

CITY OF KIRKLAND ITS STRATEGIC PLAN UPDATE

PRESENTATION TO THE TRANSPORTATION COMMISSION
JUNE 2019

DRAFT



Intelligent Transportation Systems (ITS)

PURPOSE OF THE ITS STRATEGIC PLAN

- Updates the 2008 ITS Strategic Plan
- Focuses on operations
- Provides a prioritized list of:
 - Capital Projects, with cost estimates
 - Staffing recommendations
 - Policies/Procedures related to ITS
 - Ongoing/annual operations cost estimates



PROJECT PROCESS AND SCHEDULE

City of Kirkland Citywide ITS Plan Schedule												
	2018				2019							
Month	S	O	N	D	J	F	M	A	M	J	J	A
NTP/Kick off Meeting	◆											
Step 1 - Baseline												
Individual Interviews												
Inventory												
Step 2 - Identify Needs and Operations Concept												
Workshop 1 - Needs				◆								
Corridor Based Operations Concepts												
White Papers on Areas of Key Interest												
Step 3 - Select Strategies, Projects, Policies												
Potential Improvements and Strategies												
Cost Estimates												
Workshop 2 - Rating and Ranking							◆	◆				
Step 4 - Complete the Plan												
Draft and Final Plan												
Transportation Commission										◆		
Workshop 3 - Plan Review and Comments											◆	
Draft and Final Executive Summary												

- Outreach/coordination with partners

- KFD
- KPD
- IT

- Time invested in defining multmodal operations concepts

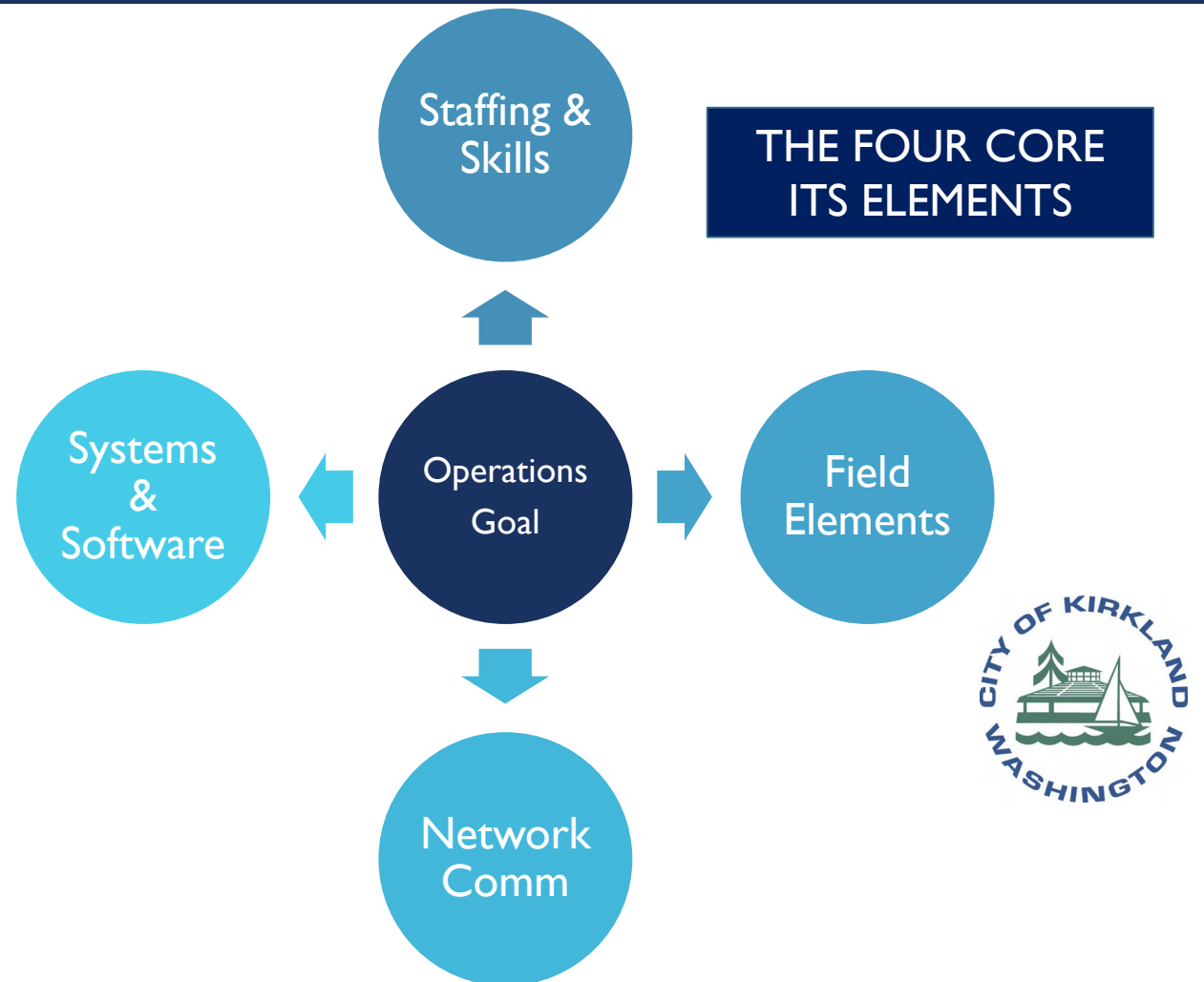
- Integration of Council and Comp Plan goals to create ITS Program Goals

- Connected Strategies/Projects/Policies to ITS Program Goals



THE OPERATIONS GOALS DRIVE THE PLAN

- How the City would like to operate drives the selection of the elements needed to produce that outcome.





OPERATIONS NEEDS - SOME METRICS

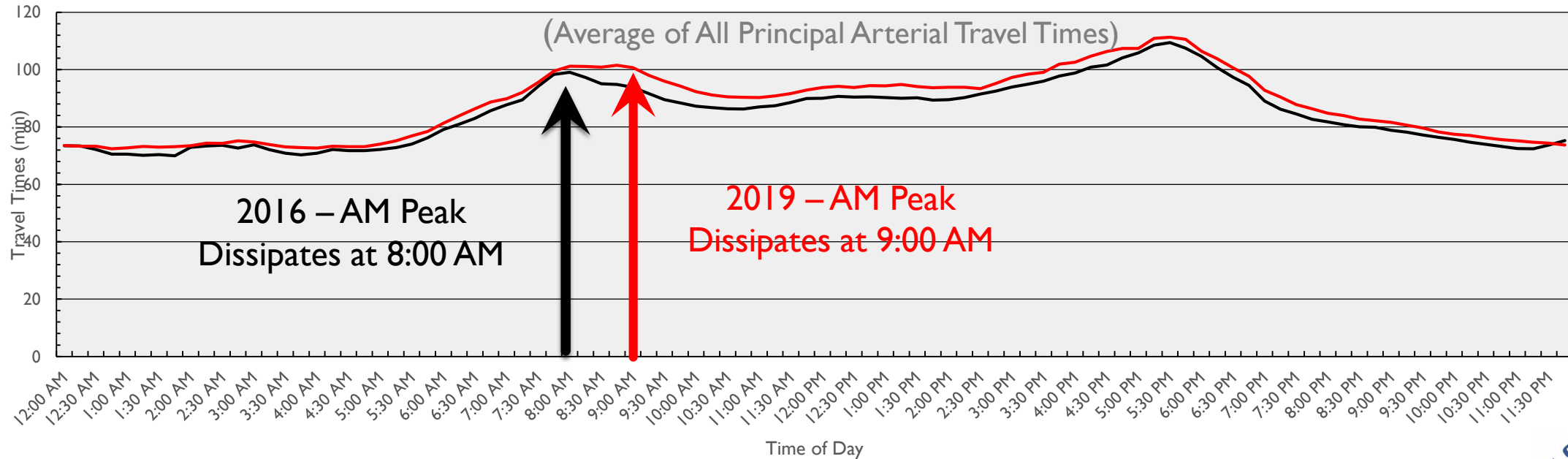
- TREND CITYWIDE (2016 -2019)
- EFFECTS OF SIGNALS IN FLASH
- EFFECTS OF FREEWAY INCIDENTS
- INFLUENCE OF WSDOT SIGNALS ON DELAY (NE 124TH ST)
- STAFFING LEVELS



