

OREGON DEPARTMENT OF TRANSPORTATION GRANTS PASS INTERCHANGE EXIT 58 ROAD SAFETY AUDIT

N. 6th Street at NW Morgan Lane Mile Point -2.54 to -2.36

January 2013



KITTELSON & ASSOCIATES, INC.
TRANSPORTATION ENGINEERING/PLANNING

MOVING **FORWARD** THINKING™

Road Safety Audit Report

Grants Pass Interchange Exit 58 Road Safety Audit (RSA)

N 6th Street at NW Morgan Lane
Mile Point (MP) -2.54 to -2.36

Prepared For:

Oregon Department of Transportation

ODOT Region 3, District 8 Traffic

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KAI Project Number: 12980.0

January 2013



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Technical Summary

PROJECT TITLE:

Grants Pass Interchange Exit 58 Road Safety Audit (RSA)
N 6th Street at NW Morgan Lane, Mile Point (MP) -2.54 to -2.36

DATE:

November 13–15, 2012

RSA TEAM AND PARTICIPANTS:

- Hermanus Steyn, PrEng, PE, Principal Engineer, Kittelson and Associates, Inc.
- Dorothy Upton, Traffic Engineer, ODOT Region 2
- Robert Hopewell, Traffic Investigator, ODOT Region 1
- Lt. Marty Clark, Jackson County Sheriff's Office
- Chad Helvey, Jackson County Roads Department
- Joey Bansen, PE, Senior Engineer, Kittelson and Associates, Inc.

RSA SUPPORT RESOURCES:

- Dan Roberts, Senior Traffic Investigator, ODOT District 8



PROJECT CHARACTERISTICS:

Description	Project Characteristic
Audit Type	Planning Stage
Land Use Development Proposal	No
Units of Measure	US
Adjacent Land Use	Urban
Design Speed (US in miles-per-hour [mph])	55 to 35 mph
Opposite Flow Separation	None, couplet
Service Function: <ul style="list-style-type: none">• Highway Number• Route Number• Functional Classification• Oregon Highway Plan (OHP) Designation	<ul style="list-style-type: none">• 25• US 199 Southbound• Urban Principal Arterial• Regional Statewide Highway
Terrain	Rolling
Climatic Conditions - Temperature	Mild Winter (rain with some freezing, icing possible), Warm Summer (sporadic hot days)
Climatic Conditions - Precipitation	Rain with Occasional Snow in Winter

BACKGROUND

The Road Safety Audit (RSA) Team studied the N 6th Street at NW Morgan Lane intersection (OR 99 Southbound from approximately MP -2.54 to MP -2.36). Exhibit 1 illustrates the location and approximate extent of the study corridor.

Corridor Characteristics

Crash data was obtained from the Oregon Department of Transportation's (ODOT) online crash database for a period from January 1, 2006 through December 31, 2011. The characteristics and crash trends observed within each study segment are summarized in the RSA findings section. ODOT crash reports do not represent all incidents along these segments because crash reports are not completed for every crash. Oregon law requires drivers to complete a crash report when damages exceed \$1,500.

Based on ODOT's Safety Priority Index System (SPIS), this intersection is in ODOT's top 5% of all intersections in the state. *Appendix A* includes a copy of the Grants Pass Interchange Exit 58 RSA Findings Presentation, which includes a summary of crash history and historic volumes.

Existing Traffic Operations

The study intersection currently operates under split phase operations for the two southbound approaches of NE Scoville Road and the I-5 Exist 58 southbound off-ramp. The I-5 southbound ramp is served first in the signal cycle, followed by the NE Scoville Road approach. The eastbound and westbound approaches of NW Morgan Lane operate under permissive phasing. The southbound approaches and westbound approaches of the intersection are signed "NO TURN ON RED."

RSA PROCESS

Kittelson & Associates, Inc.

The RSA Team initiated work on Tuesday November 13, 2012, with a kick-off meeting at ODOT Region 3 offices in White City, Oregon. The meeting was attended by the RSA Team, RSA Support Resources from ODOT, and representatives of the ODOT District 8 office. On Wednesday November 14, 2012, the RSA team met maintenance and traffic signal staff who are very familiar with this intersection. These meetings resulted in the following observations:

- There appears to be a limitation for low-cost solutions at this intersection and the interchange, which resulted in “do nothing” for the last five years.
- There is \$2.0 million in funding for potential improvements at this intersection, and the RSA Team is challenged to explore cost-effective solutions that may fit within a future interchange improvement.
- The profiles of the I-5 southbound off-ramp and NE Scoville Road do not meet driver expectations.
- Trucks have difficulty completing their turning maneuvers at the tight curb return radii.
- This is an unconventional intersection, especially for out-of-town drivers, as it has two southbound approaches that are served through split phasing. Out-of-town drivers represent a significant portion of traffic on the I-5 Exit 58 ramp approach, especially in peak season.
- This intersection appears to have a higher crash rate than other similar intersections, but fortunately most crashes are not life-threatening.
- The northwest corner of the intersection is under development (i.e., Lil’ Pantry), which may change the travel patterns through this intersection.
- The overhead flashing beacon with the “Signal Head” warning sign was installed in 1978 and was originally tied to the signal for actuation. The flashing mode was changed to flashing full time within the last five years.
- There is a similar intersection at the south end of town—E Park Street/SE 7th Street intersection—that is operating fine with fewer than 5 crashes for the same time period.
- Two of the three traffic signal poles at the intersection have been hit by trucks.
- The signal equipment at this intersection is among the oldest in the City of Grants Pass and needs to be upgraded and improved.
- New development was proposed in the northwest quadrant of the interchange several years ago that may change future travel patterns.
- The eastbound right-turn for right-turn-on-red from NW Morgan Lane has limited intersection sight distance toward southbound NE Scoville Road approaching traffic. Very few of the right-turns turn into the near-side as required by Oregon law.

The team met throughout the week at ODOT Region 3 offices in White City. The RSA Team schedule is summarized below:

Tuesday (Day 1)

- Morning
 - Pre-audit/kick-off meeting with ODOT
 - RSA overview and objectives
- Midday, Afternoon, and Evening
 - Project startup meeting and field review

Wednesday (Day 2)

- Morning
 - Field work
 - RSA analysis
- Afternoon
 - Local and public input meeting
 - RSA analysis
 - Summarize observations, identify safety issues

Thursday (Day 3)

- Morning
 - RSA analysis and findings
- Afternoon
 - Preliminary findings presentation at 1:00 PM

SUMMARY OF SAFETY ISSUES

The RSA Team identified and categorized safety issues based on a qualitative risk scale. For the purposes of this RSA, risk is defined as a function of exposure, probability, and consequence. *Exposure* reflects the number of vehicles that could be influenced by the feature. *Probability* reflects the likelihood of a crash influenced by the identified feature. The *consequence* reflects the severity of a crash, if one occurs.

