Alaskan Way Viaduct Replacement S – Holgate St to S. King St.- **H2K and Bored Tunnel Interface Workshop**

Goal:
Decision on Transition Area Alternative for Holgate to King Project (H2K)

Objective:
Minimize Traffic and Business disruptions on SR 99 and Surface Streets; Maintain Holgate to King September Ad Date.

Assumptions:
1. Whatcom Lead Vacated during Construction; 2. SR 99 traffic detoured on to 1st Ave during closures; 3. Alaskan Way S closed between S King St. and Atlantic St.; 4. WOSCA Staging Area is shared between Holgate to King (H2K) Contractor and Bored Tunnel (BT) Contractor; 5. South End Portal Construction begins April 2011

Alternative	Description	Traffic Operations	Cost	H2K Pros & Cons	Bored Tunnel Considerations
Baseline – Alternative 1 Inline Connection with WOSCA –(Not being considered further 2/20/09)	Design Speed: WOSCA Detour • 25 MPH – Superelevation deviated Transition Structures • 45-50 MPH with approved deviations Channelization: WOSCA Detour • 2 x 2 lanes with temporary NB on and SB off ramps Transition Structures • 2 x 2 lanes with temporary NB on and SB off ramps	SR99 mainline: • Weekend and nightly closures for Viaduct demolition and tie-in of WOSCA detour to RR Way Ramps 1st Ave • No impacts Alaskan Way S • Detoured to 1st Ave S. via the RR Way S (Feb 2010–Feb 2011) • 2 Way connection between S King St and Atlantic St starting March 2011	60% CEVP estimate - $55M • Transition Structures (Inline) plus WOSCA detour	Pros: • H2K EA not impacted • Night and Weekend closures of SR 99 for WOSCA Detour tie-ins Cons: • High cost of constructing two sets of temporary structures • Lower Speed and deviated geometrics for WOSCA Detour	**Considerations:** • Railroad Ramps removed – March 2011 • WOSCA Detour removed and entire site available – July 2012 • No impact to work north or RR on 1st Ave – Jan 2011 to Nov 2011 • Some work can be completed on WOSCA – 110' width available starting – Nov 2011 • Increased cost of Bored Tunnel – Production slowed due to working inside shafts • Excavation of Tunnel and U-tube operations are concurrent • WOSCA Detour work is concurrent with the south portal excavation operations • Excavation activities along 1st Ave use 1st Ave for hauling