CITYWIDE TREND

CITYWIDE TRAVEL TIMES ARE INCREASING

2016 vs 2019, Jan - April (Tu-Th) - Citywide Travel Times

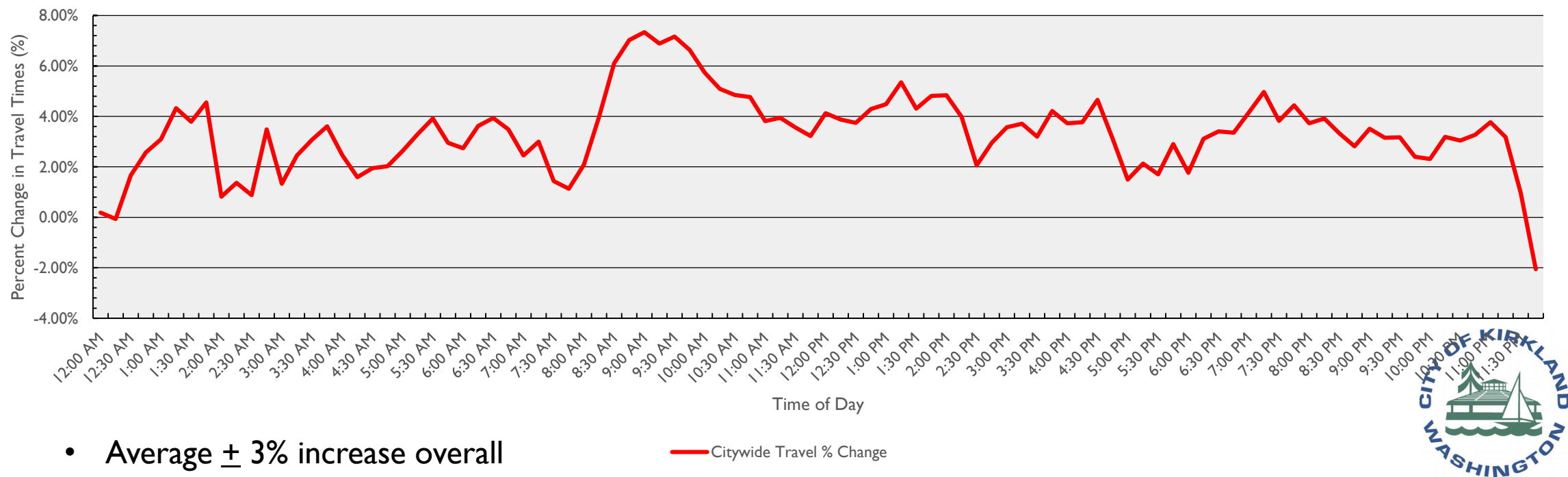


- Notable peak spread AM Peak



CITYWIDE TRAVEL TIME INCREASES AS A PERCENTAGE

2016 vs 2019 (Tu-Th) - Citywide Travel Times % Increase

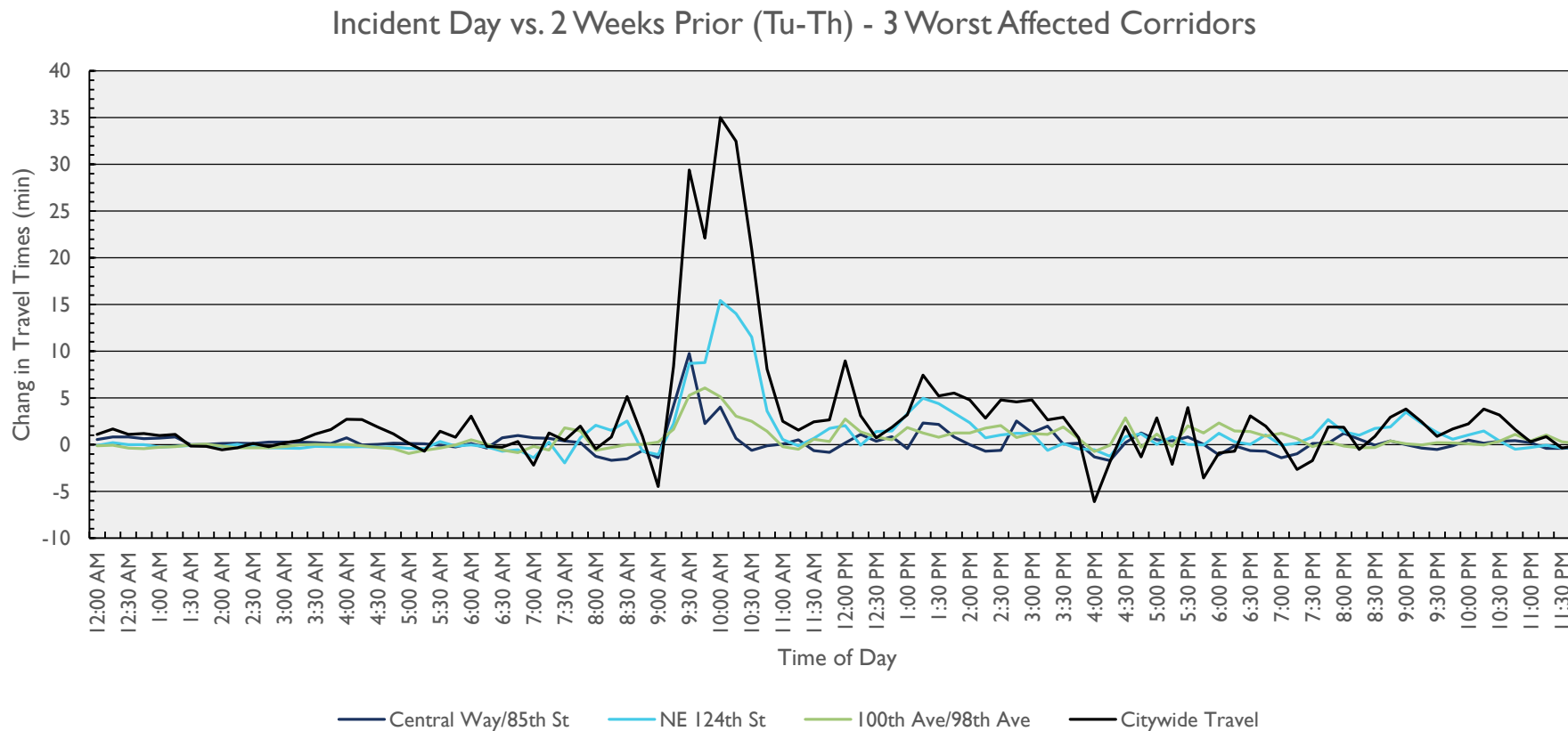




SIGNALS IN FLASH

40 TRAFFIC SIGNALS IN FLASH 10/3/2018 FROM APPROXIMATELY 9:00 AM – 11:30 AM*

* Last signal restored
at approximately
11:30 AM



SAFETY IMPACTS OF FLASHING TRAFFIC SIGNALS

A statewide study conducted in 2006 in Georgia found:

- Increase in “fail to yield” crashes – from 10% to 29%
- Right angle crash rate increase (table)

Other effects:

