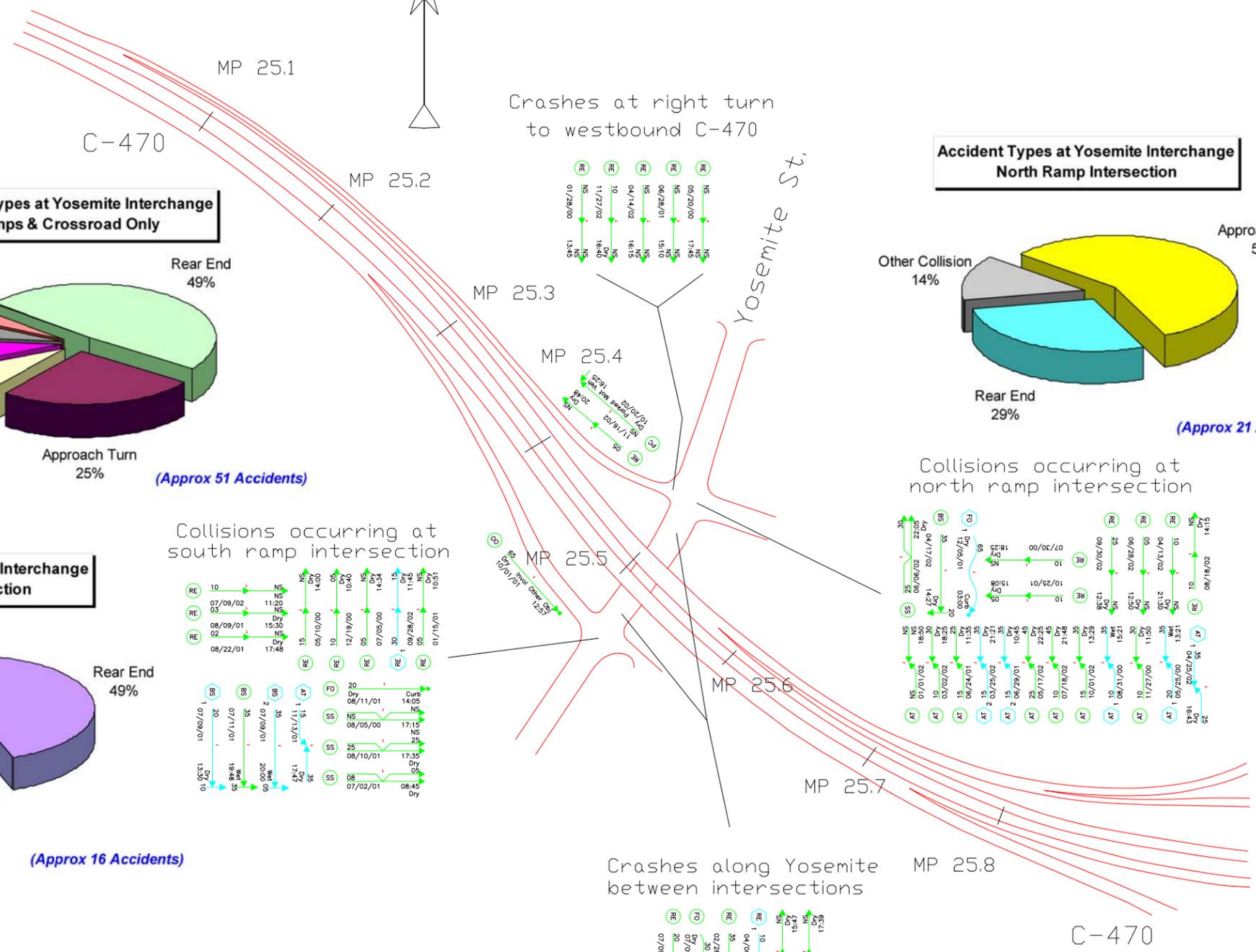
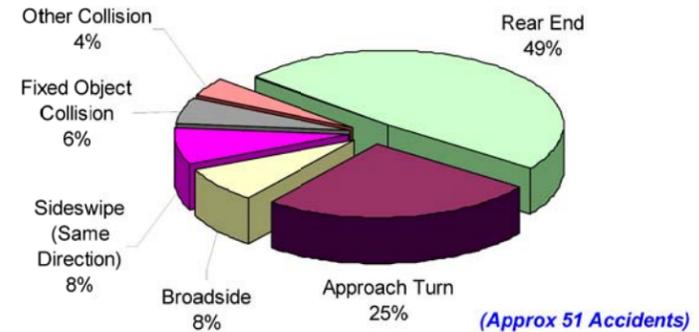


