SAHALEE WAY CORRIDOR IMPROVEMENTS

Presented to Sammamish City Council

February 11, 2025

Agenda

- Project overview
- Update on progress of planning phase
- Geotechnical/slope stability findings
- Discuss alternatives

Questions for Council

- What should be the third alternative shared with the public: Alternative 7 (higher speed) or Alternative 8 (lower speed)?
- Are there any specific items you want the public to address in the upcoming outreach phase?

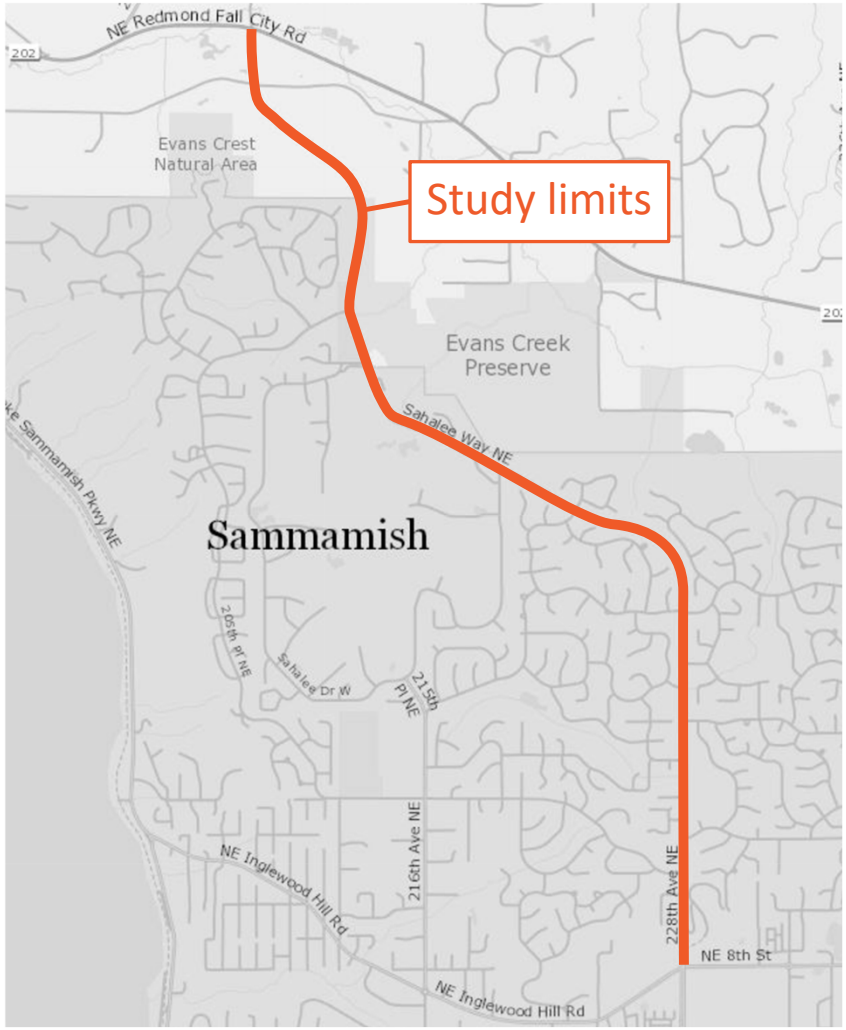
A future question to answer:

- Should the corridor improvements (south of 37th) harden the unmitigated slopes with stability risks?

Project Overview

Project Overview

- 228th Avenue NE/Sahalee Way NE from NE 8th Street to SR 202 (“the Corridor”)
- **Current phase:** master planning (alternatives analysis)
- **Future phase(s):** design, permitting, and construction



Advantages of Preparing a Corridor Study

- ✓ **Comprehensive Planning**
  - Identifies current and future transportation demands, ensuring that widening projects align with long-term mobility goals
- ✓ **Multimodal Integration**
  - Balances the needs of vehicles, transit, cyclists, and pedestrians, promoting safer and more accessible infrastructure

Advantages of Preparing a Corridor Study

- ✓ **Geotechnical and Environmental Considerations**
  - Assesses soil stability, stormwater management, and ecological impacts early, reducing risks and unforeseen design challenges
- ✓ **Cost Savings**
  - Avoids costly redesigns by identifying constraints, potential conflicts, and feasible alternatives before detailed engineering begins

Advantages of Preparing a Corridor Study

- ✓ **Community Engagement**
  - Involves stakeholders early, fostering public support and addressing concerns proactively
  - Reviewed compatibility with NESSWD water main replacement plans
- ✓ **Regulatory Compliance**
  - Ensures that projects meet local, state, and federal requirements, streamlining permitting processes

Current Phase: Master Planning

Core focus:

Establishing the near- and long-term vision for the Corridor that is attainable, actionable, and supported by the Council and public.

Steps to achieve that:

- Goalsetting and feedback loop with Council, public
- Interagency coordination
- Technical analysis
- Detailed cost estimating
- Documentation and approval

Study Team

City Staff

- Capital projects
- Transportation planning
- Traffic engineering
- Streets maintenance
- Stormwater
- Development review

