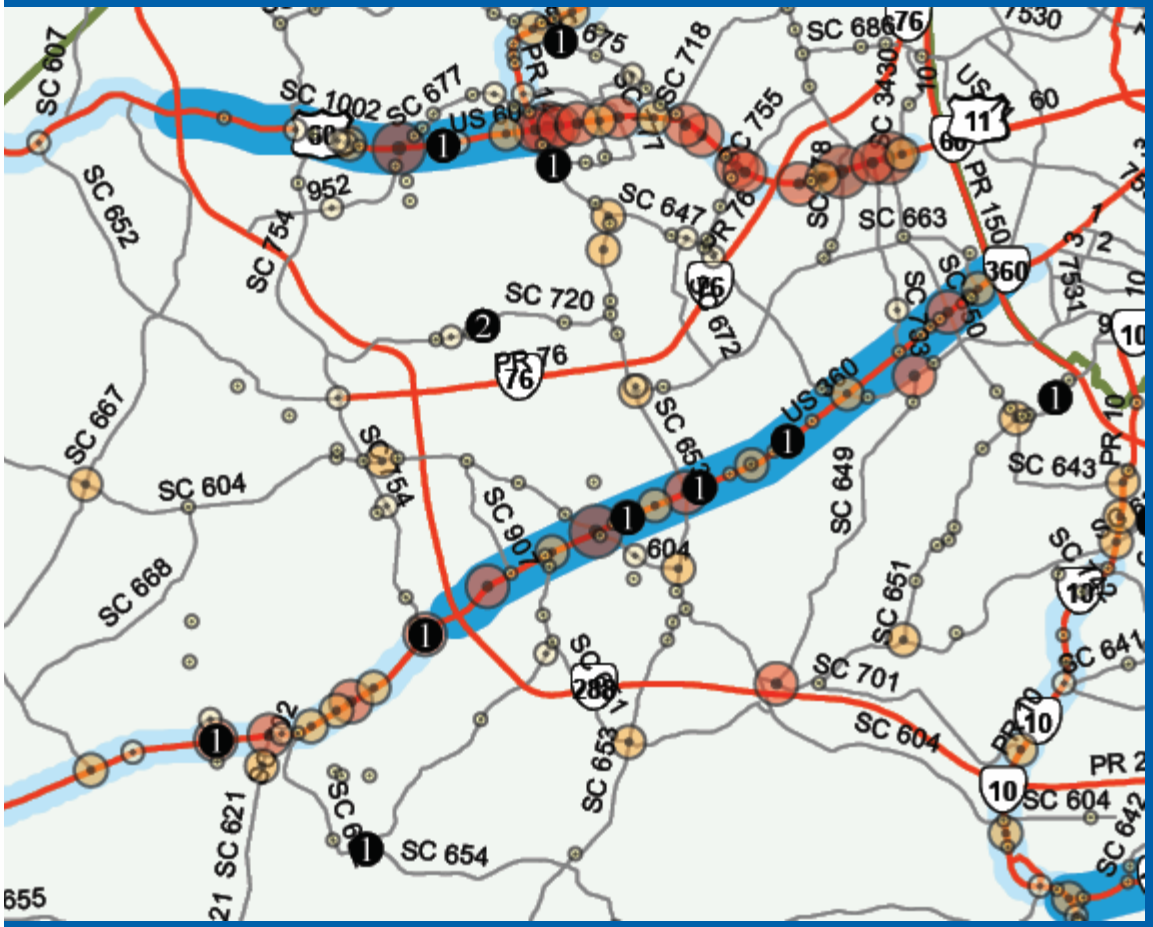
Intersection Crashes between 2004 - 2006

Total Fatalities

- 1
- 2
- 3

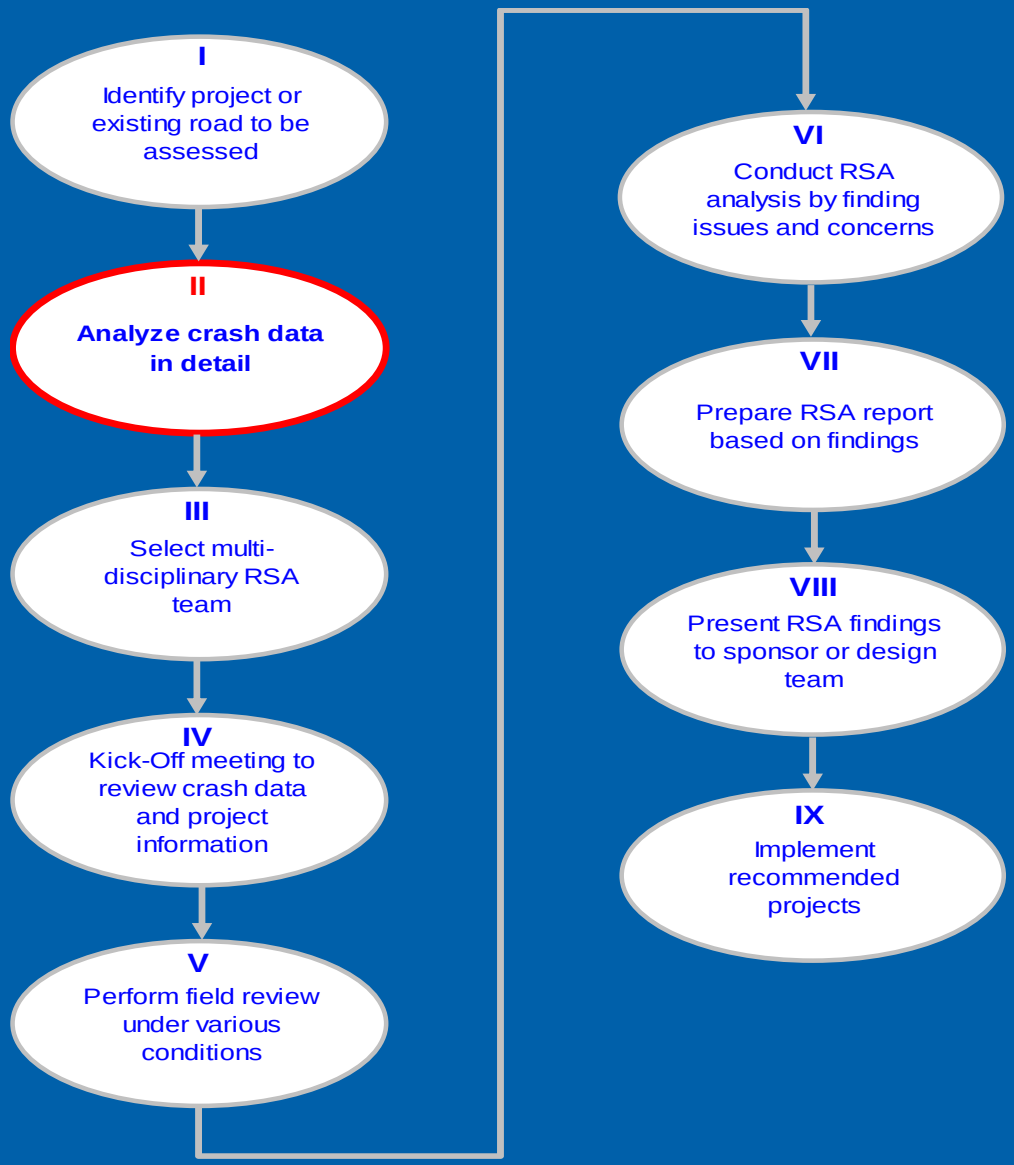
Total Fatalities & Injuries

- 3 - 8 (75%)
- 9 - 12 (15% - 25%)
- 13 - 20 (5% - 15%)
- 21 - 38 (1% - 5%)
- 39 - 57 (>1%)
- Interstate
- Primary
- Other
- Highway Safety Corridors with LOS D,E, & F
- Highway Safety Corridors
- Systems Operations Regions
- Virginia Jursidictions
- Virginia Major Water Bodies
- Virginia Jursidictions



Note: Potential Highway Safety corridors denoted in blue

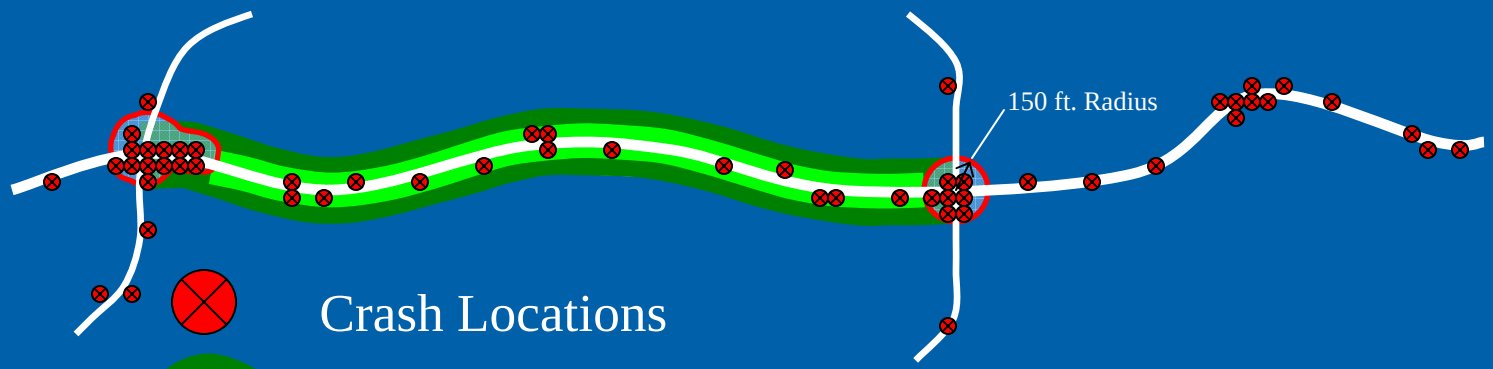
RSA Step II : Analyze crash data in detail



- Conduct a crash density analysis for study segment (F+I per 0.25 mile) or spot (intersection) assessment considering:
  1. Crash factor
     - Collision types, severity (death, injury and PDO), vehicle types, number of vehicles involved in a crash, etc.
  2. Human factor
     - Driver age, gender, conditions, reaction, DUI & drug use**, etc.**
  3. Environmental factor
     - Weather condition, lighting condition, time of day, day of week, work zone, locality, roadway condition, traffic condition, etc.

Define Corridor Sections

Arterial Locations



Crash Locations

Standard Section (Node to Node HTRIS Link)

Standard Intersection (150 ft radius around HTRIS Node)

Non-Intersection Section (excludes intersection crashes)