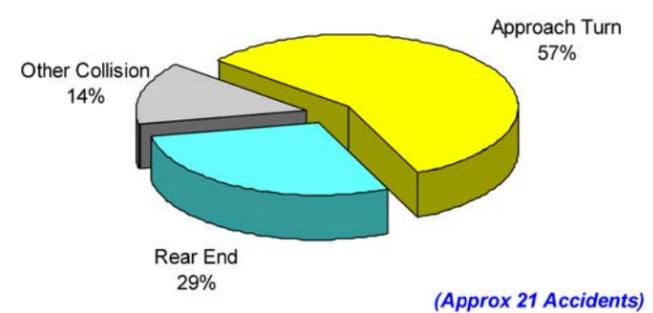
C-470 & Yosemite Interchange



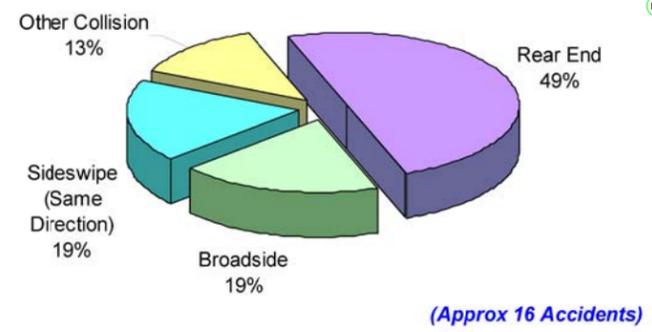
Accident Types at Yosemite Interchange Ramps & Crossroad Only



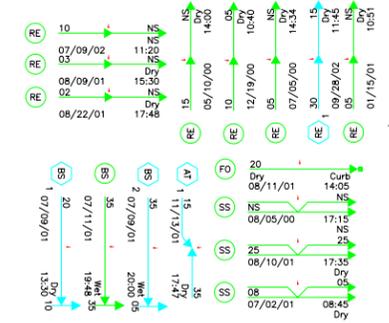
Accident Types at Yosemite Interchange North Ramp Intersection



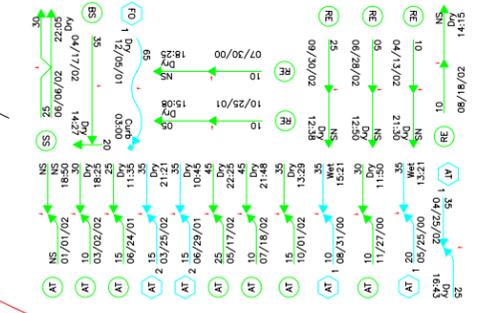
Accident Types at Yosemite Interchange South Ramp Intersection



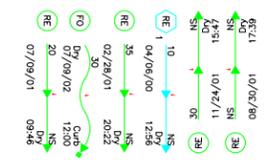
Collisions occurring at south ramp intersection