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Alternative	Description	Traffic Operations	Cost	H2K Pros & Cons	Bored Tunnel Considerations
Alternative 2 Inline Connection	Design Speed: • 50mph – Super, SSD, Deviated to 40 MPH Channelization: • 2 x 3 lane stacked transition structures • Temporary NB on and SB off constructed by Tunnel Contractor prior to removing RR Ramps	SR99 mainline • Closed – 6 Months (Feb-Aug 2011 1st Ave S • Expected level of service - LOS E or F Alaskan Way South • Detoured to 1st Ave S. via the RR Way S (Feb 2010–Feb 2011) • 2 Way Connection between Atlantic St and King St (Feb-Aug 2011) • SB movement provided after Transition Structures completed (Oct 2011)	30% CEVP estimate - $35M • 60,000SF of structure ($34M) • Additional MOT Costs ($1M) for 1st Ave improvements	**Pros**: • Existing Viaduct structural integrity maintained • Potential re-use of existing Viaduct foundations for the NB transition structure • BT Construction Schedule maintained • WOSCA Staging area utilized efficiently **Cons:** • H2K EA re-eval required for SR 99 closure • 1st Ave traffic and businesses impacted for 6 months	**Considerations:** • Railroad Ramps removed – Oct 2011 • Entire WOSCA site available – Jan 2011 • No WOSCA Detour • Costs are lowered compared to other alternatives • Major Excavation activities along 1st Ave uses WOSCA • Excavation of Tunnel and U-tube operations are concurrent • Excavation activities along 1st Ave use 1st Ave for hauling
Alternative 3A 25 MPH - Side Connection	Design Speed: • 25mph – Super, SSD, Deviated Channelization: • 2 lanes on SB and 3 lanes on NB structure connecting with existing SR 99 just south of RR Way ramps • Temporary NB on and SB off constructed by Tunnel Contractor prior to removing RR Ramps	SR99 mainline • Open at all time 1st Ave S • Not impacted Alaskan Way South • Detoured to 1st Ave S. via the RR Way S (Feb 2010–Jan 2012) • 1 lane SB can be provided after Transition Structures completed (Oct 2011)	Order of Magnitude Estimate - $35M • 40,000SF of structure ($27M) Additional SR 99 retrofitting costs ($9M)	**Pros:** • SR 99 traffic maintained at all times • H2K EA re-evaluation not required **Cons:** • Existing Viaduct needs shoring and retrofitting over 4 frames, skewed tie-in, monitoring for settlement of fills. • Lower design speed (25MPH) for 4+ years • Vertical Clearance 14’ – 5”	**Considerations:** • Railroad Ramps removed – Oct 2011 • Entire WOSCA site available – Jan 2011 • No WOSCA detour • Costs are lowered compared to other alternatives • Major Excavation activities along 1st Ave uses WOSCA • Excavation of Tunnel and U-tube operations are concurrent • Excavation activities along 1st Ave use 1st Ave for hauling
Alternative 6 WOSCA Detour optimized – No Transition Structures	WOSCA detour alignment shifted west to maximize WOSCA staging area for Bored Tunnel Contractor. <u>Transition Structures</u> • Not built <u>WOSCA Detour</u> Design Speed: • 25mph Channelization: • 2 x 2 lanes with temporary NB on and SB off ramps	SR99 mainline: • Weekend and nightly closures for Viaduct demolition 1st Ave: • Not impacted Alaskan Way S • 2 Way connection between S King St and Atlantic St	Order of magnitude - $25M – $30M • Two construction stages for WOSCA detour	**Pros:** • No Transition structures – Cost Savings • SR 99 traffic maintained majority of the time • H2K EA re-evaluation not required **Cons:** • Lower design speed (25MPH) for 4+ years • Short duration SR 99 Closures • Multiple stages of WOSCA detour construction • Constrained construction of NB WOSCA alignment final location	**Considerations:** • Railroad Ramps removed – Nov 2011 • 75% WOSCA site available – March 2012

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Alternative	Description	Traffic Operations	Cost	H2K Pros & Cons	Bored Tunnel Considerations
Alternative 3 Side Connection (Alternate 3A is an improvement – Alternative not being considered further2/20/09)	Design Speed: • 50mph – Super, SSD, Deviated to 40 MPH Channelization: • 2 x 2 lane NB and SB structures connecting with existing SR 99; NB between S. King St and S. Jackson St.; SB just south of RR Way ramps • Temporary NB on and SB off constructed by Tunnel Contractor prior to removing RR Ramps	SR99 mainline • SB SR 99 Closed - 5 months (Aug 2011-Jan 2012) • NB SR 99 on existing Viaduct at all times 1st Ave S • LOS on SB 1st Ave S. degraded Alaskan Way South • Detoured to 1st Ave S. via the RR Way S (Feb 2010–Feb 2011) • 2 Way connection between Atlantic St and King St (Feb-Oct 2011) • SB movement provided after Transition Structures completed (Oct 2012)	Order of Magnitude Estimate - $50M • 80,000SF of structure ($41M) • Additional SR 99 retrofitting costs plus MOT costs for 1st Ave detour ($9M)	Pros: • None Cons: • Existing Viaduct needs shoring and retrofitting over 6 frames, skewed tie-in • H2K EA re-evaluation required for SR 99 closure • SB 1st Ave. traffic and businesses impacted for 5 months	**Considerations:** • RR Ramps removed January 2012 • Entire WOSCA Site available – Jan 2011 • All of WOCA available starting August 2011 • Other pros same as Inline Connection above • 5 month wait for South Portal construction completion • Excavation activities along 1st Ave use 1st Ave for hauling
Alternative 4 Inline Connection with Modified WOSCA Detour (Alternative not being considered further 2/17/09)	Transition Structures • Design Speed and Channelization same as Alternative 2 WOSCA Detour Design Speed • 25mph Channelization: • 2 x 2 lanes with temporary NB on and SB off ramps	SR99 mainline: • Weekend and nightly closure for Viaduct Demolition • Closed – 1 Month (May 2012) for tie-in to Transition Structures 1st Ave S • Maintain 1 Lane 2 Way between RR Ave and Royal Brougham Way • Alaskan Way South similar to Alternative 2	Order of Magnitude Estimate - $45M • Added cost of modified WOSCA Detour ($10M)	Same as inline connection except noted below Pros: • EA re-evaluation not required Cons: • 1st Ave traffic and businesses impacted for 1 month • 11 month wait for TBM Machine setup	**Considerations:** • RR Ramps removed July 2012 • WOSCA Site available July 2012 • Access to WOSCA restricted at either ends by Detour and RR Ramps until July 2012
Alternative 5 Side Connection with Modified WOSCA Detour (Alternative not being considered further 2/17/09)	Transition Structures • Design Speed and Channelization same as Alternative 3 WOSCA Detour Design Speed: • 25mph Channelization: • 2 x 2 lanes with temporary NB on and SB off ramps	SR99 mainline: • Weekend and nightly closure for Viaduct Demolition • Closed – 1 Month (Feb 2012) for tie-in to Transition Structures 1st Ave S • Maintain 1 Lane 2 Way between RR Way Ave and Royal Brougham Way • Alaskan Way South similar to Alternative 3	Order of Magnitude Estimate - $60M • Added cost of modified WOSCA Detour ($10M)	Same as side connection except as noted below Pros: • H2K EA re-eval not required Cons: • 1st Ave traffic and businesses impacted for 1 month • BT construction within WOSCA constrained for a 7 months	**Considerations:** • RR Ramps removed May 2012 • WOSCA Site available May 2012 • Access to WOSCA restricted at either ends by Detour and RR Ramps until May 2012