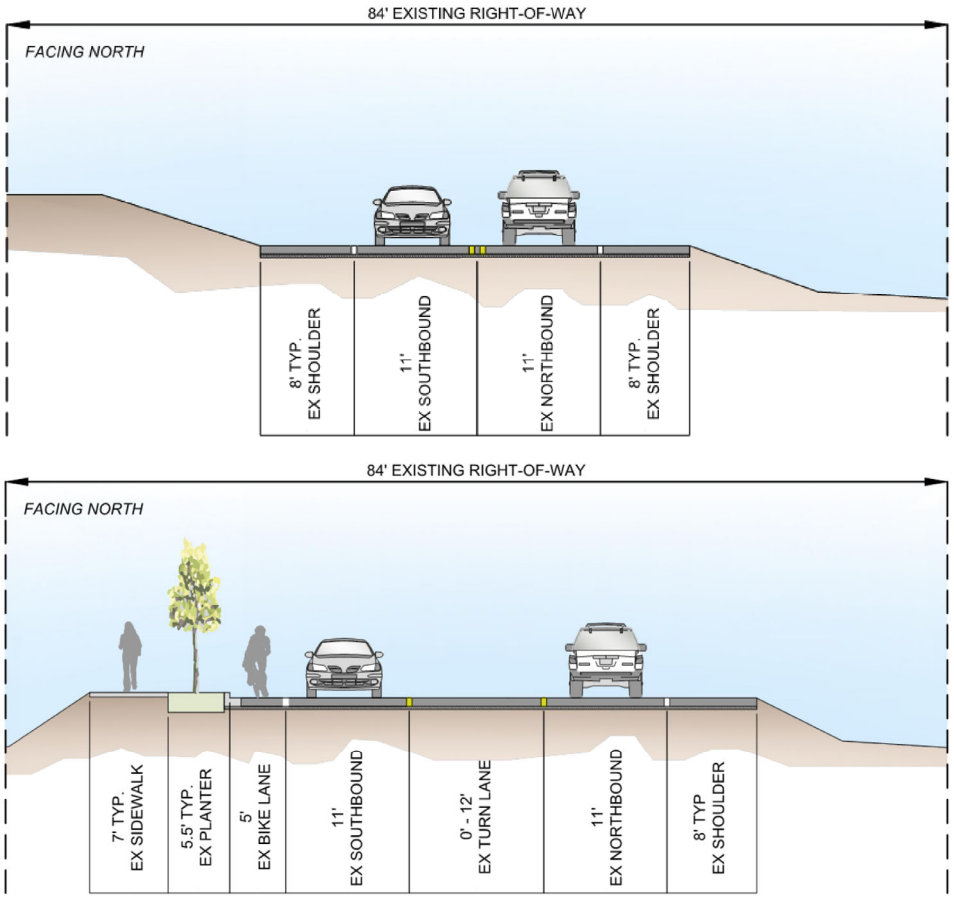
Consultants

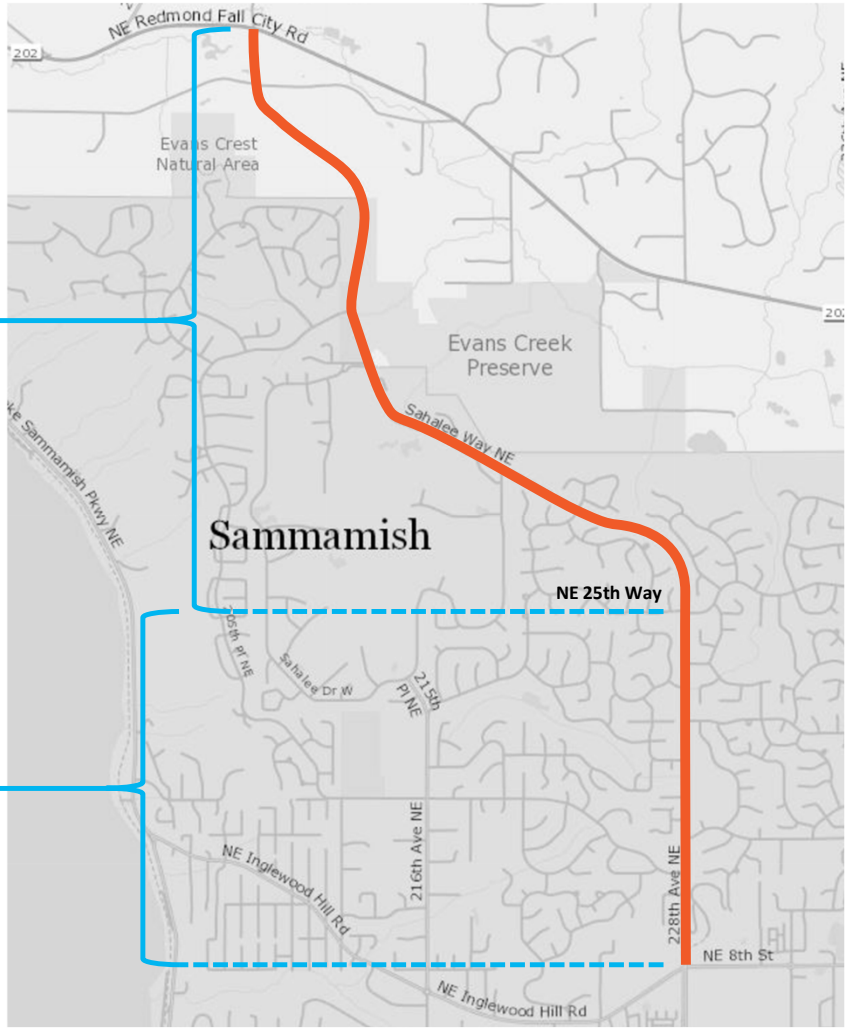
- Perteet (prime)
- HWA (geotechnical)
- Osborn (stormwater)
- HDR (structures, outreach)
- HBB (landscape & urban design)

Partner Agencies

- King County Metro
- King County Parks
- King County Roads
- Sound Transit
- WSDOT

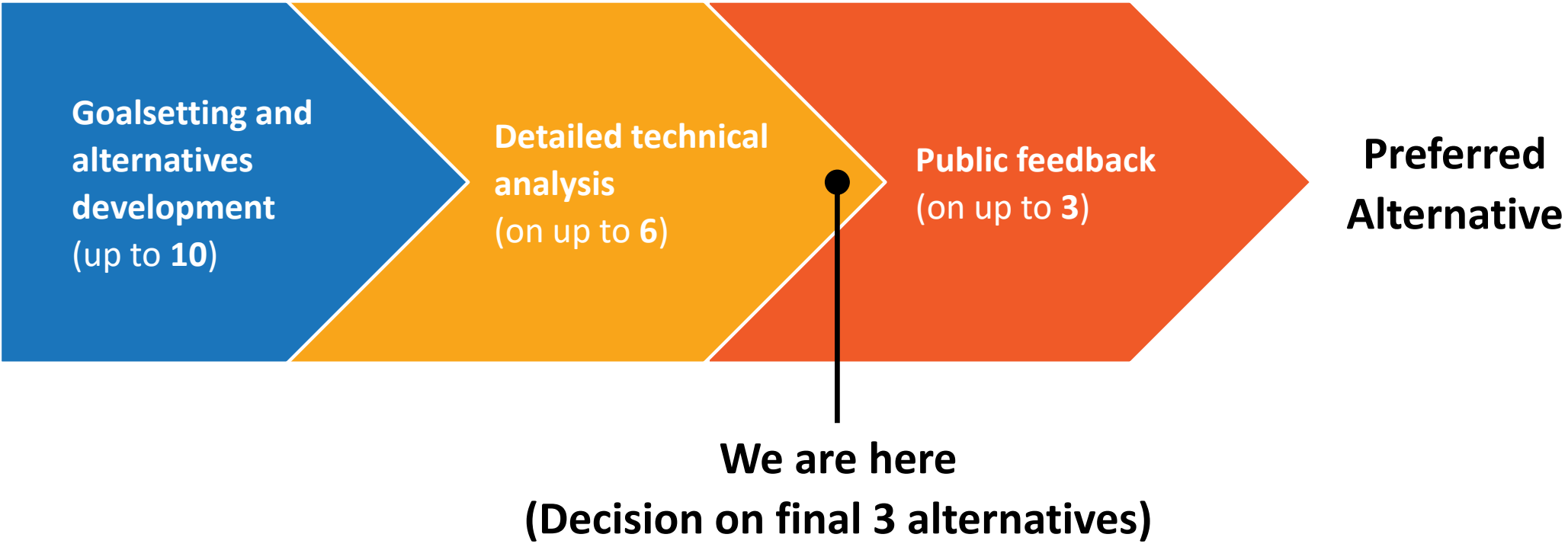
Existing Conditions





Planning Phase Progress

Alternatives Refinement Process



Progress To Date

1. First Council session to establish goals for the project
2. Community engagement to gain feedback on goals and project desires
3. Existing conditions technical analysis (transportation, stormwater, geotechnical, environmental)
4. Alternatives development, technical analysis, and alternatives refinement
5. Interagency coordination

Planning Phase Highlights

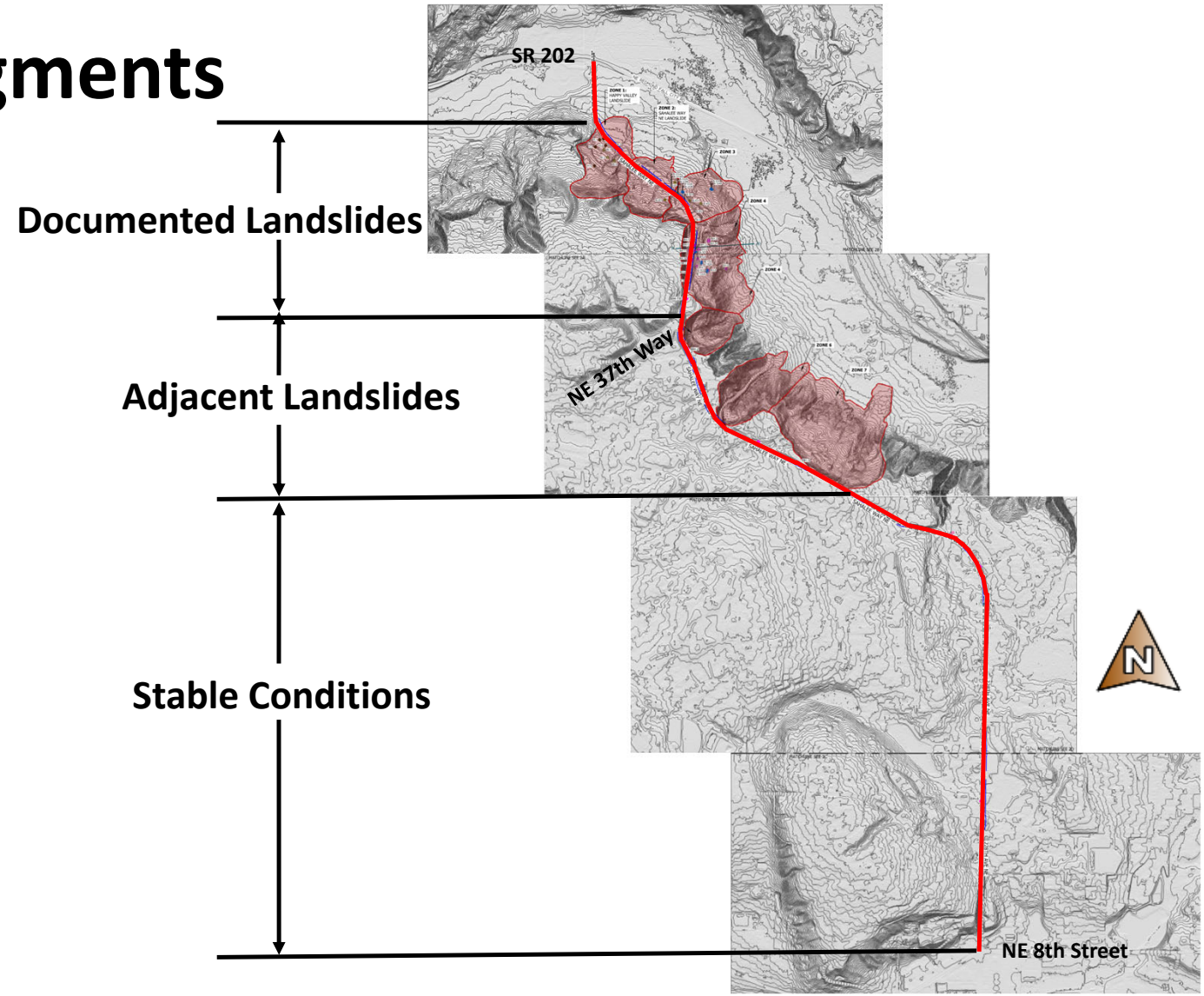
- Over 330 responses from community members during the first public outreach phase
- Alternatives analysis has taken time to complete important technical reviews:
  - Carefully considered pedestrian and bicycle elements and MMLOS
  - Invested in a robust stormwater planning task, which we have seen report differences in the millions of dollars between alternatives
  - Uncovered significant geotechnical findings on slope stability

Geotechnical Evaluations on Slope Stability

Slope Stability

- HWA GeoSciences is the geotechnical engineer for this study and project
- HWA evaluated the full study corridor (NE 8th Street to SR 202) and investigated the prior landslide events and future slope stability risks along the corridor