- Impact on public safety response times
- Particularity fraught for pedestrians

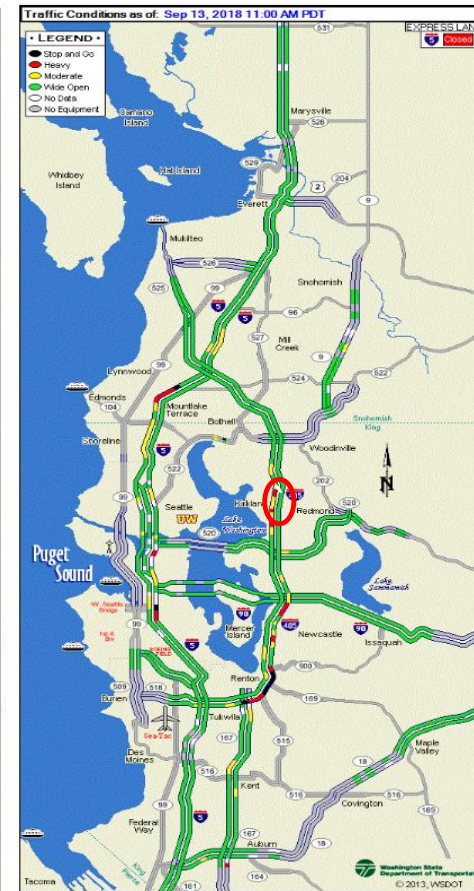
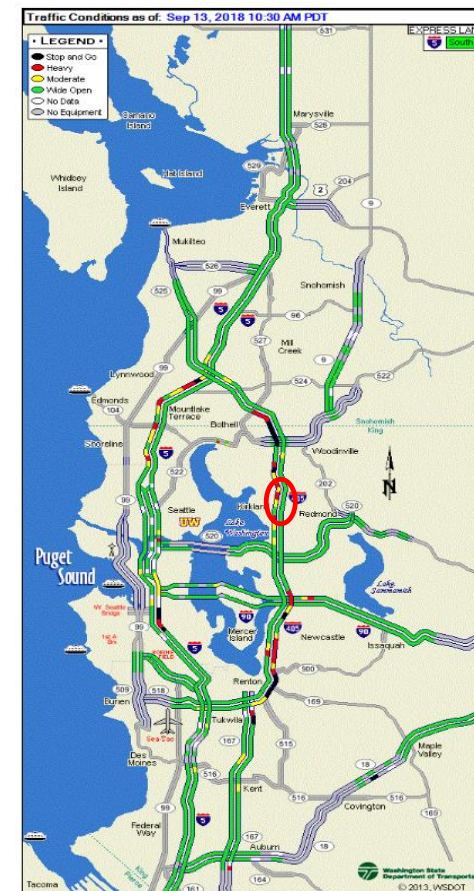
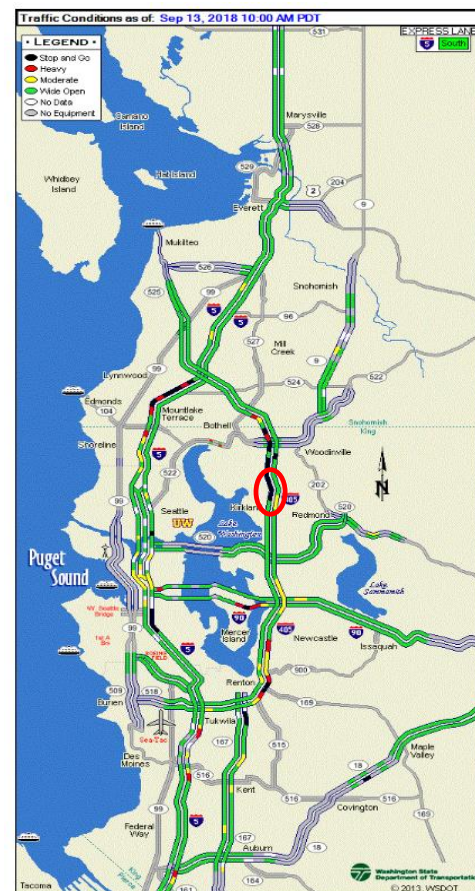
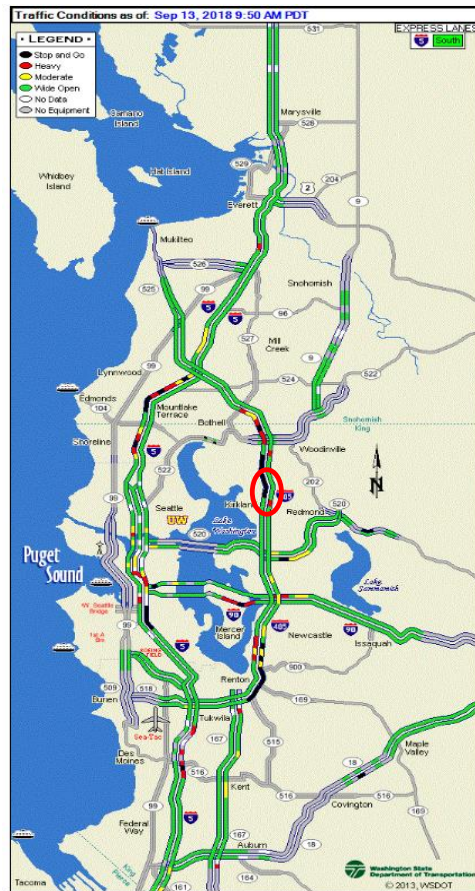
RIGHT-ANGLE CRASHES FREQUENCY AND SEVERITY

	Percent of total crashes	Percent of fatals
Normal Signal Ops	34%	55%
Signals in Flash	74%	Not reported
2-way and 4-way stop intersections	49%	83%



