US 97
Safety Assessment

(M.P. 124.40 – 133.39)

Preliminary Findings Meeting

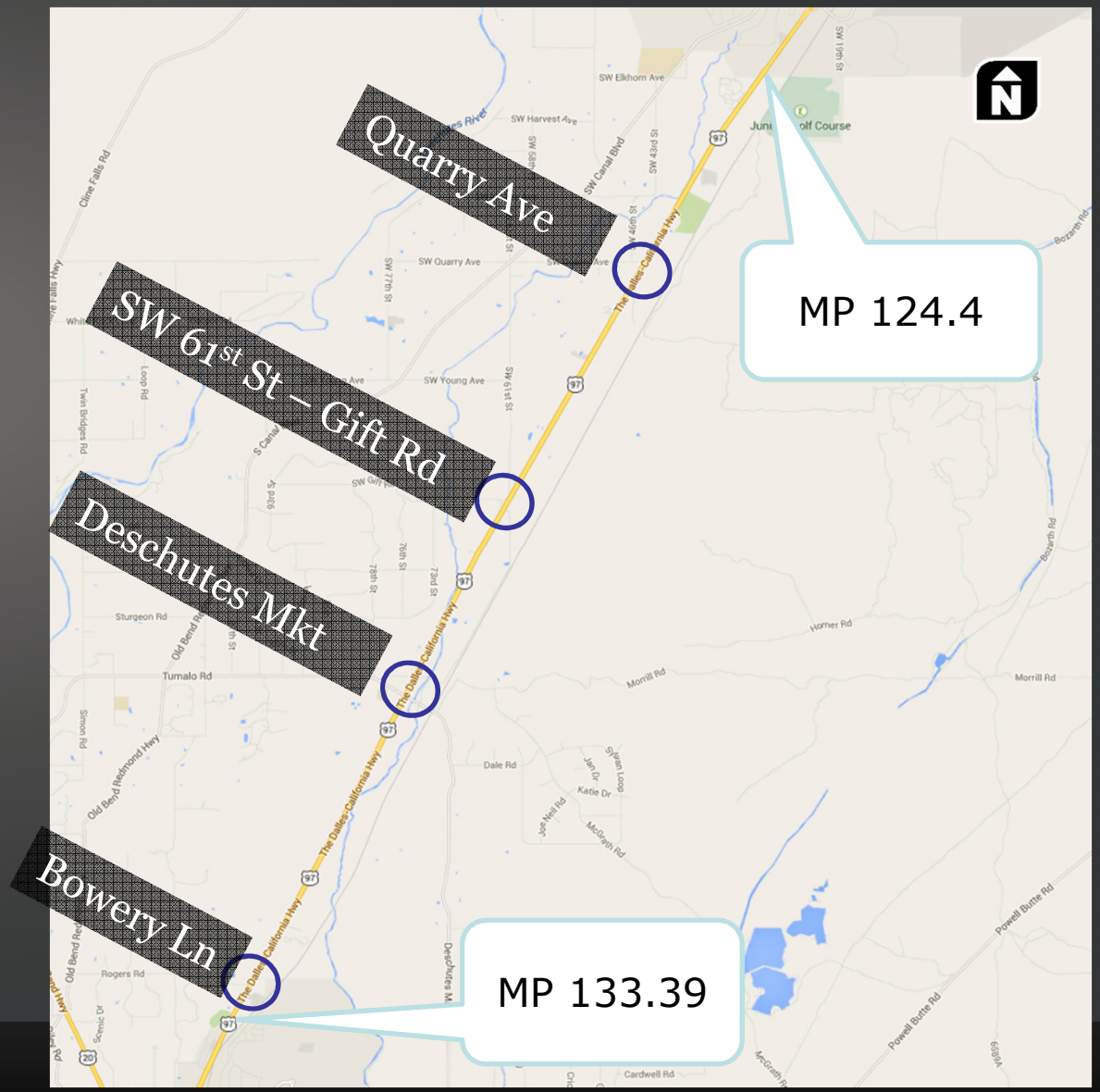
May 27, 2015
Bend, Oregon

KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

Outline

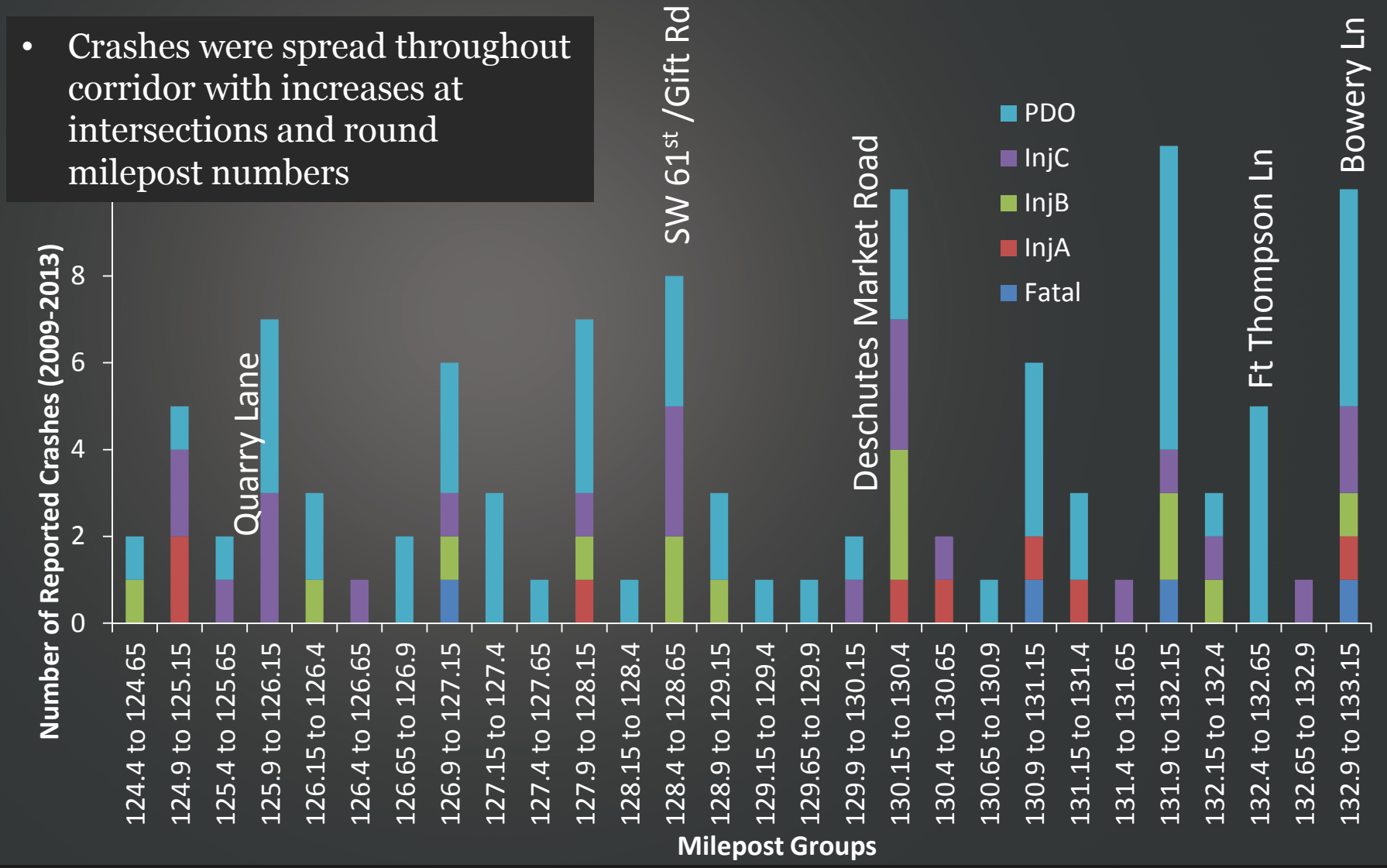
- Review of Crash Analysis
- Overview of Countermeasures
- Access Management Principles
- Implementation Plans
  - Low-Cost Countermeasures
  - Phased Access Management Plan