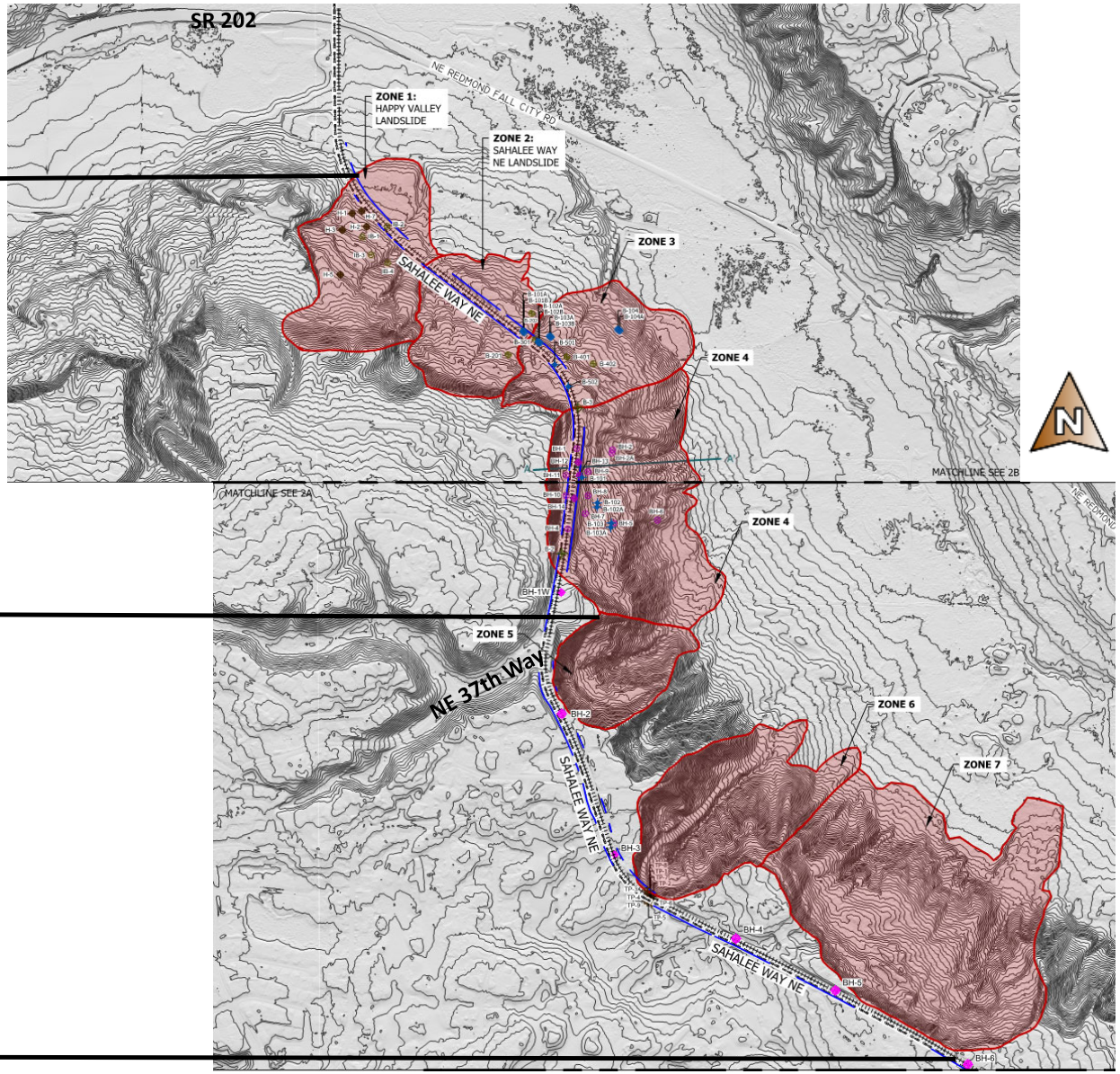
Geologic Segments



Landslide Zones

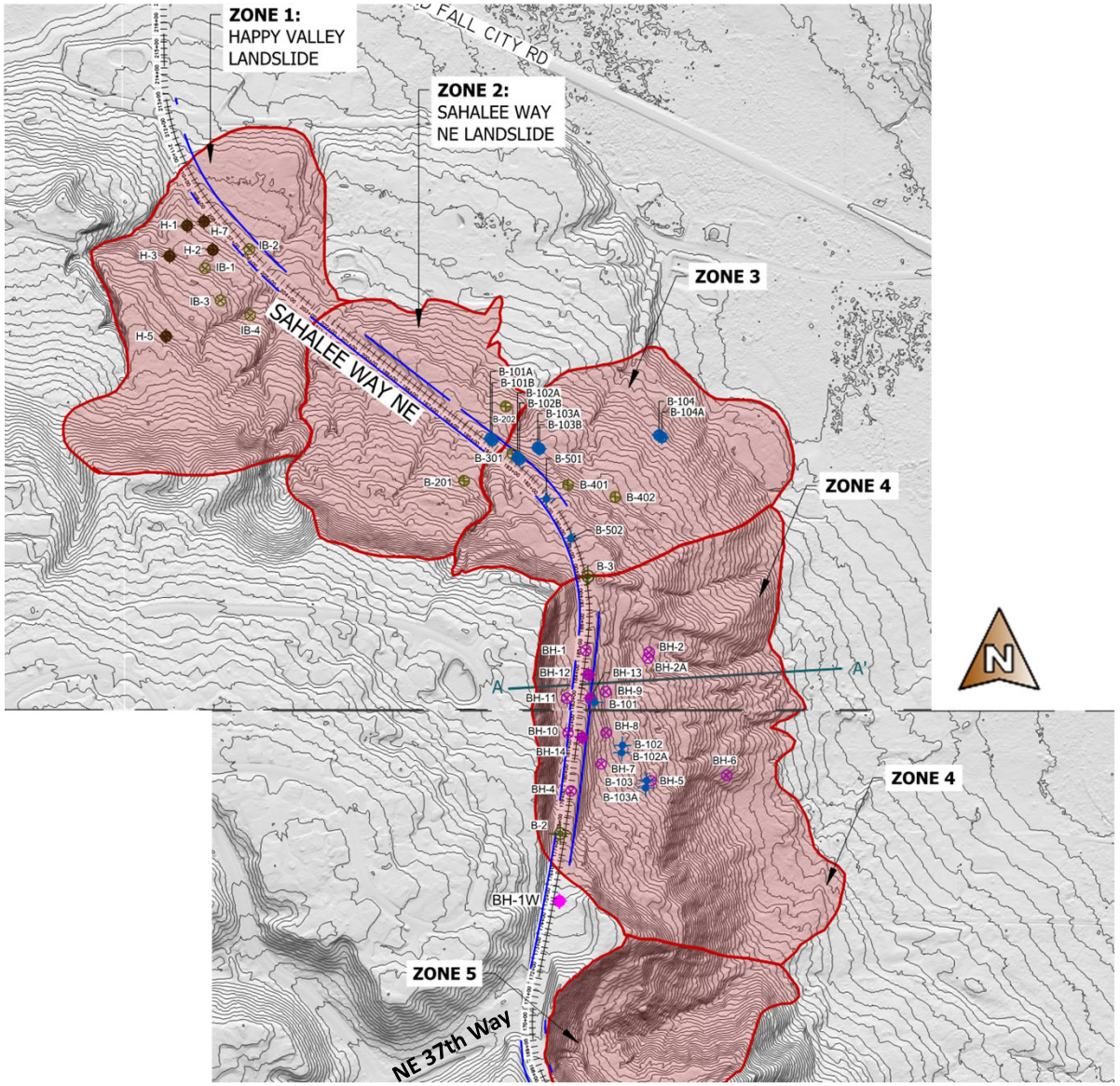
Documented Landslides

Adjacent Landslides



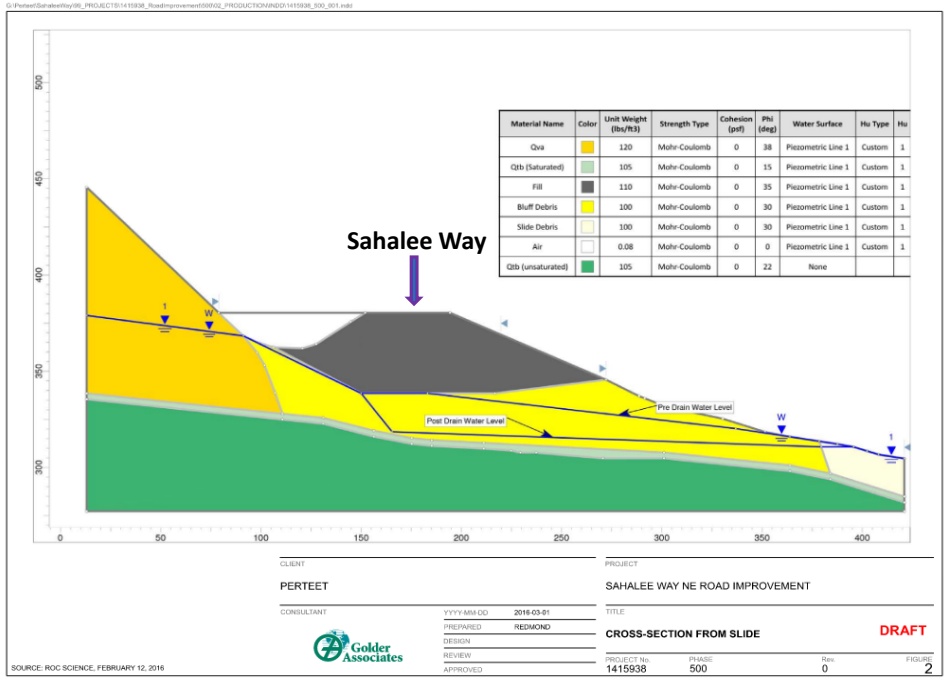
Zones 1-4

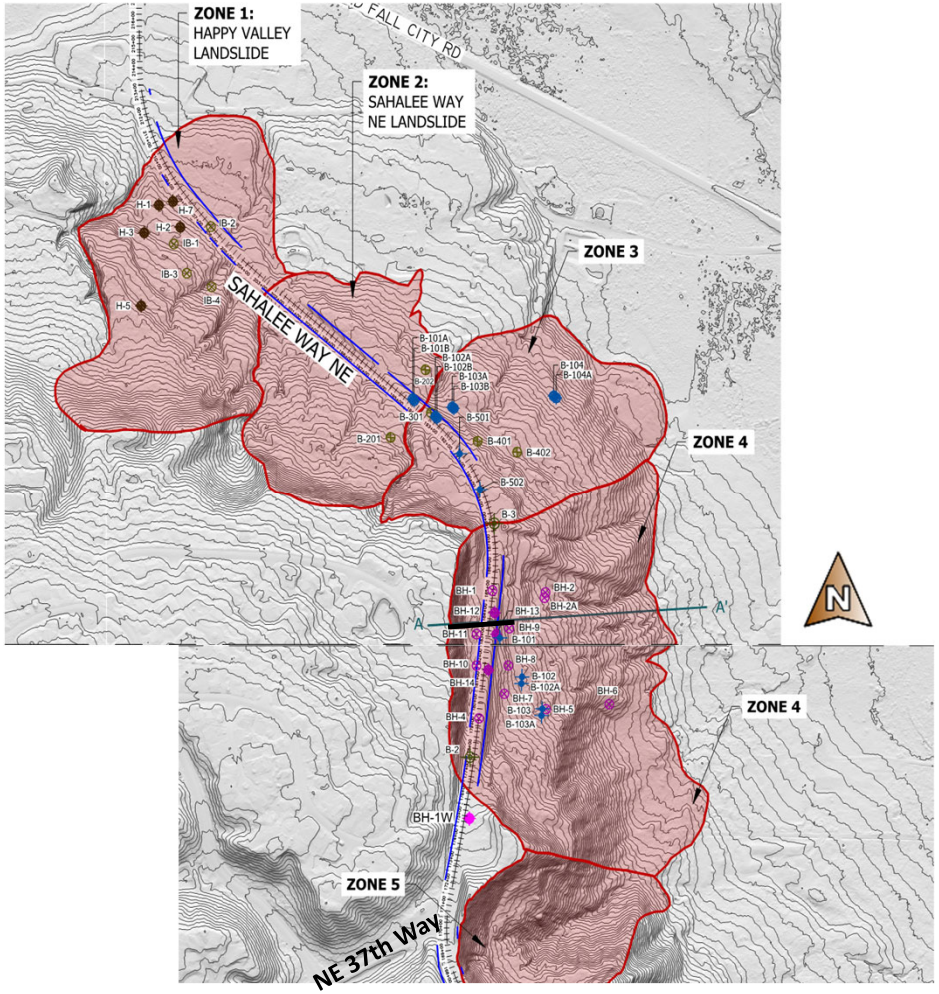
- **Zone 1 (Happy Valley Slide)**
  - Movement observed in late 1970's
  - Horizontal drains to stabilize
- **Zones 2 /3 (Sahalee Way Landslide)**
