

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

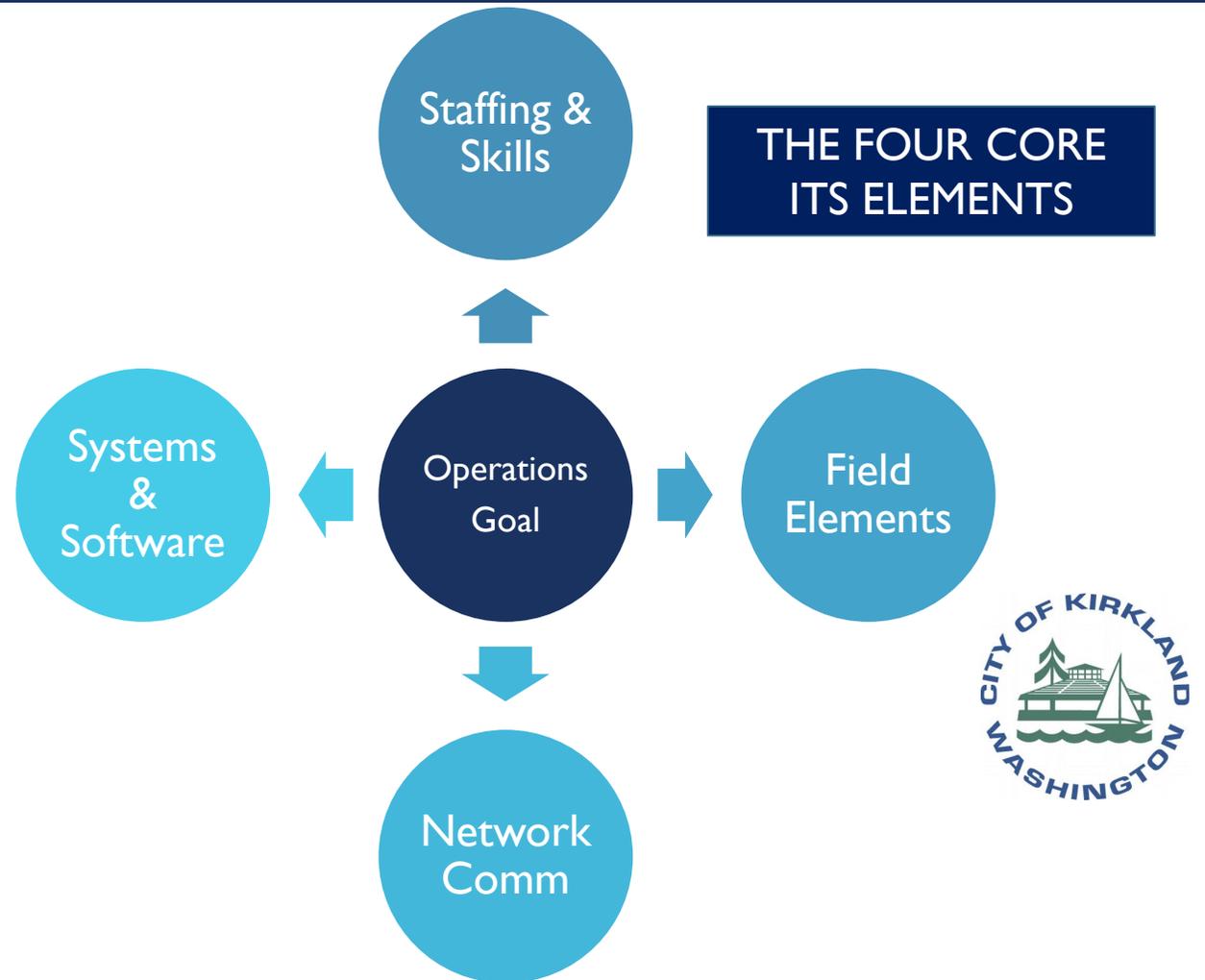
City of Kirkland Citywide ITS Plan Schedule													
	2018				2019								
Month	S	O	N	D	J	F	M	A	M	J	J	A	
NTP/Kick off Meeting	◆												
Step 1 - Baseline													
Individual Interviews													
Inventory													
Step 2 - Identify Needs and Operations Concept													
Workshop 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

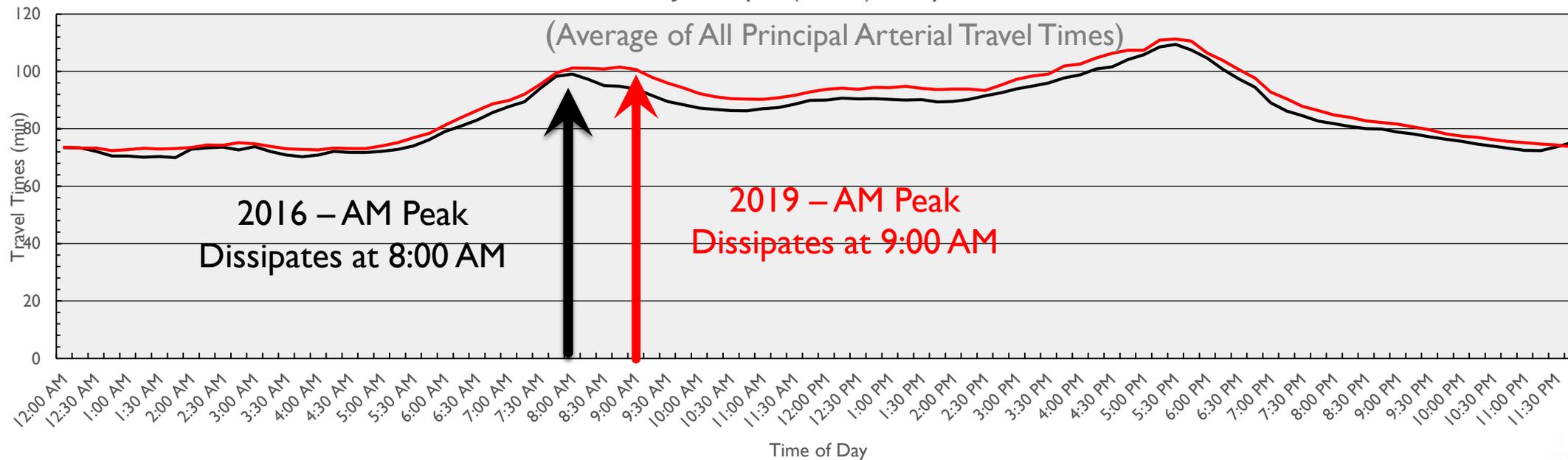
- TREND CITYWIDE (2016 -2019)
- EFFECTS OF SIGNALS IN FLASH
- EFFECTS OF FREEWAY INCIDENTS
- INFLUENCE OF WSDOT SIGNALS ON DELAY (NE 124TH ST)
- STAFFING LEVELS