Freeway Locations

Diverge Area

Merge Area

Weave Area

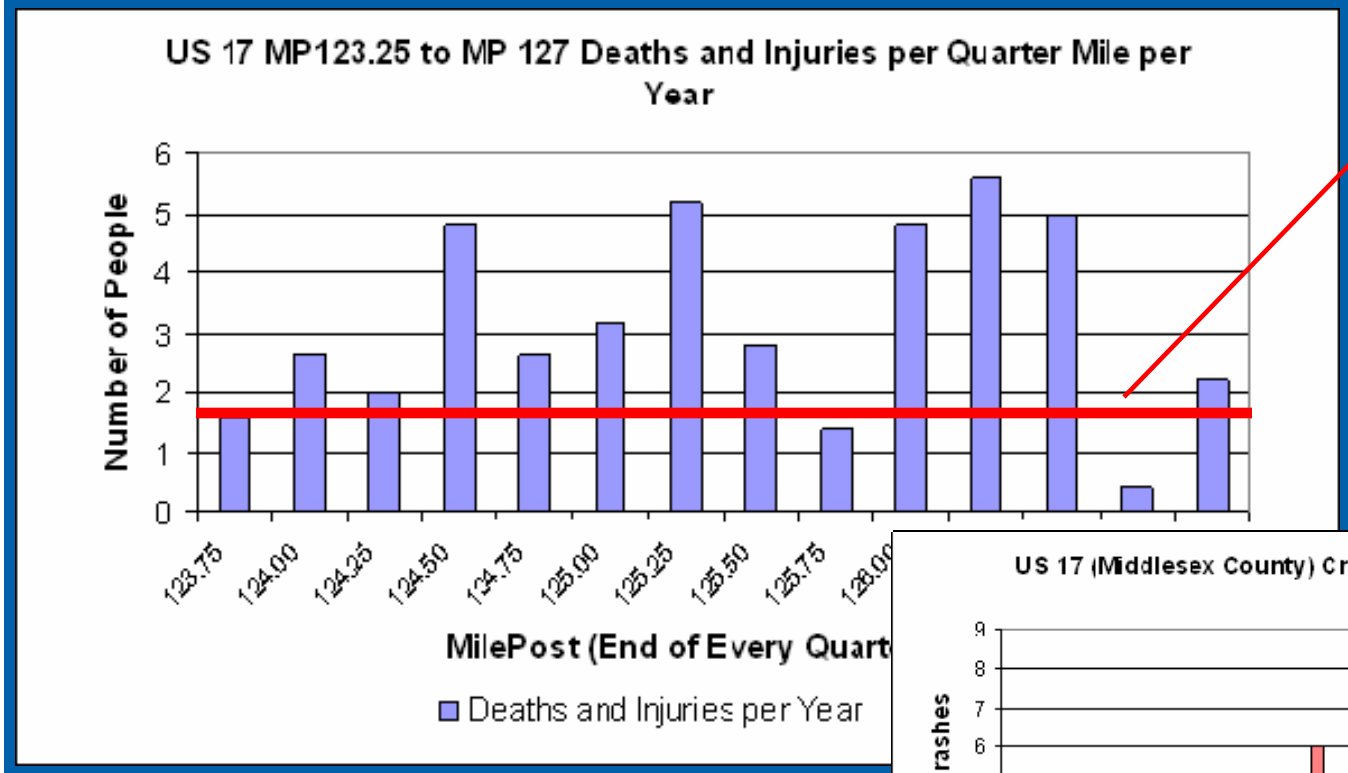
Freeway Segment Area

Study Segment Comparisons

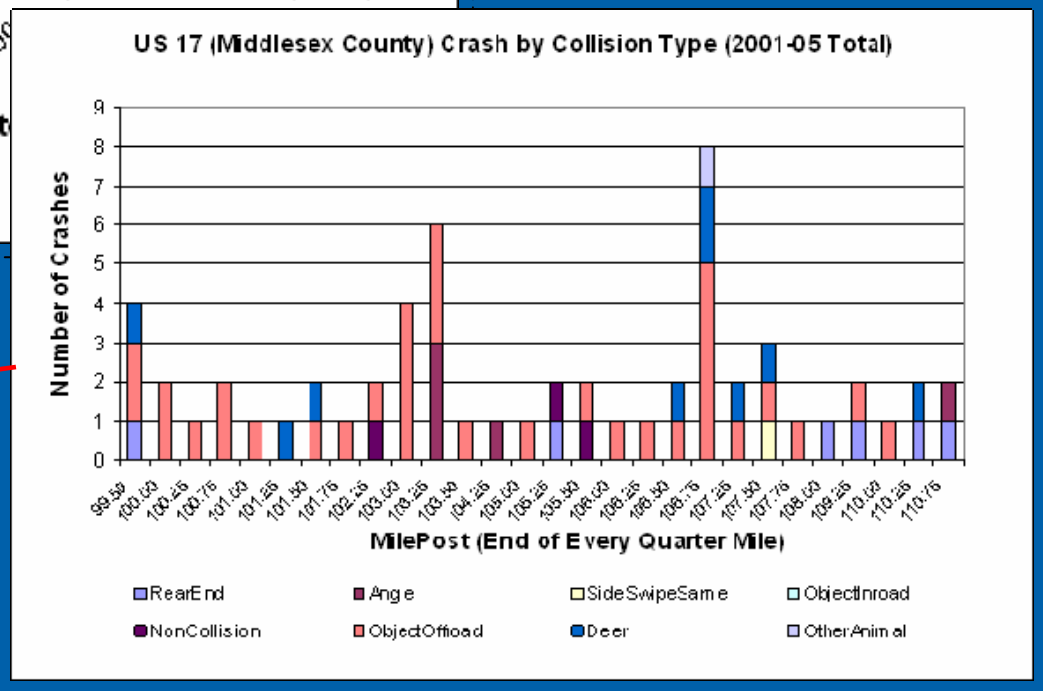
- To compare intersection and 0.25 mile densities HSIP Staff have in team Site:
  - Statewide Interstate and Primary comparison spreadsheets from annual crash reports
  - District-wide comparison measures from annual “critical rate” calculations.

	HTRIS Report (2001 - 2005 Total)					TRIS Report (2001 - 2005 Average)				Statewide Four Lane Divided HWY (No Access Control) 2001 - 2005 Average			
County Sec. Num.	Fatal	Injury	PDO	F + I (%)	Crash Rate (HMVMT)	Death Rate (HMVMT)	Injury Rate (HMVMT)	Crash Density (MI/YR)	F + I Density (MI/YR)	Avg. Injury Rate	Avg. Death Rate	F + I (%)	F + I Density (MI/YR)
Middlesex	5	30	48	42%	60	4.4	34	1.29	0.82	63	1.1	40%	3.58
Essex Sec1	0	29	35	45%	54	0.0	32	1.11	0.67	63	1.1	40%	3.58
Essex Sec2	2	94	109	47%	95	0.9	62	2.06	1.35	63	1.1	40%	3.58
Caroline	0	8	14	36%	36	0.0	18	0.78	0.39	63	1.1	40%	3.58