  - Movement observed 1996-1997
  - Horizontal drains to stabilize installed in 1997
- **Zone 4**
  - Movement observed in 1982
  - 13 feet of displacement over several months
  - Horizontal drains to installed in 1983



Slide Underdrains

Previous Slope Stability Analysis

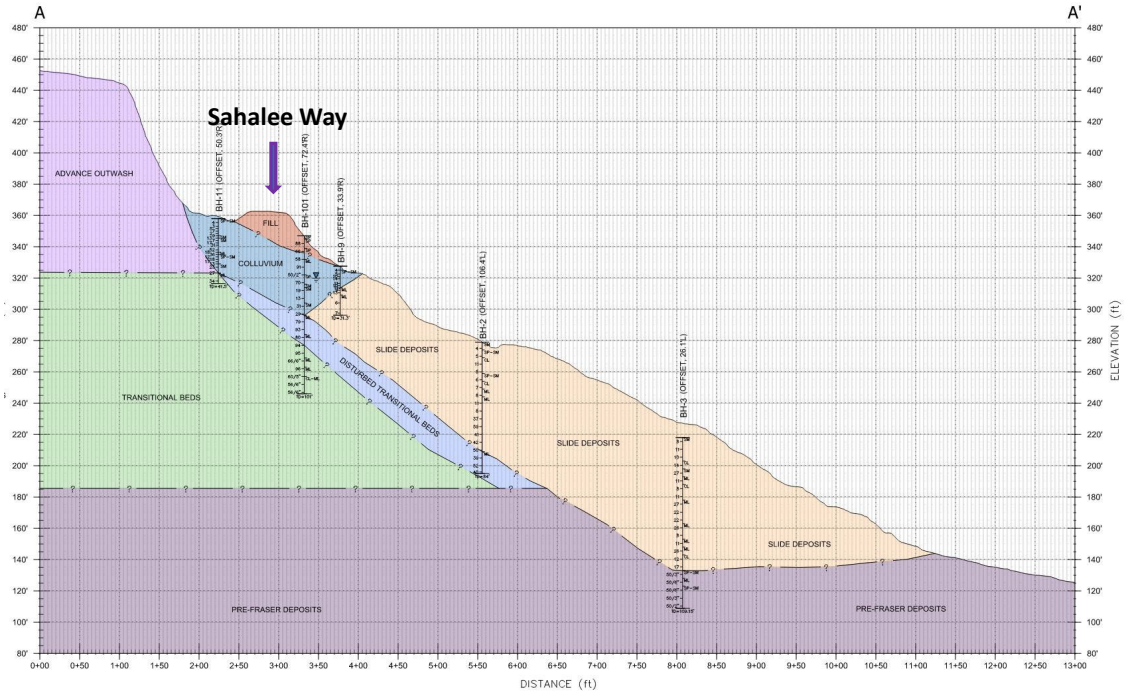


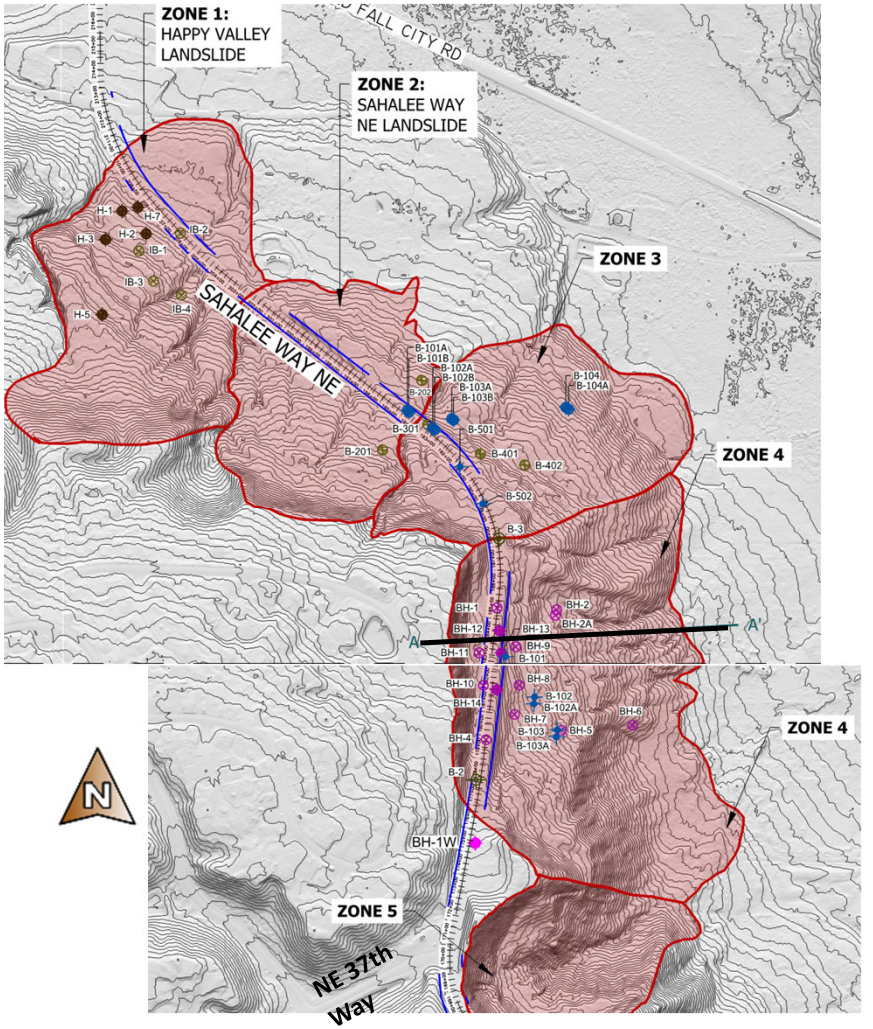


Results of Analysis:

- Minimal embankment fill on the uphill side of the roadway is feasible.
- Additional analysis and explorations required

HWA's Slope Stability Analysis

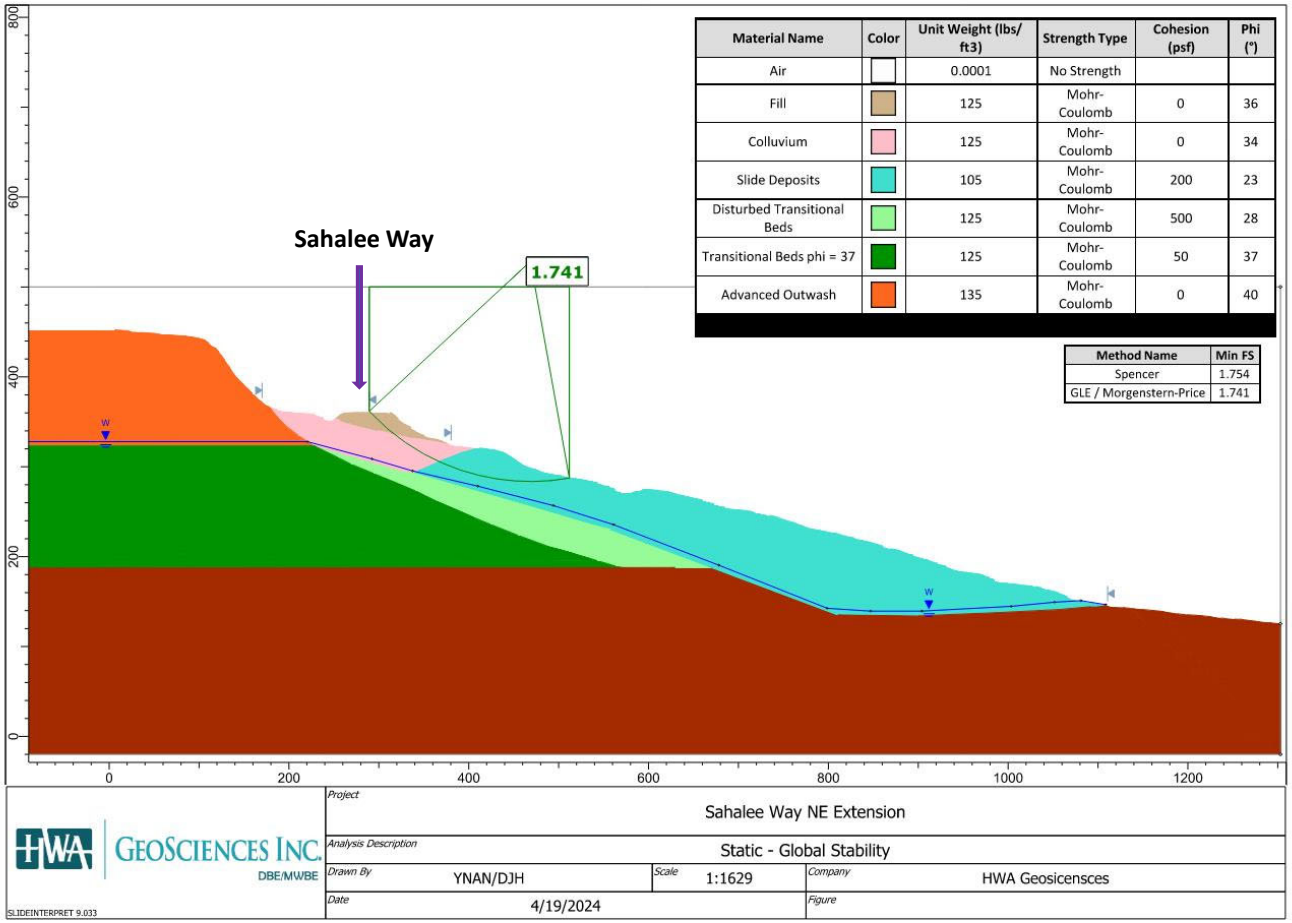




HWA Slope Stability Analysis (Static)

Results of Analysis:

- Similar static stability results to Golder's analysis
- Embankment is stable under static loading (assuming horizontal drains continue to function).



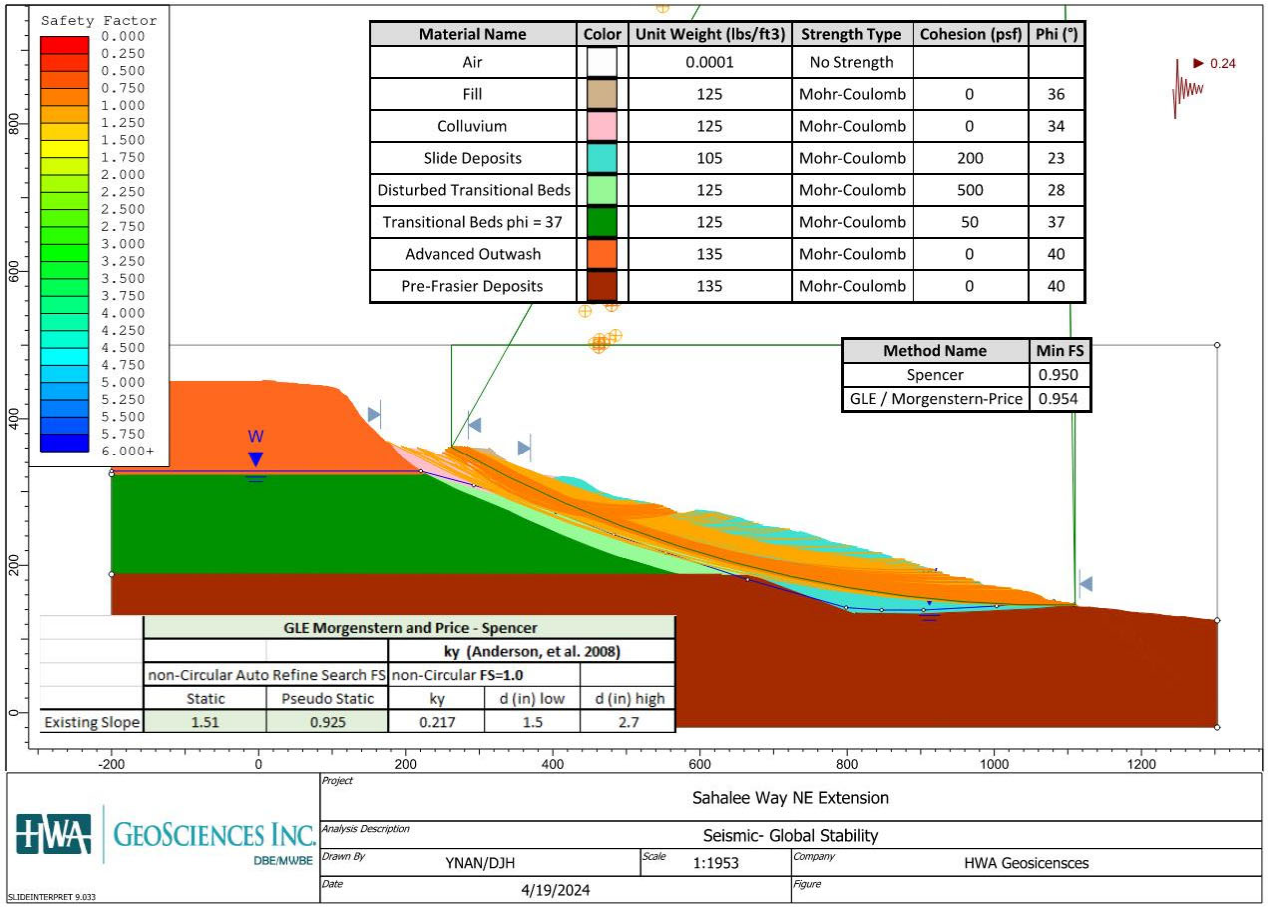
HWA Slope Stability Analysis (Seismic)

Results of Analysis:

- Slope failures expected under seismic loading.
- Seismic slope displacements expected to be less than 6 inches.