Study Segment



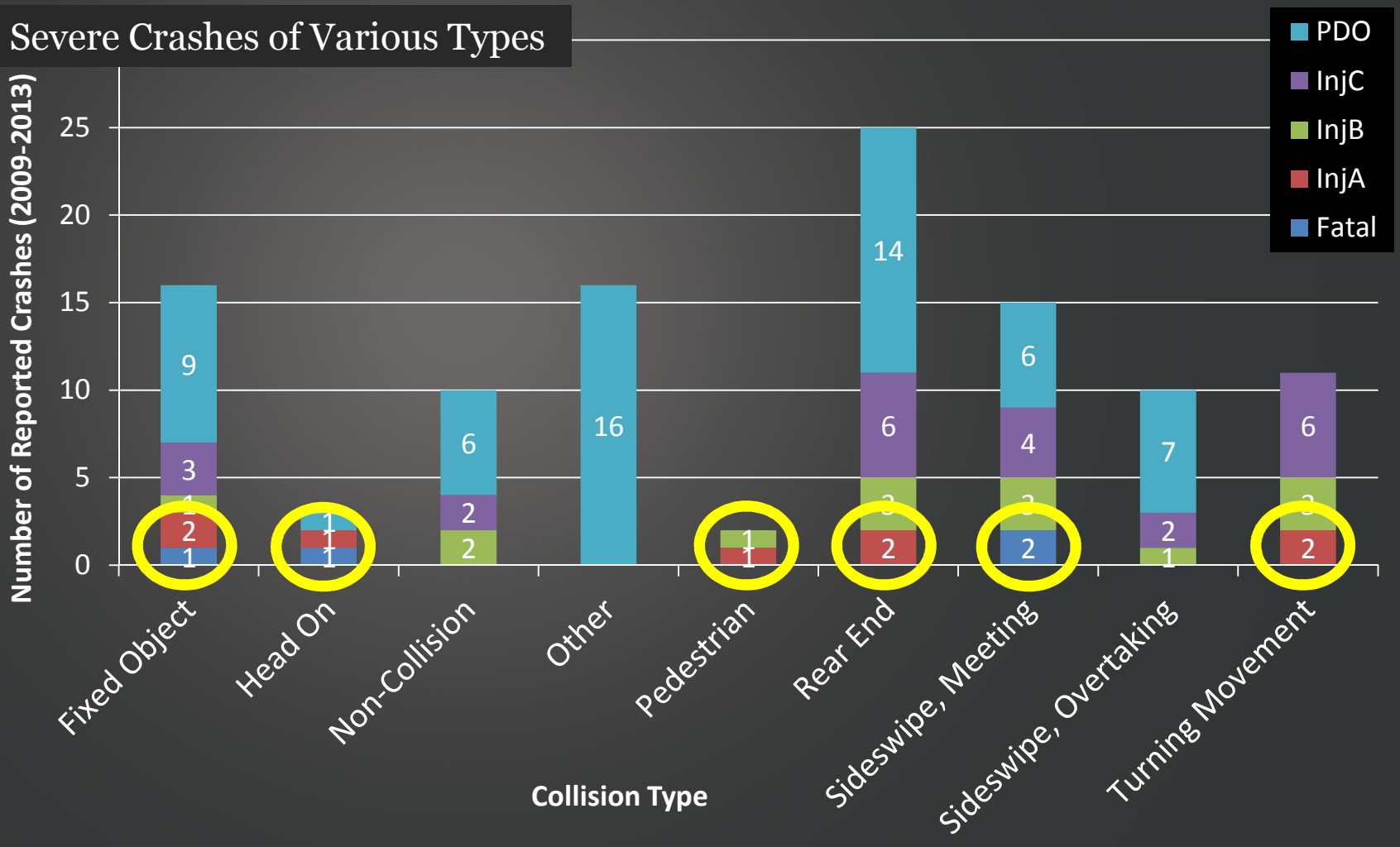
Crash Analysis – Location

- Crashes were spread throughout corridor with increases at intersections and round milepost numbers