Define Target Areas from Crash Severity and Type Density

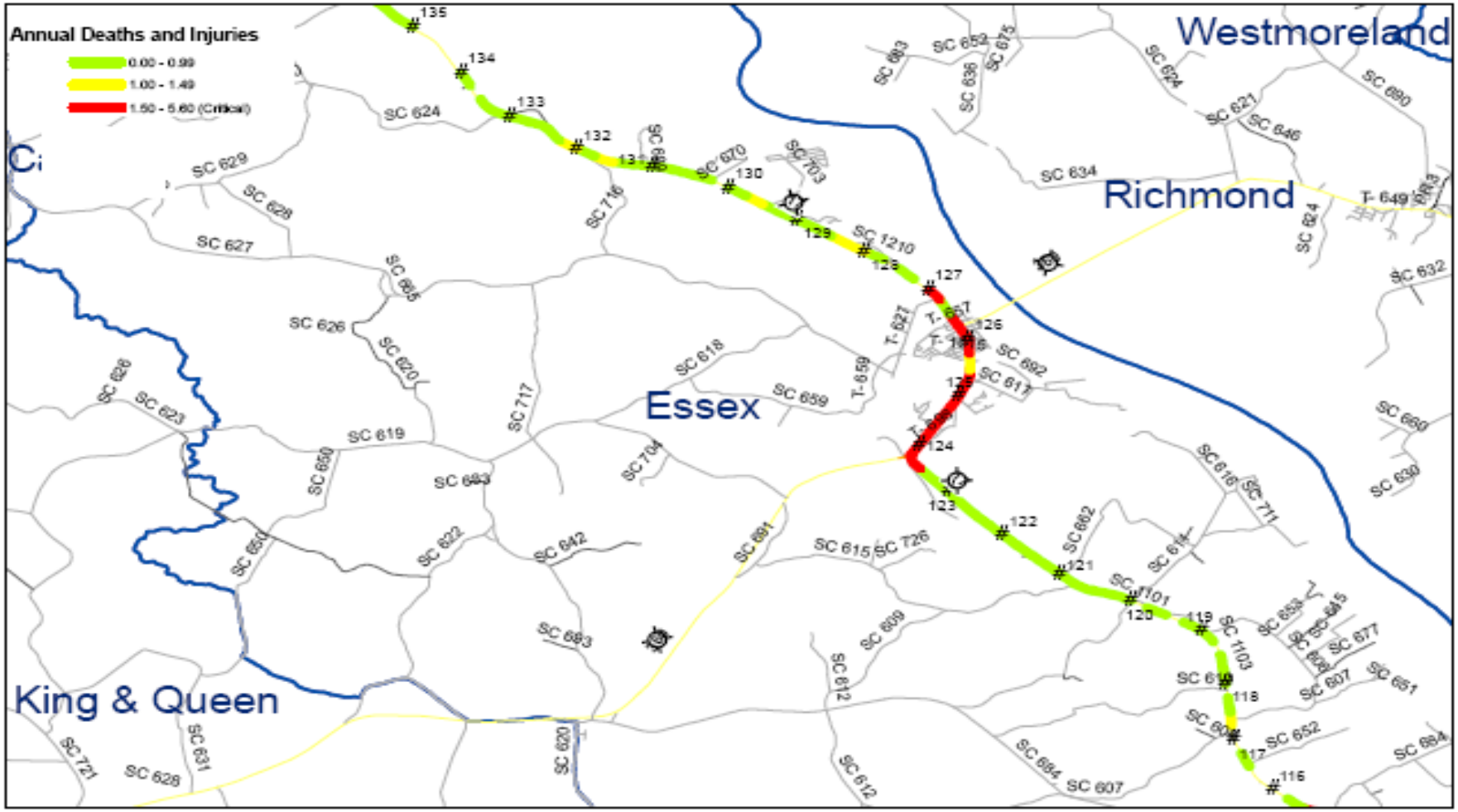


95 % CL F+I Density for 4-lane divide no access control



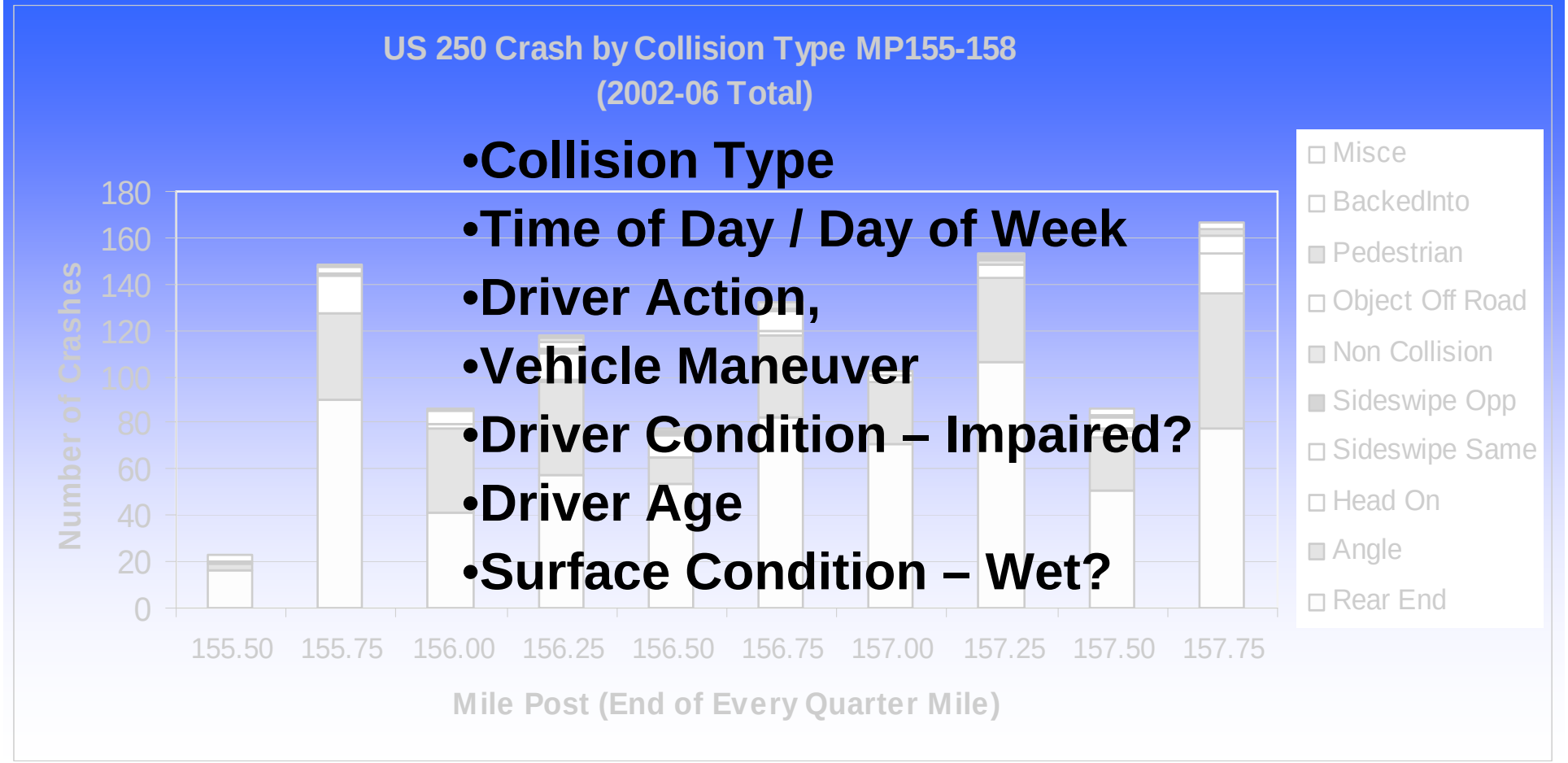
Collision Type Density per 0.25 mile

Map Critical Sections



Close look with aerial photo

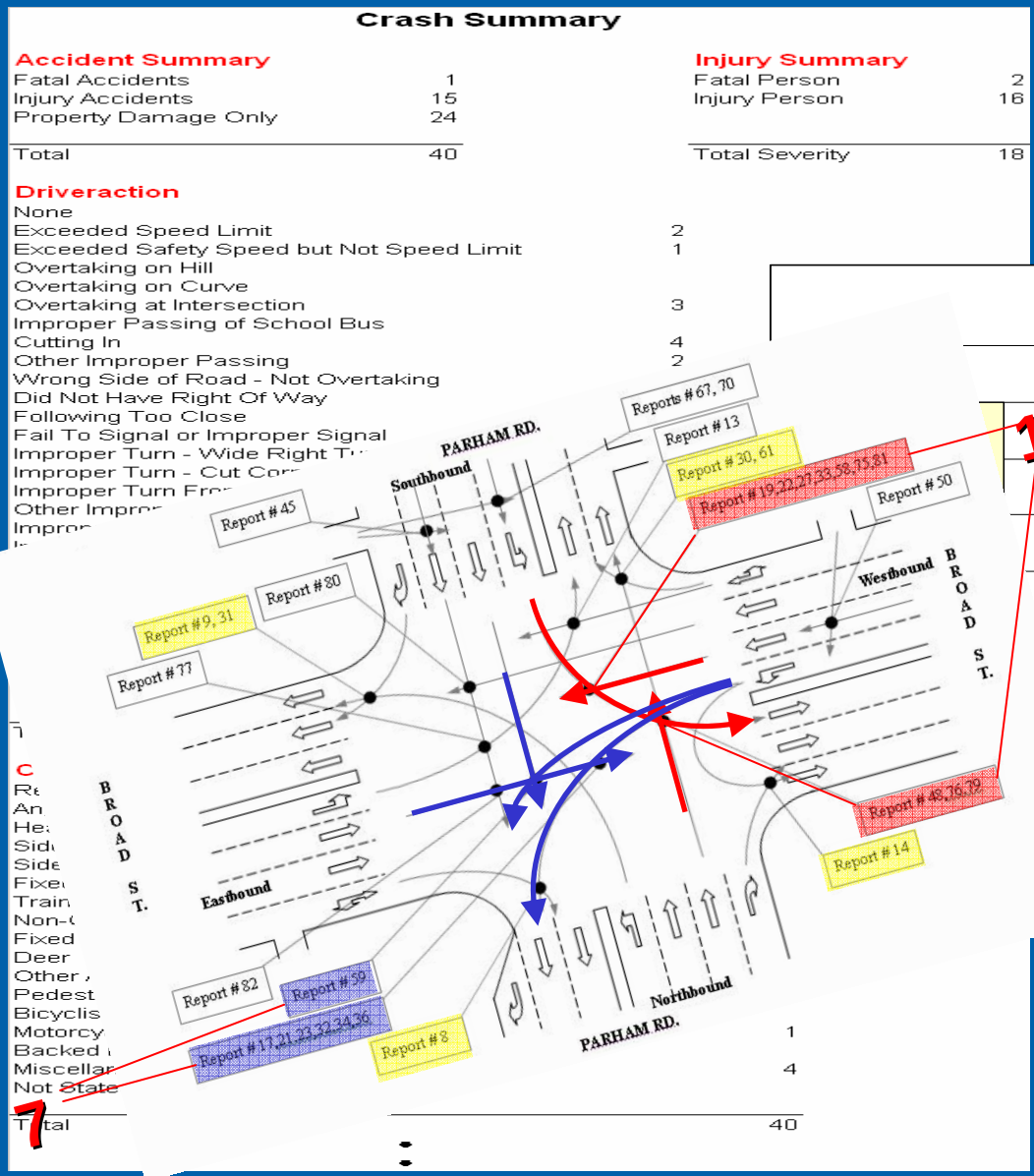
Crash Analysis Summaries



- **Collision Type**
- **Time of Day / Day of Week**
- **Driver Action,**
- **Vehicle Maneuver**
- **Driver Condition – Impaired?**
- **Driver Age**
- **Surface Condition – Wet?**

Road Safety Assessment (RSA) Field Study

Detailed Analysis of Target Locations

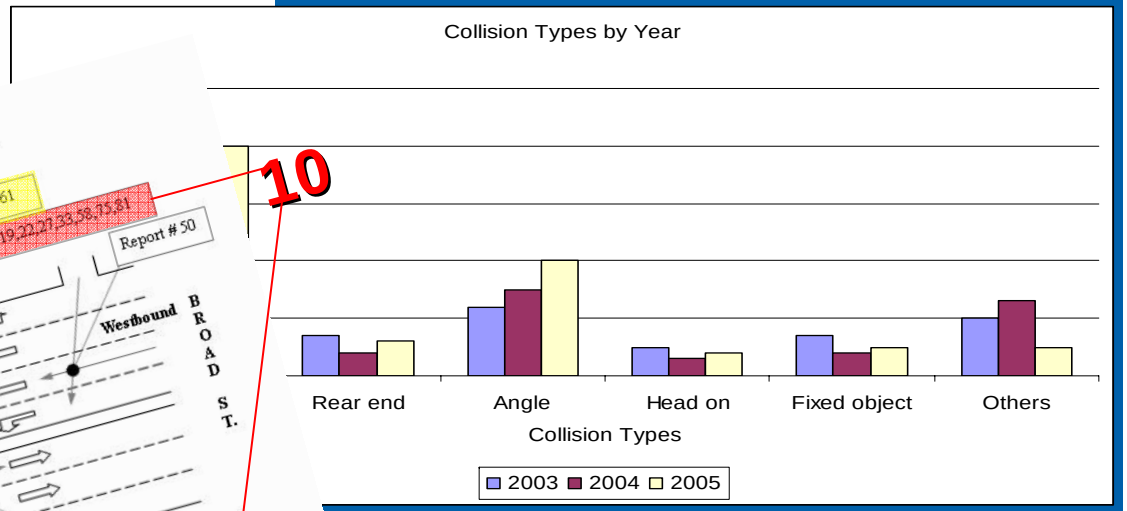


Crash Summary

Accident Summary	
Fatal Accidents	1
Injury Accidents	15
Property Damage Only	24
Total	40

Injury Summary	
Fatal Person	2
Injury Person	16
Total Severity	18

Driveraction	
None	
Exceeded Speed Limit	2
Exceeded Safety Speed but Not Speed Limit	1
Overtaking on Hill	
Overtaking on Curve	
Overtaking at Intersection	3
Improper Passing of School Bus	
Cutting In	4
Other Improper Passing	2
Wrong Side of Road - Not Overtaking	
Did Not Have Right Of Way	
Following Too Close	
Fail To Signal or Improper Signal	
Improper Turn - Wide Right T	
Improper Turn - Cut Cor	
Improper Turn Fro	
Other Impro	
Impro	
Fixed	
Deer	
Other	
Pedest	
Bicyclis	
Motorcy	
Backed	
Miscellar	1
Not State	4
Total	40

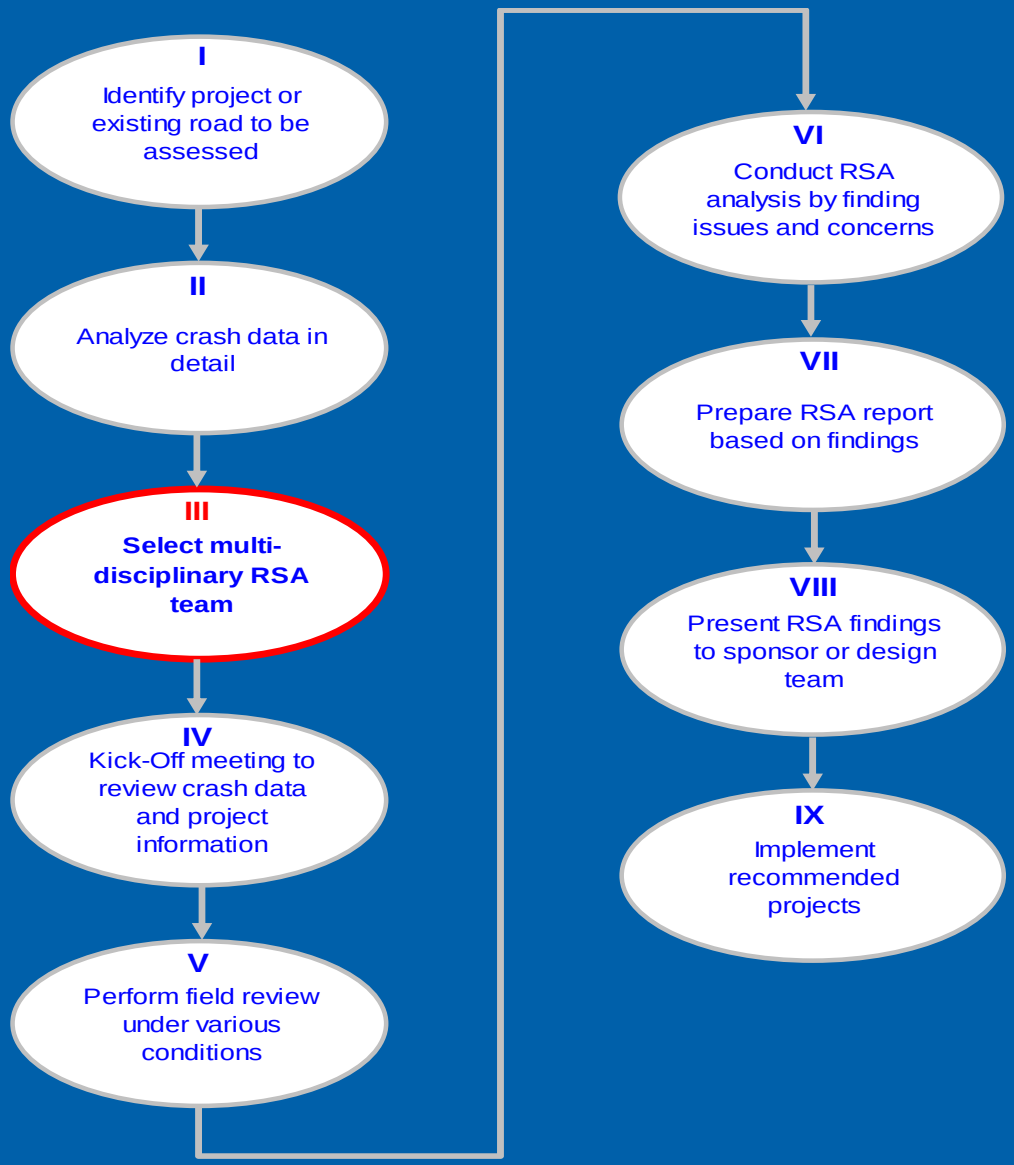


- Driver Actions & Driver Conditions
- Vehicle maneuvers
- Collision Diagrams (Intersection)

Focus on:

- Crash Factors
- Human Factors
- Weather/Time Influence

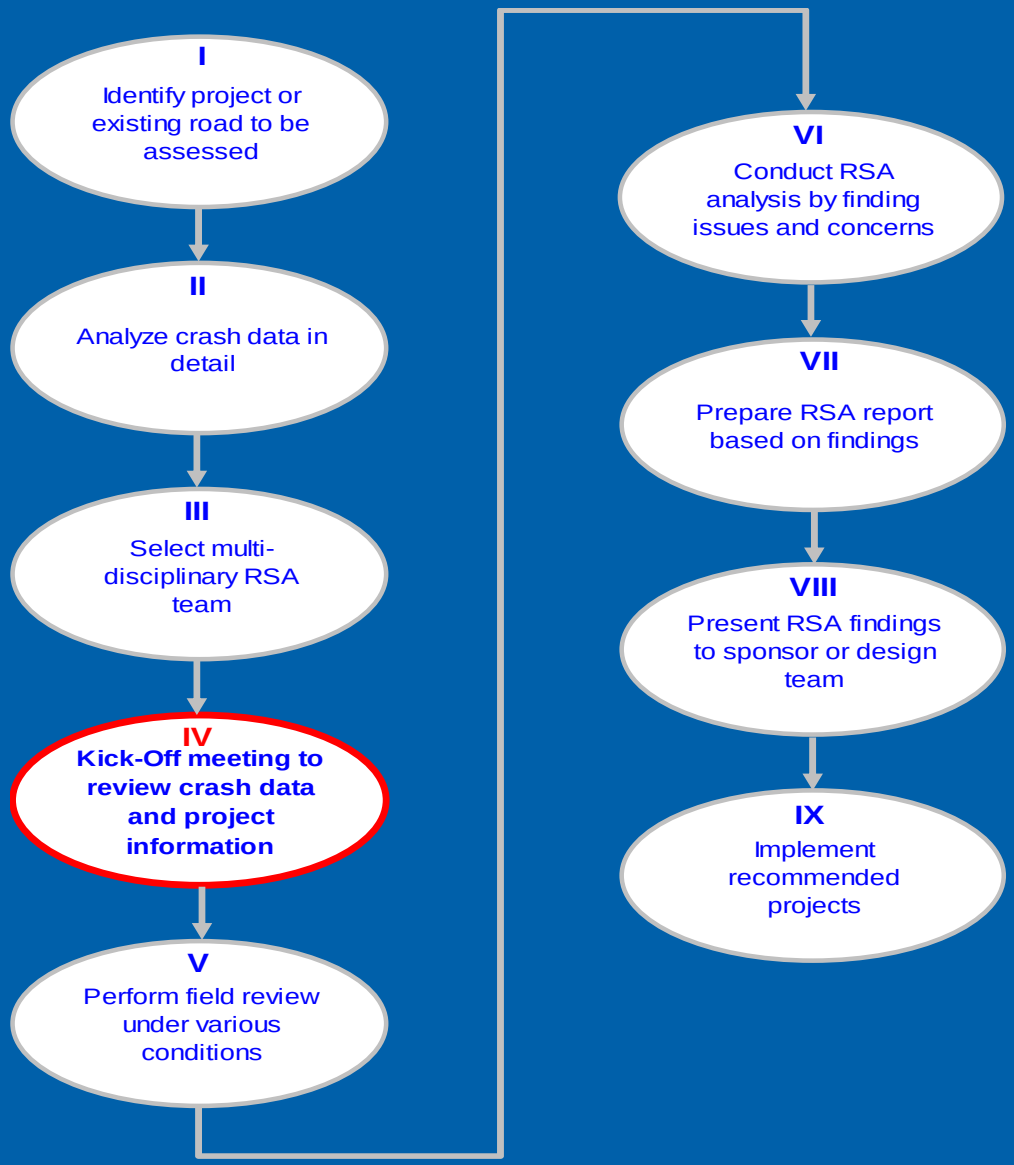
RSA Step III : RSA Team Building



- RSA team (3 - 5 person) consists of trained and experienced transportation professionals typically including:
  - Traffic/Transportation engineer
  - Highway designer
  - Maintenance specialist
  - Others with special knowledge for the project elements /location (e.g., police, drainage, utilities)