Analysis Take Aways:

- Stabilization of slide mass, under seismic loading is cost prohibitive.
- Future improvements should follow a "**Do No Harm**" approach



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (°)
Air		0.0001	No Strength		
Fill		125	Mohr-Coulomb	0	36
Colluvium		125	Mohr-Coulomb	0	34
Slide Deposits		105	Mohr-Coulomb	200	23
Disturbed Transitional Beds		125	Mohr-Coulomb	500	28
Transitional Beds phi = 37		125	Mohr-Coulomb	50	37
Advanced Outwash		135	Mohr-Coulomb	0	40
Pre-Frasier Deposits		135	Mohr-Coulomb	0	40

Method Name	Min FS
Spencer	0.950
GLE / Morgenstern-Price	0.954

	GLE Morgenstern and Price - Spencer				
			ky (Anderson, et al. 2008)		
	non-Circular Auto Refine Search FS		non-Circular FS=1.0		
	Static	Pseudo Static	ky	d (in) low	d (in) high
Existing Slope	1.51	0.925	0.217	1.5	2.7

HWA GeoSciences Inc. DBE/MWBE

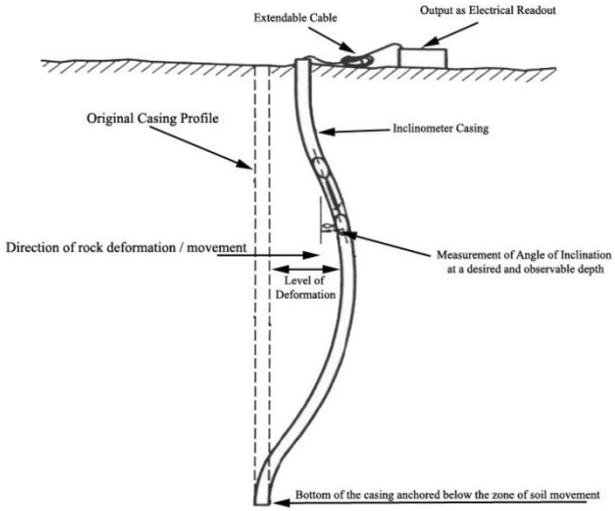
SLIDEINTERPRET 9.033

Project	Sahalee Way NE Extension
Analysis Description	Seismic- Global Stability
Drawn By	YNAN/DJH
Scale	1:1953
Company	HWA Geosicensces
Date	4/19/2024
Figure	

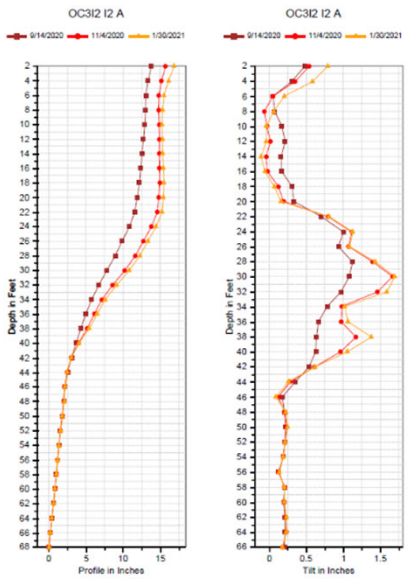
Zone 1-4 Future Monitoring

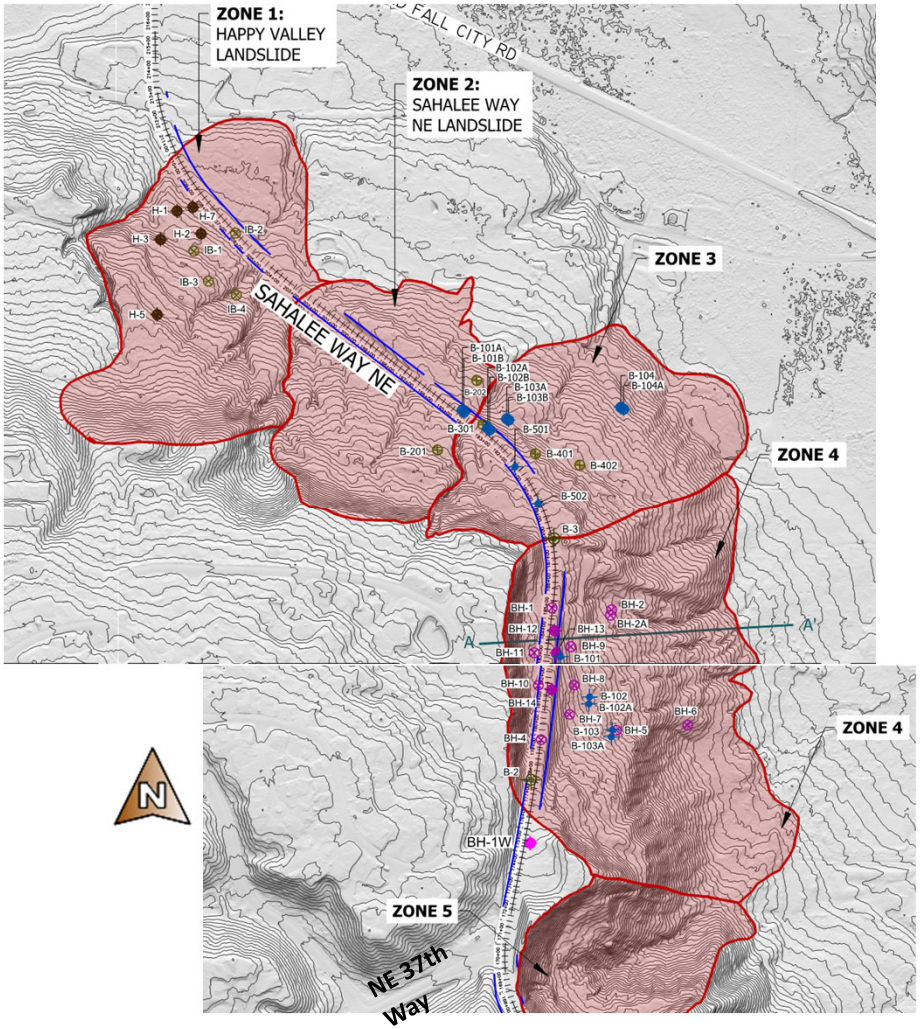
- Continued monitoring of horizontal drains
- Slope inclinometer to be installed within landslide Zone 4 this week

Slope Inclinometer Section



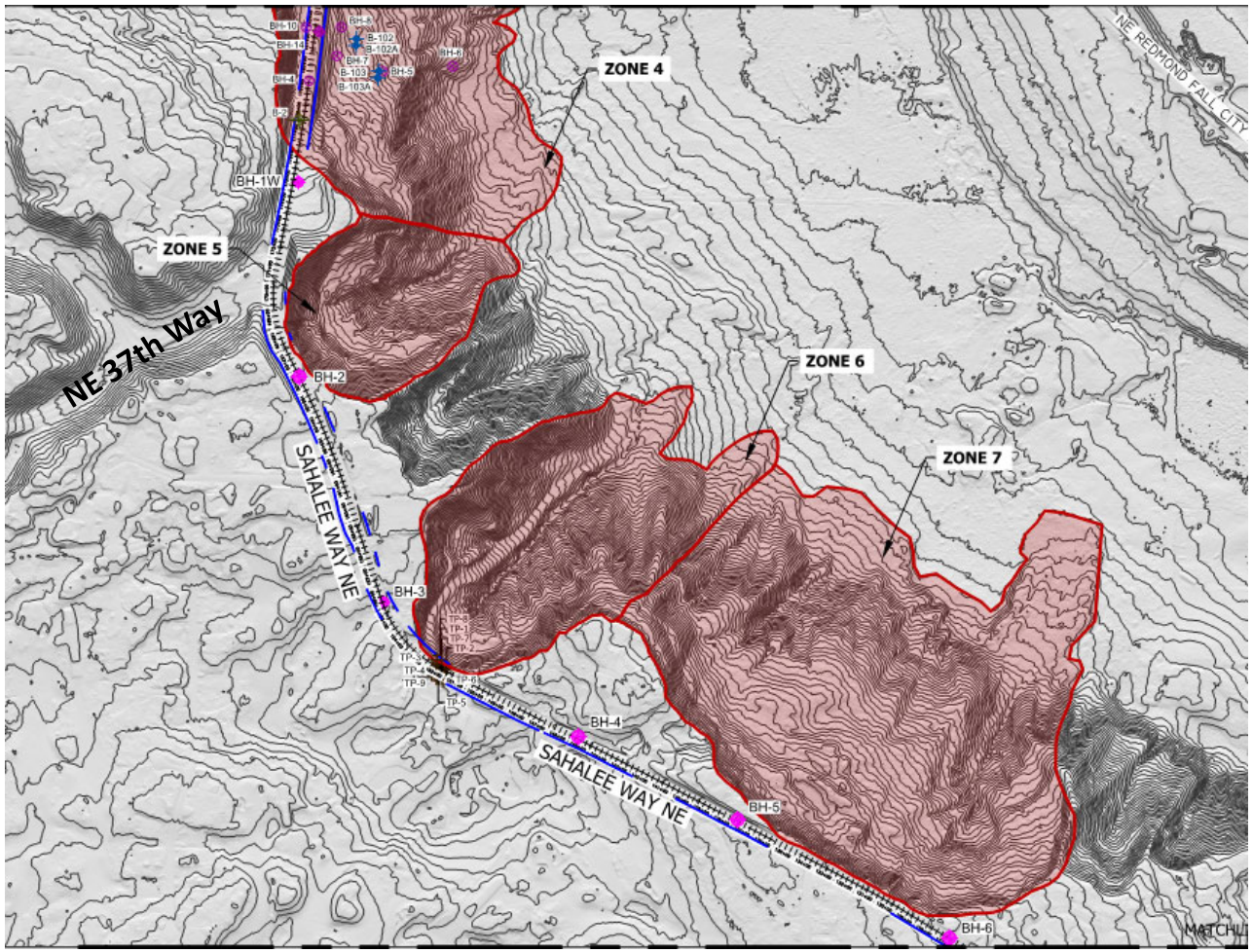
Example Readings





Landslide Areas Adjacent to Sahalee Way

- **Zone 5**
  - **Critical** adjacent slide area
  - Very steep slopes just off the fog line
- **Zones 6**
  - **Critical** adjacent slide area
  - Movement could break subsurface utilities, increasing damage
- **Zone 7**
  - Least critical adjacent slide area