CITYWIDE TREND

CITYWIDE TRAVEL TIMES ARE INCREASING

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

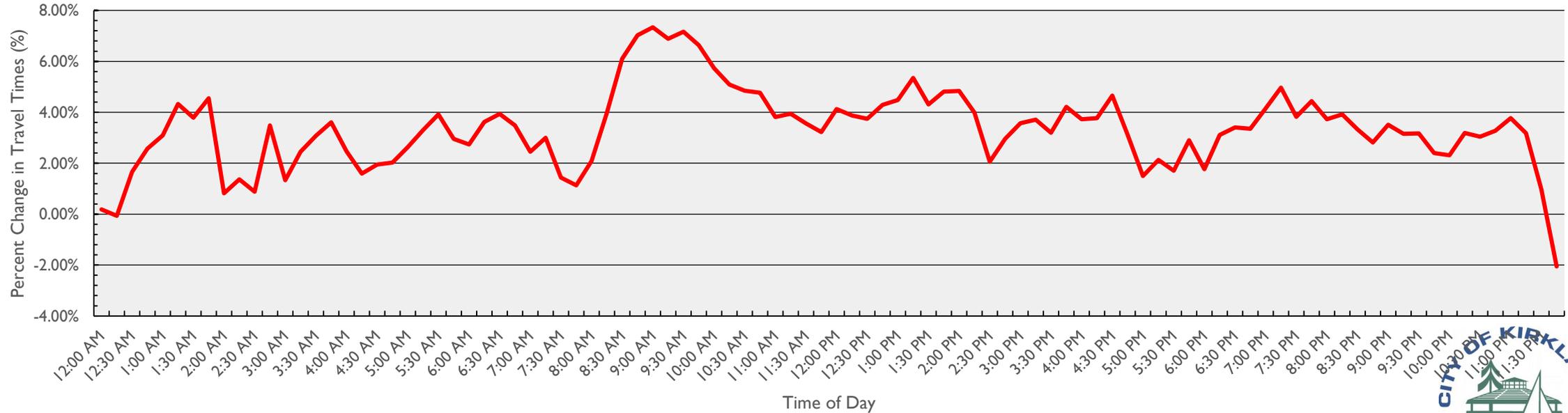


- Notable peak spread AM Peak



CITYWIDE TRAVEL TIME INCREASES AS A PERCENTAGE

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



- Average \pm 3% increase overall

— Citywide Travel % Change

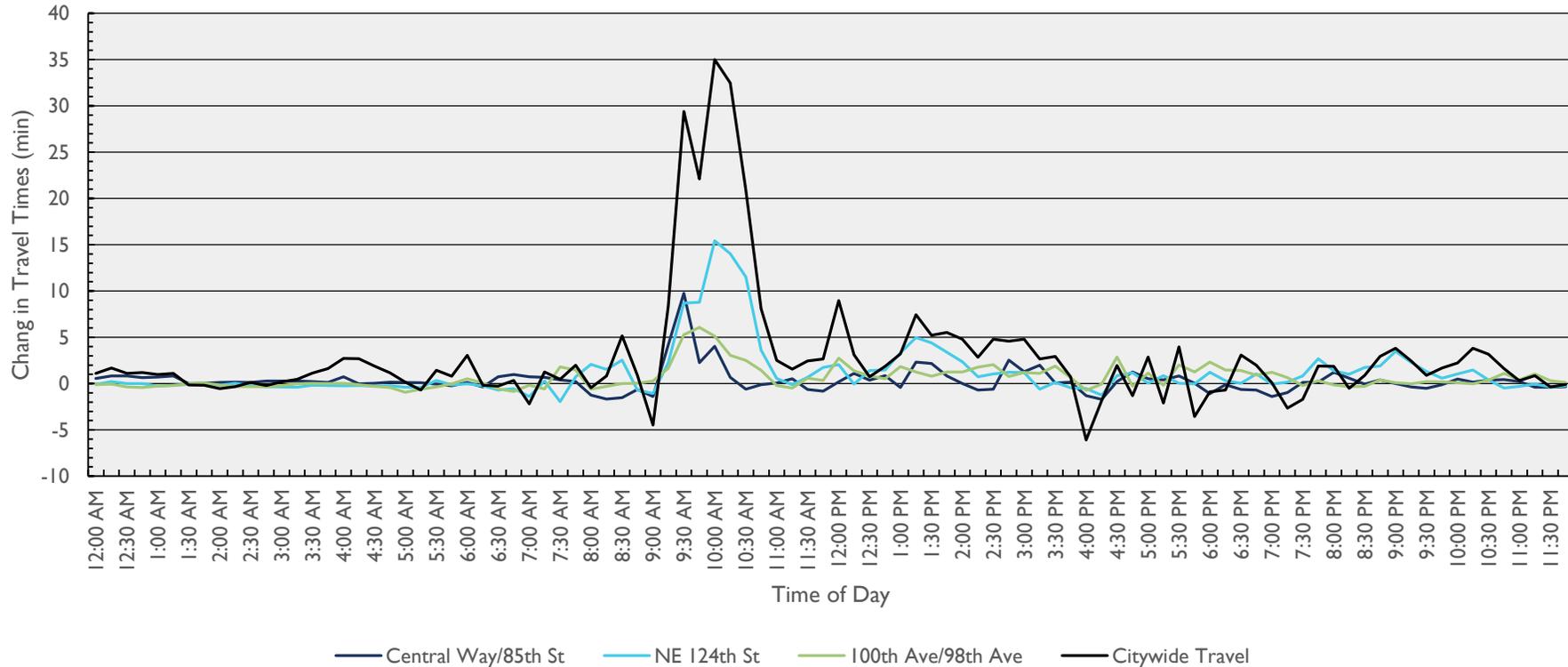




SIGNALS IN FLASH

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

Incident Day vs. 2 Weeks Prior (Tu-Th) - 3 Worst Affected Corridors



* 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 fatalities
Normal Signal Ops	34%	55%
Signals in Flash	74%	Not reported
2-way and 4-way stop intersections	49%	83%