The qualitative risk rating of safety issues identified at this intersection are assigned relative to all other issues observed. **Category III** issues have potentially the greatest risk compared to the other observed issues; they are associated with higher frequency and higher severity than other issues. **Category I** issues indicate the least risk compared to the other observed issues; they are associated with low crash severity and low crash frequency. **Category II** issues indicate higher risk than some issues and lower risk relative to other observed safety issues.

The RSA Team identified the following issues as Category III:

- Southbound turning movements
 - Southbound left turn from the I-5 ramp
 - Southbound right turn from NE Scoville Road

The RSA Team identified the following issues as Category II:

- Morgan Lane turning movements
- Visibility of signal heads
- Sign clutter
- Out-of-area drivers
- Truck turning movements
- Downstream driveways

The RSA Team did not identify any issues as Category I. The qualitative rating of risk given to each observed safety issue is documented in further sections.

Road Safety Audit Findings

Appendix B provides a summary of the issues identified during the RSA assessment by issues and suggested improvements.

ISSUE: SOUTHBOUND TURNING MOVEMENTS

I-5 Off-Ramp: Southbound Left-turn

In the six years of available data, 32 crashes were recorded between vehicles making a southbound left-turn from the I-5 southbound off-ramp and vehicles from NE Scoville Road making a southbound through movement. Eleven (11) of these crashes were recorded in the three years between 2006 and 2008, and 21 of the crashes were recorded between 2009 and 2011. Of the 12 crashes between the southbound left turn and the southbound NE Scoville Road through movement that reported injuries, 11 were classified as Injury C severity and 1 was an Injury B. The I-5 southbound ramp left-turn movement at NW Morgan Lane is a very low-volume movement compared to the number of crashes occurring with that movement. The 2008 turning movement counts provided by ODOT showed eight vehicles making the movement in the AM peak hour and 14 vehicles in the PM peak hour. The I-5 southbound ramp left-turn movement is illustrated in Exhibit 2 and Exhibit 3 below.

Further analysis of the crash reports for the left-turn crashes yielded the following insights:

- 27 of the 32 southbound left-turn crashes were coded as “turn from wrong lane” for the driver error, and all but 2 of these crashes were coded with “entering alley/driveway from road” for the driver action.
 - Suggests that many of the crashes may be taking place with vehicles turning into the gas station driveway downstream of the intersection, not at the intersection itself. This explains the high number of crashes compared to the left-turn volume at the intersection (some of the left-turning vehicles are part of the through volume at the intersection).
 - Suggests that vehicles wishing to turn into the gas station are choosing the center or far right receiving lane and turning from that lane instead of the far left lane.
- In 29 of the 32 southbound left-turn crashes, the offending vehicle was coded as non-resident or as an Oregon resident from greater than 25 miles out of the area.
 - This suggests that the number of crashes is directly tied to the fact that drivers are unfamiliar to the intersection.
- 5 of the 32 southbound left-turn crashes were coded as “disregarded traffic signal” or “failed to obey traffic control device” for the driver error. These were all coded as turns at the intersection of N 6th Street and NW Morgan Lane.
 - These crashes are likely due to the unconventional intersection layout, signal phasing, and signal head arrangement for the southbound approaches. These are discussed further below.

- Unconventional intersection layout: The NE Scoville Road and I-5 southbound ramp approaches come into the intersection parallel to each other. This creates the sense that the two approaches are one roadway, instead of two separate and conflicting legs of the intersection.
- Signal phasing: The approaches operate on a split phase arrangement where the I-5 southbound ramp is served, followed by the NE Scoville Road approach. The arrangement can create driver confusion when one approach starts and the other approach mistakes the green for their movement.
- Signal head arrangement: The signal heads for both southbound approaches are mounted on even spacing across the three lanes on the south approach of N 6th Street. The existing signal heads are 3M programmable heads, but the indications are clearly visible from the adjacent approach at the stop bar.



Exhibit 2 I-5 Southbound Off-Ramp Left-Turn



Exhibit 3 I-5 Southbound Off-Ramp Left-Turn

Scoville Road: Southbound Right-turn

In the six years of available data, 13 crashes were recorded between vehicles making the southbound right-turn from NE Scoville Road and vehicles making the southbound through movement from the I-5 southbound ramp. Seven (7) of these crashes were recorded in the three years between 2006 and 2008, and 6 of the crashes were recorded between 2009 and 2011. Four (4) of the crashes between the NE Scoville Road southbound right-turn and the I-5 southbound ramp through movement were recorded as injury crashes, all Injury C severity. The southbound right-turn movement from NE Scoville Road is a heavier movement than the southbound left-turn from the I-5 southbound ramp as described above, with 77 vehicles in the AM peak hour and 111 vehicles in the PM peak hour. The NE Scoville Road southbound right-turn movement is illustrated in Exhibit 4, Exhibit 5, and Exhibit 6 below.

Further analysis of the crash reports for the southbound right-turn crashes yielded the following insights:

- 8 of the 13 southbound right-turn crashes were recorded with the right-turning vehicle being at fault. These were primarily coded as “disregarded traffic signal” for the driver error.
- 5 of the 13 southbound right-turn crashes were recorded with the southbound through vehicle being at fault. These were primarily coded as “disregarded traffic signal” for the driver error.
- 1 of the 13 southbound right-turn crashes was a large semi-truck with trailers turning right at the signal and cutting the corner, colliding with a stopped vehicle.
- In 6 of the 13 southbound right-turn crashes, the offending vehicle was coded as a non-resident or as an Oregon resident from greater than 25 miles out of the area.

Some potential causes for the occurrence of these crashes between the NE Scoville Road southbound right-turn and I-5 southbound ramp through movement are outlined below, based on the crash data analysis, include:

- Unconventional intersection layout: the alignments of NE Scoville Road and the I-5 southbound ramp coming into the intersection with NW Morgan Lane in a parallel alignment creates the sense that the two approaches are one roadway, instead of two separate and conflicting legs of the intersection. The low, narrow curb separator between the two legs is also not effective in creating a sense of separation.
- Signal phasing: The approaches operate on a split phase arrangement as described above. The arrangement can create driver confusion when one approach starts and the other approach mistakes the green for their movement.
- Signal head alignment: The existing programmable signal heads on NE Scoville Road are clearly visible from the adjacent lanes at the stop bar on the I-5 southbound ramp. This creates the possibility for confusion of drivers not knowing which indication to obey.
- Conflicting movements in the same direction: Though the movements are separated with split signal phasing, the NE Scoville Road southbound right-turn is located to the left of the I-5 southbound ramp left-turn lane. This increases the potential for conflict and for collision between confused drivers.
- Trucks turning from the far lane: Several large trucks with trailers were observed turning right from the far left lane of NE Scoville Road to travel west on NW Morgan Lane. The maneuver is necessary to provide adequate turning radius for trucks to turn into the one receiving lane on NW Morgan Lane without conflicting with vehicles queued in the eastbound through lane. This maneuver creates the potential for crashes between the right-turning trucks and through vehicles in the inside lane of NE Scoville Road.