Examples of Potential Slope Failures

- Future Slope Movements likely triggered by weathering of exposed steep slopes
- Potential of slope displacements largest during the wet winter months

Minor Pavement Cracking

East Lake Sammamish Parkway & 14th St

Increased Roadway Distress

East Lake Sammamish Parkway & 14th St

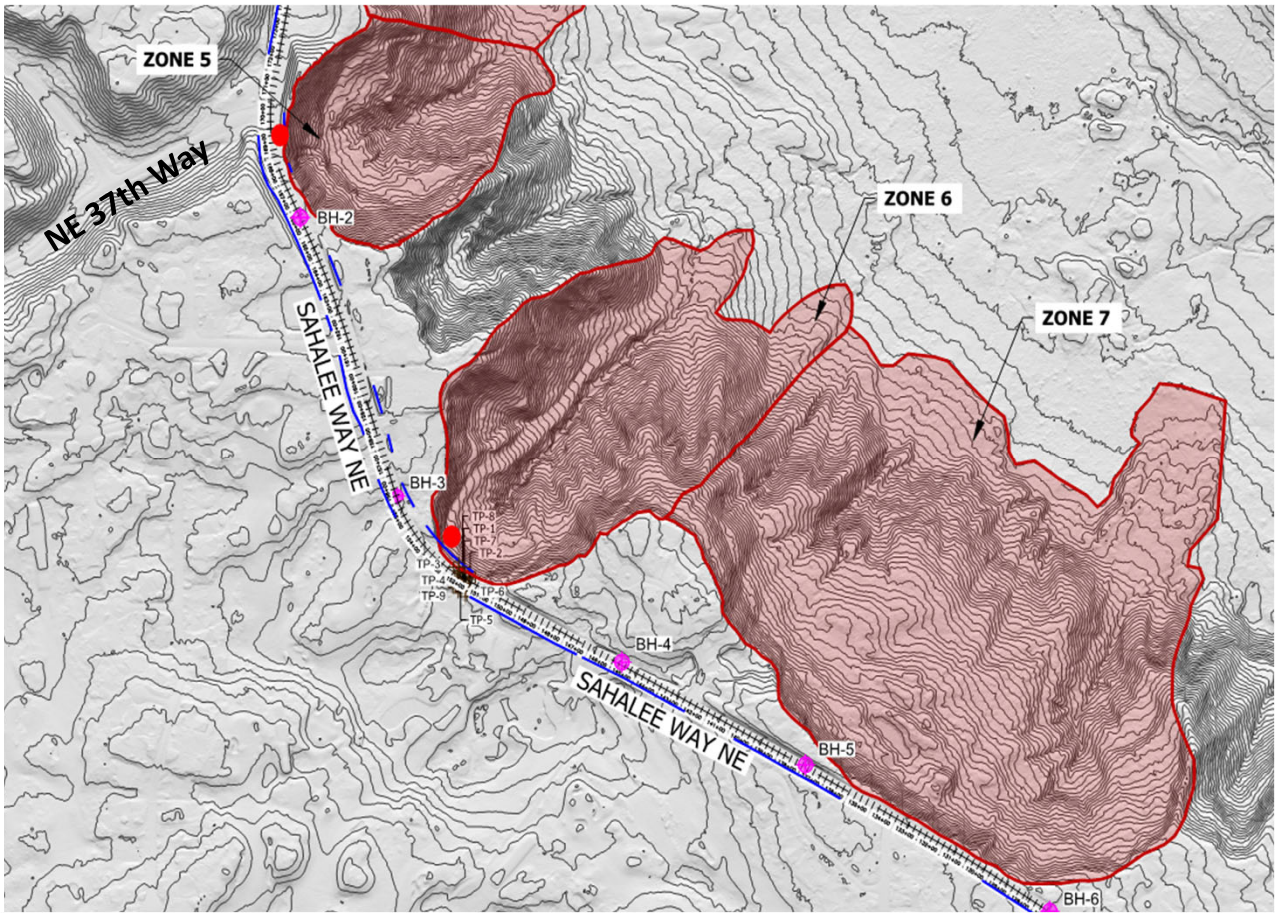
Complete Shoulder Failure

Olympic View Drive Edmonds, Washington

Start → → → → → → **Failure**

Zone 5 and 6 Slope Monitoring

- **Zone 5**
  - Slope inclinometer to be installed this week
- **Zones 6**
  - Slope inclinometer to be installed summer 2025
- **Monitoring Frequency**
  - 2-3 annually over wet season
  - Increased frequency if movement detected



Recommendations for Planning Study

- Avoid widening toward the northeast in Zones 5, 6, and 7
- Where widening occurs, assume a very deep retaining wall system will be required to mitigate risks (a tangent pile or secant pile wall system)

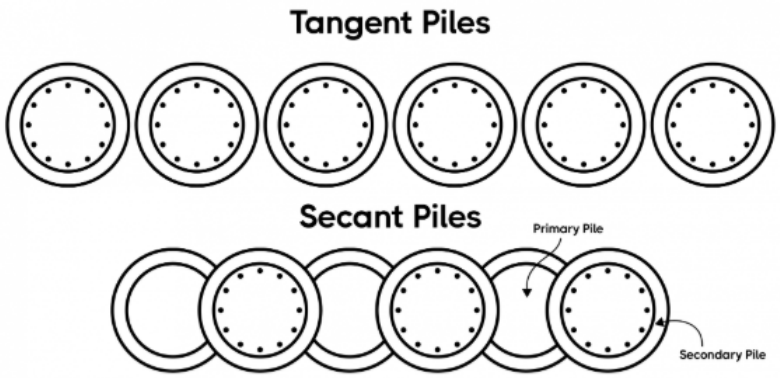


Image credit: HLN Engineering (UK)

Secant Piles

Tangent Piles

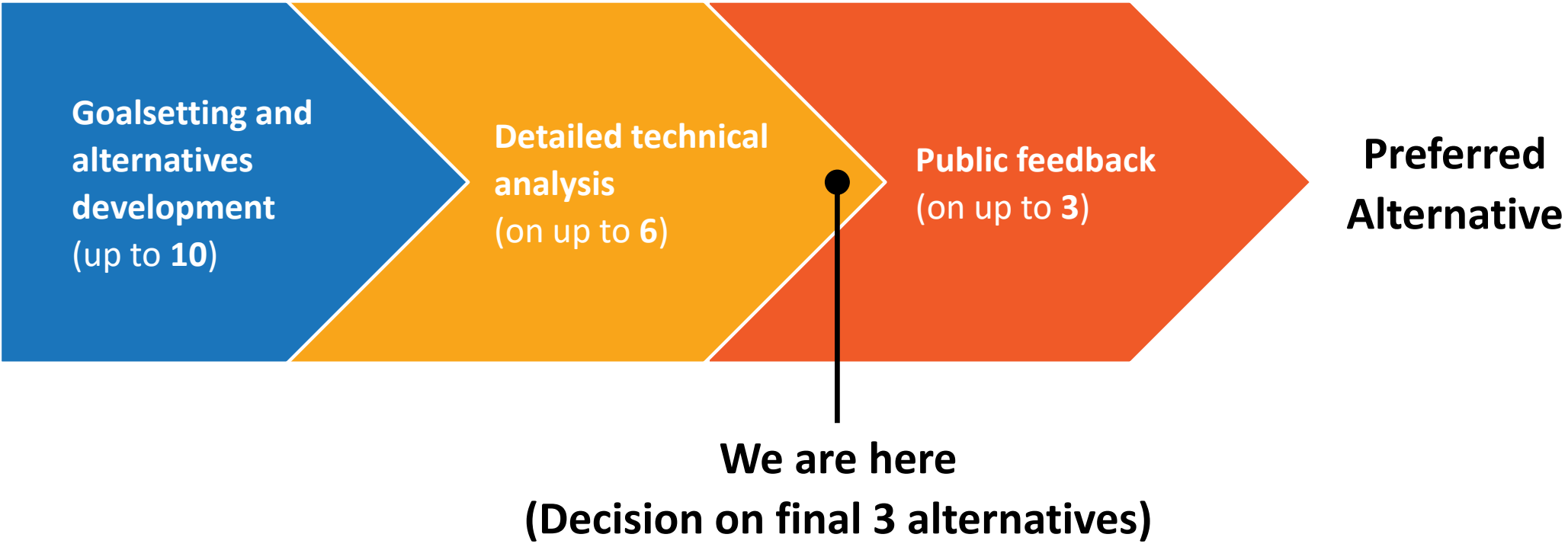
Image credit: FHWA Drilled Shaft Manual

Monitoring and Mitigation

- Working with HWA and our structural engineer for the project (HDR Inc.), we estimate that building these retaining wall systems will generally cost between **$15 - 20 million**.
- These costs would be in addition to the baseline project costs
- No apparent grant funding opportunity for mitigating this type of potential failure

Alternatives Refinement

Alternatives Refinement Process



Potential Alternatives (10)

1. Transit crossing improvements and enhancements
2. Transit crossings/enhancements + pedestrian and spot safety improvements
3. Corridor pedestrian improvements (25th to 37th)
4. Corridor bicycle improvements (25th to 37th)
5. Shared-use path north of NE 25th Way (to 37th)
6. Regional trail (to SR 202)
7. Multi-modal corridor, higher speed north of 25th (to 37th)
8. Multi-modal corridor, lower speed north of 25th (to 37th)
9. Full ped/bike buildout (both sides; to 37th)
10. City-standard principle arterial (three lane; to 37th)