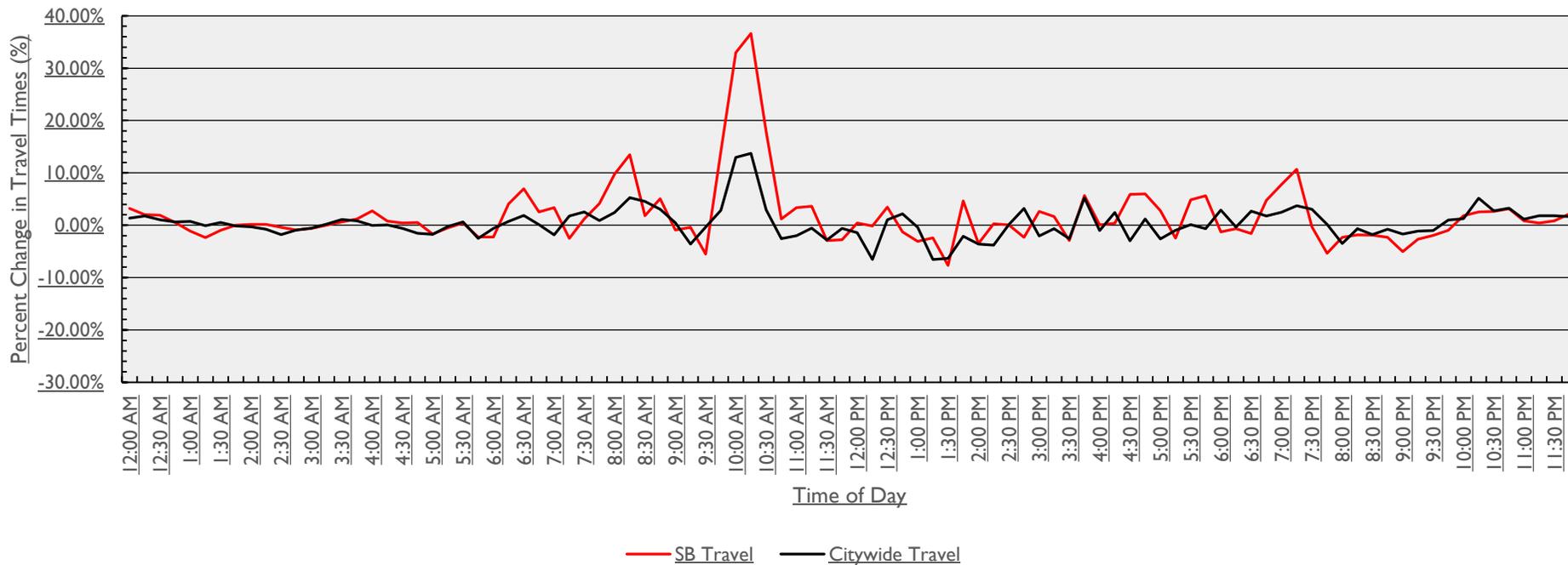
EFFECTS OF FREEWAY INCIDENTS

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

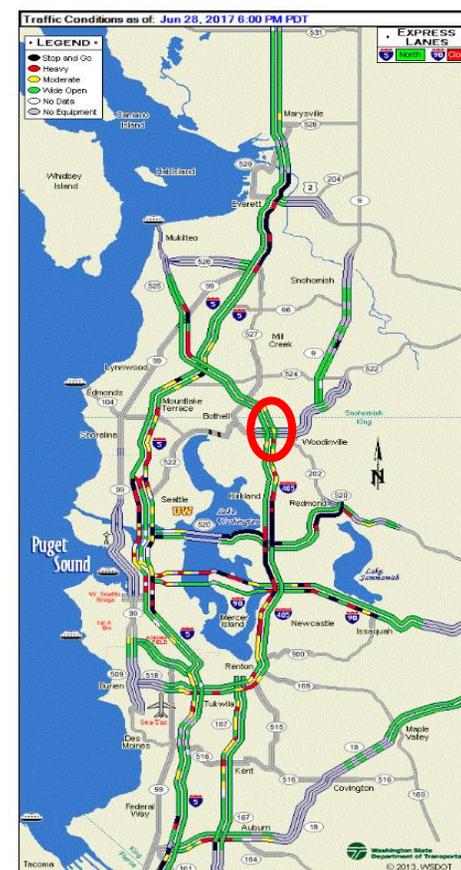