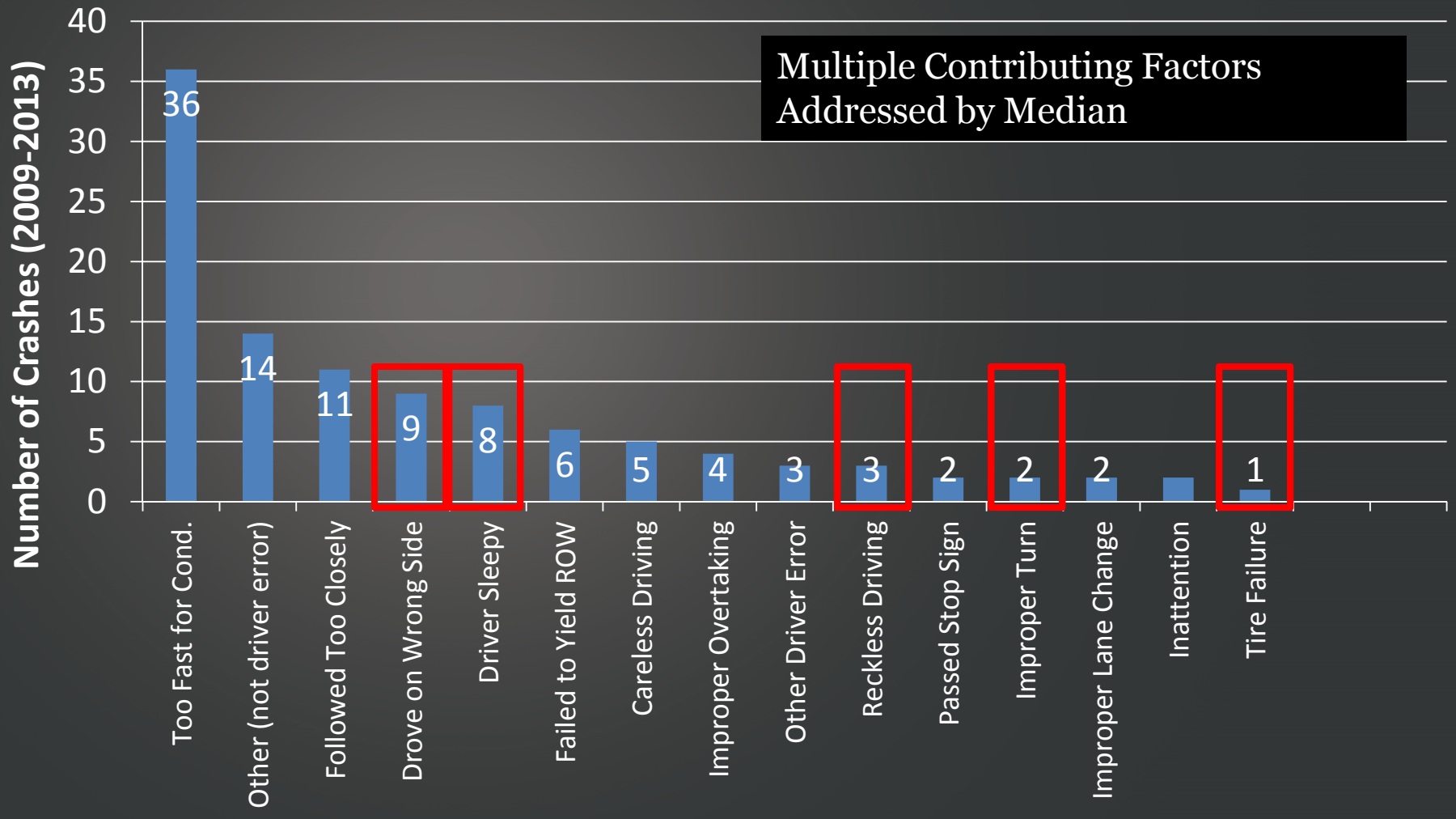


Crash Analysis - Type

- Severe Crashes of Various Types