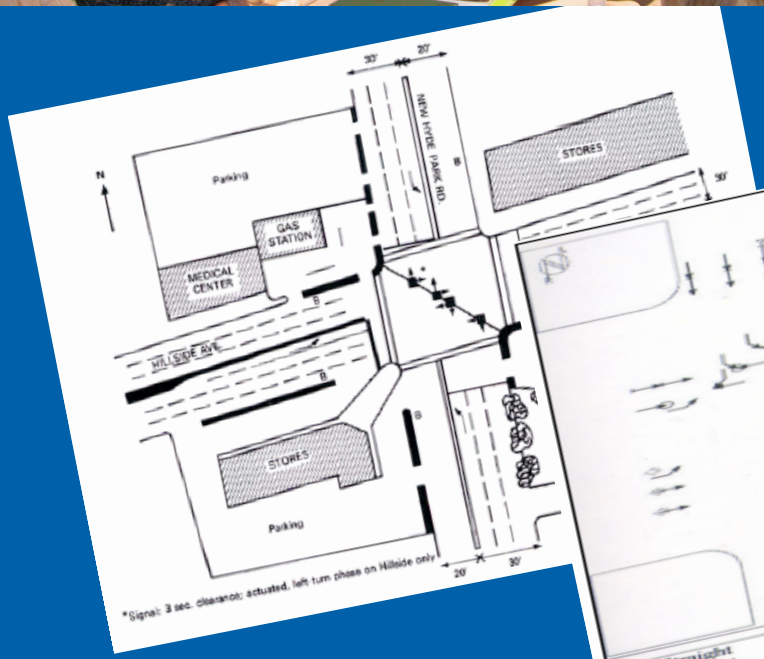
- The members should be independent of the area operations, maintenance or project being assessed to review without bias

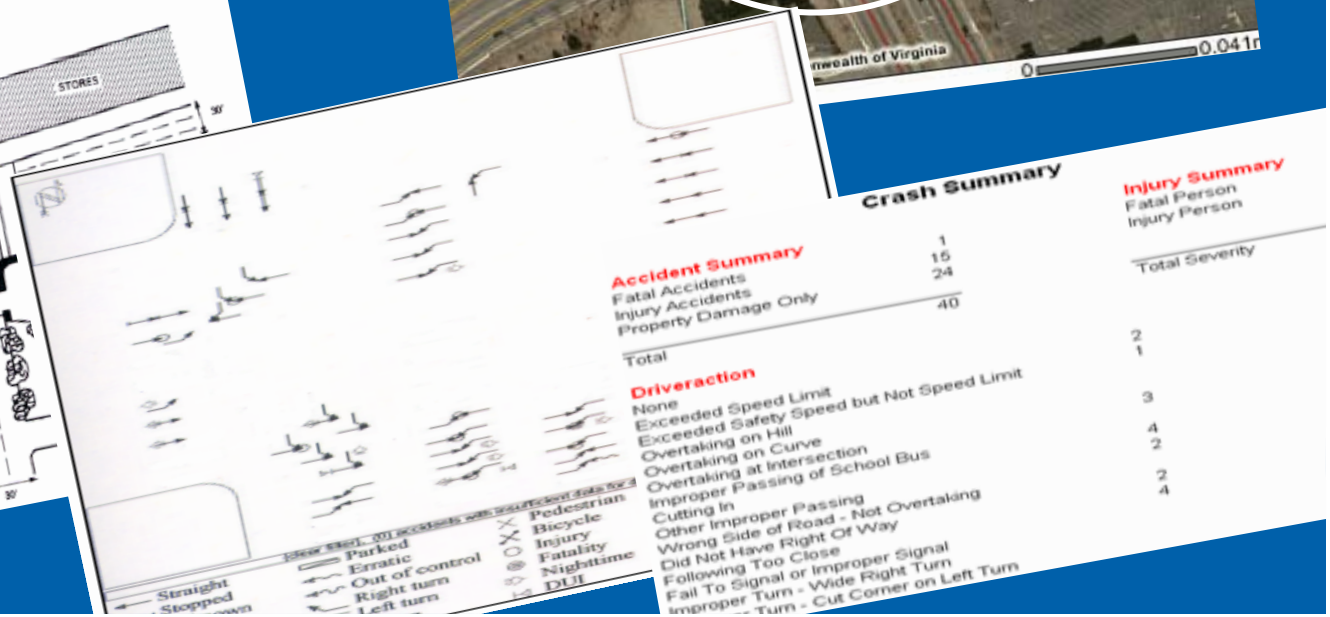
RSA Step IV : Compile Information



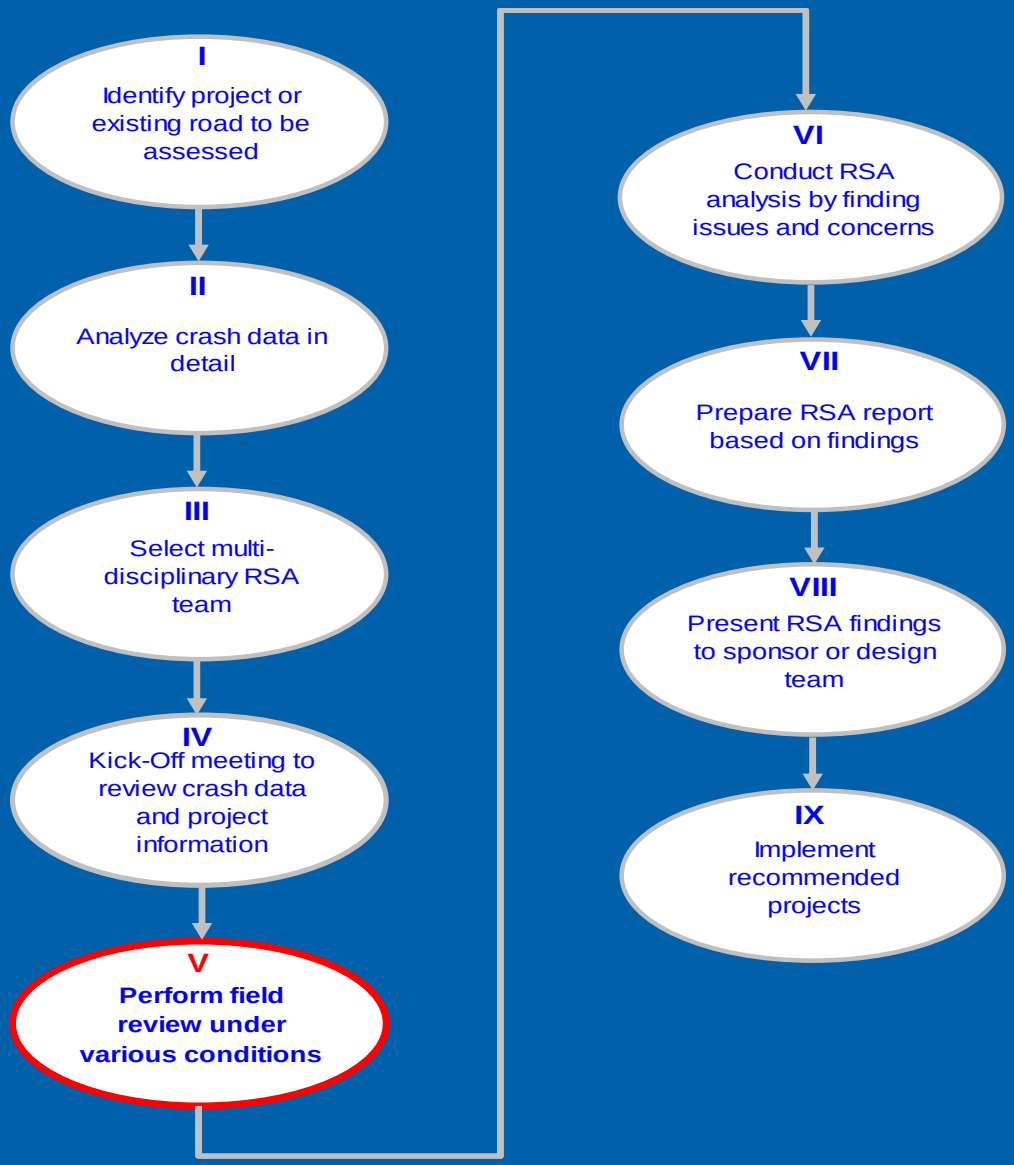
- Launch the safety assessment and discuss the purpose, scope, roles, and responsibility
- Reviewing relevant crash data and documentation including (but not limited) to:
  - Site maps/drawings and project plan
  - Design standard used
  - Crash data (at least last 3 years) – trend, collision type, severity etc.
  - Traffic volume
  - Signal phasing and timing (if available)
  - Geometrics – curves (ballbank), grades…

RSA Step IV : Compile Information





RSA Step V : Conduct Field Review



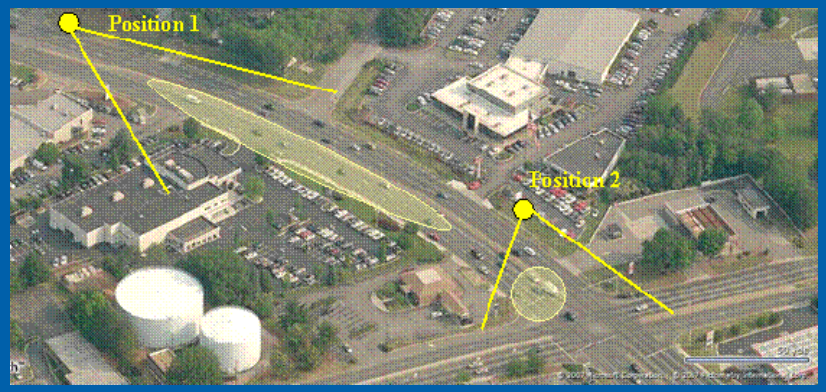
- More than one visit of field review might be required in both daytime (AM/PM Peak) and nighttime
- Identify safety issues and deficiencies which consider all possible road conditions and users
- Drive and video corridor or approaches
- Inspect the site or section with **RSA field checklists** using the Field Review Assessment Tool to assist in the safety assessment

Field Review (Cont.)

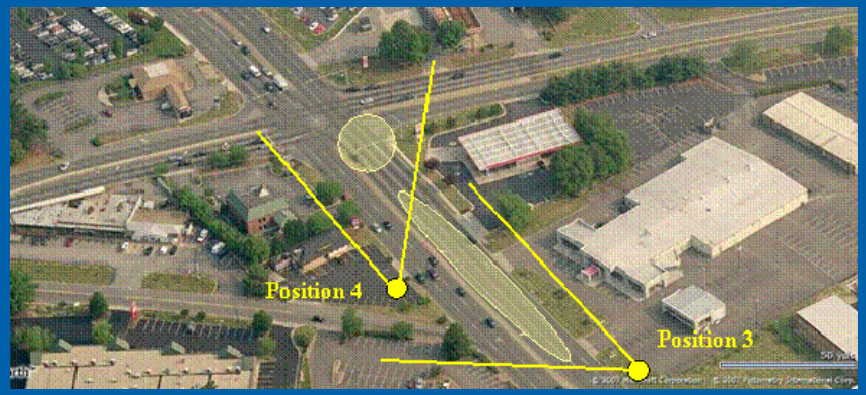
Parham Road Northbound

FIELD Review (Cont.)

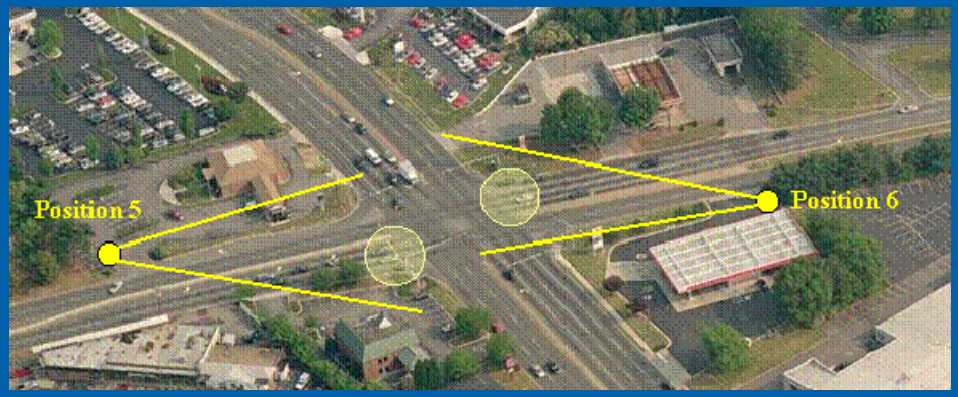
Video Camera Location and Recording Target Area



Broad Street Eastbound



Broad Street Westbound



Parham Road

Field Review Assessment Tool
(General Info Module)

RSA General Field Review

Study Name : Jurisdiction :

Study Route/Location : Area Land Use : **RSA Study # (Office Use Only) :**

Types of Area Use : Study Category :

Project Purpose :

Improvement Plan :
- ☐ Traffic Sign Improvement
- ☐ Traffic Signal Improvement
- ☐ Channelization Improvement
- ☐ Pavement Improvement
- ☐ Roadside Improvement
- ☐ Realignment Improvement
- ☐ Illumination & Lighting
- ☐ Regulation Improvement
- ☐ Drainage
- ☐ Traffic Sign Improvement
- ☐ School Area Safety
- ☐ Road User Facility
- ☐ Others - specify

Implementation Approach : ☐ Spot Improvement* ☐ System-Wide Improvement** Length : Mile Direction :

Mile Point : FR TO Number of Intersections Number of Horizontal Curves

RSA Inspectors:

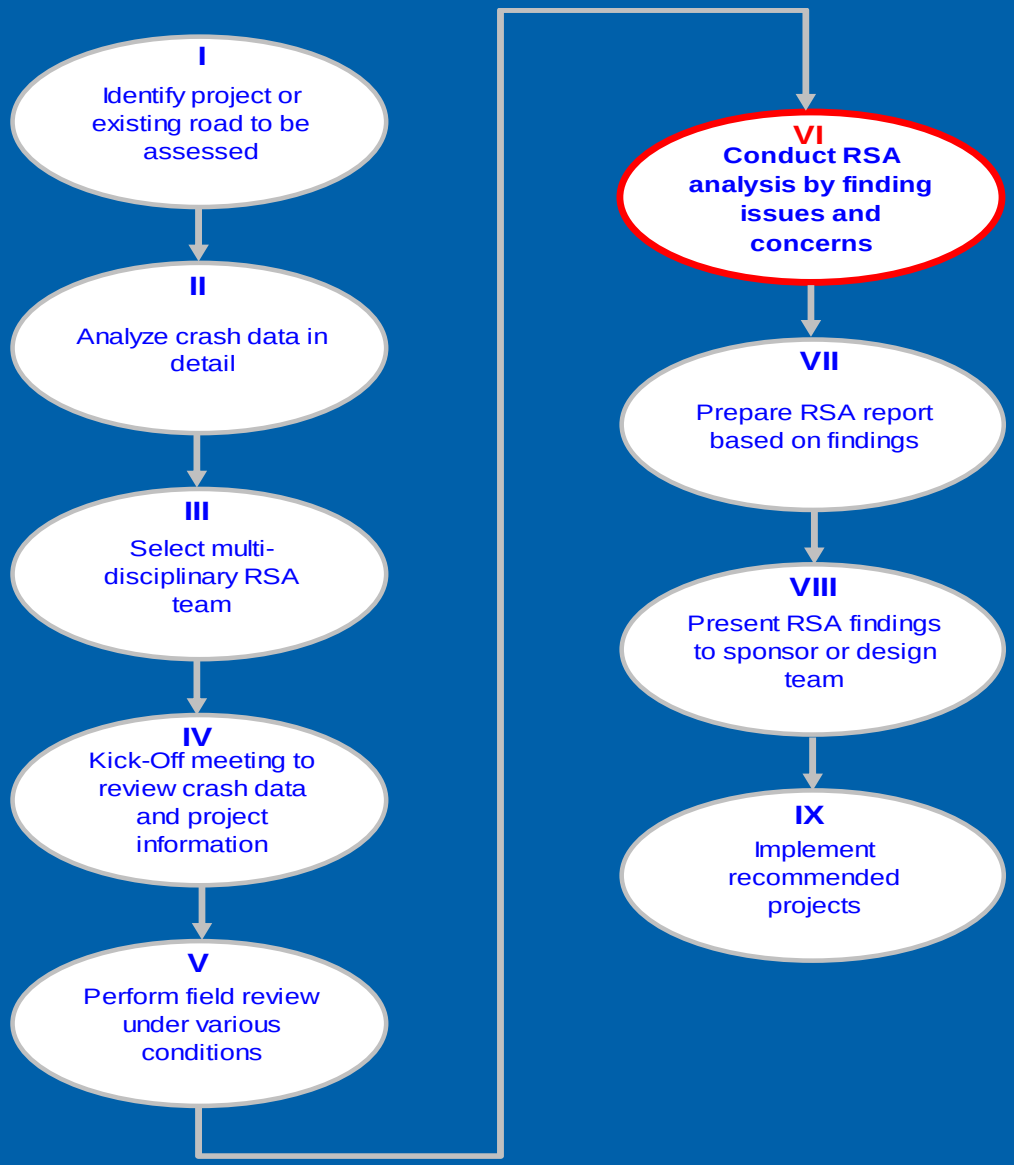
	Name	Division/District	Position	Telephone	E-mail
1					
2					
3					
4					
5					

RSA Inspection Stage : Date of RSA Inspection (MM/DD/YYYY) : Begin Date End Date

Available Data/Information :
- ☐ Aerial Photo
- ☐ Crash Data (by type, severity, and location)
- ☐ Traffic Volume and ADT
- ☐ Pedestrian Flow
- ☐ Signal Timing/Queue Length (if applicable)
- ☐ Topographic Map/Plan Sheet
- ☐ Existing Policies / Standards
- ☐ Previous RSA Report
- ☐ Others - specify

RSA Step V : Conduct Field Review

RSA Step VI : RSA Evaluation



- The RSA team discusses the safety issues and concerns raised/found during the field review assessment
- RSA analysis should consider (but not limit) to:
  - **Geometry design** – curve radius, sight distance, clear-zone etc.
  - **Traffic operation** – access control, TMC, queuing and spillback, intersection control signal coordination, etc.
  - **Crash pattern** – collision type, cause of crash, driver action, etc.
- Brainstorm with team for adequate countermeasures and solutions to create long list of alternatives
- Reduce alternatives to feasible and prudent recommendations and categorize based on expected funding source

RSA Step VI : Countermeasure Development

Major Cause of Crashes	Possible Countermeasures
Red-light running	· Remove signal sight obstructions · Post "Signal Ahead" warning signs · Install/replace signal visors and back plates · Add signal back plates · Install advance flasher signs · Install (additional) 12-inch signal lenses · Upgrade signalization · Review warrants/consider removing signal · Synchronize adjacent signals
Running stop sign	· Remove sign sight obstructions · Install larger signs · Install "Stop"/"Yield Ahead" signs · Construct rumble strips in pavement · Review warrants/consider removing sign · Replace "Stop" with "Yield" sign, if feasible · Place flashing beacons overhead or on "Stop" sign · Place red flags on "Stop" sign · Place "Stop" signs on both sides of road
Failing to yield right of way to pedestrians	· Add stop bars/crosswalks · Post "Ped Xing"/"Advance Xing" signs · Place advance pavement messages · Add/improve lighting · Post "School Xing"/"Advance Xing" signs · Use crossing guards near schools · Reroute pedestrians to safer crossing · Signalize pedestrian crossing · Install barrier curbing

- HSIP Guidelines provide list of possible countermeasures and associated crash reduction factors

- Document improvements that will reduce risk but do not have known reduction factors, such as:
  - **Signing and marking upgrades**
  - **Bicycle and pedestrian imp.**

IMPROVEMENT TYPE		Service Life	CRF Fatal	CRF Injury	CRF PDO	All	Head On	Rear End	Right Angle	Side Swipe
Realignment Improvement										
	Horizontal alignment changes (general)	25	0.25	0.25	0.25	X				
	Redesign Intersection	25	0.25	0.25	0.25	X				
	Vertical Alignment/Improve vertical curve	25	0.25	0.25	0.25	X				
	Improving the Sight Distance	25	0.3	0.3	0.3	X				
Illumination										
	Install the street light/roadway segment	20	0.25	0.25	0.25					
	Lighting-Intersection and Interchange	20	0.25	0.25	0.25					
Regulation Improvement										
	Two-way to One-way operation	20	0.5	0.5	0.5	X				
	Convert two-way stop to four way stop	20	0.47	0.47	0.47					
	Prohibit Right Turn on Red at sigalized inte	10	0.25	0.25	0.25				X	
Drainage										
	Provide adequate drainage	10	0.5	0.5	0.5					

Countermeasure Development

HSIP – Countermeasures and Reduction Factors

http://www.virginiadot.org/business/ted_app_pro.asp

AASHTO – Crash Reduction factors

http://www.transportation.org/?siteid=35&pageid=1490

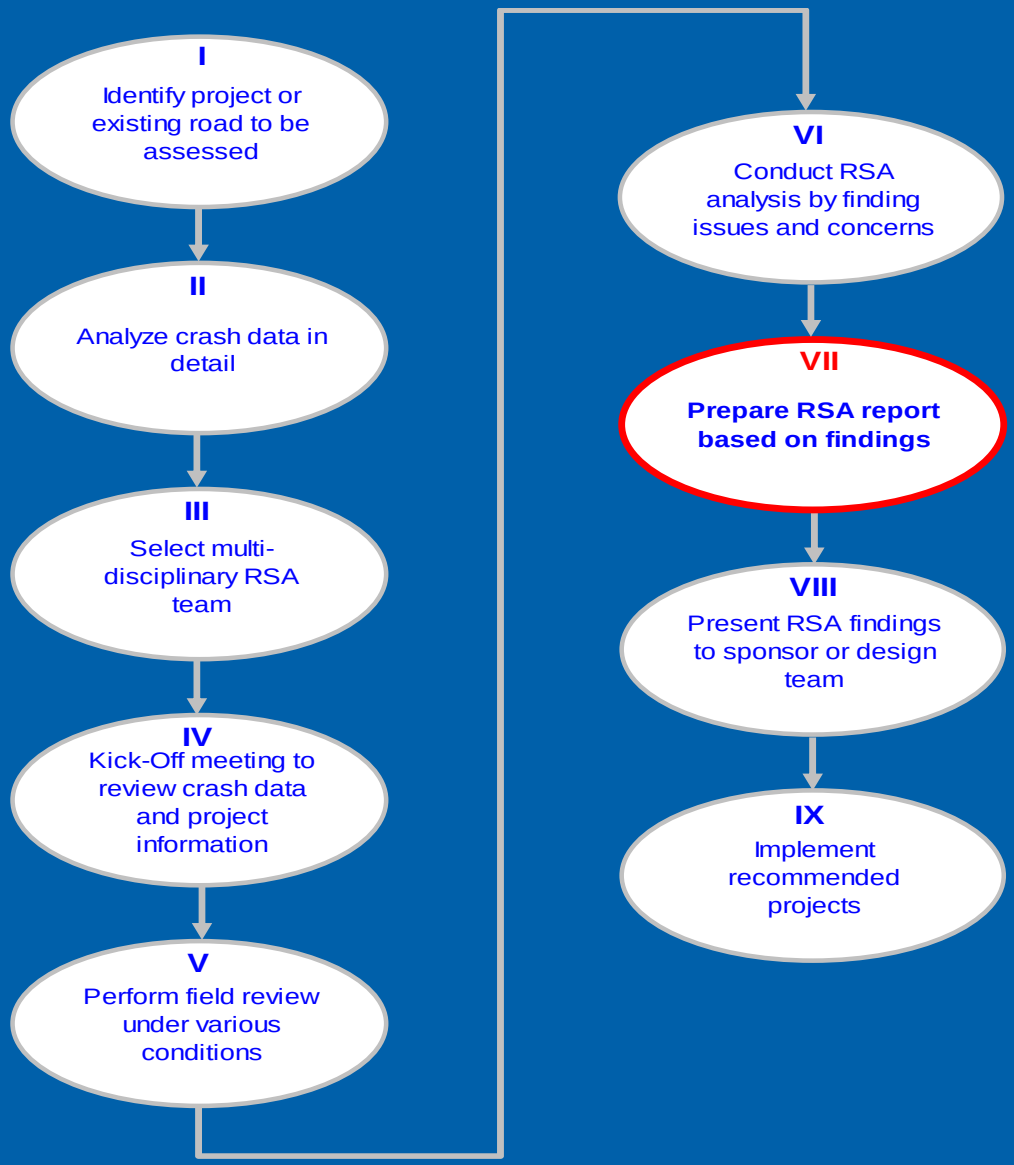
AASHTO/FHWA/NCHRP – Report 500

http://safety.transportation.org/guides.aspx

ITE -

"The Traffic Safety Toolbox: a primer on traffic safety", 1999

RSA Step VII : Reporting



- The RSA report must be created by the independent RSA team without any interference from outside (e.g. sponsor)
- The RSA report outline template should include:
  - Overview
    - Site Description
    - Why Chosen
    - RSA study team and process
  - Crash Data Analysis document/checklist reviewed
  - Field visit observation with physical characteristics, conditions, layout.
  - Findings – clearly states observations with photos & sketches
  - Conclusions with recommendations, suggestions, alternatives, and implementation strategies
- The RSA report need not be too long; **3-10 pages would be ideal !!**

RSA Step VII : RSA Sample Report

1) *District 2 Maintenance will place temporary flashing lights on the w*
the area.
2) *Investigate the possibility of splitting the cost of permanent flashers*
County, similar to the agreement for the flashers on the Geiger Gra
3) *Determine the availability of federal safety funds and, if available, i*

Guide Posts

- Generally well placed and in good shape.

ROADSIDE HAZARDS

Clear Zones

- Generally free of hazards, however the following was noted:
- There is a sharp two to three foot drop off of the roadway fill to natural
Road and Occidental Drive on the south side of US 50.
Regrade to a safe slope.

Culverts

- Several culverts under approaches appear to be in clear zone and may p
Occidental, Segale, and La Fond are examples.
Identify these culverts and either regrade the slope around the culvert i

LEVEL OF SERVICE

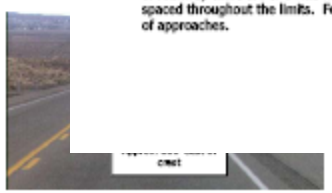
Passing Opportunities

- New approaches and intersections have reduced the length of passing z
Road to Chaves Road.
Lyon County, NDOT, and developers should coordinate future improvem
1) Construct frontage roads to control access onto US 50 and reduce t
2) *Require developers to construct acceleration, deceleration, and left*
these improvements.
- Ten mile hill, there was concern about a sag vertical curve to the east n
van stopped at the crest to observe and, at that position and eye height
Discussion centered around driver frustration and the limited passing op
Dayton. It has been observed that during morning and evening rush ho
passing opportunities and reducing passing opportunities in this area ma
that historically there appears to be no increase in crashes during the ru

Driving easterly in a compact sedan, the night review team stopped beyond the crest and o

1) The headlights
15 seconds whi
2) It took approxi
the teams stop
reappeared. A
this would indic
2,640 feet.