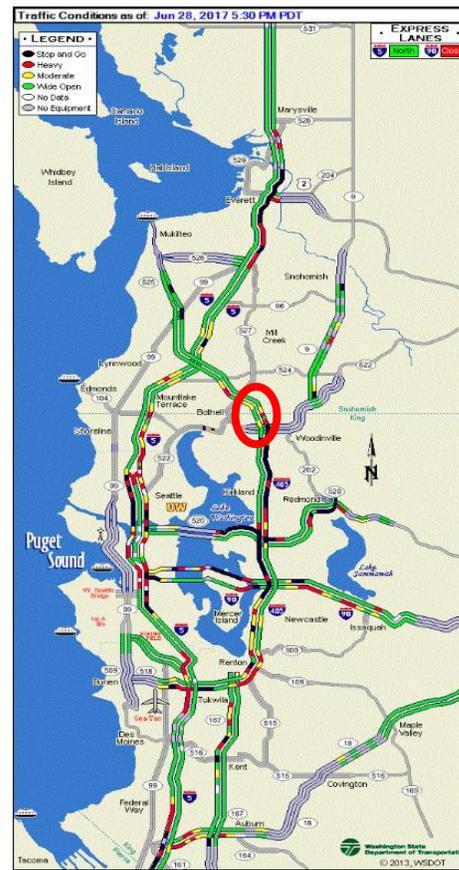
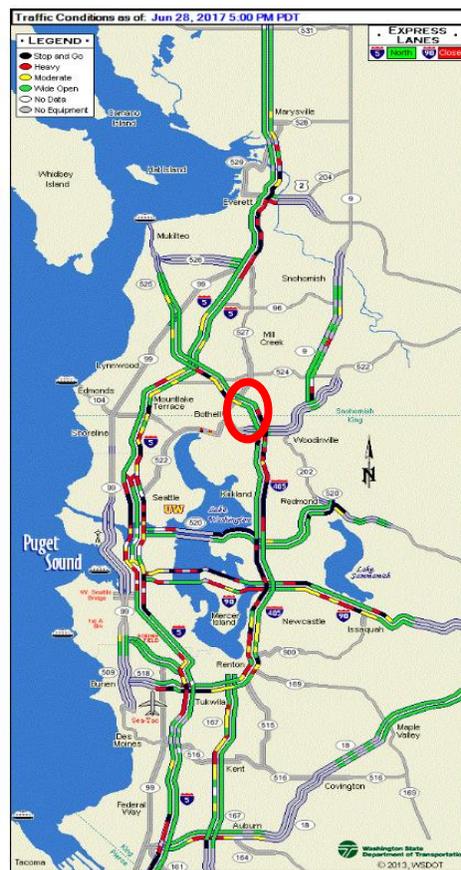
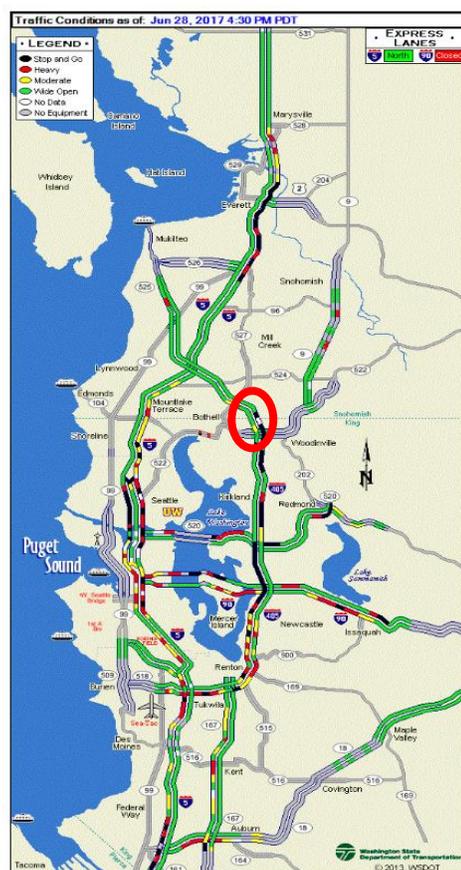
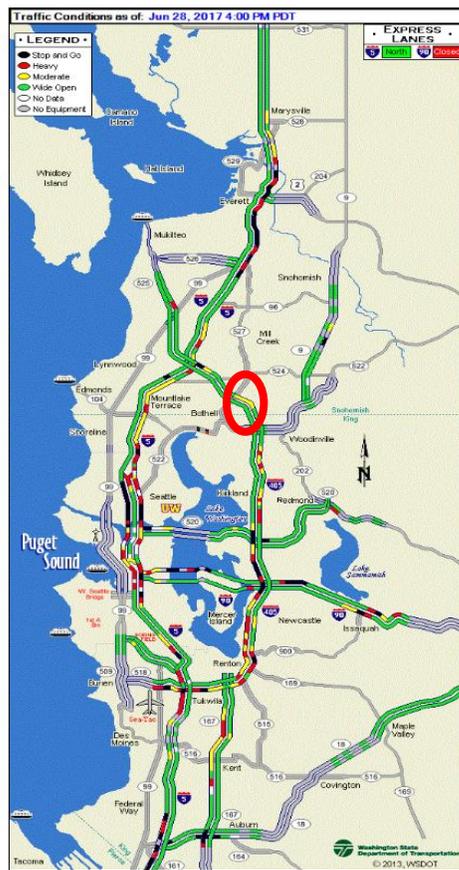


Max percentage increase in travel times:

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

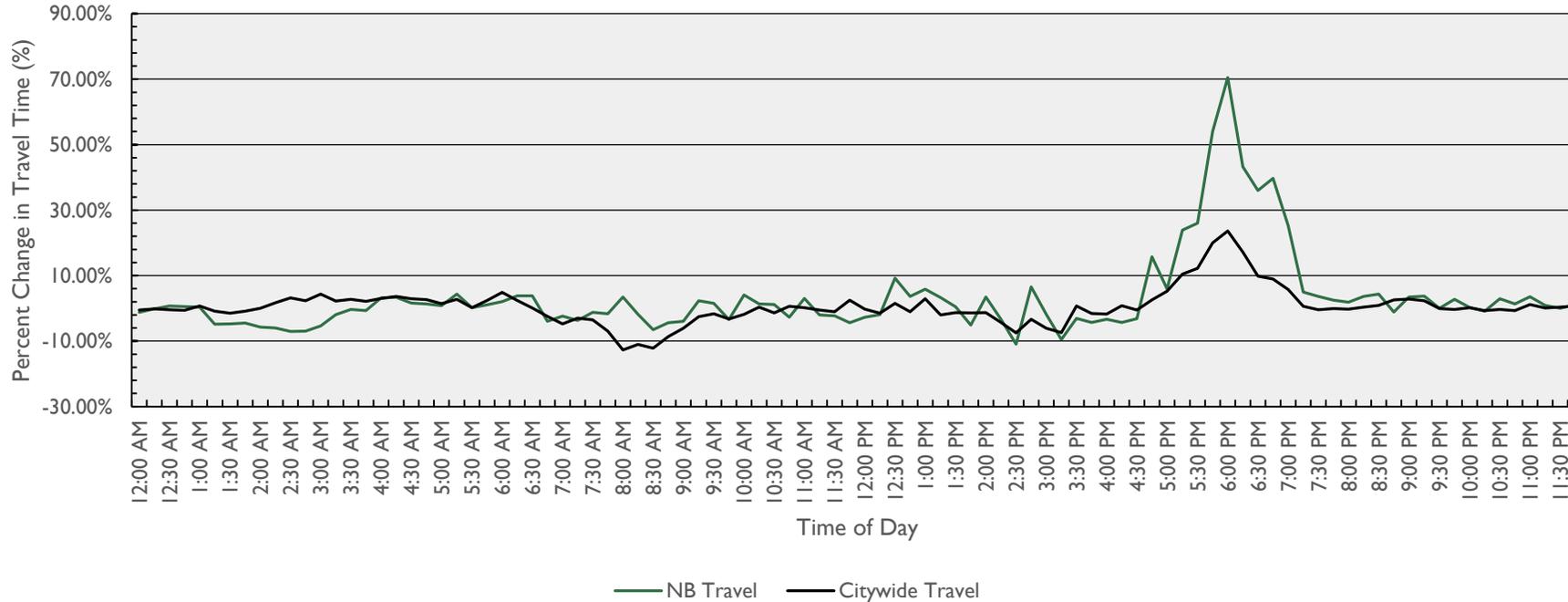


I-405 NB COLLISION NORTH OF SR 527 BLOCKING 3 RIGHT LANES ±4:00 PM START/CLEAR BY ±5:45 PM



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:

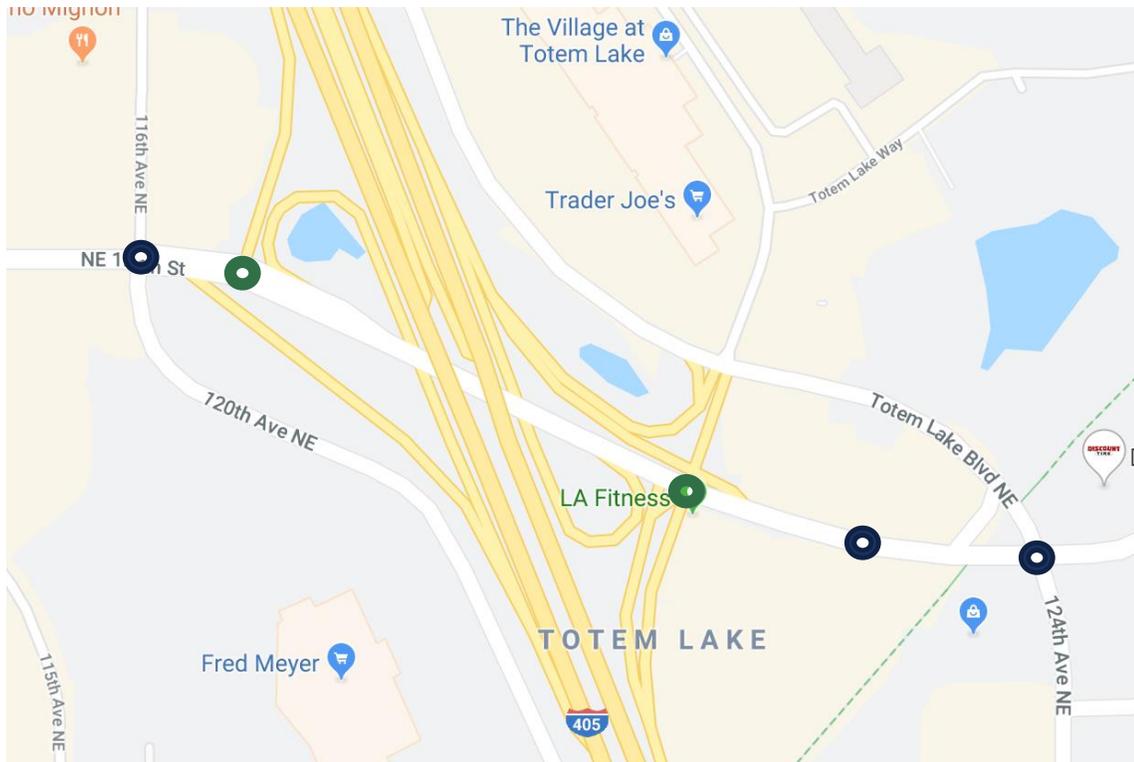
- NB routes
 ↑ ± 70%
- Citywide
 ↑ ± 25%





INFLUENCE OF WSDOT SIGNALS NE 124TH ST EXAMPLE

WSDOT TRAFFIC SIGNALS



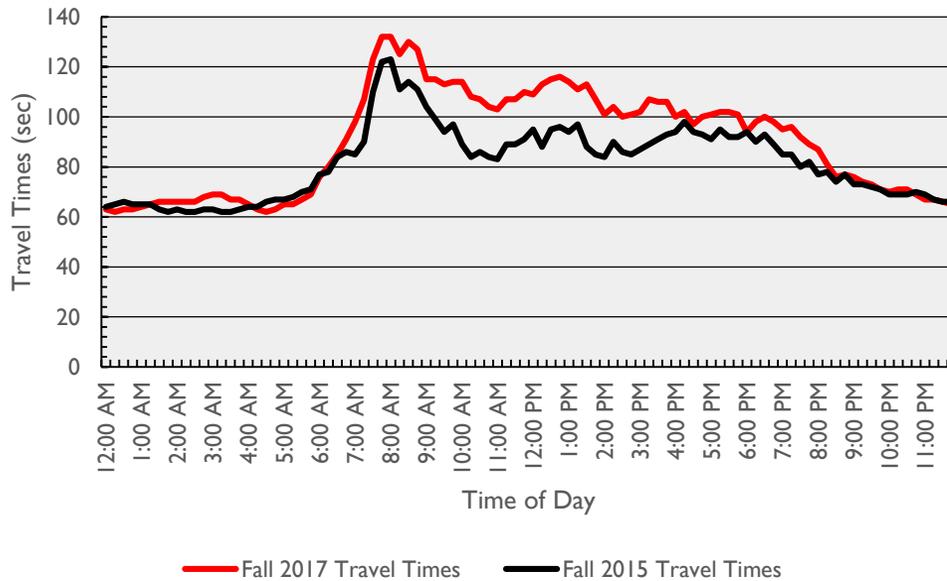
- WSDOT Traffic Signal
- COK Traffic Signal