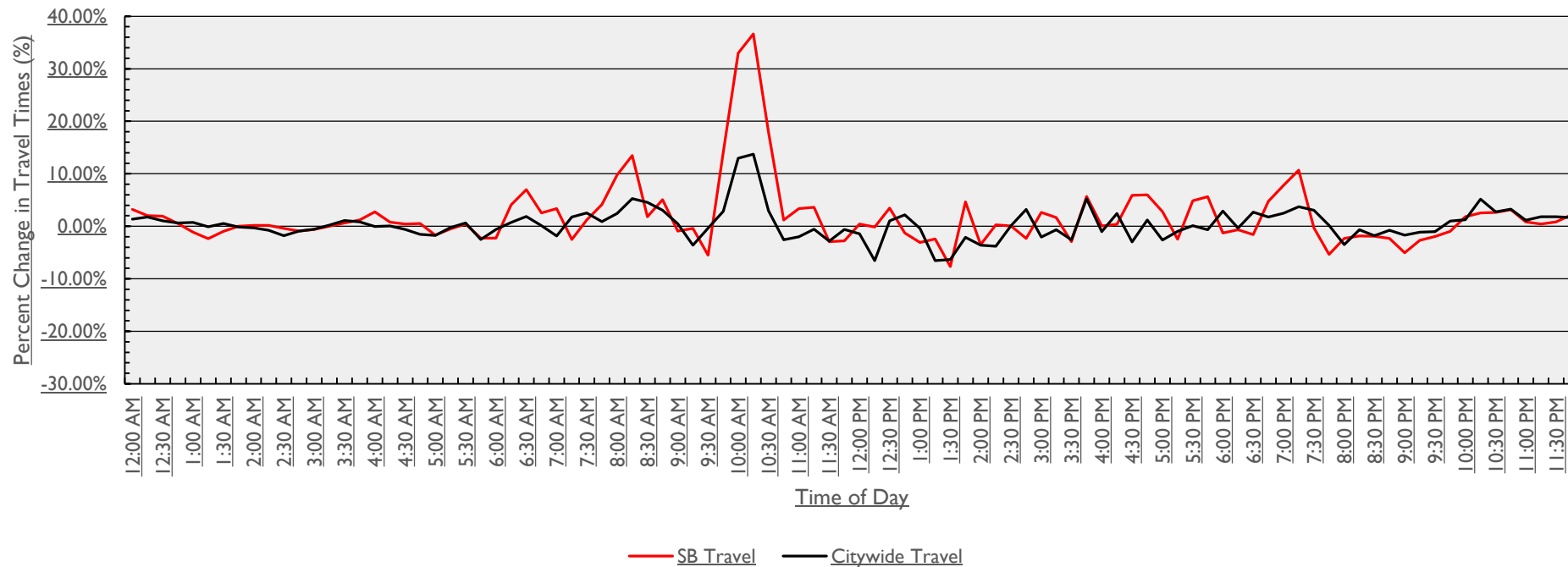
EFFECTS OF FREEWAY INCIDENTS

I-405 SB COLLISION AT NE 85TH ST BLOCKING ONE RIGHT LANE ±9:30 AM START/CLEAR BY ±10:30 AM



I-405 SB COLLISION AT NE 85TH ST BLOCKING ONE RIGHT LANE ±9:30 AM START/CLEAR BY ±10:30 AM

Incident Day vs. 2 Weeks Prior (Tu-Th) - Travel Times % Increase

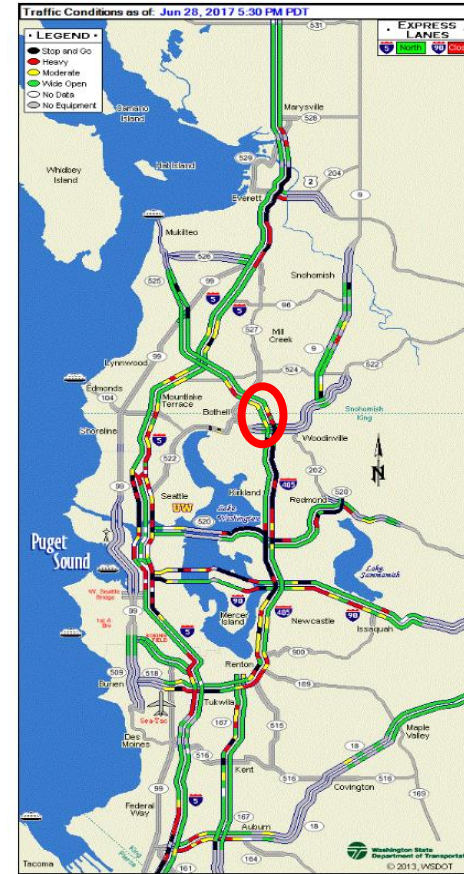
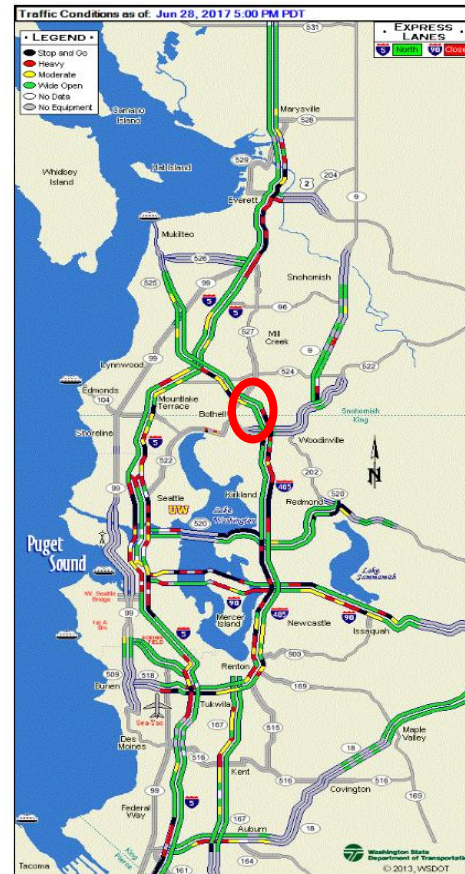
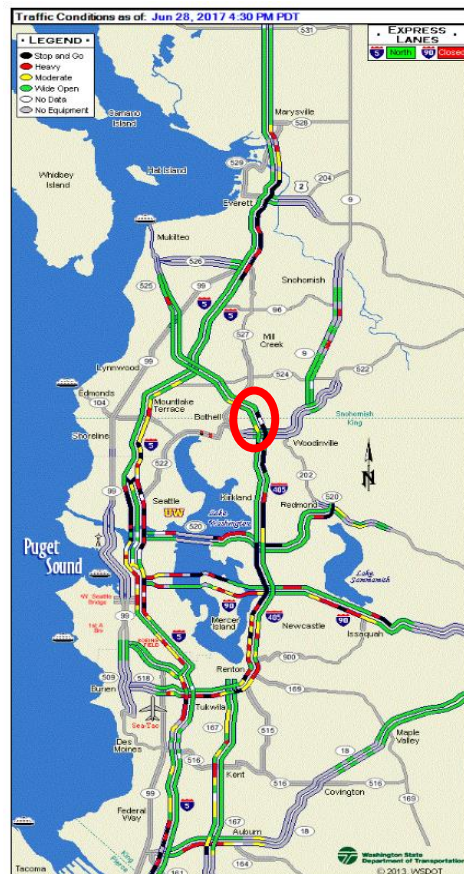
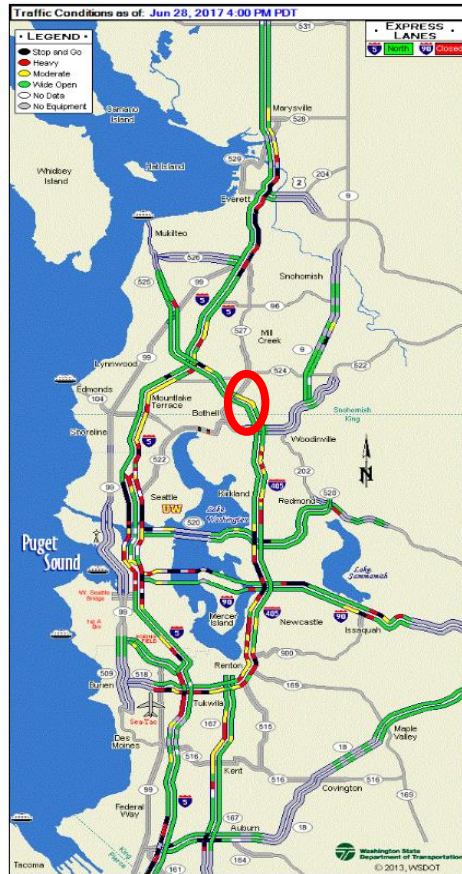


Max percentage increase in travel times:

- SB routes
↑ ± 35%
- Citywide
↑ ± 15%

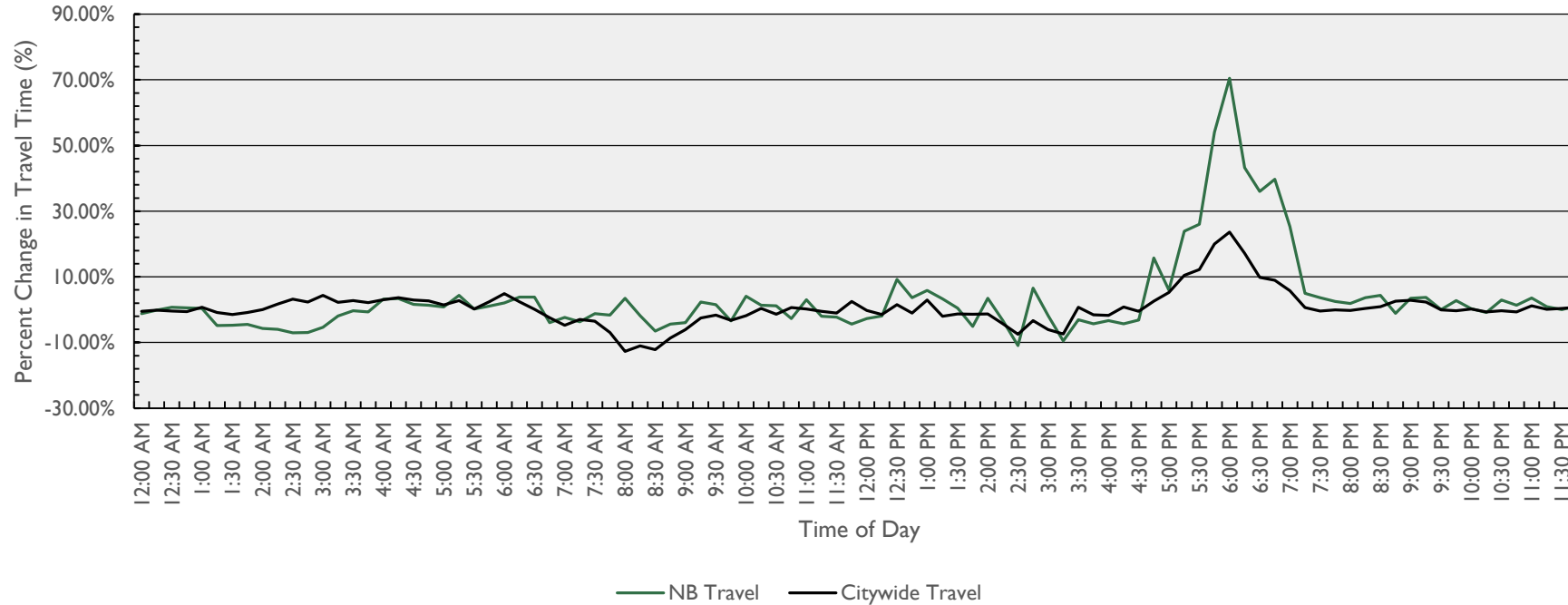


I-405 NB COLLISION NORTH OF SR 527 BLOCKING 3 RIGHT LANES ±4:00 PM START/CLEAR BY ±5:45 PM



I-405 SB COLLISION AT NE 85TH ST BLOCKING ONE RIGHT LANE ±9:30 AM START/CLEAR BY ±10:30

Incident Day vs. 2 Weeks Prior (Tu-Th) - Travel Times % Increase



Max percentage increase in travel times:

- NB routes
↑ ± 70%
- Citywide
↑ ± 25%





INFLUENCE OF WSDOT SIGNALS NE 124TH ST EXAMPLE

WSDOT TRAFFIC SIGNALS



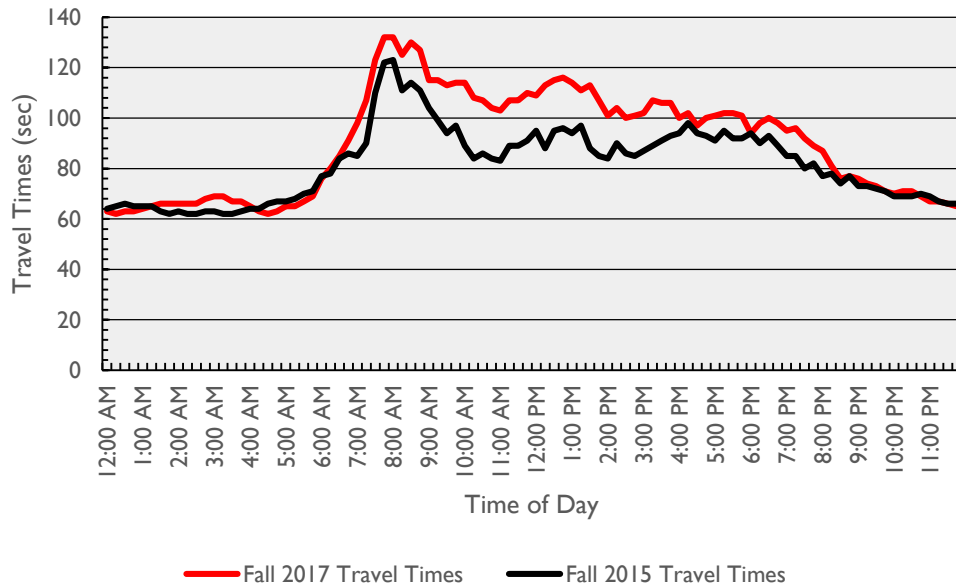
- WSDOT Traffic Signal
- COK Traffic Signal

- WSDOT elected to remove signals on NE 124th St from COK coordination during ITS Phase 3
- WSDOT signals on NE 116th St have never been coordinated with COK signals

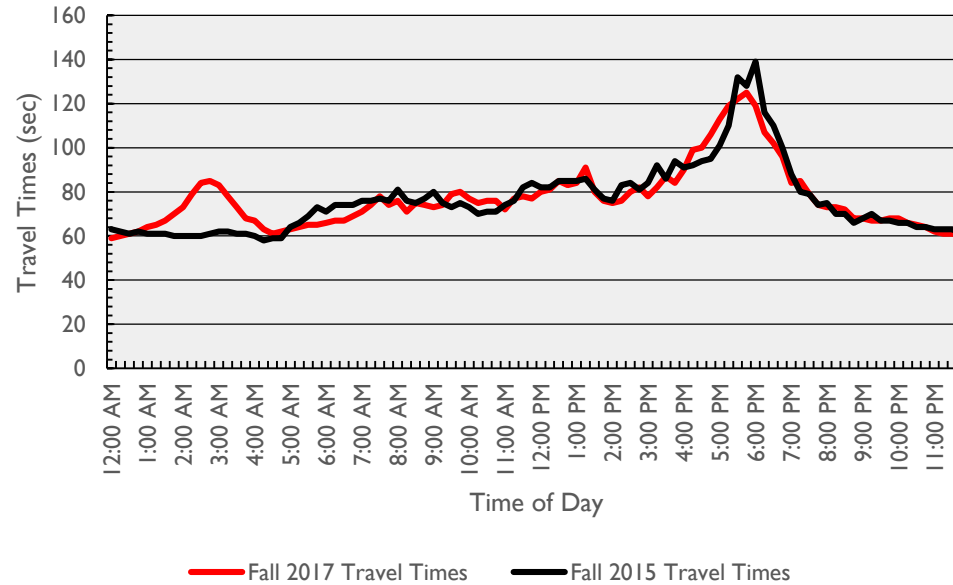


REMOVAL OF SIGNALS FROM COORDINATION – NE 124TH ST

EB NE 124th St - 116th Ave NE to 124th Ave NE
Fall 2017 vs. Fall 2015 (Tu-Th) - Travel Times
Comparisons



WB NE 124th St - 124th Ave NE to 116th Ave NE
Fall 2017 vs. Fall 2015 (Tu-Th) - Travel Times
Comparisons