The night review team proceeded downhill easthound and stopped at three more locations. The closest to the sag where oncoming headlights disappeared was approximately 800 feet east of the first observation point. The oncoming vehicle took approximately 22 seconds to reach the teams stopped vehicle. Assuming the vehicle



In the evening of 02/21/01 a night review was performed by Chu
Robert Kvam. They again drove the limits in each direction, stopped to o
vertical curve at the east end of the ten mile hill, and entered/exited seve

Following is a compilation of the comments and recommendation

GENERAL COMMENT

Note: Bullets indicate observations with the subsequent *italics* indicating

The roadway co
shoulders with r
condition throug

ROAD MARKINGS

- Striping was clearly visible during the day, but only moderate at night
Freshen the striping and widen the edge lines from 4 to 6 inches. Th
line District wide would increase uniformity throughout the District.
- Passing is allowed on US 50 through several approaches (i.e. James,
are not county roads and District stated these approaches were not s
proximity of these low volume approaches to county roads would sig
Identify all approaches through which passing is allowed and assess i
be restriped as double yellow.

SPEED CONTROL

- The 65 mph speed limit appears justified throughout, however the de
Chaves Road) should be reassessed periodically. The increased cross
speed conflict with the 65 mph through traffic. Also, as new approac
lengthen which in turn reduce passing opportunities and increase dri

SIGNS

- The signs were legible during the day, however 30%-40% of the sign
Perform a night time sign review to determine which signs need to be
- There are two types of advance street name plaques. The first is a s
below. The second is a dual sign with the diamond warning sign abo
advisory sign noting the street name using 8 inch lettering below. It
of the single signs are located too close to the intersection. By the ti
time to decide on an appropriate action. Intersections without left tu
the area to suddenly decelerate in the travel lane.
1) Use dual signs for all approaches except those approaches with s
Fort Churchill Road). Approaches with multiple names should us
2) Identify advance street name plaques too close to the approach,
relocate them to allow sufficient driver decision/action time.
- Animal crossing signs. Over the last five years, between Mark Twain
collisions with horses resulting in five injuries and six collisions with o
of roadway there are two wild horse signs, one equestrian sign, and
spaced throughout the limits. Fencing may not be effective along a l
of approaches.

CORRIDOR EVALUATION

US 50, MP LY 8.68 (near Segale Road) to MP LY 29.99 (JCT. US 95A)

INTRODUCTION

In response to public concern, the Safety/Traffic Division performed a corridor evaluation on US 50 from approximately MP LY 18.00 (west of Segale Road) to MP LY 29.99 (junction of US 50 and US 95A. The purpose was to assess the road from a safety perspective and recommend interim roadway improvements to be employed until the phased widening of this section of US 50 is complete. It is the understanding of the evaluation team that the following concerns have been expressed at various public meetings:

- Consideration of a Daylight/Headlight section and/or lighted reader boards.
- Constructing left turn pockets at various intersections.
- Additional horse warning signs/put flashers on the existing signs.
- Assess sight distance along Ten Mile Hill.
- The lack of an eastbound left turn pocket at Pinto Street (Stagecoach Market).

Since the early 1990s Australia and New Zealand have been employing highway "safety audits" for existing and proposed roadways to meet objectives similar to those stated below. A safety audit for their roadway system is a formal review using standardized procedures. The safety audit concept is beginning to gain acceptance in the United States and is being recognized as a cost-effective tool to reduce risk on the roadway. This corridor evaluation is an initial step towards formalizing an NDOT safety audit procedure and will be beneficial in assessing its value to NDOT. Because the term "safety audit" may imply a standardized process, the term "corridor evaluation" was used for this study.

OBJECTIVES

- Reduce the risk and severity of crashes that may be attributed to the existing road conditions by identifying potential safety problems.
- From a road user's viewpoint, identify confusing and/or misleading messages.
- Improve awareness of safe maintenance practices.

METHODOLOGY

The "Transfund New Zealand Safety Audit Procedures for Existing Roads" (Report No. RA97/623S) was used as a guide for this corridor evaluation and some of the described procedures were used. For example, field review team members were provided a modified prompt list (see Appendix) from the above report in order to organize field comments.

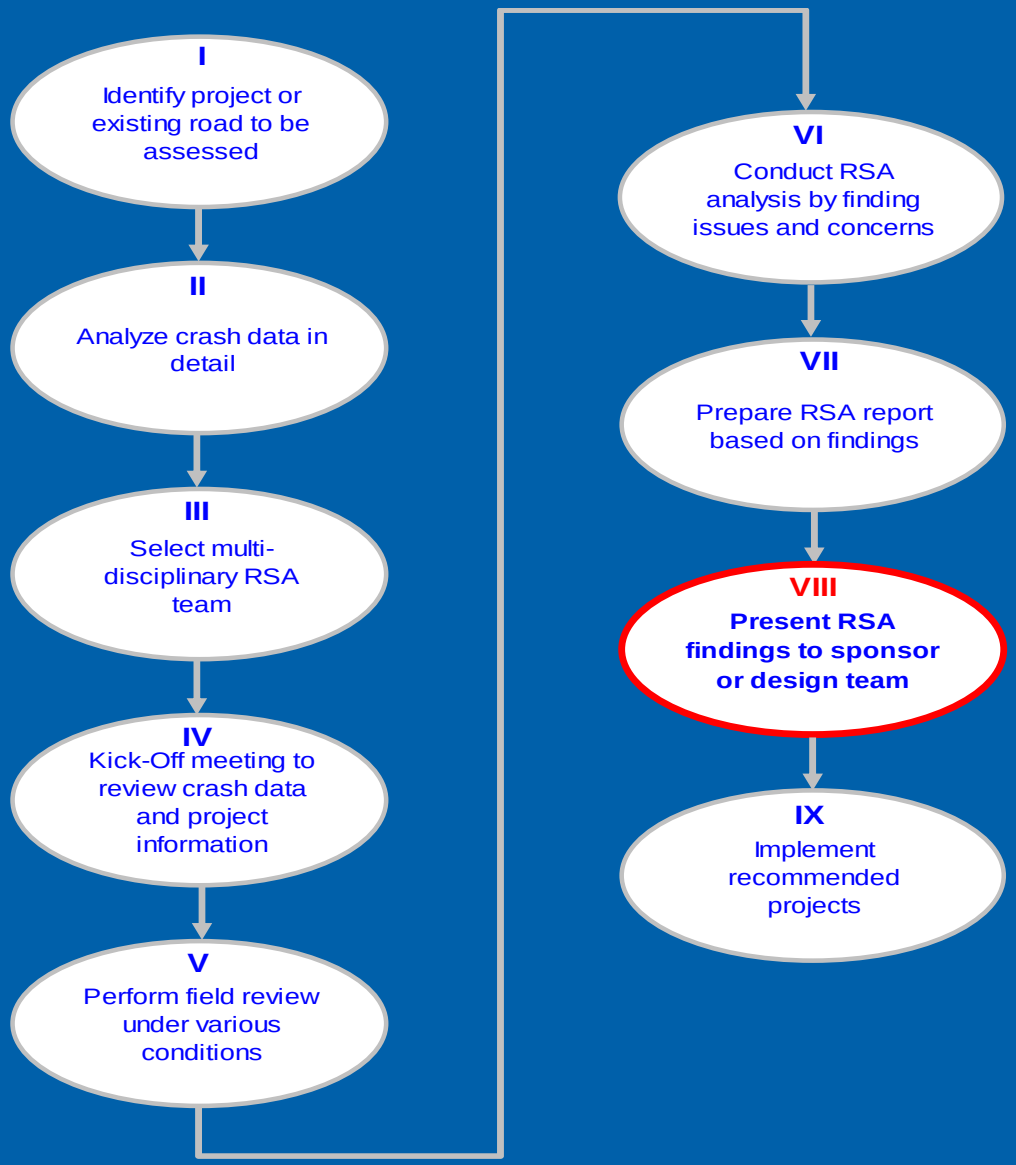
The review team was comprised of the following members:

Jim Warne	Nevada Highway Patrol
Pete Forinash	Lyon County Road Department
Sam Wokdridge	NDOT Maintenance
Debra Starnes	NDOT District 2
Robert Kvam	NDOT Specifications
Mark Mindrum	NDOT Traffic
Chuck Reider	NDOT Safety
Jerry Pieretti	NDOT Safety
Jay Van Sickle	NDOT Safety

A kickoff meeting was held 02/21/01 prior to the field review. During this meeting the objectives, goals, scope, evaluation procedure and reporting procedure were discussed (see Appendix).

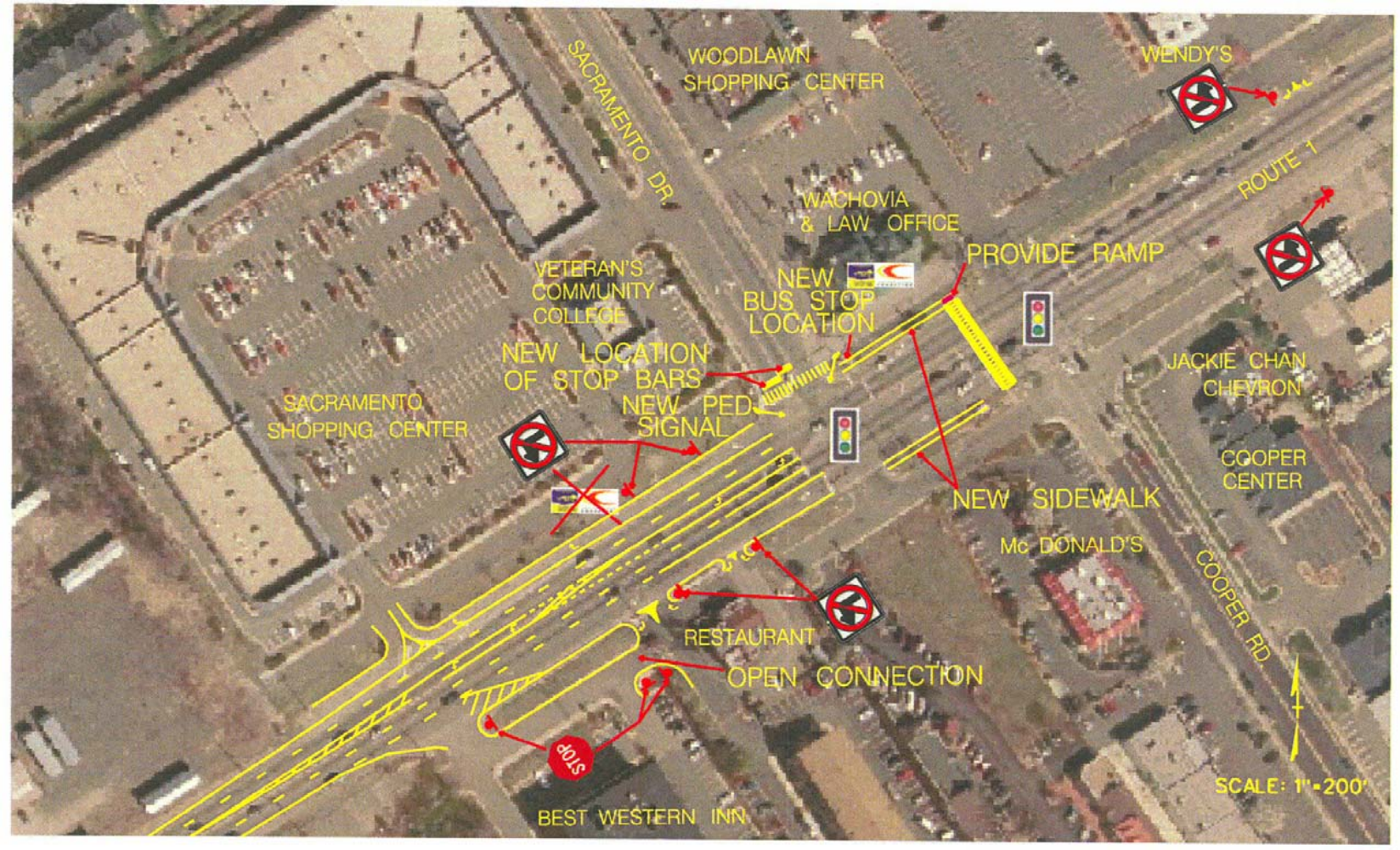
The review team traveled as a unit in a van to allow full team discussion of all the issues noted. The limits were driven in each direction during the day and the team stopped at several locations to discuss items of interest. The team returned to Dayton to discuss findings and summarize recommendations.