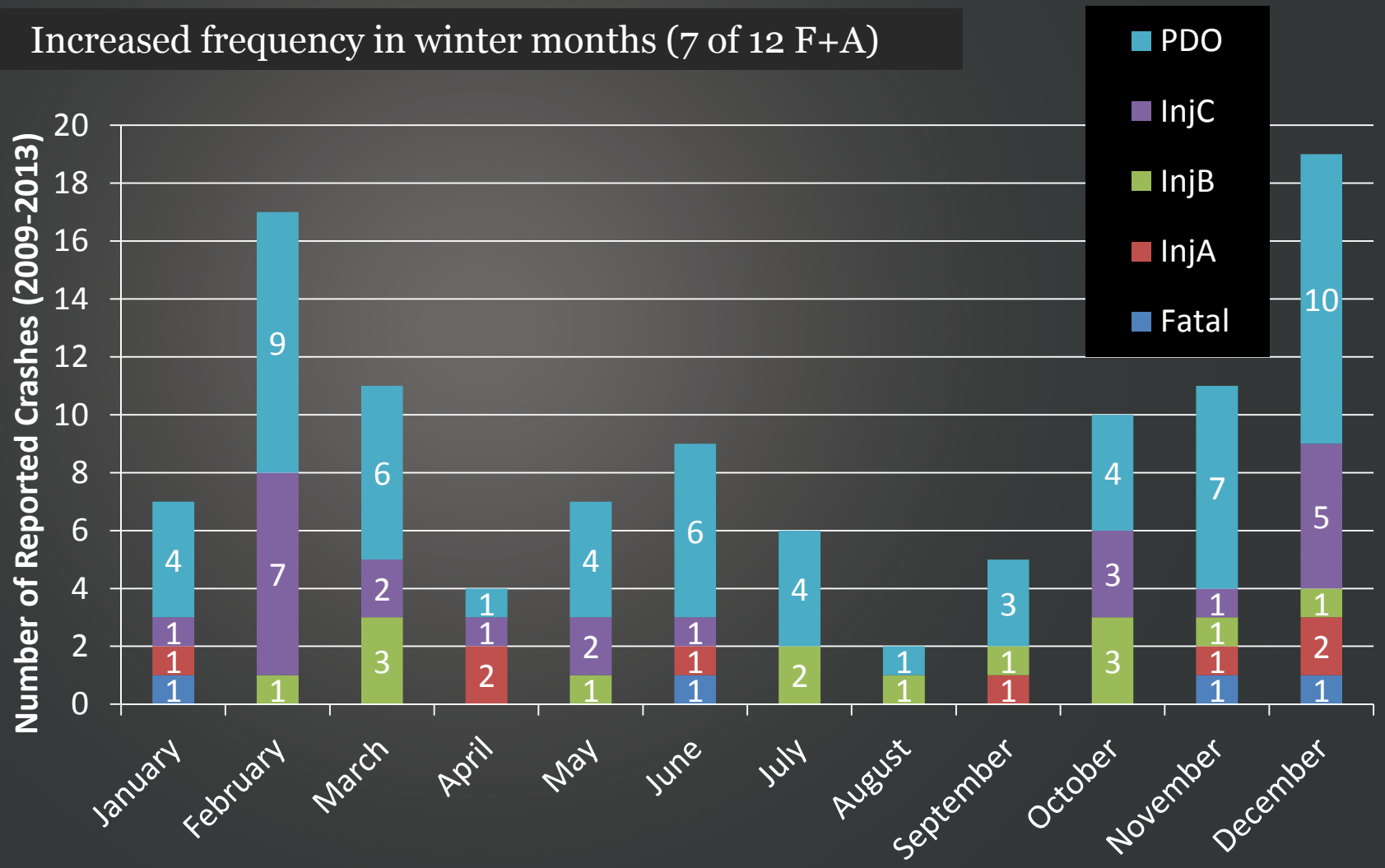


Crash Analysis – Reported Contributing Factors

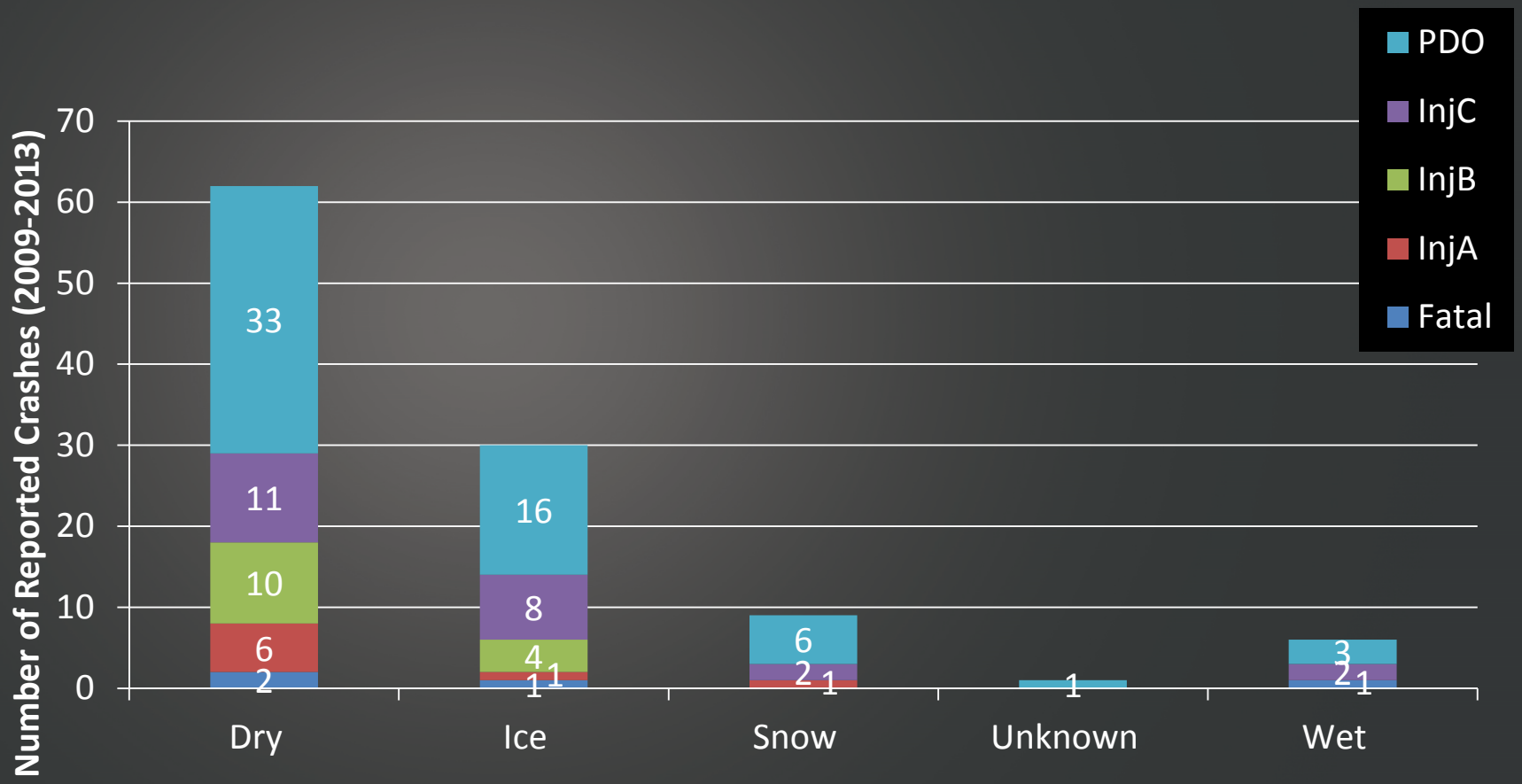