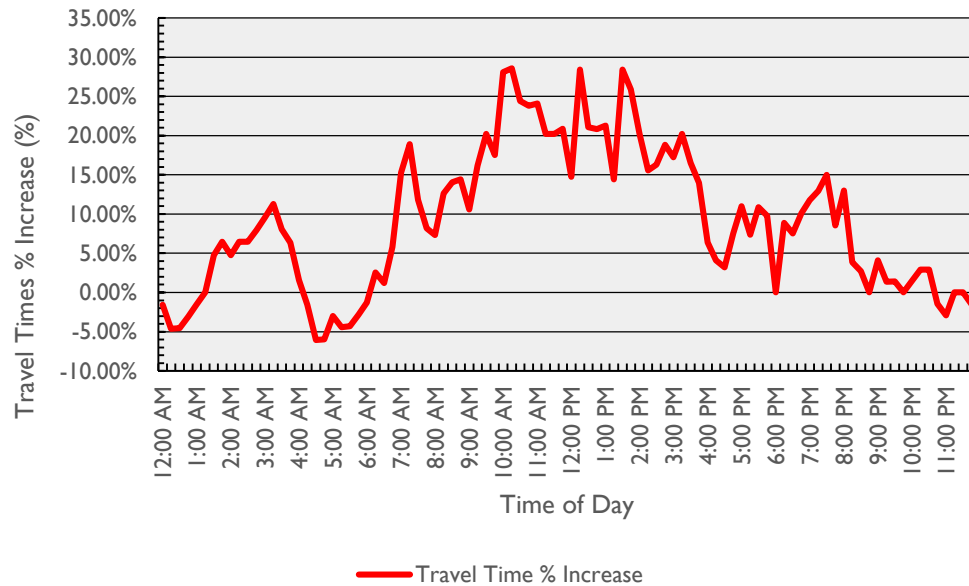
EB: consistent
20 sec
increase

WB:AM
increase up to
20 seconds

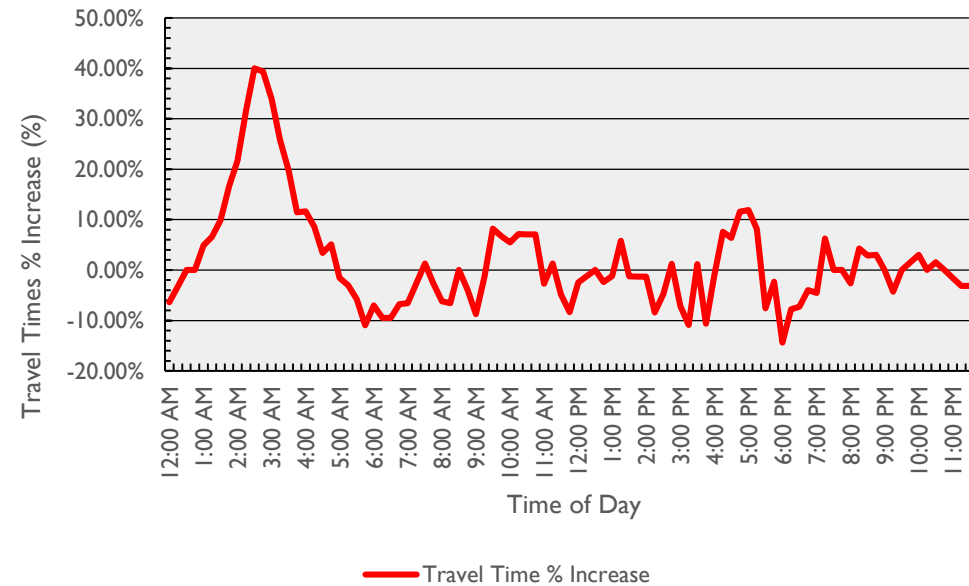


PERCENTAGE INCREASE IN TRAVEL TIME

EB NE 124th St - 116th Ave NE to 124th Ave NE
Fall 2017 vs. Fall 2015 (Tu-Th) - Travel Times %
Increase



WB NE 124th St - 116th Ave NE to 124th Ave NE
Fall 2017 vs. Fall 2015 (Tu-Th) - Travel Times %
Increase



Percentage increase is greater than background growth





MAINTENANCE AND OPERATIONS STAFFING LEVELS

STAFFING NEEDS

MAINTENANCE – ADD 2 ELECTRIANS

LED lamps Streetlighting	1600
HPS lamps Streetlighting	400
RRFB	50
Radar Signs	25
Solar Panels for 3 and 4 above	40
Traffic Signals (including comm)	65
CCTV	30
Detection (video)	100

- **Need 5 electricians plus a Supervisor, now have 3 electricians plus a Supervisor**

Sources: NCHRP/Oregon DOT/FHWA

OPERATIONS – ADD 1 ENGINEER

65 traffic signals + need for advanced control strategies

30 CCTV

100 video detection cameras

- **Need 3 engineers, now have 1.5 engineers**
- Maintain institutional knowledge

Source: FHWA





OPERATIONS NEEDS

ITS OPERATIONS NEEDS

- Reduce incidence of signals going into flash/malfunctions
- Reduce response times to signal malfunctions
- Operate signals in manner to respond to spikes in demand
 - Freeway incidents
 - Surface street incidents/closures
 - School operations
- Improve emergency services response times
- Remove barriers to better operations at WSDOT signals
- Better serve a balance of multimodal operations



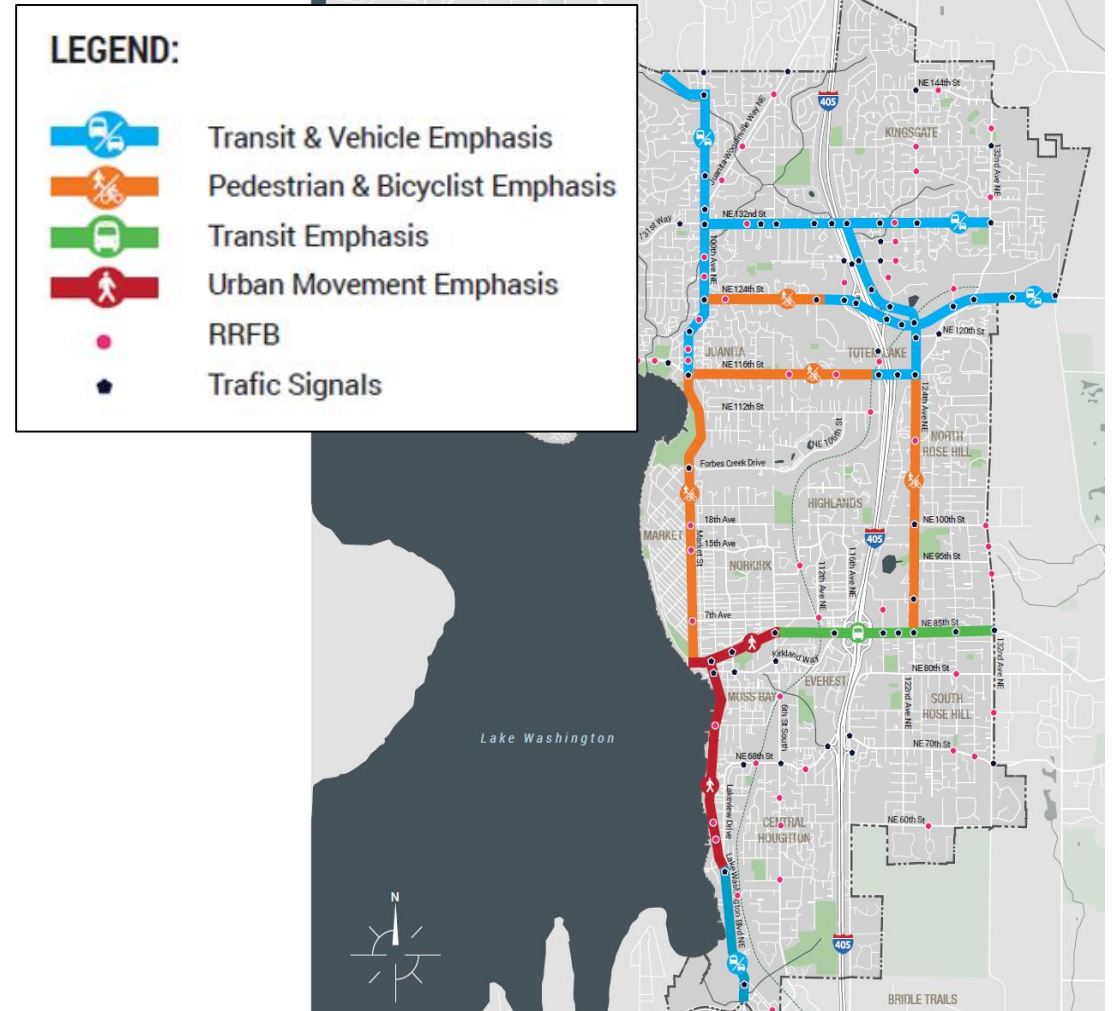
MULTIMODAL BALANCE IN OPERATIONS

Urban Movement Emphasis	
Mode	Relative Emphasis (Rank)
Pedestrians	1
Cyclists	2
Transit	3
Vehicles	4