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INLINE CONNECTION WITH WOSCA DETOUR ALTERNATIVE

DESIGN DOES NOT PRECLUDE CONSTRUCTION OF TEMPORARY RAMPS (TO REPLACE RAILROAD WAY RAMPS)

4 LANE SECTION CONNECTION TO WEST HALF OF SB-1 STRUCTURE

SB Alaskan Way

TRANSITION STRUCTURES

TAIL TRACK

RAMPS FOR WOSCA DETOUR TWO LANES / DIRECTION

RAILROAD WAY SOUTH

1ST AVE S

S ROYAL BROUGHAM WAY

S KING ST

S JACKSON ST

DETOURED NB ON RAMP (MERGE)

WOSCA DETOUR

PORTION OF EXISTING NB RAMP REMOVED

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FOR DISCUSSION
PURPOSES ONLY

LEGEND

- = RETAINED CUT
- = SURFACE IMPROVEMENTS
- = RETAINED FILL
- = AERIAL
- = SR99 DETOUR AT GRADE
- = SR99 DETOUR ON FILL
- = STAGING & CONSTRUCTION FOOTPRINT LIMITS

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROGRAM

S HOLGATE ST TO S KING ST VIADUCT REPLACEMENT PROJECT

FEBRUARY 2009

FIG

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InLine Connection with 60% WOSCA Detour

ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROGRAM

February 11, 2009

Durations Assume NO RISK

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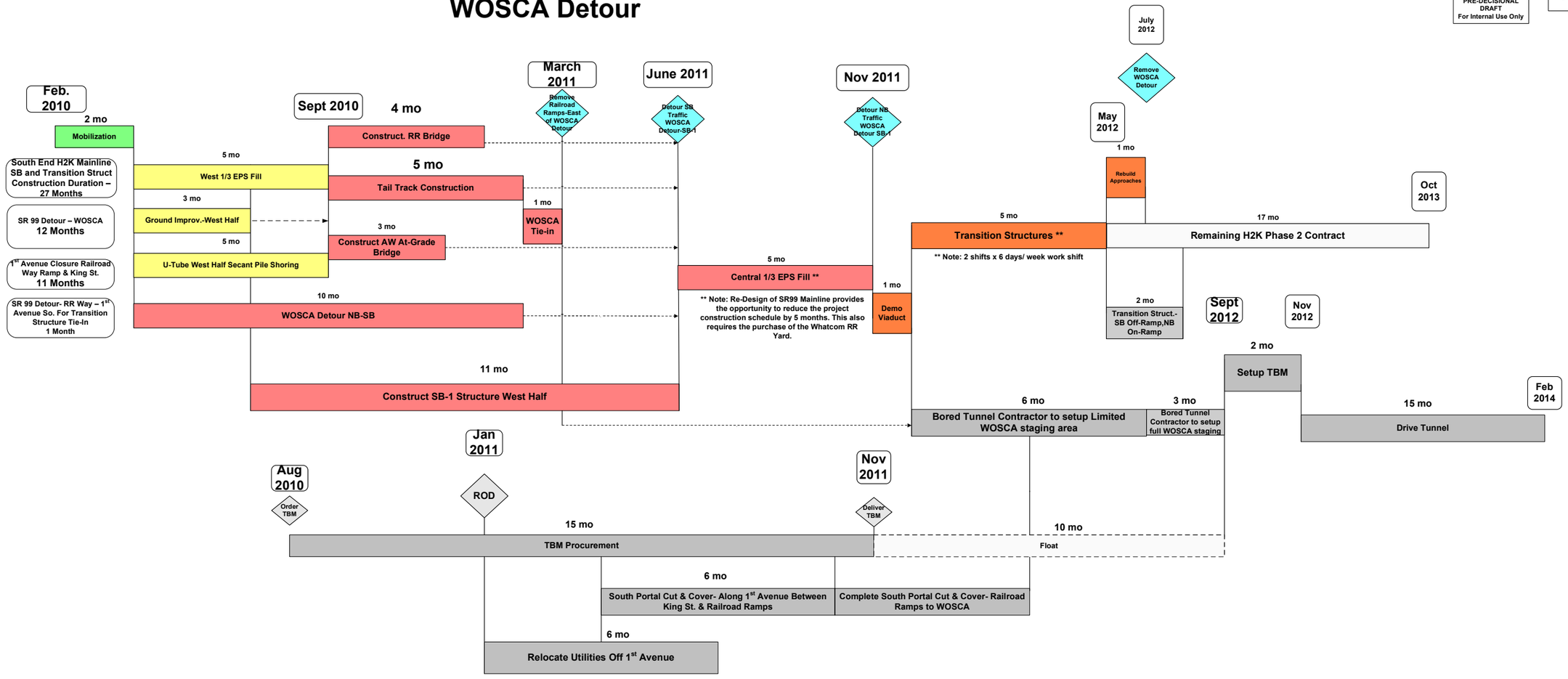

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INLINE CONNECTION ALTERNATIVE

DESIGN DOES NOT PRECLUDE CONSTRUCTION OF TEMPORARY RAMPS (TO REPLACE RAILROAD WAY RAMPS)

SB Alaskan Way

TAIL TRACK

RAILROAD WAY SOUTH

1ST AVE S

S ROYAL BROUGHAM WAY

S KING ST

S JACKSON ST

LEGEND

= RETAINED CUT

= SURFACE IMPROVEMENTS

= RETAINED FILL

= AERIAL

= STAGING & CONSTRUCTION FOOTPRINT LIMITS

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ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROGRAM

S HOLGATE ST TO S KING ST VIADUCT REPLACEMENT PROJECT

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FIG

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In-Line Connection

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Feb. 2010

2 mo

Mobilization

South End H2K Mainline SB and Transition Ramps Construction Duration – 18 Months

SR 99 Detour – RR Way – 1st Avenue South for South End H2K Transition Ramp Construction
6 Months

1st Avenue Closure Railroad Way Ramp & King St.
11 Months

5 mo

West 1/3 EPS Fill

3 mo

Ground Improv.-West Half

5 mo

U-Tube West Half Secant Pile Shoring

Sept 2010

4 mo

Construct. RR Bridge

3 mo

Construct. AW At-Grade Bridge

5 mo

Tail Track Construction

Feb 2011

5 mo

Transition Structures

Detour SR 99 via 1st Avenue So.