RSA Step VIII : Recommendations



- The RSA team presents its findings and distributes the report to sponsor for their review and comments
- If a briefing meeting is held it should have open, positive, and constructive discourse that is free of criticism
- All parties should work together to be proactive in their approach to safety; not adversarial
- Implementation should group recommended countermeasures by time frame and funding sources as:
  - Short-term = Maintenance
  - Intermediate = HSIP Proactive
  - Long-term = (Re)construction
- Submit HSIP proposals to TED for funding

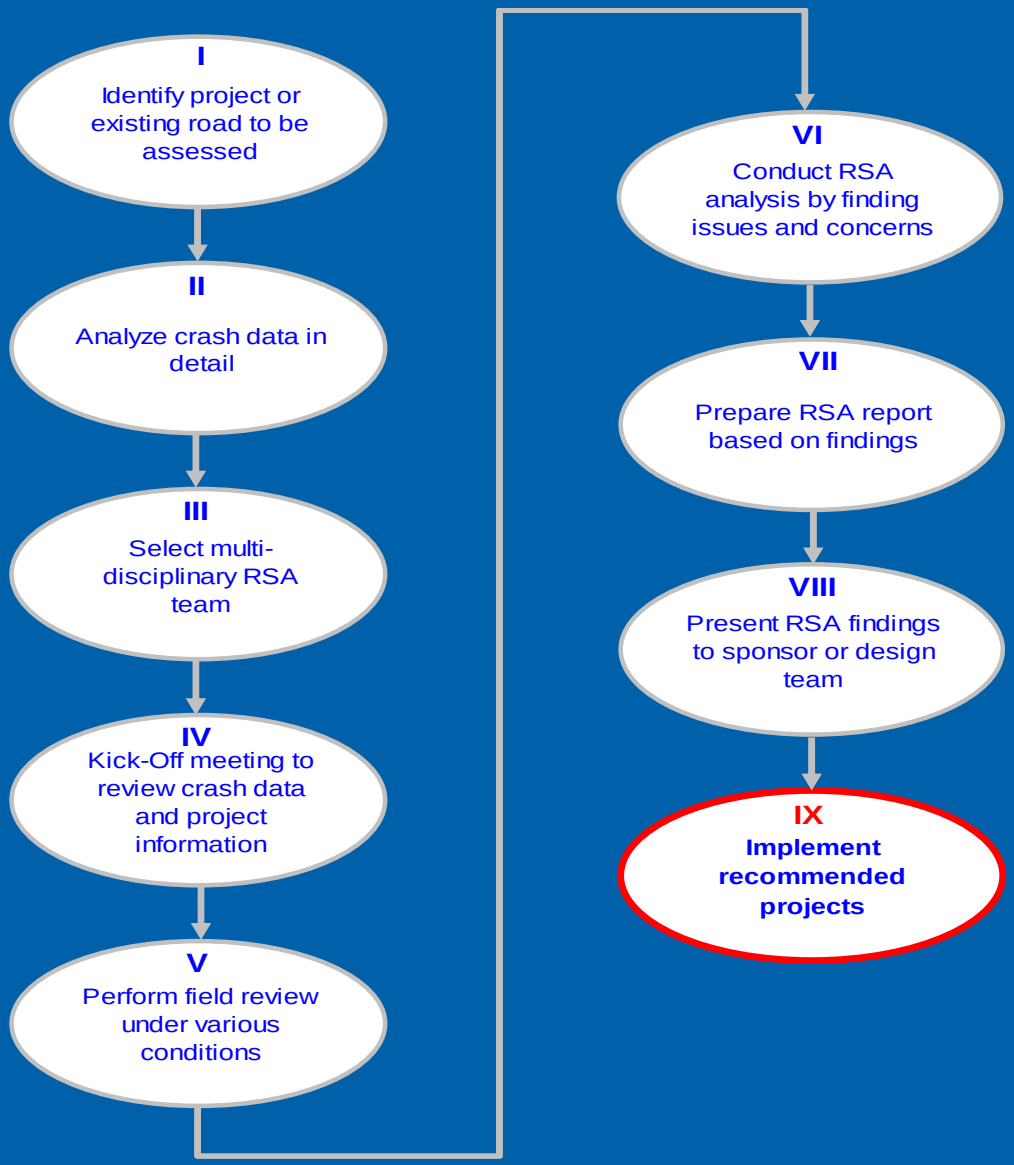
Diagram Improvements



RSA Step VIII : Presentation by Recommendations

- Location
  - Intersection at Sullyfield Cir and Westmore St. Chantilly, VA
- Existing condition
  - Each approach has one lane
  - 2-way stop control
  - Sullyfield Cir and Westmore St. have both 30 mph speed limit
  - The intersection has about 6000 ADT
- Problems
  - About 70 percent of angle crashes are distributed during PM peak hours in last three years
  - Limited sight distance from approaches
- Expected countermeasures
  - Install traffic signals
  - Prohibit parking
  - Turning movement channelization

RSA Step IX : Implement Countermeasures



- Implement the changes that RSA team and stakeholders agree to improve safety
- The implementation must be documented and stored as a part of the HSIP/RSA file
- HSIP projects must be monitored and evaluated for effectiveness
- Share lessons learned from applied recommendations
- TED –HSIP to compile database of RSAs and resultant improvements

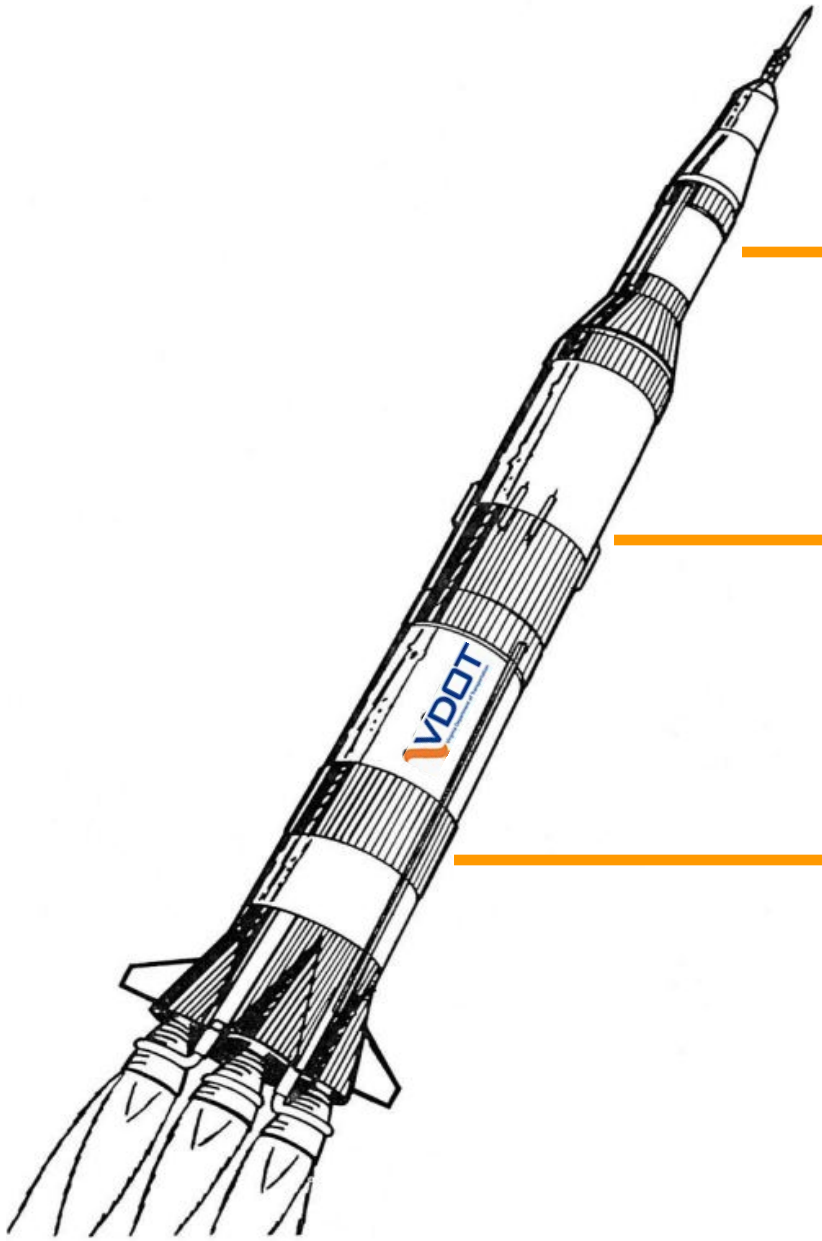
RSA Step IX : Implementation

Urban - Road Diet

Urban – Road Visual Clearance

RSA Project Development Procedure For Recommended Improvements

VDOT Rocket : Prioritize Improvements



Stage III (36+ months)
TIP with ROW

Stage II (12-36 months)
HSIP / CMAQ / TE Projects with no ROW

Stage I (0-12 months)
Signal Optimization / Maintenance Fix

Fuel =
Crash Analysis / RSA
Turning Movement Counts / Traffic Signal Timing and/or Model

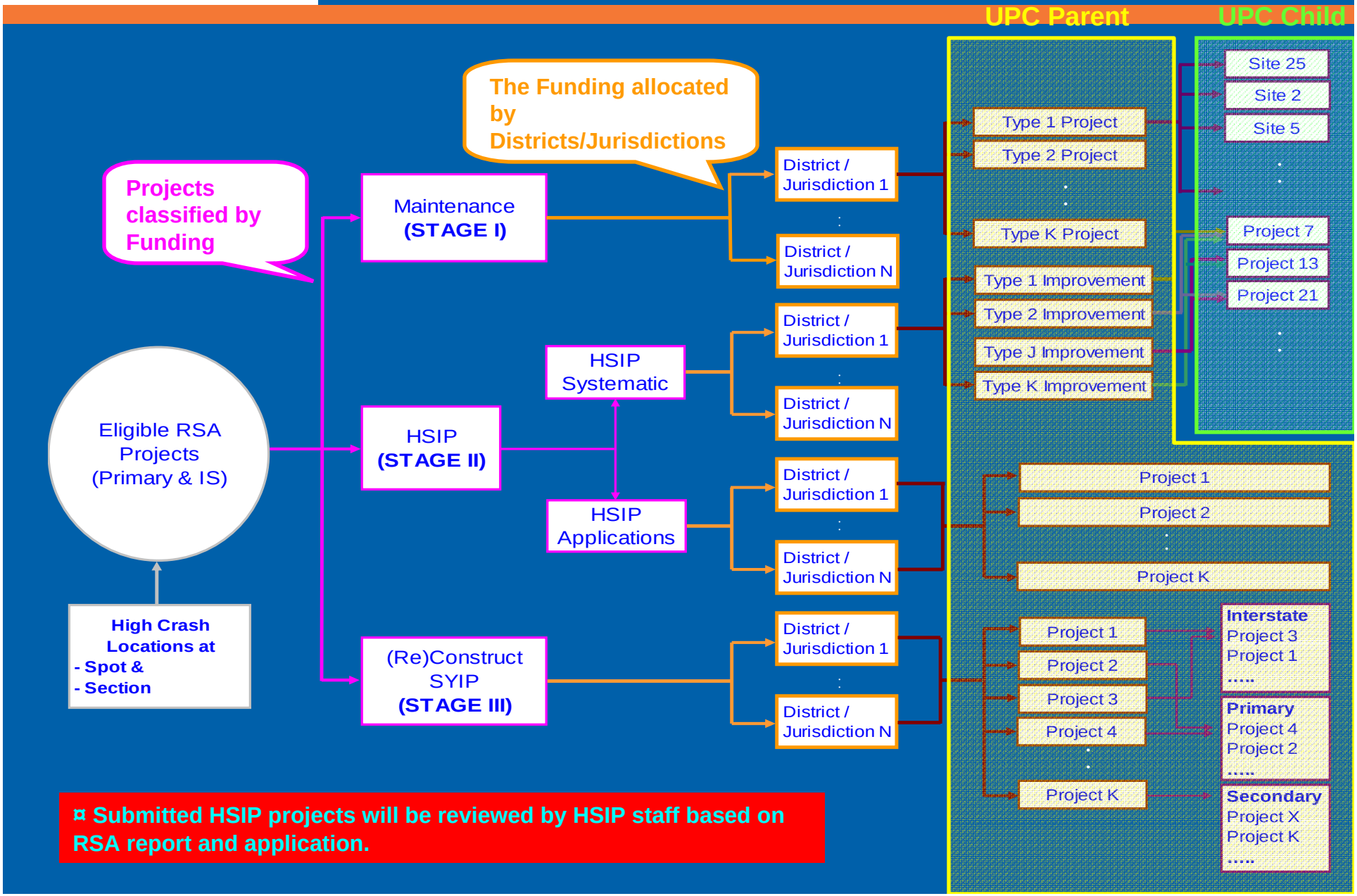
HSIP Systematic Funding

- $38M for FY07 proportional to District's F+I crashes
- $20M for FY08 proportional to top 20 F+I crash jurisdictions

Funded Safety Improvement Types
Roadway Safety Assessment (RSA)
Guardrail
Traffic Signs
Traffic Signals & ITS
Traffic Markings
Roadway Lighting
Roadside Safety
Shoulder Improvement
Rumble Strips/Stripes

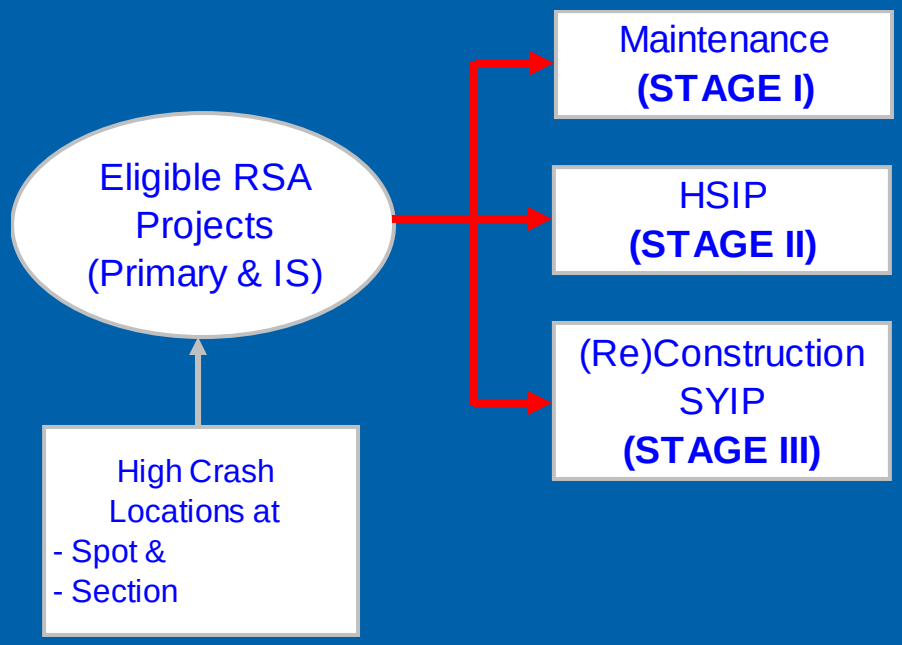
" Required to develop Project "

RSA/Safety Project Development



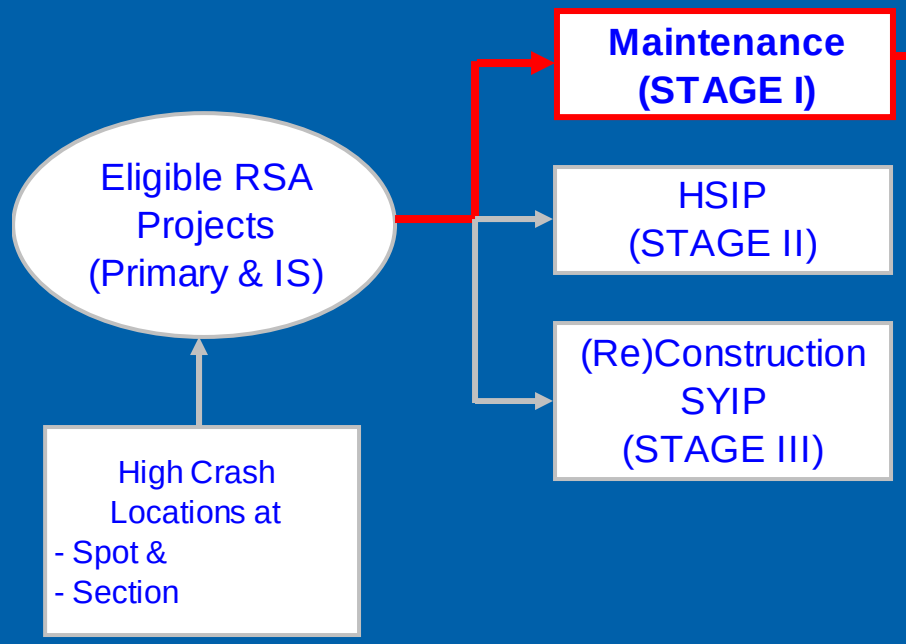
¤ Submitted HSIP projects will be reviewed by HSIP staff based on RSA report and application.