Transit Emphasis	
Mode	Relative Emphasis (Rank)
Transit	1
Vehicles	2
Pedestrians	3
Cyclists	3

Transit and Vehicle Emphasis	
Mode	Relative Emphasis (Rank)
Transit	1
Vehicles	1
Pedestrians	2
Cyclists	2

Pedestrian and Cyclist Emphasis	
Mode	Relative Emphasis (Rank)
Pedestrians	1
Cyclists	1
Transit	2
Vehicles	2



ITS PROGRAM GOALS AND GUIDING PRINCIPLE



Council Goals

- Dependable Infrastructure
- Public Safety
- Balanced Transportation



Comprehensive Plan Transportation Element

- Safety
- Walking
- Biking
- Transit
- Motor Vehicles
- Link to Land Use
- Sustainable
- Be an Active Partner
- Measurement



ITS Program Goals

- Reliable
- Resilient
- Responsive

Guiding Principle:
Transparency

ITS PROGRAM GOALS/OBJECTIVES AND GUIDING PRINCIPLE

RELIABLE

Reliable delivery of service

- Almost no failures of communications network, systems, devices
 - 99% uptime
- Future proof – ready for current and future changes in ITS technology
- Maintain a secure IT network
- Field device change-out and end-of-life

RESILIENT

Resilient delivery of service
(quick recovery, quick responses)

- Resilient communications, systems, devices
- Resilient level of staffing to respond

RESPONSIVE

Responsive to needs

- Safety focused first
- Introduce traffic responsive operations, leveraging and adding to existing systems
- Implement system to provide detailed signal operations measurement to diagnose and correct signal timing
- Multimodal – peds, bikes and transit
- Take over WSDOT signal operations
- Reduce Emergency Services response times

GUIDING PRINCIPLE

Transparency - Measure and report on performance

- Travel time
- Travel time reliability
- Impacts of incidents on freeways
- Emergency services (KFD) response times
- Reliability/Resilience
- Others







DELIVERING OPERATIONS/ADDRESSING NEEDS

- Policy should dictate what the ITS Plan delivers:
 - Operationally, to achieve “X” service level (operations) we need:
 - So much staff
 - So much field devices
 - So much comm
 - So much systems and software
- The Corollary is: without policy, the 4 core ITS Elements Dictate Policy
 - Given our current staff, systems, etc., we can provide X level of service (status quo)



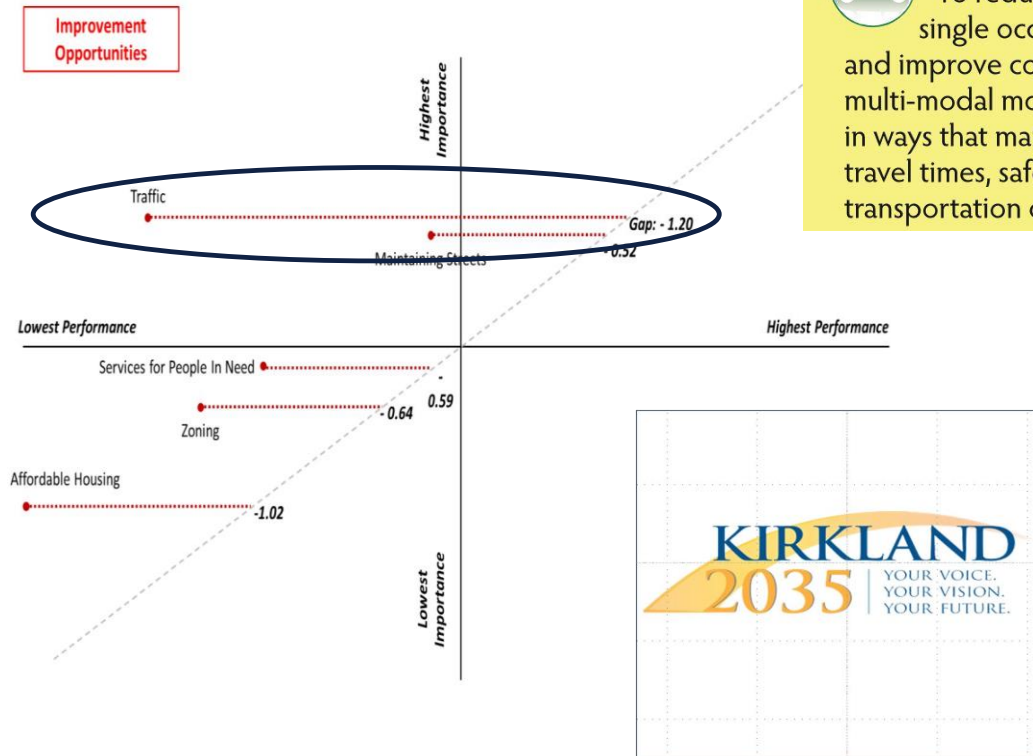
ARE EXISTING CORE ITS ELEMENTS READY FOR THE FUTURE?

Communications Network	NOT READY	
<hr/>		
<ul style="list-style-type: none">• Signal malfunctions (loss of coordination, flash, dark)• Overly long time to repair• Inadequate capacity for hi-def CCTV images• Unable to add additional devices – constrains functionality• Not “future proof”		
Systems and Software	PART READY	
<hr/>		
<ul style="list-style-type: none">• Supports current service level well• Provides a platform to build on• Lacking performance monitoring• Fire Department signal pre-emption does not meet needs		
Field Elements	PART READY	
<hr/>		
<ul style="list-style-type: none">• Some locations lack detection, CCTV, proper controllers• Bike detection is inconsistent• Budgetary process for field element replacement not sufficient		
Staffing and Skills	NOT READY	
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<ul style="list-style-type: none">• Operations staff can maintain current operations/service level• Operations staff unable to take full advantage of systems/software to improve service level• ONE Ops staff person below national std.• Without 24X7 maintenance coverage, WSDOT will not allow City to take over signal operation• Preventative maintenance cannot be fully performed – leads to more responsive maintenance• TWO Maintenance staff below national std.		



STATUS QUO IS NOT SUSTAINABLE

Figure 5-6 – Performance vs. Importance Improvement Opportunities Quadrant Chart



Balanced Transportation:*
To reduce reliance on single occupancy vehicles and improve connectivity and multi-modal mobility in Kirkland in ways that maintain and enhance travel times, safety, health, and transportation choices.