1 mo

Demo Viaduct

5 mo

Central 1/3 EPS Fill

11 mo

Construct SB-1 Structure West Half

Aug 2011

Oct 2011

Remove RR Ramps

17 mo

Remaining H2K Phase 2 Contract

Jan 2013

Nov 2011

2 mo

Setup TBM

2 mo

2 month waiting period till portal construction complete

March 2012

5 mo

Complete South Portal Cut & Cover

June 2013

Jan 2011

9 mo

Bored Tunnel Contractor to setup WOSCA staging area

2 mo

Transition Struct.- SB Off-Ramp,NB On-Ramp

15 mo

Drive Tunnel

Aug 2010

Order TBM

ROD

Deliver TBM

15 mo

TBM Procurement

6 mo

South Portal Cut & Cover- Along 1st Avenue Between King St. & Railroad Ramps

3 mo

Relocate Utilities Off 1st Avenue

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SIDE CONNECTION ALTERNATIVE

DESIGN DOES NOT PRECLUDE CONSTRUCTION OF TEMPORARY RAMPS (TO REPLACE RAILROAD WAY RAMPS)

SB Alaskan Way

SB STRUCTURE OVER NB ROADWAY

TAIL TRACK

3 FRAMES

3 FRAMES

RAILROAD WAY SOUTH

1ST AVE S

S ROYAL BROUGHAM WAY

S KING ST

S JACKSON ST

LEGEND

- = RETAINED CUT
- = SURFACE IMPROVEMENTS
- = RETAINED FILL
- = AERIAL
- = STRUCTURAL SHORING /RETROFIT
- = STRUCTURAL SHORING /RETROFIT + REMOVAL OF UPPER DECK
- = STAGING & CONSTRUCTION FOOTPRINT LIMIT

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FOR DISCUSSION
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ALASKAN WAY VIADUCT AND SEAWALL REPLACEMENT PROGRAM

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FIG

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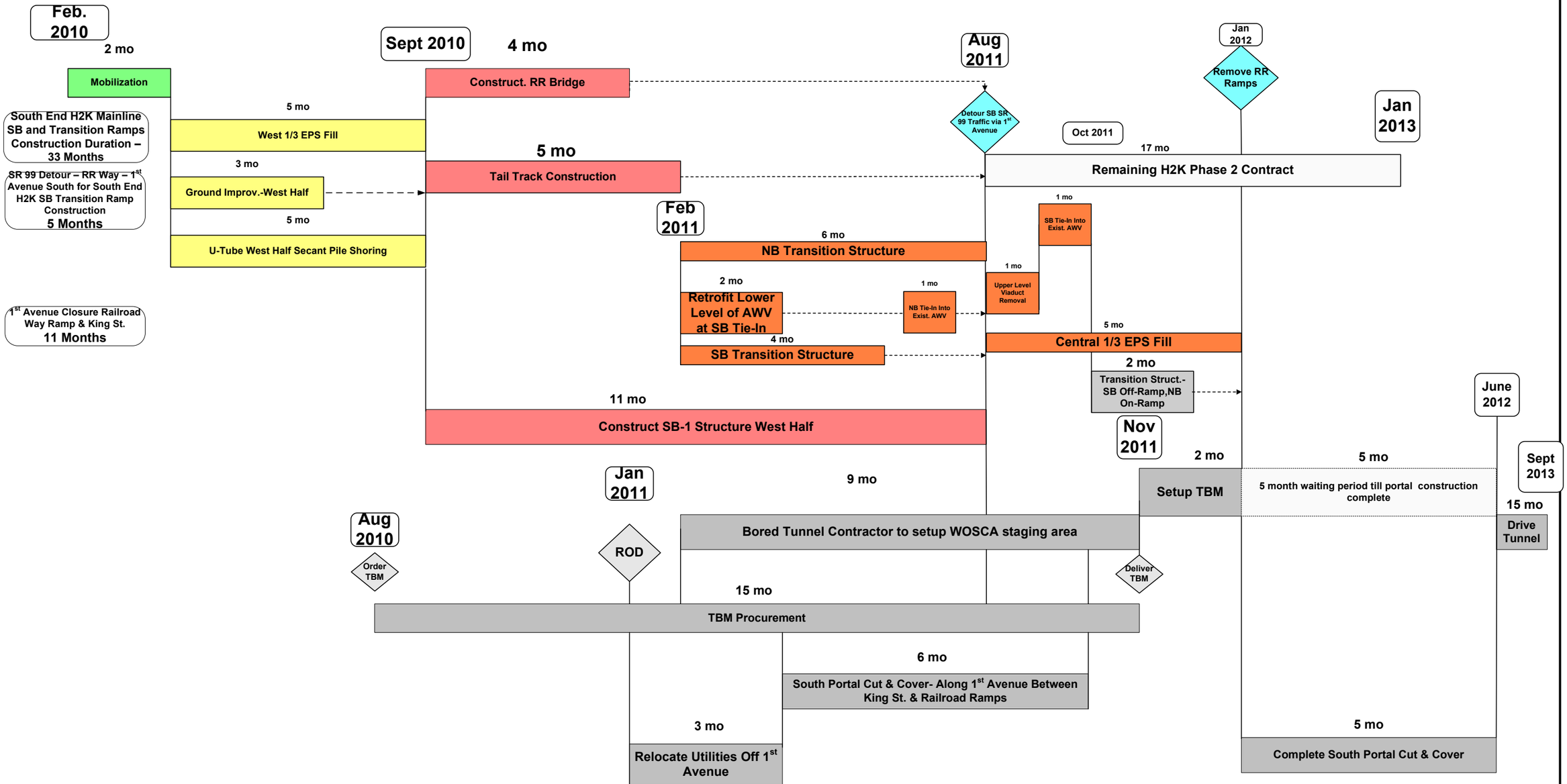
Side Connection Alternative