Exhibit 5 Scoville Road Southbound Right-Turn



Exhibit 4 Scoville Road Southbound Right-Turn



Exhibit 6 Truck Turn from Wrong Lane

Table 1 presents the qualitative risk rating of turning movement crashes at the intersection, relative to all other issues observed.

Table 1 Qualitative Risk Rating of Turning Movement Crashes

Function	Classification	Reasoning
Exposure	Category III	Most crashes at intersection
Probability	Category III	Existing driver behavior, high crash rate
Consequence	Category II	Resulted in mostly Injury C and PDO crashes
Overall	Category III	-

Lower-Cost Suggestions

- Install retro-reflective back plates on signal heads to increase visibility of signals.
 - Add 1- to 3-inch-wide reflective strip around backplates (option added to 2009 Manual on Uniform Traffic Control Devices [MUTCD]) – see Exhibit 7 and Exhibit 8
- Review number, size, and location of signal heads and compare to MUTCD and ODOT “Traffic Signal Policy and Guidelines”
- Change signal indications
 - Change the signal indications for the inside lanes of the I-5 southbound ramp and NE Scoville Road to 4-section heads that include green arrows for the right- and left-turns. See Exhibit 9.

- Change the spacing arrangement of the signal heads for the southbound approaches to make it more clear which indications serve each southbound approach.
- Review and consider increasing red clearance intervals between split phasing for southbound approaches (i.e., off-ramp and NE Scoville Road).



Exhibit 7 Example of reflective striping on signal backplate.



Exhibit 8 Example of signal head visibility with and without reflective backplates.

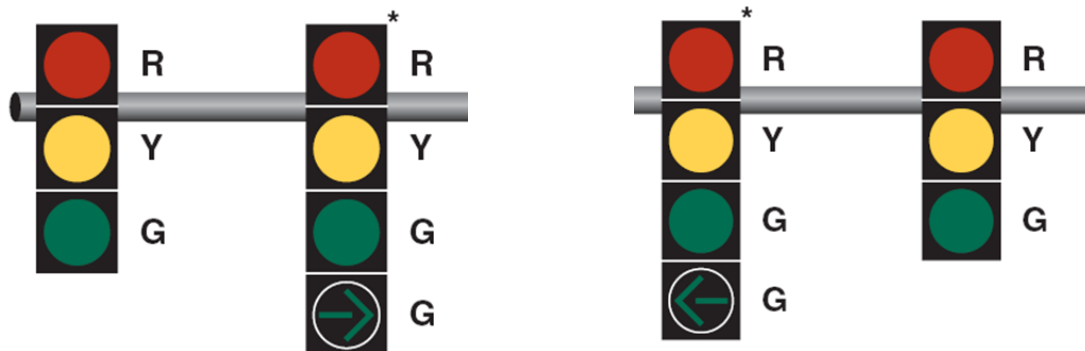


Exhibit 9 Example of 4-section signal heads

- Restripe downstream on N 6th Street south of NW Morgan Lane to two-receiving lanes (see Exhibit 10)
 - Reduces the complexity of the intersection and number of decisions for drivers. Guides drivers into the correct lane.
 - Reduces the instance of drivers turning left into the downstream driveways from the wrong lane.
 - Creates similar configuration to E Park Street/SE 7th Street in Grants Pass.
- Move stop bar location back on southbound approaches (see Exhibit 10)
 - Provides physical separation for movements and increases distance to correct or avoid collision. Improves truck turning space for southbound right-turns.

- Reduces the likelihood of right-turn on red from I-5 southbound off-ramp.



Exhibit 10 Downstream re-striping and relocated stop bar

- Restripe NE Scoville Road to one through lane and one exclusive right-turn lane (See Exhibit 11).
 - Physically separates the traffic movements.
 - Allows for a right-turn arrow signal indication, which may reduce confusion for through vehicles mistaking the adjacent signal indication.

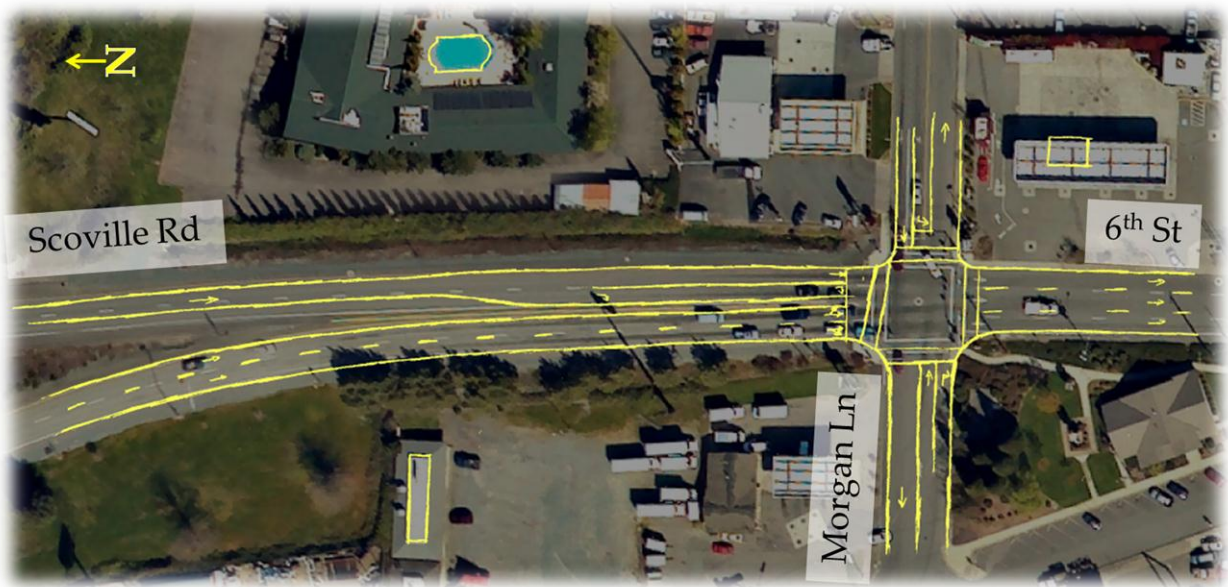


Exhibit 11 Restripe Scoville Road

- Enhanced traffic separators
 - Construct 42-inch concrete barrier with 16-inch glare shields (see Exhibit 12 and Exhibit 13).
 - Provides physical separation and screening between the adjacent traffic movements. Increases the feeling of two separate and conflicting roadways.