Eligible RSA Safety Project Classifications



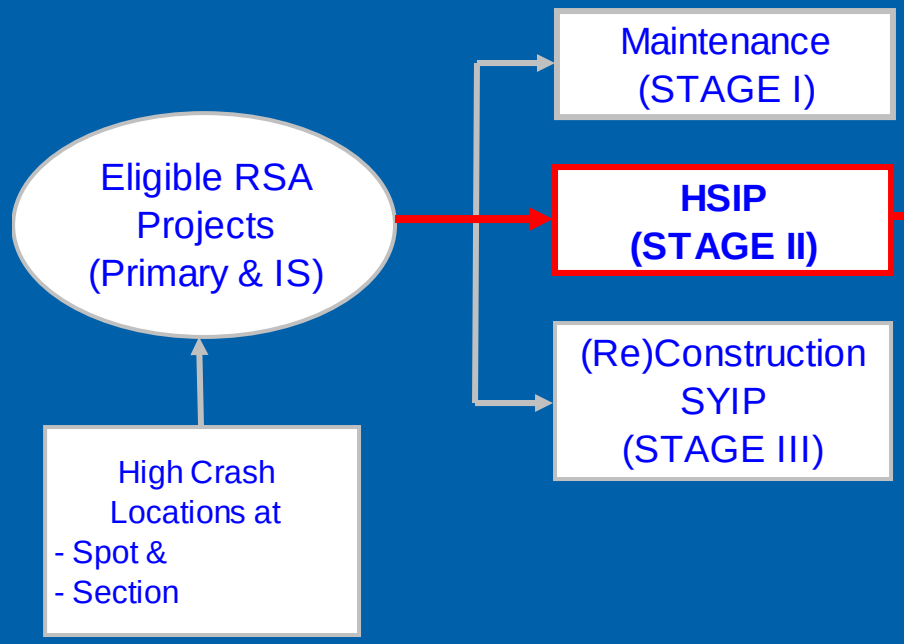
- Crash analysis required
  - Complete RSA
- RSA project can be sponsored by:
  - Maintenance Engineer
  - Traffic Engineer
  - Planner
  - MPO
  - Jurisdiction
  - Administration etc.
- Communication between stakeholders is important
- The applied RSA projects will be classified by the funding categories
- The safety projects in each category are identified/prioritized by cost and B/C ratio

Eligible Maintenance and Operations Project



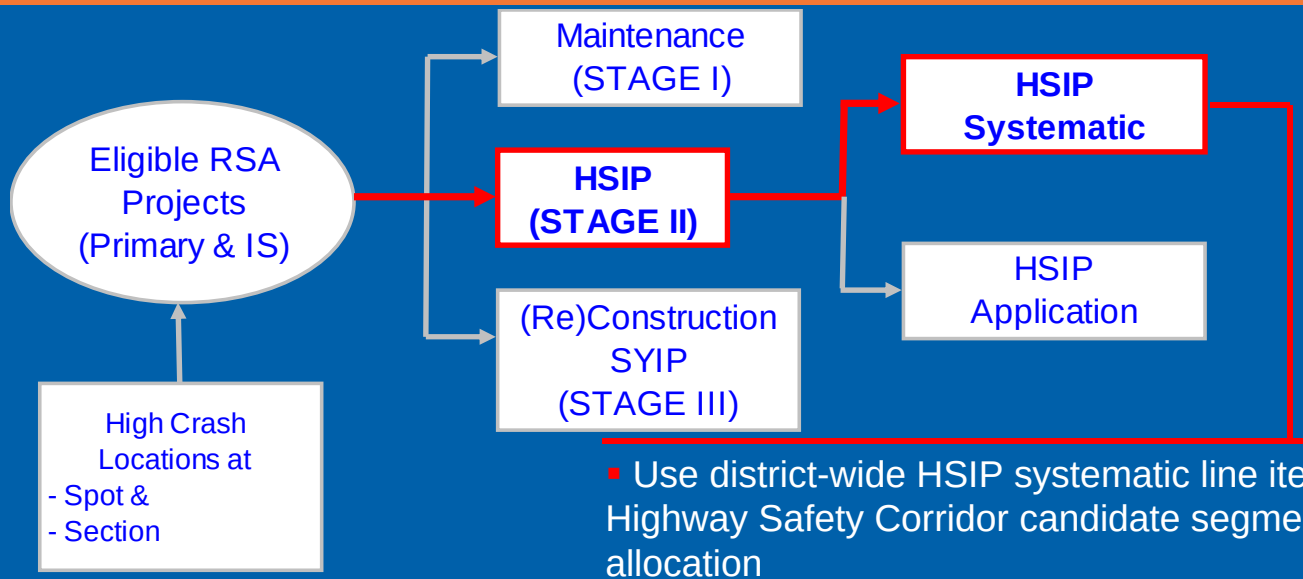
- Low cost and short term (0 – 12 month) projects
- Any type of 3R maintenance project or improvement activity for improving safety
- Request/Apply funding the improvement by **maintenance staff, traffic engineer, planner, and etc.**

Eligible HSIP Project



- Low/Mid cost and short/moderate term (0 – 24 month)
- Eligible projects such as:
  - Guardrail
  - Traffic Signs
  - Traffic Signals & ITS
  - Traffic Marking
  - Roadway Lighting
  - Roadside Safety
  - Shoulder Improvement
  - Rumble Strip
- Request/Apply for project funding to HSIP staff (TED, VDOT) by sponsor
- Application requirements
  - 3 years (min) of **detailed crash data analysis** (FR 300's)
  - Estimated project cost
  - Project scope and work schedule
  - **B/C (Benefit/Cost) Ratio > 1.0** (using VDOT CRF table) or Risk Narrative
  - Provision to evaluate – before and after comparison

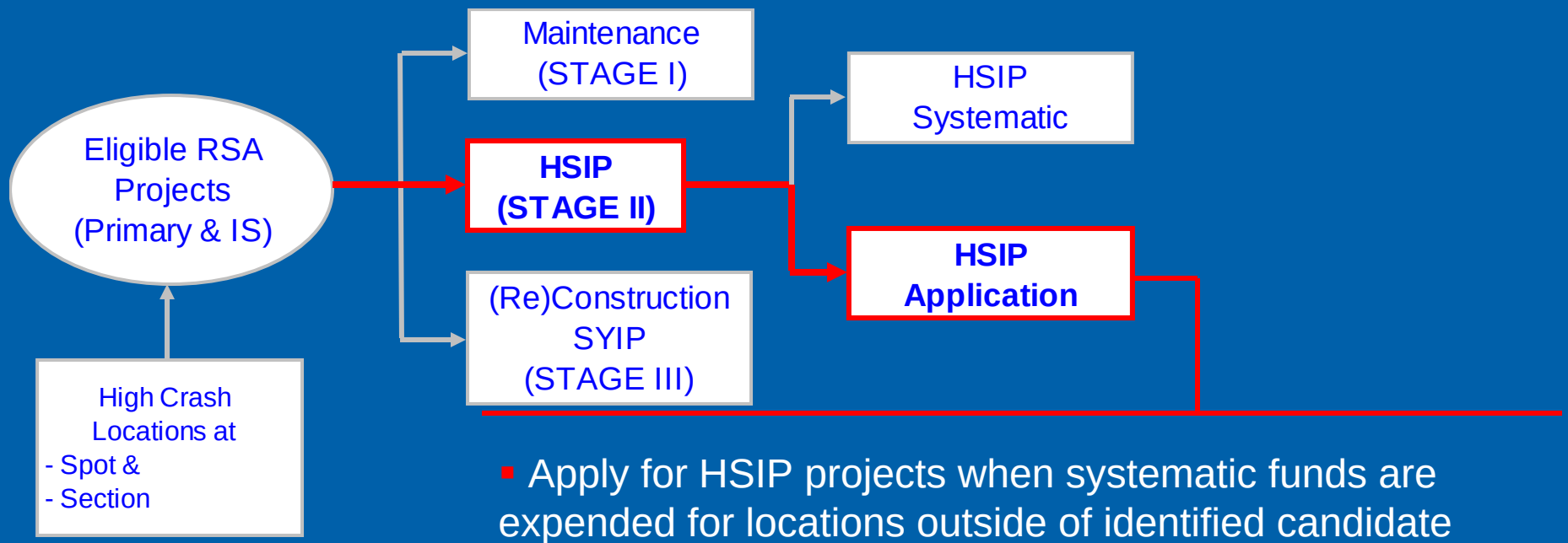
Eligible HSIP Systematic Project



- Use district-wide HSIP systematic line item funding for IS and Primary Highway Safety Corridor candidate segments or jurisdiction HSIP allocation
- Submit HSIP project request form with:
  - crash analysis and RSA Report including FRAT checklist
  - B/C and/or risk narrative form (XLS) with project elements, costs and schedule by phase from HSIP applications to TED-HSIP staff for approval

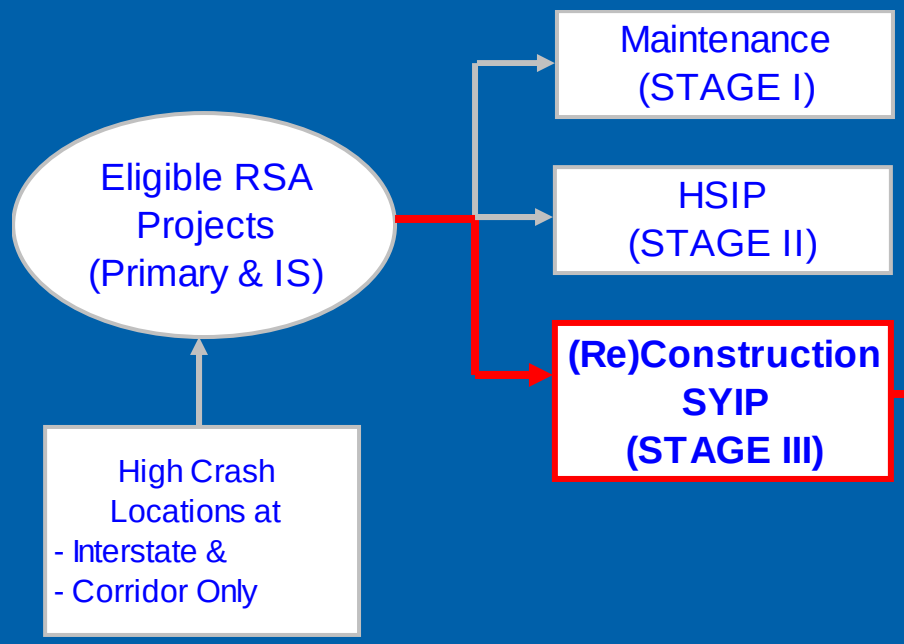
- Approved projects with multiple countermeasures will require **one principal funding UPC (child project)** to be opened from the district-wide allocations (parent UPCs).
  - Request amounts from TED-HSIP staff
  - Funding from other parent line items may be added to cover the total cost

Eligible HSIP Application Project



- Apply for HSIP projects when systematic funds are expended for locations outside of identified candidate Highway Safety Corridors (HSC).
- Annual application following HSIP Guidelines for low to medium cost improvements.
- Based on project scope, cost and expected benefits qualifying projects will be proposed in SYIP for CTB approval the following June.
- 12 – 18 Month process for CTB and FHWA STIP approval with notice to proceed.

Eligible (Re)Construct/SYIP Project



- Long term, high cost and impact required (> 36 month)
- Capital safety projects that incorporate safety elements, such as:
  - Construction/Reconstruction
  - Geometric changes
- Suggest/Request project to VDOT planning, MPO, jurisdiction staff and administration
  - Final project approval by CTB in June each year
  - Projects proceed after FHWA approval of STIP (6-9 months)
- Annual allocation meetings and process

Questions or Information?

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