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SIDE CONNECTION ALTERNATIVE

N

DESIGN DOES NOT PRECLUDE CONSTRUCTION OF TEMPORARY RAMPS (TO REPLACE RAILROAD WAY RAMPS)

2 LANES THROUGH BENTS 123 & 124 (25 MPH)

TAIL TRACK

SB Alaskan Way

S ROYAL BROUGHAM WAY

1ST AVE S

RAILROAD WAY SOUTH

S KING ST

S JACKSON ST

LEGEND

- = RETAINED CUT
- = SURFACE IMPROVEMENTS
- = RETAINED FILL
- = AERIAL /BRIDGE
- = BRIDGE OR FILL (Further Study Needed)
- = STRUCTURAL SHORING /RETROFIT
- = STAGING & CONSTRUCTION FOOTPRINT LIMITS

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FIG

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25 MPH Side Connection – Option 3A

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Durations Assume NO RISK

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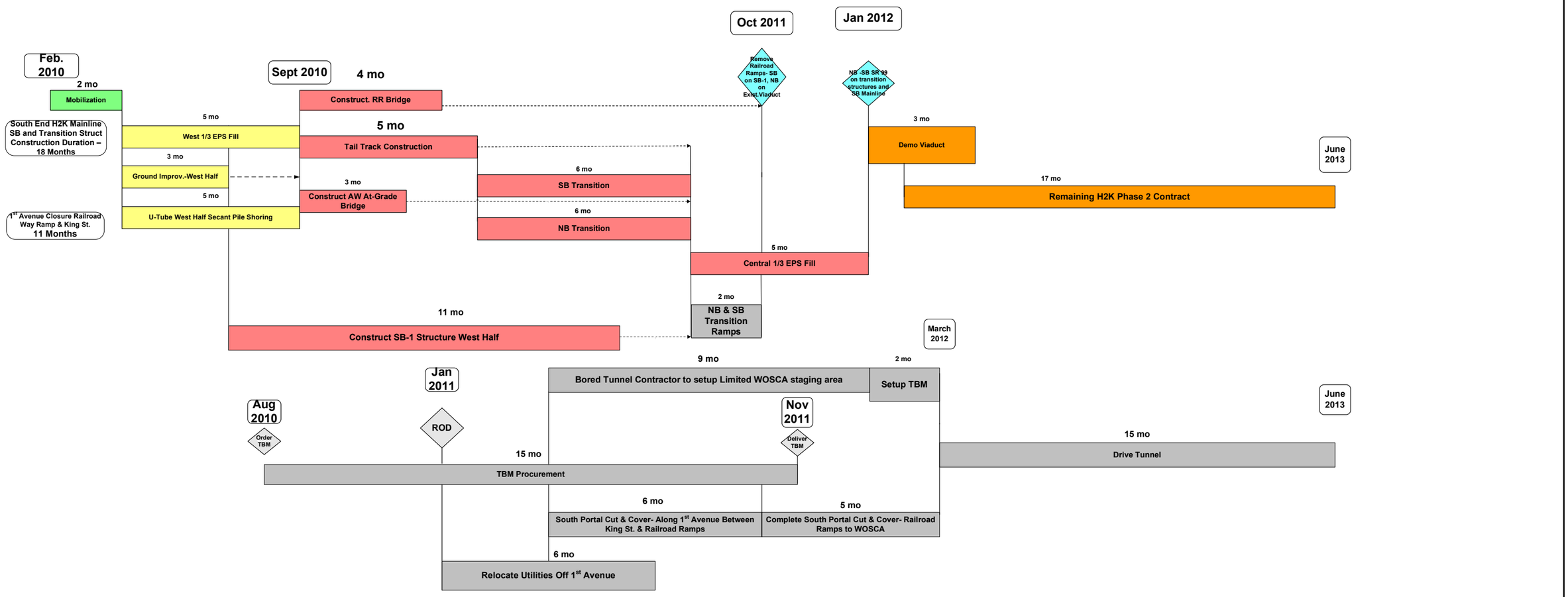