Collisions occurring at north ramp intersection



Crashes along Yosemite between intersections

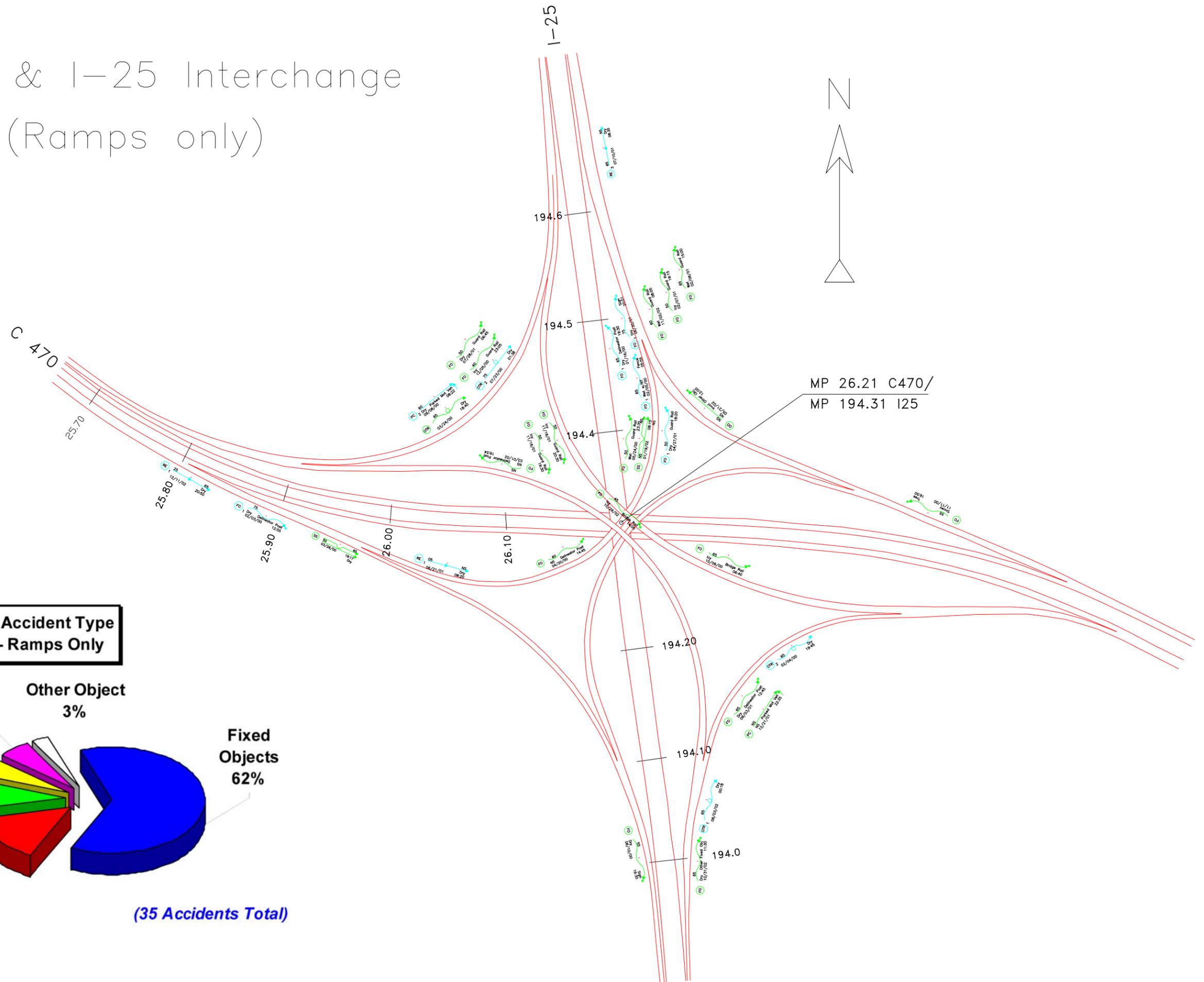


C-470 and I-25 Interchange (interchange ramps only)

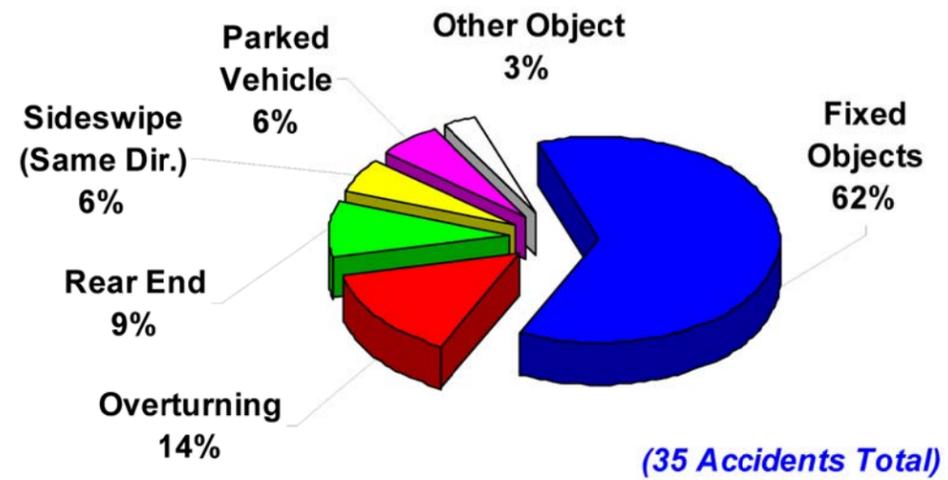
An accident diagram as well as charts showing the accident type distribution profile for the interchange ramps is shown on the following page.