Exhibit 12 Existing separation between southbound approach legs

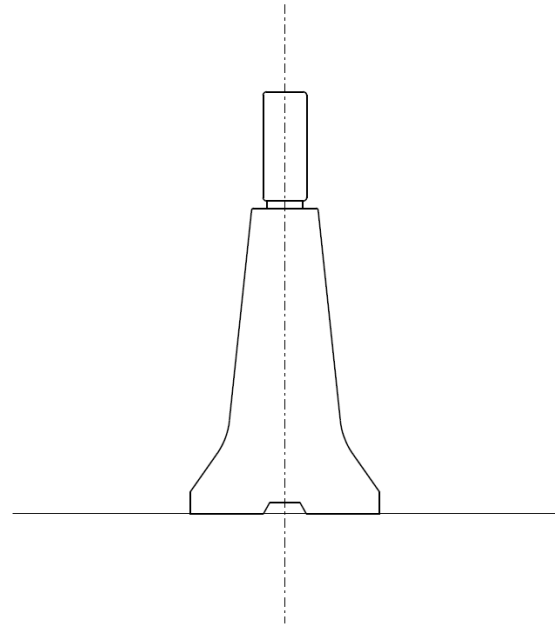


Exhibit 13 Example of 42-inch concrete barrier with glare shield

- Southbound turn restrictions to eliminate turning conflicts
 - Restrict and re-route I-5 southbound ramp left-turns.
 - Closest path is through private property (orange path on Exhibit 14), approximately 1,000 feet out-of-direction.
 - Next public street is traffic signal at Hillcrest Drive (yellow path on Exhibit 14), approximately 0.7 miles out-of-direction.
 - Restrict and re-route NE Scoville Road southbound right-turns.
 - Vehicles take next right-turn at Vine Street (green path on Exhibit 14), approximately 800 feet out-of-direction.



Exhibit 14 Southbound Turn Restrictions

Higher-Cost Suggestions

- Realign and re-grade off-ramp with re-graded NE Scoville Road as lane addition; results in a weaving section upstream of the N 6th Street/NW Morgan Lane intersection (see Exhibit 15).



Exhibit 15 Realign and re-grade off-ramp with re-graded Scoville Road as lane add

- Introduce a new signalized intersection and modify to two 2-phase signals (see Exhibit 16)
 - Realign and re-grade I-5 off-ramp, and re-grade NE Scoville Road.
 - Improves system hierarchy and simplifies the existing N 6th Street/NW Morgan Lane signal operations.

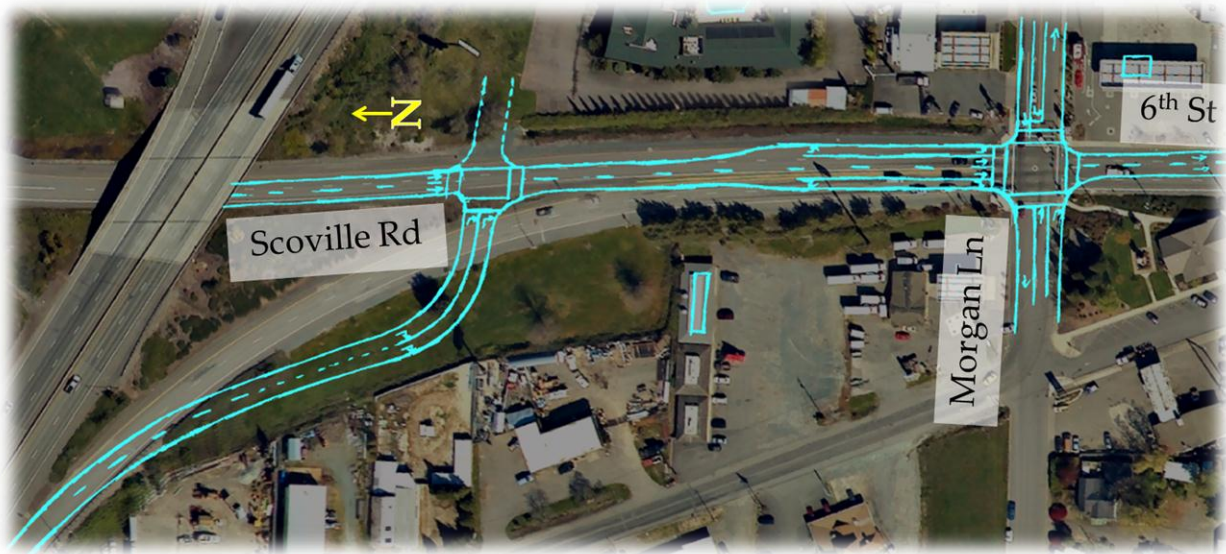


Exhibit 16 Add new signal upstream, create two 2-phase signals

- Phase 1 of Potential Future Interchange Improvement Plan
 - Improvements shown in Exhibit 17 could be built as Phase 1 of a larger future interchange improvement plan, minimizing project throw-away.

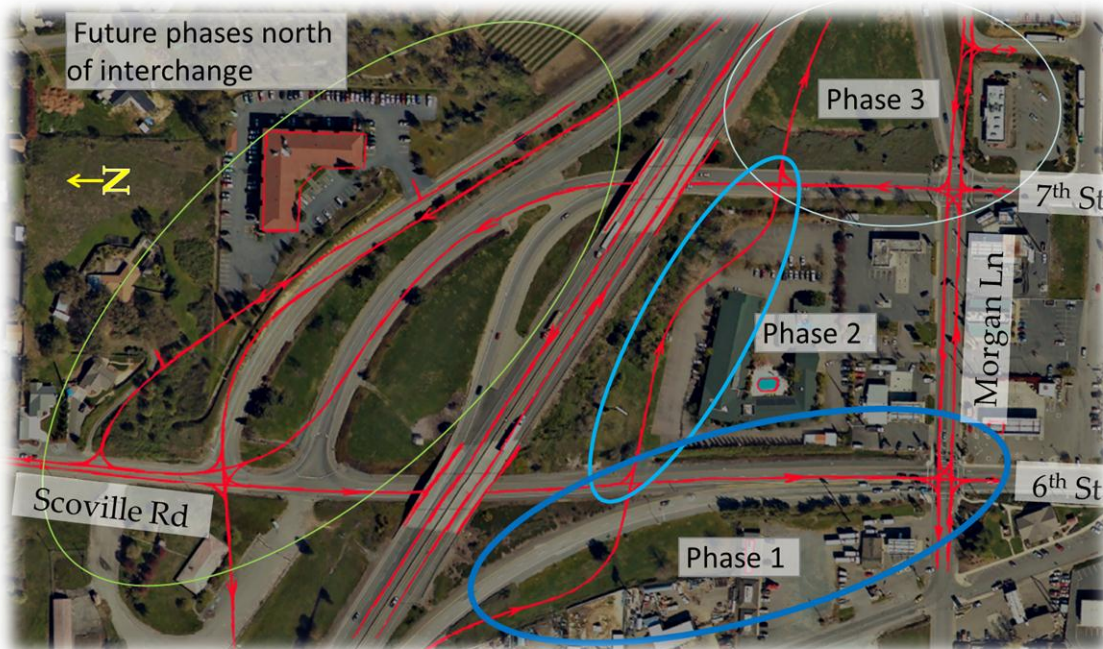


Exhibit 17 Phase 1 of Potential Future Interchange Improvement Plan

ISSUE: MORGAN LANE TURNING MOVEMENTS

The eastbound and westbound approaches of NW Morgan Lane are currently run together with permissive phasing for the westbound left-turn. A left-turn pocket exists for the westbound left-turn, and a right-turn pocket exists for the eastbound right-turn. For six years of available data, 6 crashes were reported between the NW Morgan Lane westbound left-turns and eastbound.