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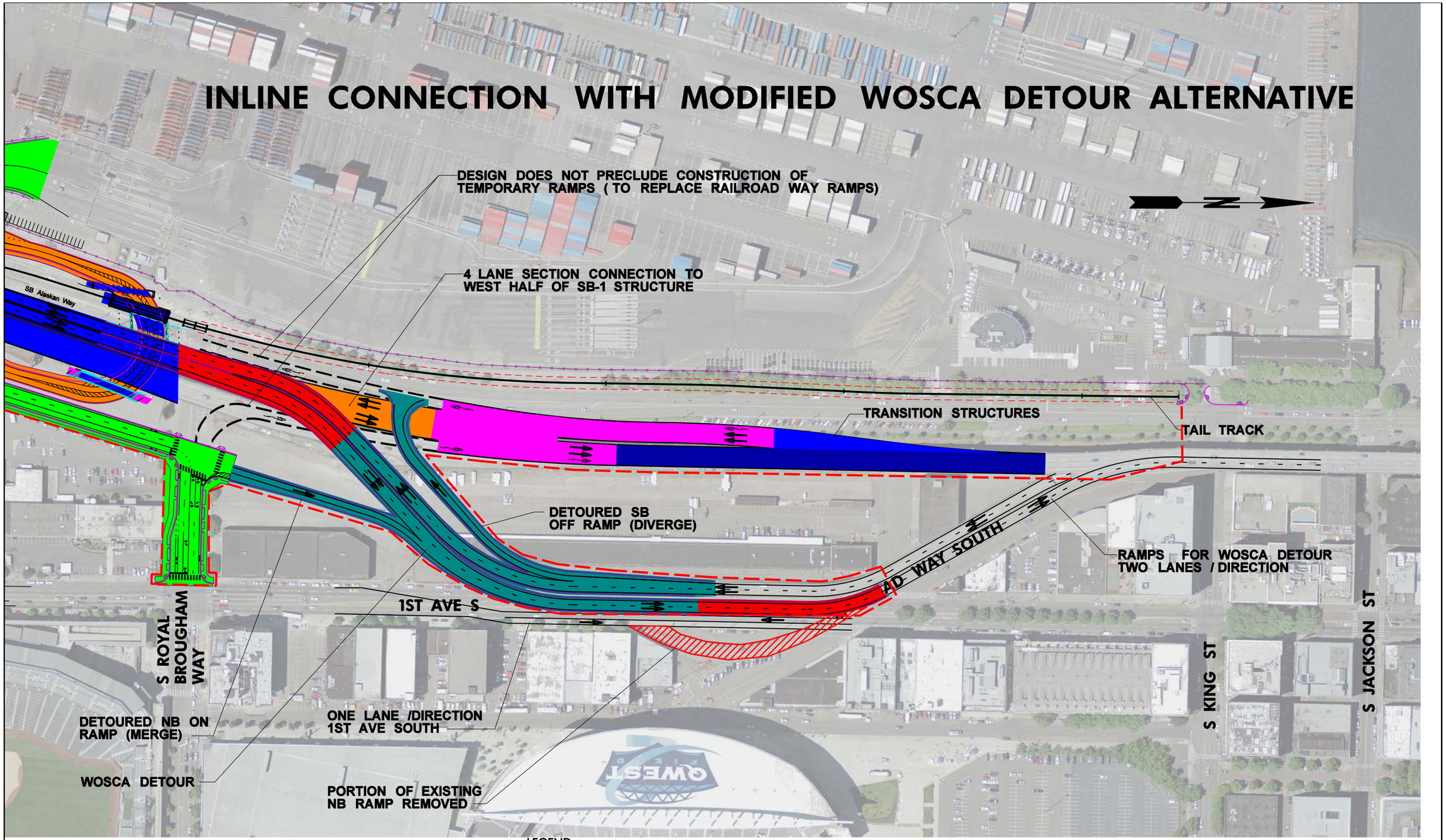
INLINE CONNECTION WITH MODIFIED WOSCA DETOUR ALTERNATIVE