Crash Analysis - Month

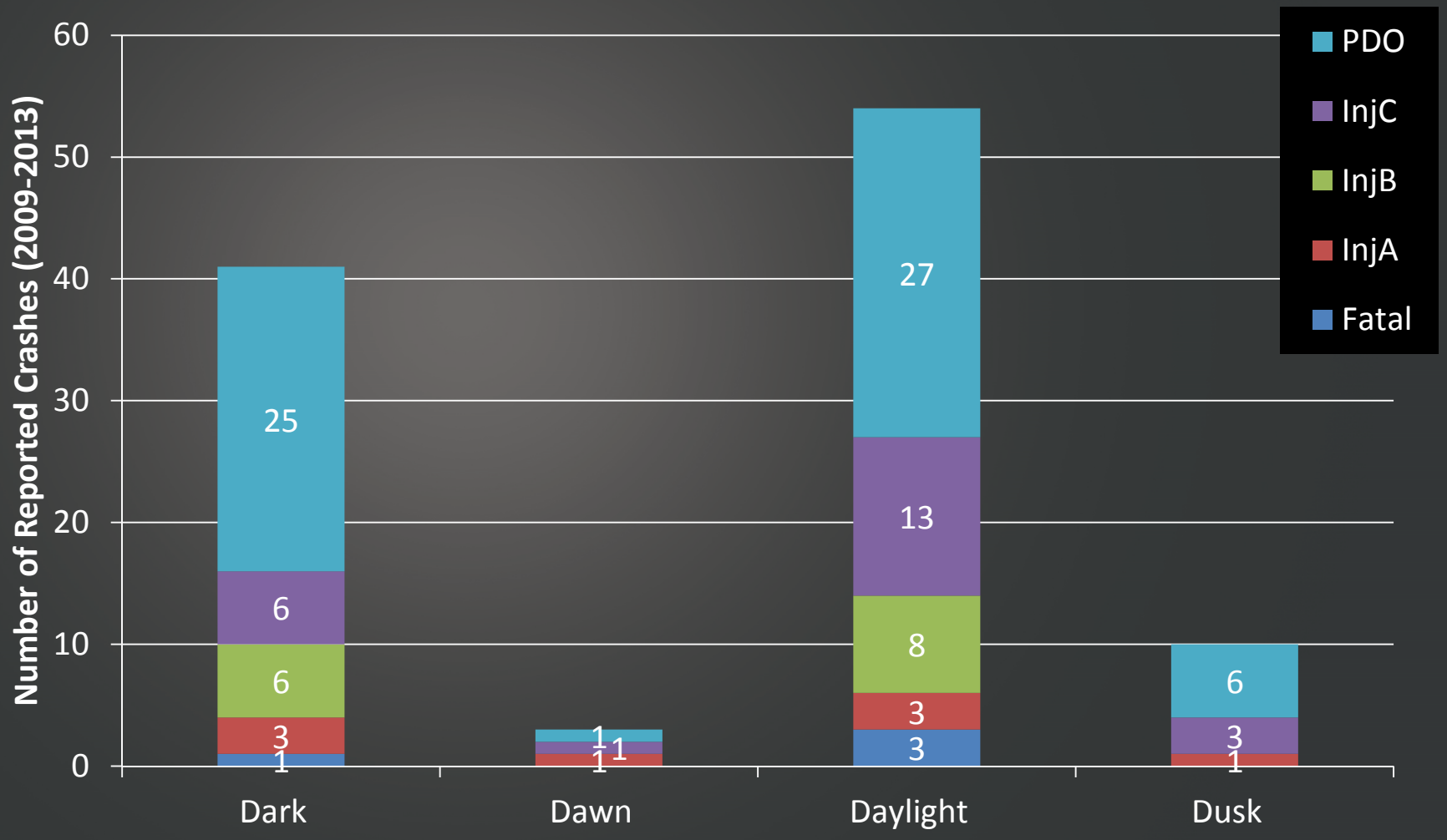
- Increased frequency in winter months (7 of 12 F+A)