- All of the left-turn crashes were coded as “left-turn in front of oncoming traffic” for the driver error. These crash types are typical for an intersection with permissive phasing for left-turns.
 - Of the 6 left-turn crashes, 1 was an Injury C crash. The rest were recorded as property damage only.
- Eastbound right-turns and westbound left-turns were observed to “off-track” into the center or far lane rather than the near lane. This may be due to the tight turning radius or destinations just downstream of the signal (i.e. gas stations, restaurants; see Exhibit 18 and Exhibit 19).
- Many observations were made of eastbound right-turning vehicles and westbound left-turning vehicles completing their maneuvers simultaneously into the 3 receiving lanes on N 6th Street (see Exhibit 20).
- 1 crash was recorded between an eastbound right-turn and a southbound through vehicle.
 - NE Scoville Road through traffic was observed to merge right in the intersection. NW Morgan Lane eastbound right-turns were observed turning into the center or far lane at the intersection.
 - Sight distance for the eastbound right-turn to see NE Scoville Road southbound through traffic is limited when vehicles are queued on the I-5 southbound off-ramp (see Exhibit 21).



Exhibit 18 Eastbound right-turn off-tracking



Exhibit 19 Westbound left-turn off-tracking



Exhibit 20 Simultaneous turns eastbound and westbound



Exhibit 21 EB RT sight distance to Scoville Road SB

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 2.

Table 2 Qualitative Risk Rating of Turns from Morgan Lane

Function	Classification	Reasoning
Exposure	Category II	Typical traffic volumes for side streets
Probability	Category II	Typical number of crashes and crash types
Consequence	Category I	Slow speed side-swipe type crashes
Overall	Category II	-

Suggestions

- Consider providing a protected left-turn phase for the westbound left-turn from NW Morgan Lane
 - This would add an additional phase and could contribute to additional delay at the intersection.
 - Alternatively, provide a protected-permissive left-turn phase with a flashing yellow arrow. Install signal heads with arrows for left-turns on westbound NW Morgan Lane.
- Improve turning maneuvers by increasing curb return radii (see Exhibit 22)
- Consider reducing N 6th Street just downstream of intersection to two lanes (see Exhibit 22)
 - Transition to three lanes beyond Vine Street intersection.
- Consider moving the I-5 southbound ramp stop bar back from the intersection to increase sight distance for vehicles turning right from eastbound Morgan Lane

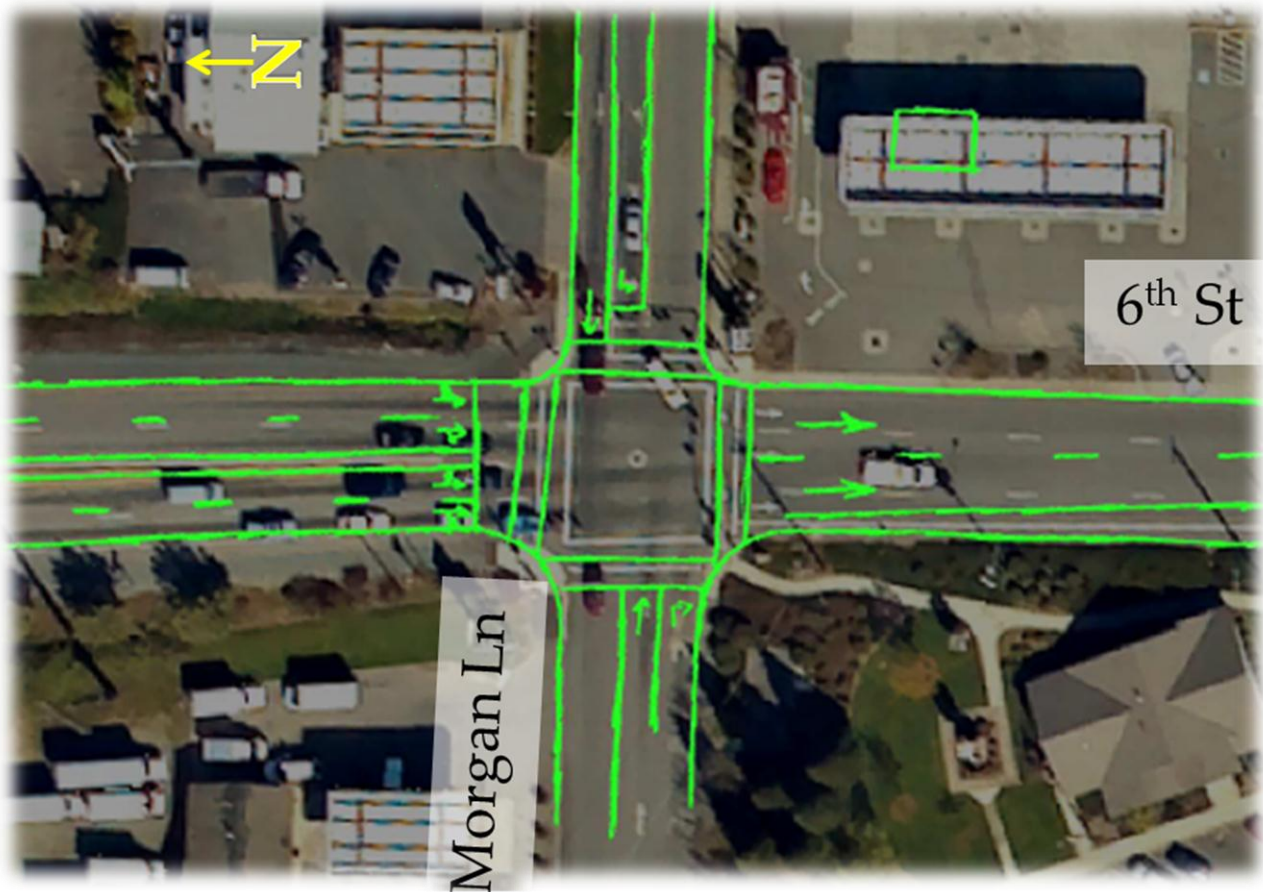


Exhibit 22 Increase curb radii and restripe downstream to two lanes

ISSUE: VISIBILITY OF SIGNAL HEADS

The following issues were observed related to the visibility of the traffic signal heads for the southbound intersection approaches:

- Old programmable signal heads are visible from both roadway alignments and can be confusing to motorists in the adjacent lanes (see Exhibit 23 and Exhibit 24)
- Unconventional signal phasing – split phasing in the same direction
- Visual clutter – Commercial signing beyond the intersection creates background clutter and competes for attention with signal heads (see Exhibit 23 and Exhibit 25)
- The existing signal mast arms are “too busy” with signage and signal indications and may be structurally inadequate
- The signal heads installed for the I-5 southbound off-ramp are not centered over the approach lanes
- Eastbound and westbound NW Morgan Lane approaches have 8-inch existing signal lenses (see Exhibit 26)



Exhibit 23 Signal Heads Visible from adjacent lanes/visual clutter



Exhibit 24 Signal heads visible from adjacent lanes



Exhibit 25 Visual clutter



Exhibit 26 8" signal lenses on Morgan Lane

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 3.

Table 3 Qualitative Risk Rating of Signal Head Visibility

Function	Classification	Reasoning
Exposure	Category II	Competing messages and clutter
Probability	Category II	Busy intersection
Consequence	Category II	Low-severity crash types
Overall	Category II	-

Suggestions

- Install retro-reflective back plates on signal heads to increase visibility of signals
 - Add 1- to 3-inch-wide reflective strip around backplates (option added to 2009 Manual on Uniform Traffic Control Devices [MUTCD]; see Exhibit 27).

- Extend the length of signal visors on the southbound approaches' signal heads (see Exhibit 28)
- Update or change the programmable signal heads for the southbound approach (see Exhibit 29)
- Increase eastbound and westbound signal heads to 12-inch lenses
- Reduce distracting signing that takes away from the important right-of-way message provided by the signal heads. The design of traffic signal modifications will require key coordination with signing to ensure that only essential signing is placed on the signal poles and mast arms.



Exhibit 27 Example of reflective striping on signal backplate



Exhibit 28 Example of extended signal head visors



Exhibit 29 Example of programmable signal head

ISSUE: SIGN CLUTTER

The following issues were identified relating to sign clutter in the vicinity of the study intersection:

- Sign clutter in advance of intersection (see Exhibit 30 and Exhibit 31)
 - Too many signs, some blocking each other.
- Sign clutter on signal poles/mast arms (see Exhibit 32 and Exhibit 33)
 - Too many signs
- Driver overload – not enough time to process all the information



Exhibit 30 Sign clutter in advance of intersection



Exhibit 31 Sign clutter in advance of intersection



Exhibit 32 Sign clutter on signal poles/mast arms



Exhibit 33 Sign clutter on signal poles/mast arms

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 4.

Table 4 Qualitative Risk Rating of Sign Clutter

Function	Classification	Reasoning
Exposure	Category III	Too many signs
Probability	Category II	Driver overload
Consequence	Category I	Informational and guide signs low consequence, but regulatory high
Overall	Category II	-

Suggestions:

- Prioritize signage to relay the most important information
 - Regulatory
 - Warning
 - Informational and guide signing
- Considerations (apply to all recommendations):
 - Add lane designation signage prior to intersection (See Exhibit 34 through Exhibit 36)
 - Reduce signage on mast arms
 - Move Oregon Travel Experience (OTE) signs back on off-ramp
 - Combine City of Grants Pass entry and population signs (3 signs into 1)
 - Upgrade sign sheeting to High Intensity Prismatic (HIP)
 - Provide appropriate sign spacing per the MUTCD

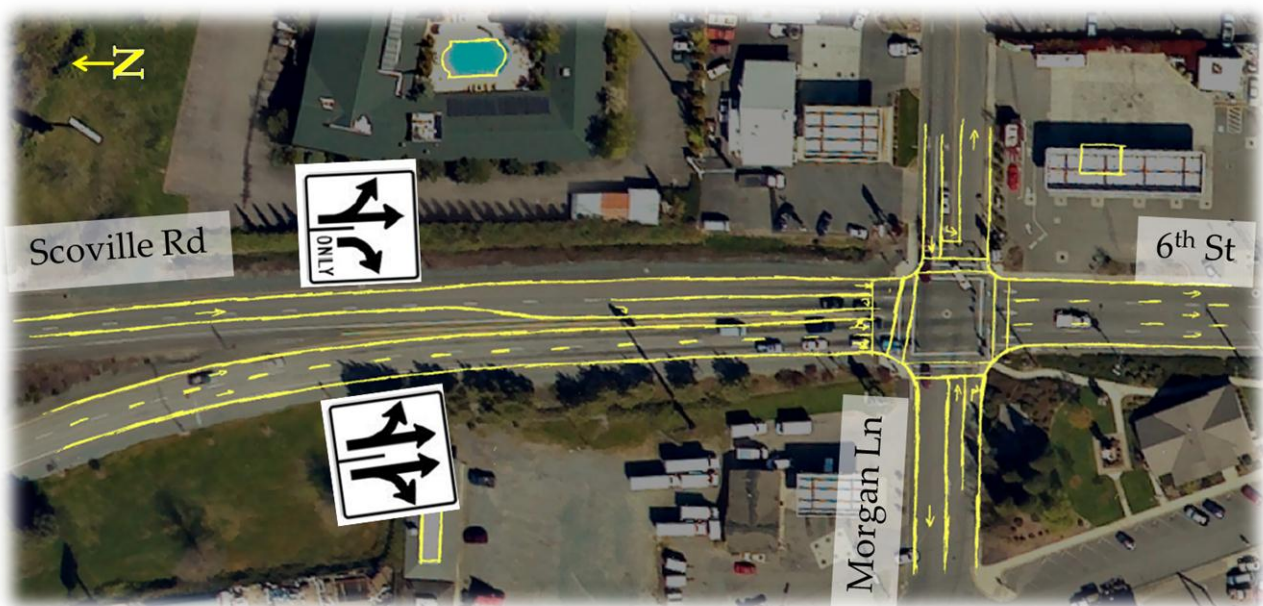


Exhibit 34 Lane use signage – Restripe Scoville Road to through and exclusive right