- Public perception survey
- Council Goal: Dependable Infrastructure
- Council Goal: Balanced Transportation
- Comp Plan Goals
 - Safety
 - Multimodal Goals
 - Measurement



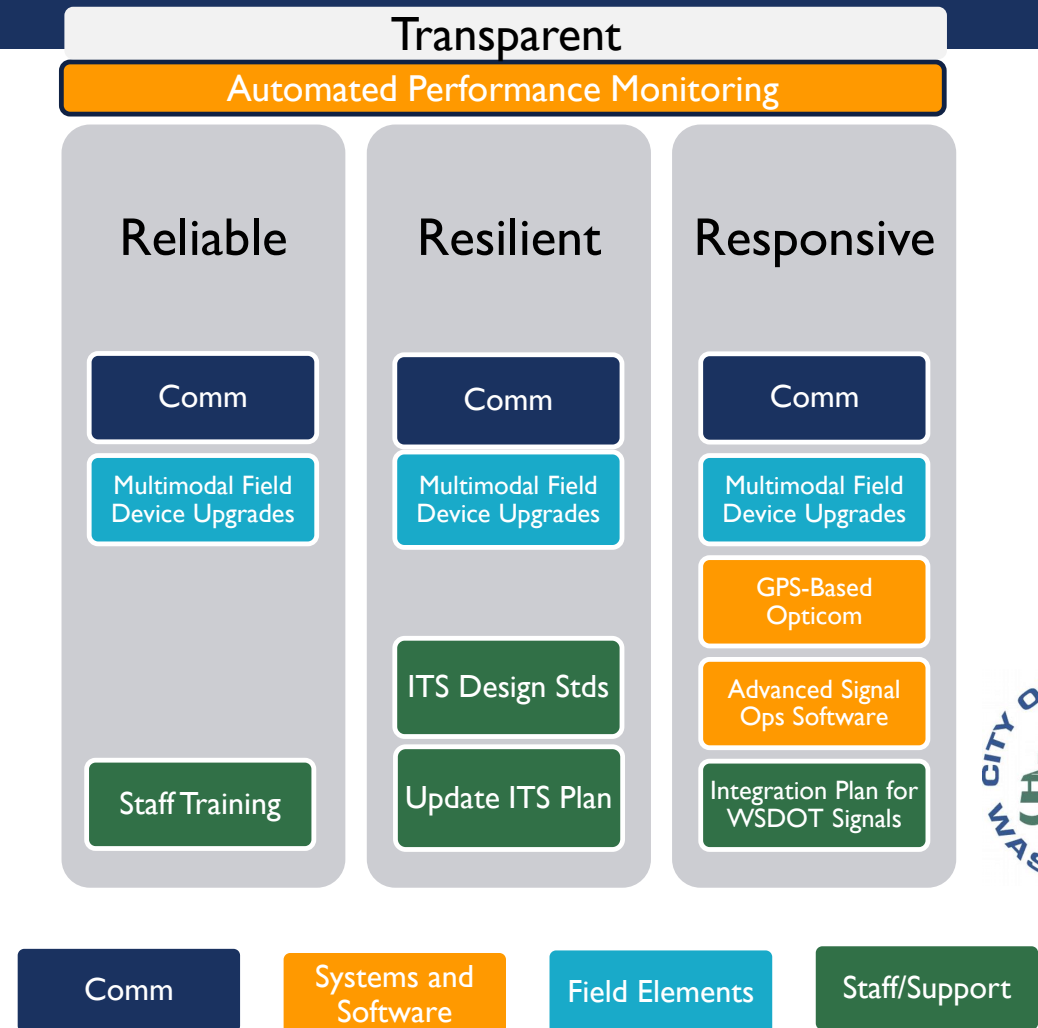
Dependable Infrastructure: *
To maintain levels of service commensurate with growing community requirements at optimum life-cycle costs.



THE PLAN – CAPITAL PROJECTS

Priority Projects:

1. Implement Automated Performance Monitoring
1. Build out Communications Network
1. Improve Multimodal Field Devices
2. Leverage Existing Systems and Software/Add New Software
2. Support Staff Needs



THE PLAN – CAPITAL COSTS

ITS ELEMENT	PROJECT	BUDGET ESTIMATE	YEAR				
			1	2	3	4	5
Comm Network	ITS PHASE 3	\$ 2,800,000					
System & Software	PERFORMANCE MONITORING	\$ 300,000					
	GPS-BASED OPTICOM	\$ 500,000					
	ADVANCED SIGNAL OPS SOFTWARE	\$ 175,000					
Field Elements	MULTIMODAL FIELD DEVICES	\$ 500,000					
Staffing	INTEGRATION PLAN FOR WSDOT SIGNALS	\$ 75,000					
	TRAINING	\$ 20,000					
	UPDATE ITS PLAN 2024	\$ 100,000					
	ITS DESIGN STDS	\$ 35,000					
TOTAL		\$ 4,505,000					

Note: Estimates are preliminary and currently under review
 Estimates are in 2019 dollars

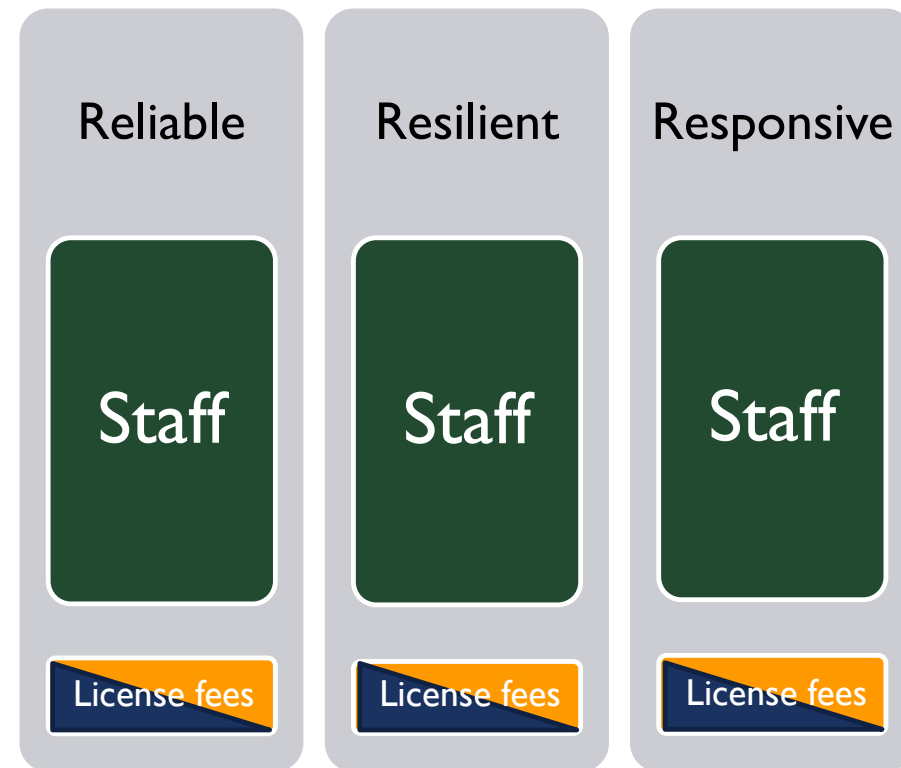


THE PLAN – ONGOING

Priority Projects:

- I. Increase Maintenance Staff by Two/Add Stand By
 - ➔ Maintenance Staff Additions are Required to Meet Objective of Taking Over WSDOT Signals & Meet Minimum National Staffing Level
- I. Increase Ops Staff by One
 - ➔ To Meet Minimum National Staffing Level
- I. Additional IT Stand By Hours
- I. Staff Training

Remaining Costs are for License Fees



Comm

Systems and
Software

Field Elements

Staff/Support

THE PLAN – ONGOING COSTS

ITS ELEMENT	PROJECT	BUDGETARY ESTIMATE BY YEAR				
		1	2	3	4	5
Comm Network	NETWORK MONITORING SOFTWARE	\$ 5,000	\$ 10,000	\$ 15,000	\$ 15,000	\$ 15,000
System & Software (Licenses)	PERFORMANCE MONITORING				Year 6 5-Year License = \$180,000	
	ADVANCED SIGNAL OPS SOFTWARE					\$ 2,000
	MULTIMODAL FIELD DEVICES		\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000
Staffing	MAINTENANCE STAFF TO MEET MIN NEED	\$ 450,000	\$ 450,000	\$ 450,000	\$ 450,000	\$ 450,000
	OPS STAFF TO MEET MIN NEED	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000	\$ 250,000
	MAINTENANCE STAFF STAND-BY	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000	\$ 18,000
	IT ADDED STAND BY	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000	\$ 12,000
	TRAINING	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000	\$ 10,000
	TOTAL	\$ 745,000	\$ 760,000	\$ 765,000	\$ 765,000	\$ 767,000

Note: Estimates are preliminary and currently under review
Estimates are in 2019 Dollars





QUESTIONS