Crash Analysis – Road Surface Conditions

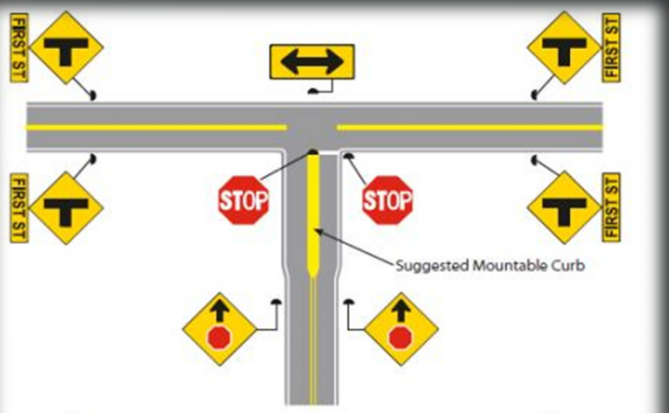


Crash Analysis – Lighting Condition



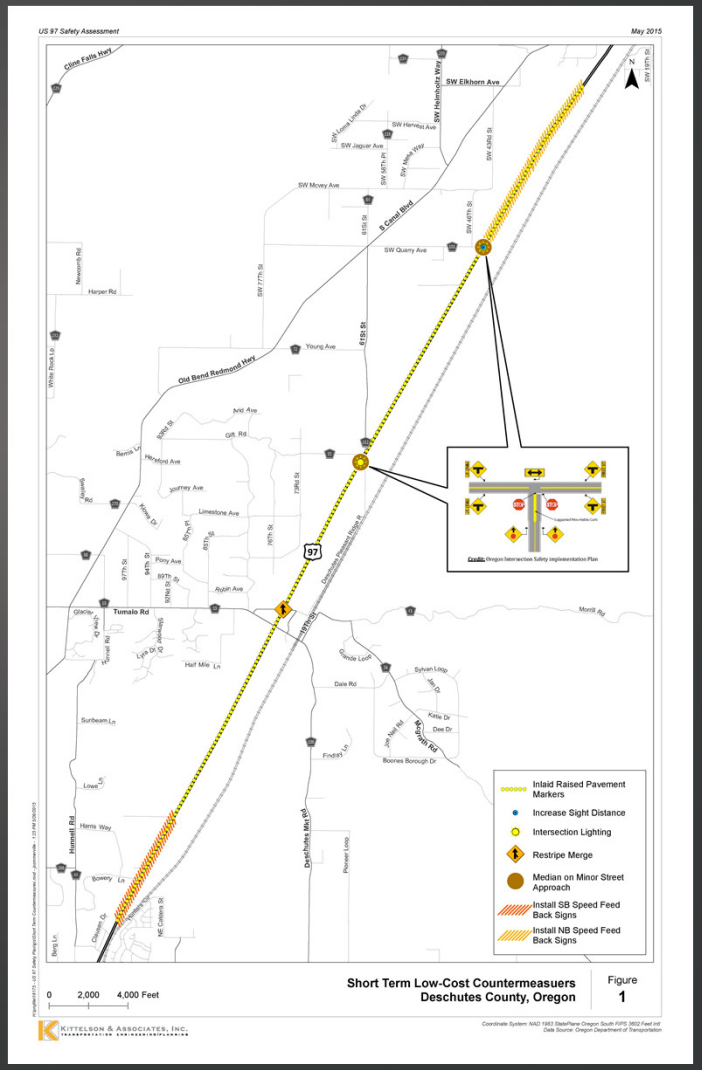
Overview of Low-Cost Countermeasures

Treatment	CMF*
Raised Pavement Markers	85%
Speed Feedback Signs	88%
Acceleration Lanes	89%
Deceleration Lanes	93%
Median & Enhanced Signage/Striping on Minor Street	75%
Increasing Clear Zone Width (Reducing Roadside Hazard Rating)	94%
Intersection Lighting	80%
Increase Sight Distance	52%
Segment Lighting	91%