- 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

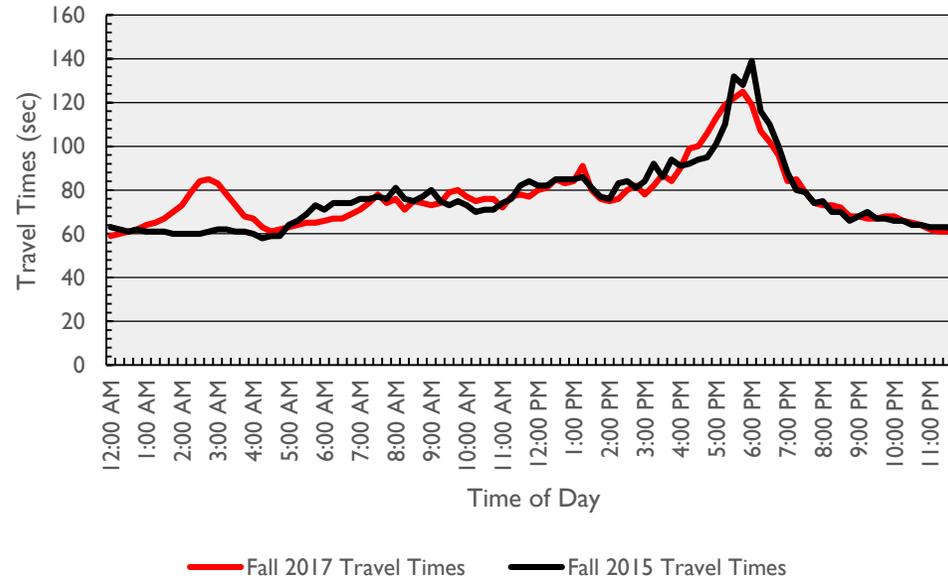


REMOVAL OF SIGNALS FROM COORDINATION – NE 124TH ST

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



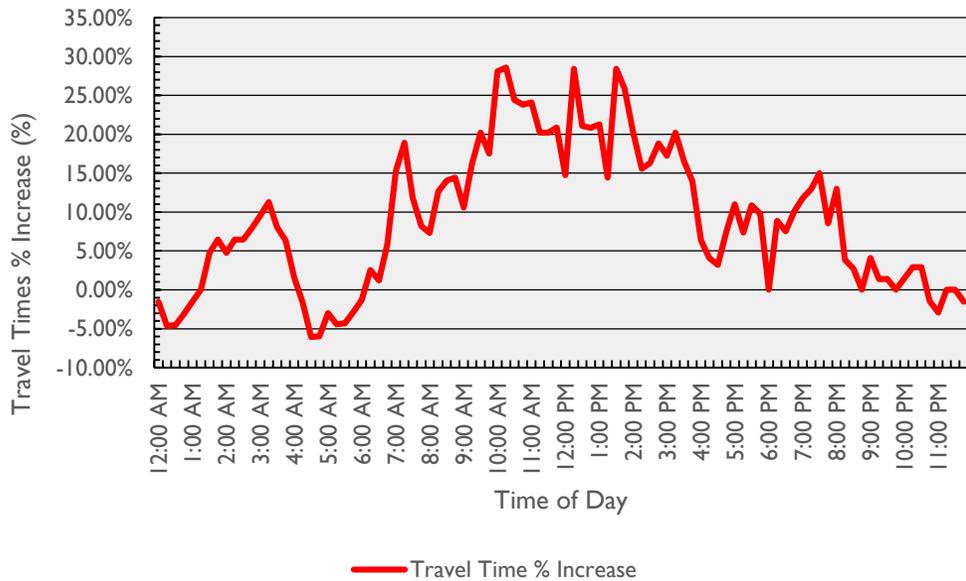
EB: consistent
20 sec
increase

WB:AM
increase up to
20 seconds

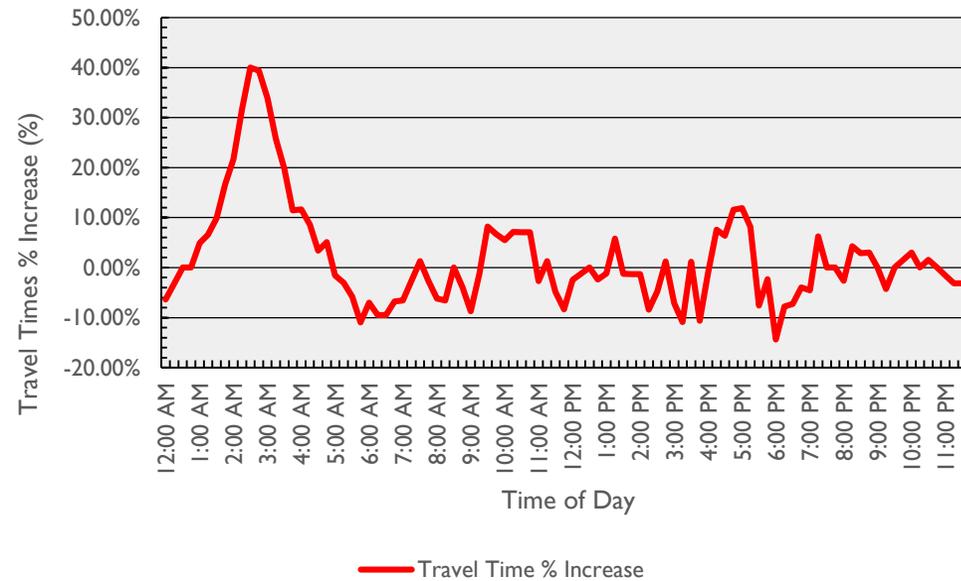


PERCENTAGE INCREASE IN TRAVEL TIME

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



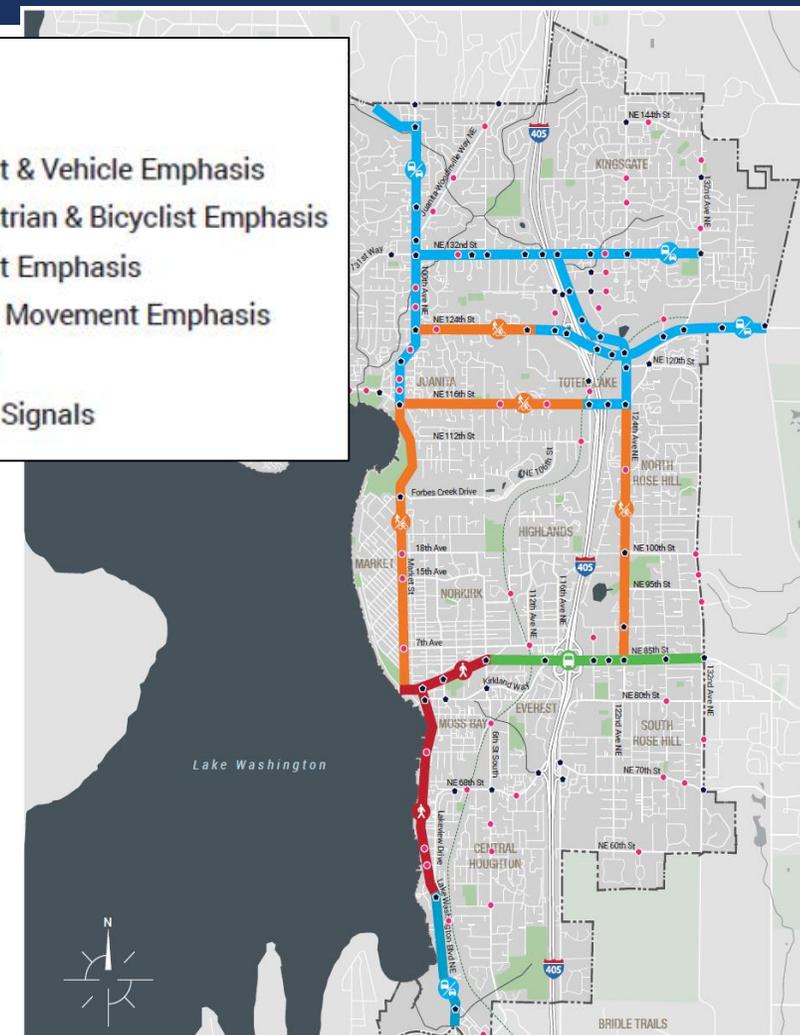
MULTIMODAL BALANCE IN OPERATIONS

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



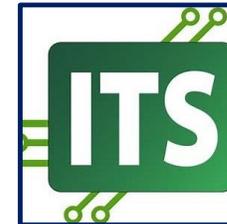