For the purposes of this report, only the ramp accidents were examined for the I-25/C-470 interchange. Overall, the accident frequency during the 3-year study period was low on the included ramps. In contrast to other interchange locations, collisions with various fixed objects such as guardrail, delineator posts, bridge rail etc. were highest in the I-25 interchange zone. The reduced congestion, higher speeds and consistent, predictable driving conditions through this interchange are, most likely, the reason for the lower incidence of rear-end crashes when compared to previous freeway segments. At this location, timely winter maintenance attention, prompt repair of guardrail and bridgerail and maintenance of the pavement surface and pavement markings is recommended to continue the lower accident frequency at this location.

C-470 & I-25 Interchange (Ramps only)



**Accident Distribution by Accident Type
C470/I-25 Interchange - Ramps Only**



CONCLUSIONS AND RECOMMENDATIONS

The Transportation Equity Act for the 21st Century (TEA-21) of 1998 requires explicit consideration of safety in the transportation planning process. In order to meet this requirement and assist in the C-470 planning process, we have employed various analytical methods to evaluate the safety history on the segment of C-470 between the Ken Caryl Rd. interchange and the I-25 interchange. Primary among these methods is the recently developed concept of the Level of Service of Safety (LOSS). The LOSS concept makes it possible to accomplish the following:

- Qualitatively describe the degree of safety or un-safety of a roadway segment.
- Effectively communicate the magnitude of the safety problem to other professionals or elected officials.
- Bring perception of roadway safety in line with reality of safety performance reflecting a specific facility.
- Provide a frame of reference from a safety perspective for planning major corridor improvements.

Level of Service of Safety (LOSS) analysis shows that most of the C-470 corridor in the study area is performing at the LOSS-II level from an overall crash frequency as well as crash severity perspective. This observation suggests that C-470 is, on average, performing in an expected manner when viewed against freeways of this type statewide. In general, the potential for exceptional accident reduction in the study area is only moderate. This is not a surprising result as this highway is of relatively recent construction and was designed to a high standard. This study, however, has revealed the strong association of elevated accident occurrence with periods of high traffic volume and congested conditions. The higher incidence of the characteristic, congestion-related rear end and same direction sideswipe collisions is noted on the mainline as well as throughout most of the included interchanges. From a safety improvement perspective, any steps taken to increase capacity and improve traffic operations will have an accident reduction benefit. An overall reduction in accidents of 20% - 25% is expected to accompany capacity improvements such as adding an additional lane to the present freeway cross-section.

At the included interchanges, most of the safety problems can similarly be attributed to congestion and backups during periods of high traffic volume. Accident problems at interchange-related ramp intersections can be addressed by congestion mitigation such as adding travel and storage lanes, extending existing auxiliary lanes, using protected only left turn phases where approach turn problems exist and verifying adequate yellow and all-red times where broadside problems are present. In locations such as the Santa Fe and Broadway interchanges, more extensive modifications can provide commensurate operational and safety benefits.

Part II: Evaluation of Alternatives from a Safety Standpoint

Introduction

Hauer⁴ formulated very clearly just how to measure road safety, "Of two alternative highway designs connecting points A and B and serving the same traffic, that highway design which is likely to have fewer and less severe crashes is the safer one. If so, safety of a road is always a matter of degree. A road can be safer or less safe." This formulation sets out sound principles to follow for the evaluation of design alternatives from a safety standpoint. In Part II we will assess how well each alternative addresses safety problems identified in Part I. The extent to which these problems are addressed is quantified by the estimated accident reduction for each design alternative. These estimates are inherently associated with some degree of uncertainty, yet we believe this approach will allow us to identify design alternatives that are more safe than others. Estimated accident reduction for each design alternative is based on the nature and magnitude of the existing safety problem and its susceptibility to correction. Assuming a 2% annual growth in the number accidents due to increasing traffic, we can estimate the number of accidents prevented over the next 20 years if the recommended improvements are implemented.

THIS SECTION IN PROCESS OF COMPLETION - FEB. 2005

⁴ Hauer, E., (1999) *Safety Review of Highway 407: Confronting Two Myths*. TRB

Appendix

Three Year (1/1/2000 - 12/31/2002) Detailed Summary of Accidents: Mainline, MP 10.00 - 26.21

Three Year (1/1/2000 - 12/31/2002) Detailed Summary of Accidents: Overall (including mainline & interchanges), MP 10.00 - 26.21