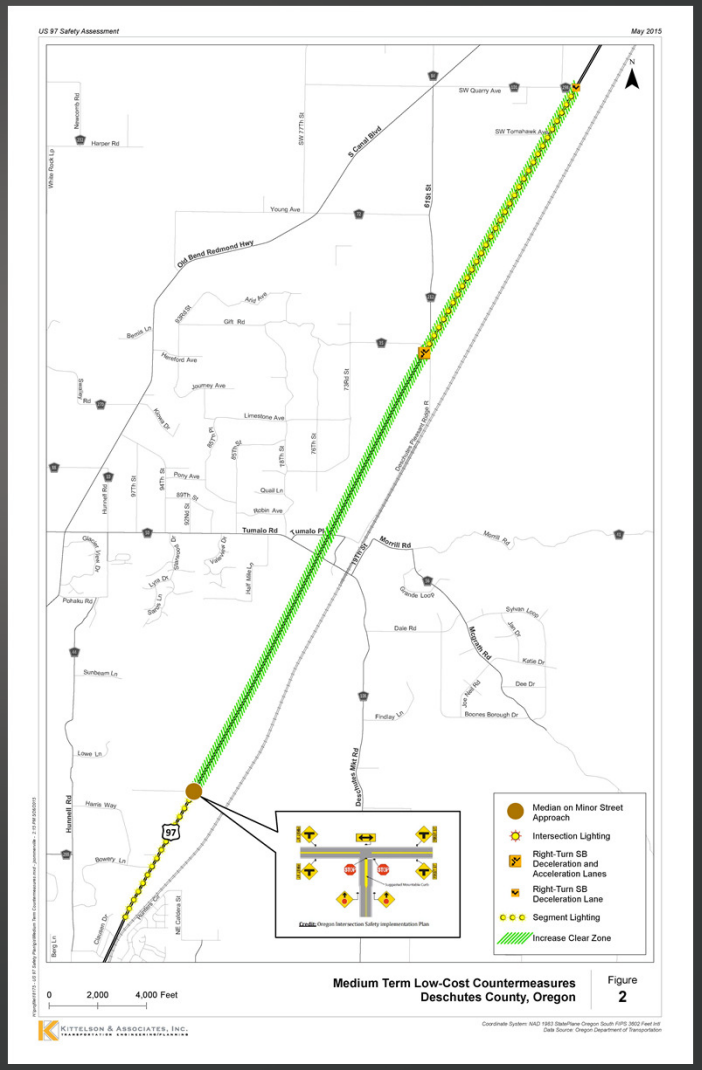
Credit: Oregon Intersection Safety implementation Plan

Short-Term, Low-Cost Countermeasures



Total B/C: 42.7

Medium-Term, Low-Cost Countermeasures



Total B/C: 2.2

Access Management Principles

Land Use	Distance to U-turn Opportunity	Major Street Left-turn Volumes (vph)		
		Low	Medium	High
Commercial	>2 miles	RIRO	LI	LI
	≤ 2 miles	RIRO	RIRO	RIRO
Other (residential, public driveway/street, industrial, etc.)	> 2 miles	RIRO	RIRO	LI
	≤ 2 miles	RIRO	RIRO	RIRO

RIRO = Access restricted to Right-in, Right-out only

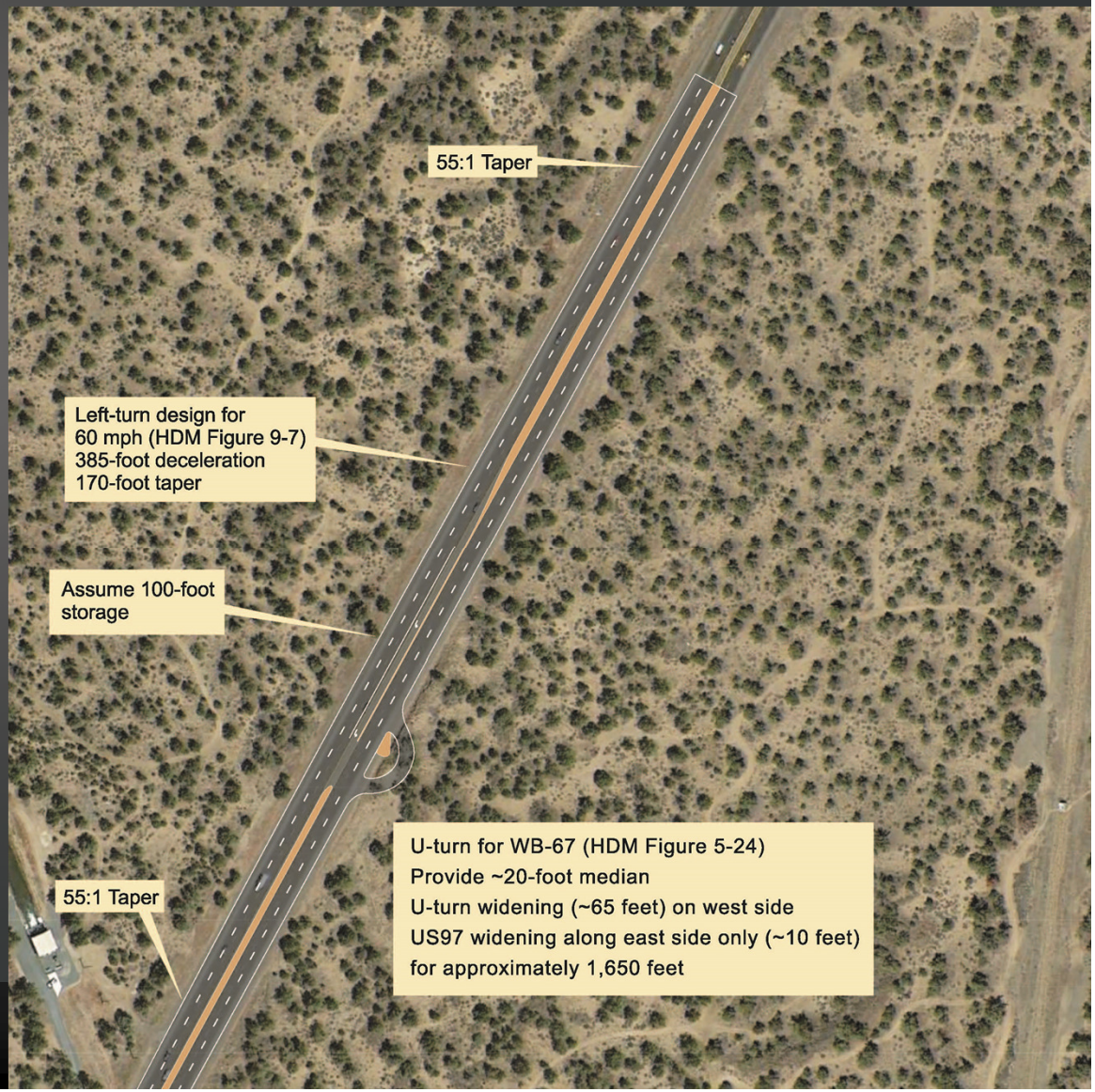
LI = Access restricted to major street left-in only