Council Goals

- 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



- 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



- 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



- Some locations lack detection, CCTV, proper controllers

- Bike detection is inconsistent
- Budgetary process for field element replacement not sufficient

Staffing and Skills

NOT READY



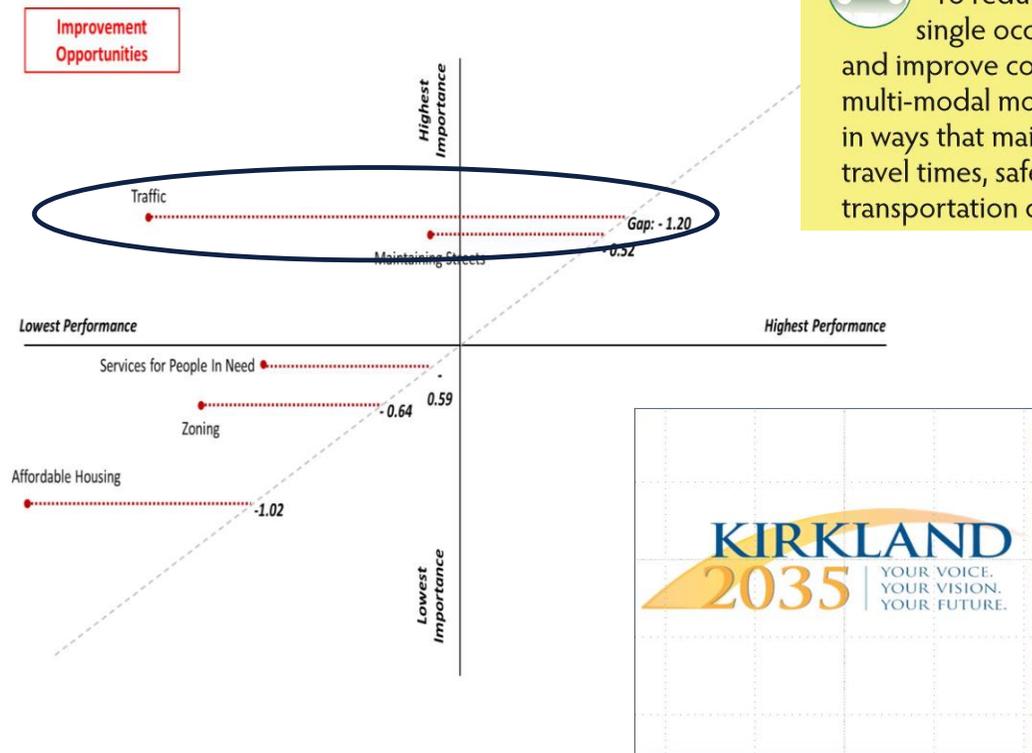
- Operations staff can maintain current operations/service level
- Operations staff unable to take full advantage of systems/software to improve service level
- ONE Ops staff person below national std.