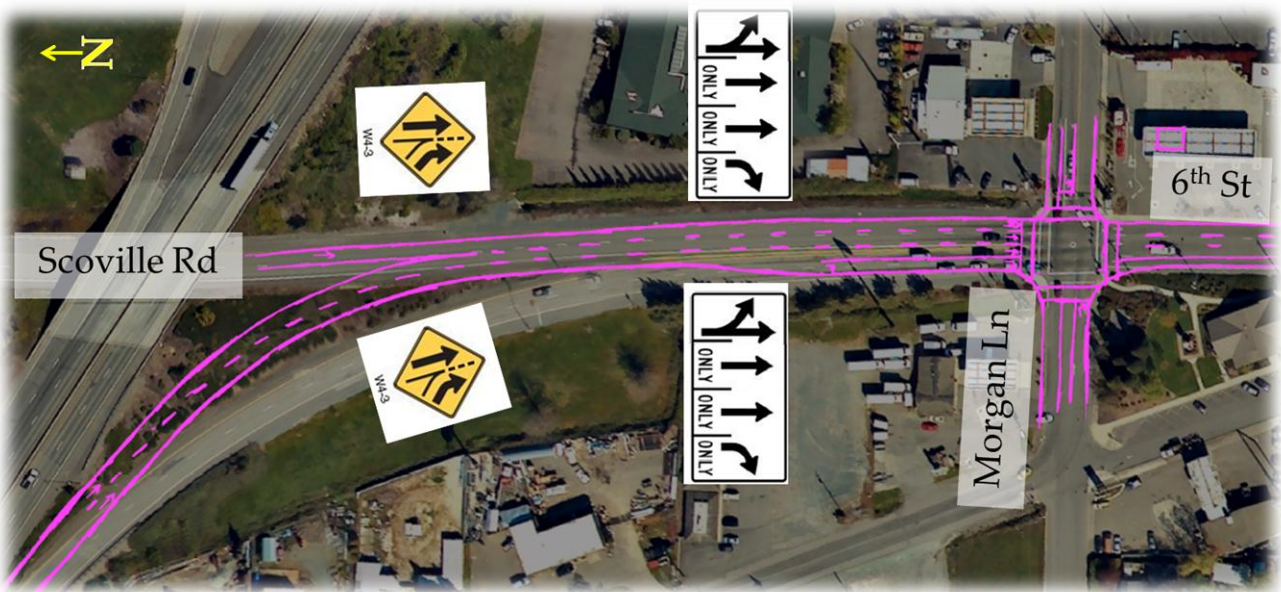


Exhibit 35 Lane use signage – Realign and re-grade off-ramp with re-graded Scoville Road

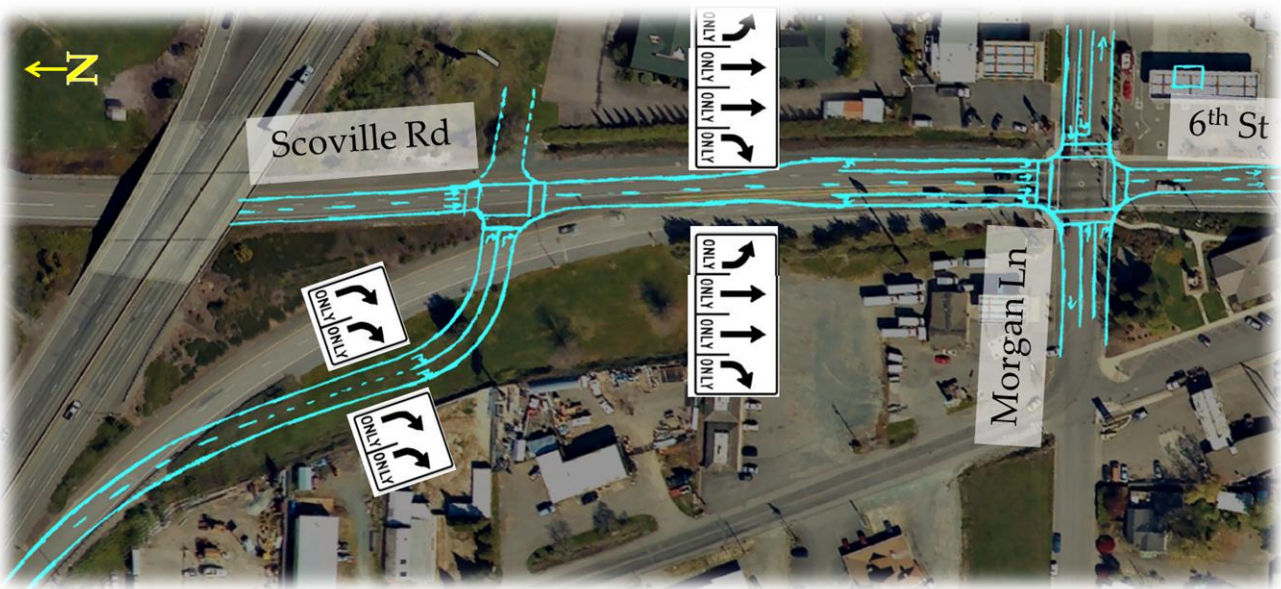


Exhibit 36 Lane use signage – Introduce a new signal and simplify to two 2-phase signals

ISSUE: OUT-OF-AREA DRIVERS

The following issues were identified related to out-of-area drivers in the study area:

- Approximately 60% to 65% of total crashes involve drivers that are non-residents or Oregon residents who live more than 25 miles away from the study intersection.
- Of the 32 southbound left-turn crashes identified as being the primary safety issue at the intersection, out-of-area drivers were at fault in 29 of the crashes.
- Out-of-area drivers may find the unconventional signal phasing and intersection configuration confusing or unexpected (see Exhibit 37).



Exhibit 37 Configuration encountered by out-of-town drivers

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 5.

Table 5 Qualitative Risk Rating of Out-of-Area Drivers

Function	Classification	Reasoning
Exposure	Category II	Moderate number of tourist travelers
Probability	Category III	High percentage of crashes
Consequence	Category II	Low-severity and PDO crash types
Overall	Category II	-

Suggestions:

- Simplify the driving task through signage
 - Improve pull through signing from I-5 Southbound
 - Reduce the sign clutter and eliminate unnecessary signing
 - Relocate and consolidate OTE signing with the proper sign spacing
- Simplify the intersection configuration through previous suggestions

ISSUE: TRUCK TURNING MOVEMENTS

Large trucks represent approximately 4% to 5% of average daily traffic (ADT) volumes on US 199, as counted in January 2011. Light trucks contribute another 5% of the ADT. Due to the length of tractor-trailer combinations and small radius curbs, trucks often encroach onto curb-returns and pedestrian ramps, as shown in Exhibit 38 and Exhibit 39.

- The RSA team observed a high volume of large semi-truck traffic through the intersection. Truck traffic seems to contribute to over 10% of the right-turn volumes and through movements.
- The intersection geometry (e.g. stop bar locations, curb radii, pole placement) does not accommodate large vehicles
- The existing signal poles at the intersection have been hit by trucks

- This presents a hazard to pedestrians in the vicinity of the pedestrian push-buttons.
- The team observed most trucks and even light pickup trucks have a difficult time turning into the near lane from NW Morgan Lane eastbound and westbound
- Trucks were observed turning right from NE Scoville Road and the I-5 exit ramp off-tracking into—or even turning from—the adjacent lane in order to properly align their vehicle into the receiving lane while avoiding the opposing lane of traffic.