Initial Alternatives (6)

The project team refined from 10 options to 6:

2. Transit crossings + pedestrian and spot safety
3a. Corridor pedestrian improvements (25th to 37th)
3b. Corridor pedestrian improvements (25th to 37th)
7. Multi-modal corridor, higher speed north of 25th (to 37th)
8. Multi-modal corridor, lower speed north of 25th (to 37th)
10. City-standard principle arterial (three lane; to 37th)

Initial Alternatives (6) – Baseline (Alt. 2)

- Alternative 2 is the baseline option. It includes the following, which is incorporated into every alternative:
  - Bus stop enhancements and new/enhanced crossings at bus stops
  - Minor speed reduction measures at unsignalized bus stop locations
  - New turn lanes serving Sahalee Greens (216th) and Plateau Point (217th)
  - Intersection improvements at 28th/223rd to address LOS E
  - New sidewalk between 36th and 37th to connect to the trailhead
  - New sidewalk to connect 217th to nearest bus stop at Sahalee Drive
  - Spot safety improvements

Initial Alternatives (6) – Comparison

ITEM	ALT. 2	ALT. 3A	ALT. 3B	ALT. 7	ALT. 8	ALT. 10
25th to 37th						
Pedestrian facility	**New sidewalk segments**	**Sidewalk (west side)**	**Sidewalk (west side)**	**Shared-use path (west)**	**Shared-use path (west)**	**Sidewalk (both sides)**
Bicycle facility	Existing shoulders	**None**	Existing shoulders			**Bike lane (both sides)**
Speed limit	Existing (45)	Existing (45)	Existing (45)	Existing (45)	**35 mph**	**35 mph**
8th to 25th						
Pedestrian facility	Existing west sidewalk	Existing west sidewalk	Existing west sidewalk	Existing (west) **Shared-use path (east)**	Existing (west) **Sidewalk (east)**	Existing (west) **Sidewalk (east)**
Bicycle facility	Existing bike lanes	Existing bike lanes	Existing bike lanes		**Protected bike lanes (both)**	Existing bike lanes
Speed limit	Existing (45/35)	Existing (45/35)	Existing (45/35)	**35 mph**	**35 mph**	**35 mph**

Public Alternatives (3) – Recommendations

Staff recommendations to advance: 2, 3B, and 7 or 8

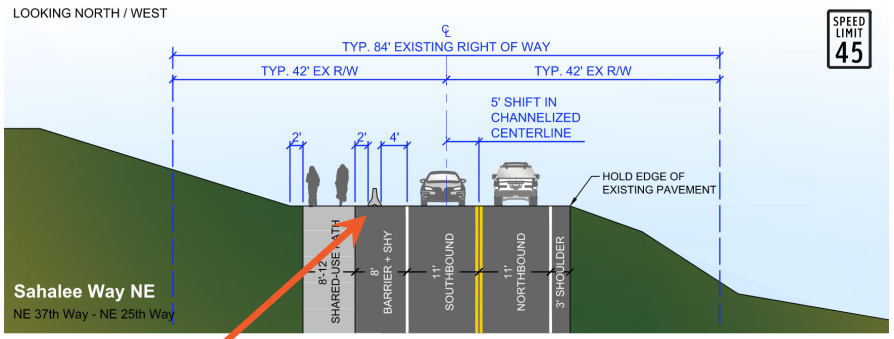
ITEM	ALT. 2	ALT. 3A	ALT. 3B	ALT. 7	ALT. 8	ALT. 10
25th to 37th						
Pedestrian facility	**New sidewalk segments**	**Sidewalk (west side)**	**Sidewalk (west side)**	**Shared-use path (west)**	**Shared-use path (west)**	**Sidewalk (both sides)**
Bicycle facility	Existing shoulders	**None**	Existing shoulders			**Bike lane (both sides)**
Speed limit	Existing (45)	Existing (45)	Existing (45)	Existing (45)	**35 mph**	**35 mph**
8th to 25th						
Pedestrian facility	Existing west sidewalk	Existing west sidewalk	Existing west sidewalk	Existing (west) **Shared-use path (east)**	Existing (west) **Sidewalk (east)**	Existing (west) **Sidewalk (east)**
Bicycle facility	Existing bike lanes	Existing bike lanes	Existing bike lanes		**Protected bike lanes (both)**	Existing bike lanes
Speed limit	Existing (45/35)	Existing (45/35)	Existing (45/35)	**35 mph**	**35 mph**	**35 mph**

Public Alternatives (3) – Alt. 7 vs Alt. 8

- **The core difference is posted speed limit north of 25th**
- Alternative 7 proposes to maintain the existing speed limit north of NE 25th Way at 45 miles per hour
- Alternative 8 proposes to lower the speed limit in that segment to 35 miles per hour
- To encourage the lower target speed, Alternative 8 includes a series of proposed intersection treatments (most likely roundabouts) to meter speeds

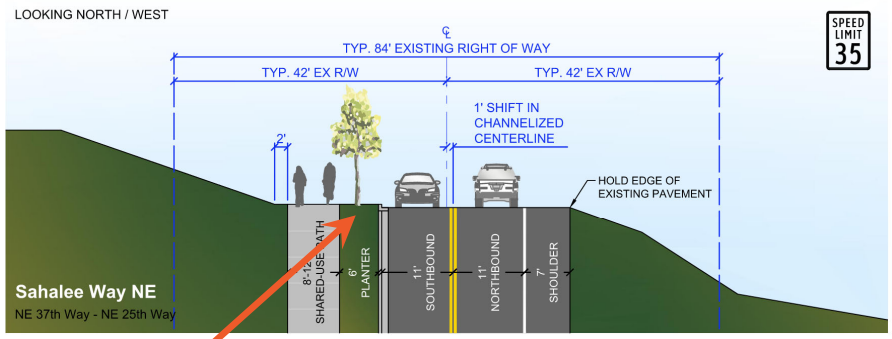
Public Alternatives (3) – Alt. 7 vs Alt. 8

- Both alternatives achieve the City's MMLOS targets in the TMP (both scoring at PLTS 2 and BLTS 2)
- These scores rely on separating vehicles from peds and bikes. How to separate depends on speed:



ALTERNATIVE 7
FROM NE 37TH WAY TO NE 25TH WAY

Traffic barrier



ALTERNATIVE 8
FROM NE 37TH WAY TO NE 25TH WAY

Planter strip

Public Alternatives (3) – Alt. 7 vs Alt. 8

ALT. 7	Design Element	ALT. 8
45 mph	Posted Speed Limit (25th to 37th)	35 mph
Shared-use path	Ped/Bike Facility (25th to 37th)	Shared-use path
Traffic barrier	Separation Method	Planter strip
PLTS 2, BLTS 2	Level of Traffic Stress	PLTS 2, BLTS 2
Minor treatments at crossings	Speed Control Strategy	Series of roundabouts
	<u>Simulation Travel Times (minutes)</u>	
7.1	AM Peak Hour – NB (8th to SR 202)	8.6
7.2	AM Peak Hour – SB (SR 202 to 8th)	8.3
6.3	PM Peak Hour – NB (8th to SR 202)	7.6
7.3	PM Peak Hour – SB (SR 202 to 8th)	8.3
$ 60.8 million	Planning-Level Opinion of Cost (2024 $, slope mitigation excluded)	$ 82.7 million

Initial Estimated Cost (millions, 2024 $)

ITEM	ALT. 2	ALT. 3A	ALT. 3B	ALT. 7	ALT. 8	ALT. 10
25th to 37th						
Design	$1.6	$2.5	$2.5	$2.6	$3.1	$5.7
Right-of-Way	$0.3	$0.4	$0.4	$1.2	$1.0	$2.2
Construction	$13.2	$19.7	$20.3	$20.9	$29.9	$55.9
Const. Mgmt.	$1.8	$3.0	$3.0	$3.2	$3.6	$6.7
North Total	**$16.9**	**$25.6**	**$26.2**	**$27.9**	**$37.6**	**$70.5**
8th to 25th						
Design	$0.5	$0.6	$0.8	$3.2	$3.7	$2.7
Right-of-Way	$0	$0	$0	$0.5	$0.8	$0.5
Construction	$3.5	$3.5	$4.9	$25.4	$36.3	$21.7
Const. Mgmt.	$0.7	$0.7	$1.0	$3.8	$4.3	$3.3
South Total	**$4.7**	**$4.8**	**$6.7**	**$32.9**	**$45.1**	**$28.2**
Corridor Total	**$21.6**	**$30.4**	**$32.9**	**$60.8**	**$82.7**	**$98.7**

Next Steps; Discussion

Remaining Planning Phase Elements

1. Public engagement (Part II) **(March/April)** to share concepts and gain feedback on overall strategy and certain details
2. Concurrently, risk analysis for slope stability options
3. Selection of preferred alternative strategy by Council **(June)**
4. Final planning analysis: refined cost estimate, phasing analysis, concept layout, constructability review, risk analysis
5. Corridor Plan development
6. Council to adopt Corridor Plan, authorize 30% design **(October)**

Questions for Council

- What should be the third alternative shared with the public: Alternative 7 (higher speed) or Alternative 8 (lower speed)?
- Are there any specific items you want the public to address in the upcoming outreach phase?

A future question to answer:

- Should the corridor improvements (south of 37th) harden the unmitigated slopes with stability risks?