- 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

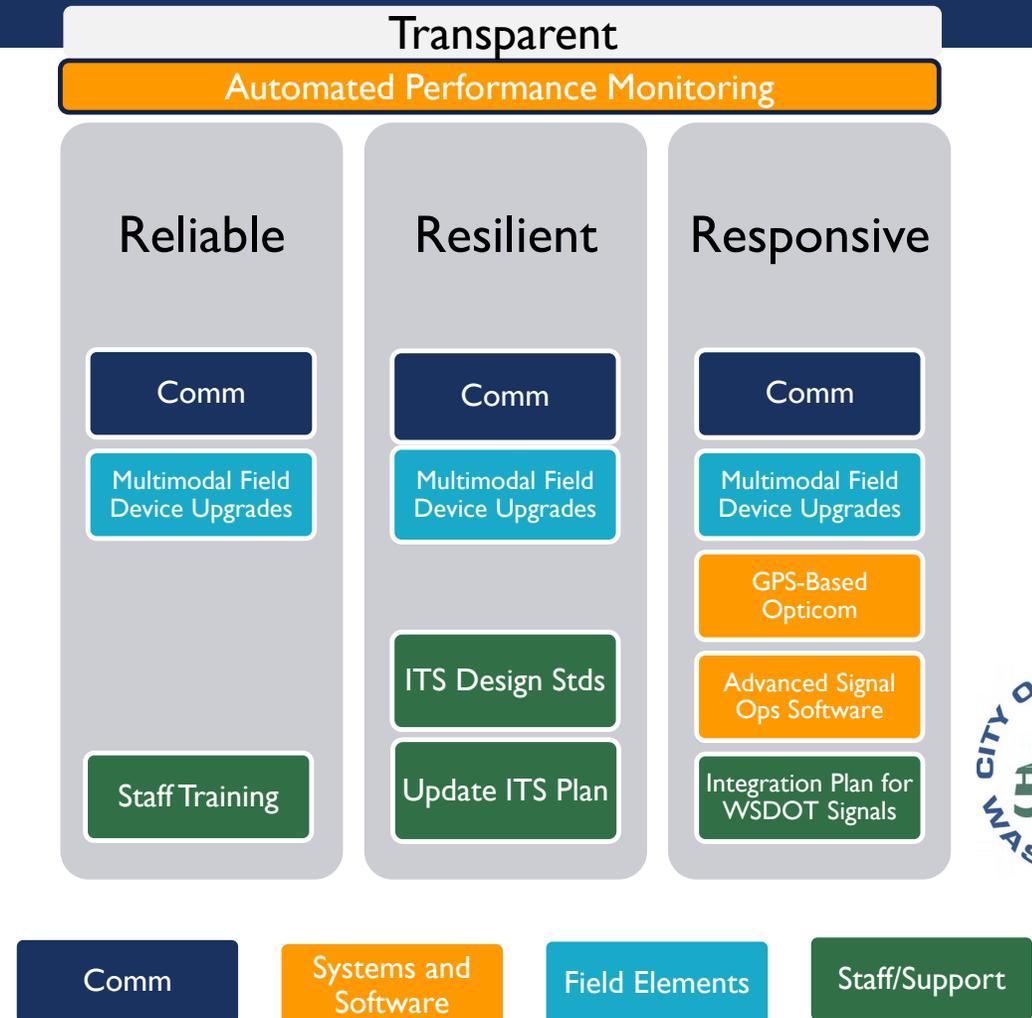
Dependable Infrastructure: *
 To maintain levels of service commensurate with growing community requirements at optimum life-cycle costs.



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

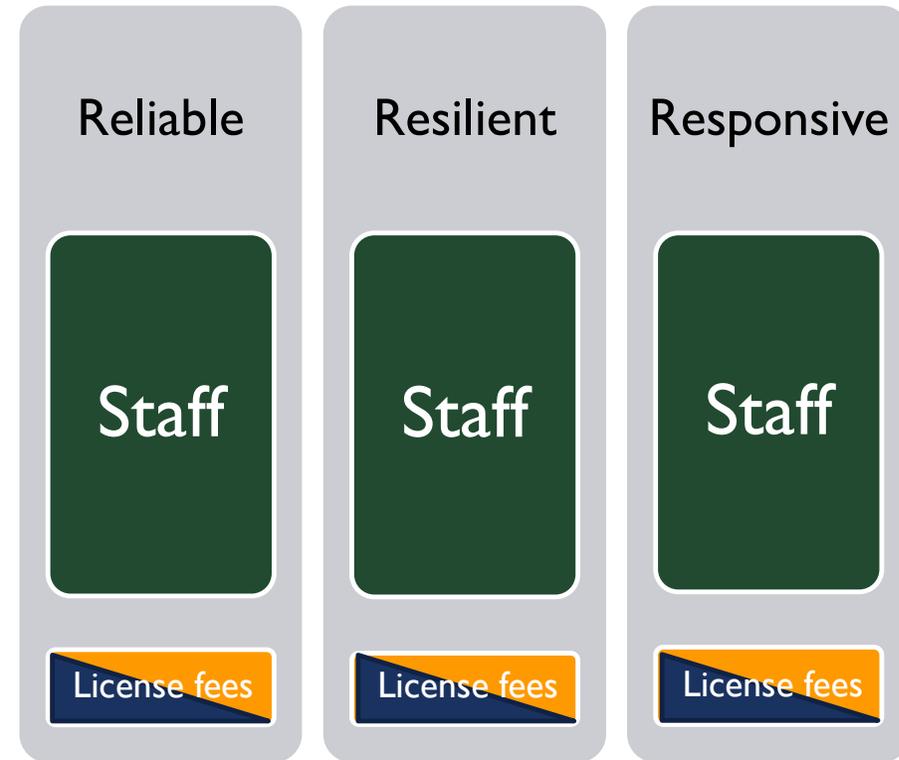


THE PLAN – ONGOING

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



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