DRAFT WORKING DRAWING

FOR DISCUSSION

PURPOSES ONLY

LEGEND

- = RETAINED CUT
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FIG

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InLine Connection with Modified WOSCA Detour

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February 11, 2009

Durations Assume NO RISK

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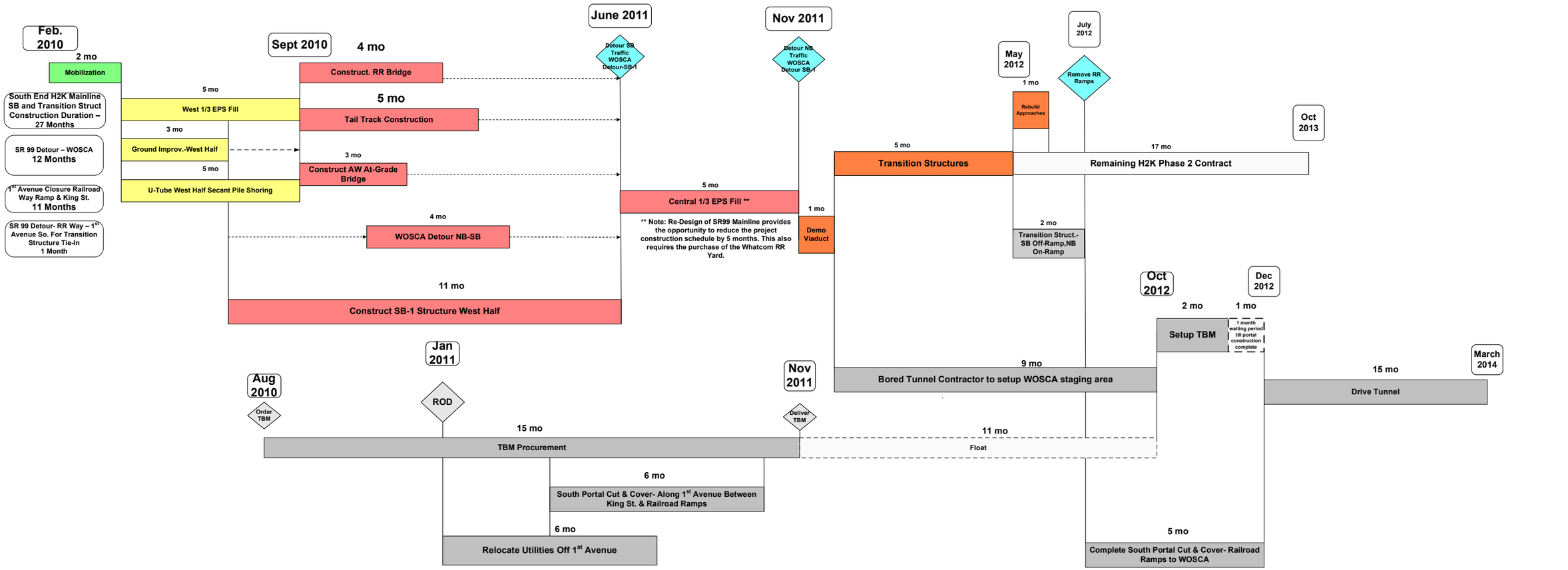

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