vph = Vehicles Per Hour

Median Considerations

- Median type
  - Cable barrier
  - Jersey barrier

J-Turn Concept



J-Turn Concept (w/Acceleration Lane)

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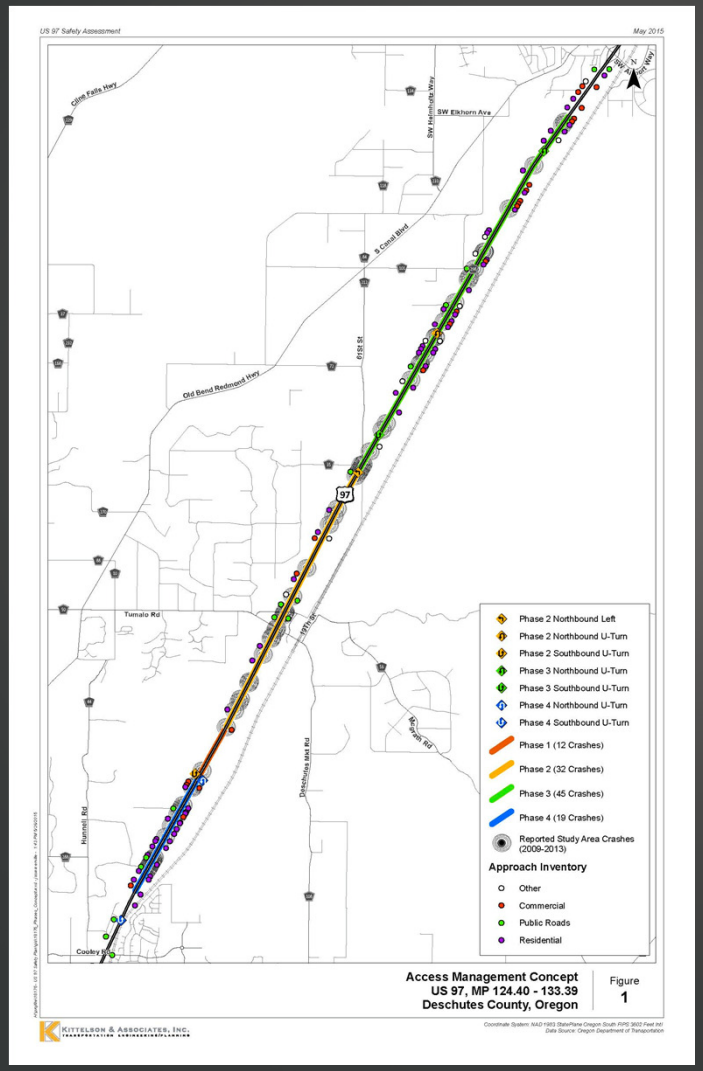
Draft Access Management Implementation Plan



Phase	B/C (Concrete Median)	B/C (Cable Median)
1	4.1	21.9
2	2.0*	2.6
3	2.3	3.9
4	1.4	1.8

Phase	Cost (Concrete Median & J-turns)	Cost (Cable Median & J-turns)
1	$325,000	$60,000
2	$2.7 million	$2.1 million
3	$3.6 million	$2 million
4	$2.2 million	$1.8 million

Preliminary Consultant Recommendations

- Low-cost Countermeasures in near-term
- Initiate access management discussions with property owners
  - Phase 1 plus Phase 2a with cable barrier and SB j-turn
    - B/C: 3.6
    - Total cost: $1.2 million
  - Phase 2b with cable barrier and 1 NB j-turn:
    - B/C: 3.2
    - Total cost: $1 million