Exhibit 38 Large truck turning at intersection



Exhibit 39 Signal poles damaged from vehicle hits

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 6.

Table 6 Qualitative Risk Rating of Trucks Encroaching on Curb Returns

Function	Classification	Reasoning
Exposure	Category II	Trucks encroach on pedestrian ramps and adjacent lanes
Probability	Category II	Relatively high percentage of trucks
Consequence	Category II	Slow truck turn speeds
Overall	Category II	-

Suggestions

- Improve curb-return radii for NW Morgan Lane to N 6th Street movements to accommodate truck maneuvers
- Improve curb-return radii for the I-5 southbound ramp to NW Morgan Lane westbound movement to accommodate truck maneuvers

- Consider reducing downstream N 6th Street to two receiving lanes
- Move stop bar back for southbound approaches

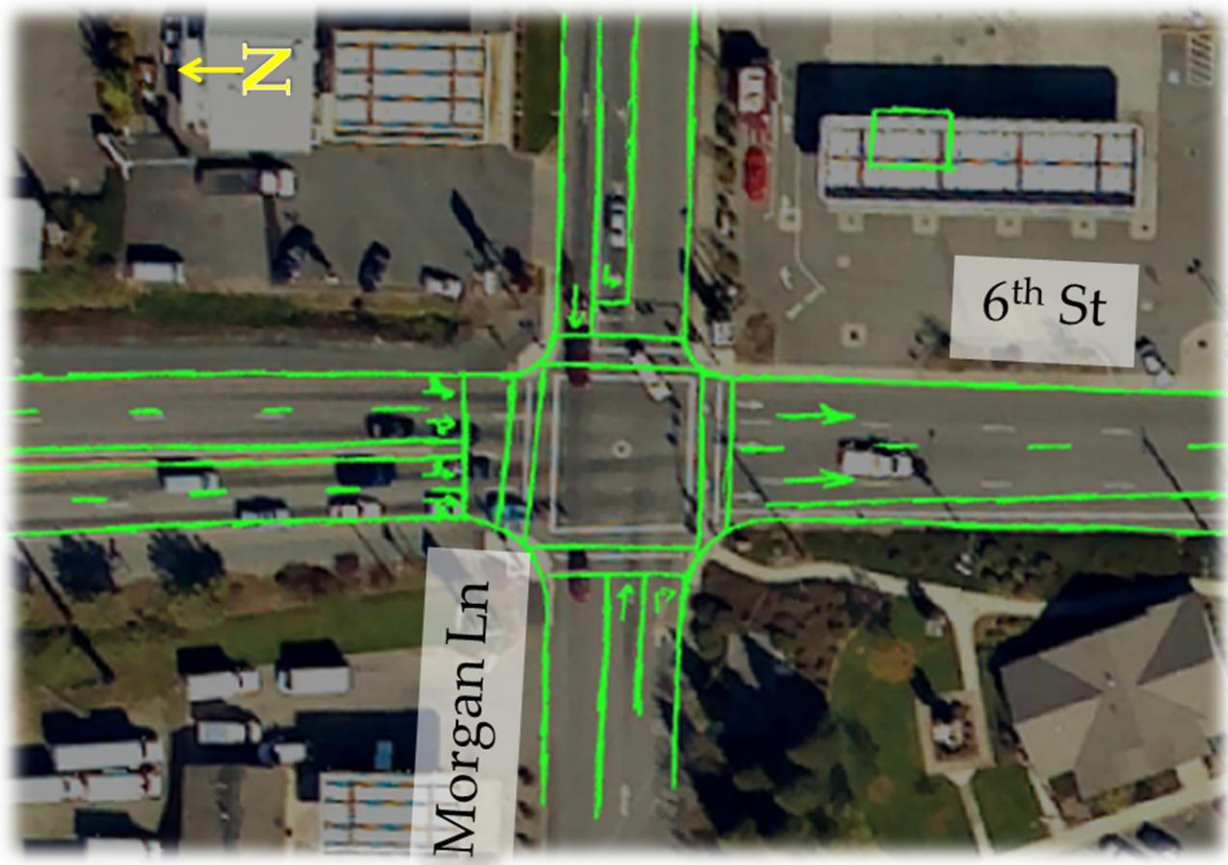


Exhibit 40 Intersection reconfiguration to accommodate large trucks

ISSUE: PROXIMITY OF DRIVEWAYS

Several safety issues were identified in relation to the proximity of driveways immediately downstream of the study intersection. A review of the crash data yielded the following insights:

- Of the 32 southbound left-turn crashes with southbound through vehicles, 27 were coded as “entering alley/driveway from road” as the driver action and “turning from wrong lane” as the driver error.
 - The crash data suggests that a large majority of crashes are occurring due to vehicles destined to the downstream land uses making improper lane changes or turns from the wrong lane.
- 9 sideswipe crashes were recorded in the southbound direction
 - 7 of the sideswipe crashes were non-residents or out-of-area drivers.
 - 1 crash was recorded as Injury B, and 1 was recorded as Injury C severity.

- 2 crashes were vehicles making a left-turn out of a downstream driveway colliding with a southbound through vehicle
- 1 crash was a vehicle making a right-turn out of a driveway the wrong way onto N 6th Street

The following safety issues were identified in relation to the proximity of driveways to the study intersection:

- 76 gas station
 - Driveways immediately south of intersection.
 - Vehicles from eastbound NW Morgan Lane and southbound NE Scoville Road and I-5 southbound off-ramp weave across lanes to reach the driveways.
- McDonald's driveway
 - Used as a westbound alternative to NW Morgan Lane (cut through); 35 vehicles were observed during a 15-minute time period over the lunch hour.
 - Extends through from N 6th Street to N 7th Street and serves multiple land uses.
 - Vehicles weave across N 6th Street to reach the driveway.



Exhibit 41 Vehicles weaving across N. 6th Street



Exhibit 42 McDonald's driveway/shared alley access

The qualitative risk rating associated with this safety issue, relative to all other issues observed, is presented in Table 7.

Table 7 Qualitative Risk Rating of Proximity of Driveways

Function	Classification	Reasoning
Exposure	Category II	High volume driveways and access routes
Probability	Category III	Numerous driveways at intersection
Consequence	Category I	Low-severity crash types
Overall	Category II	-

Suggestions

- As part of the intersection improvements, coordinate with property owners to explore driveway consolidations
- Future redevelopment would require a land use action with the consideration of consolidating accesses
- Consider future access management strategy in the vicinity of this intersection

Appendix A
Grants Pass Interchange
Exit 58, RSA Findings
Presentation

Appendix B
Summary of Road
Safety Audit (RSA)
Findings