

Appendix D: Retaining Walls and Embankments Analysis



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I-5 PEL Seismic - Seismic Report

Appendix D - Retaining Wall and Embankment Estimated Analyses LOE

December 1, 2022

Vulnerability Analysis Level of Effort
 RETAINING WALLS & EMBANKMENTS
 Lower (●○○) - 150 to 350 hours
 Medium (●●○) - 351 to 1,150 hours
 Higher (●●●) - 1,151 to 2,500 hours

Structure ID	Retaining Wall or Embankment Notes	Route Type	Length (ft)	Retaining Wall or Embankment Map Coordinates	Estimated Seismic Vulnerability Analysis LOE
EM-1	DS landslide deposit upslope, some shallow landslide hazard	I-5 Mainline	1100	[[47.5142951783744, -122.286477099264], [47.5155849282366, -122.287459662526], [47.5169546892132, -122.288357126319]]	●○○
EM-2	DS landslide deposit upslope, moderate shallow landslide hazard	I-5 Mainline	2600	[[47.5189493168954, -122.28938132191], [47.5206645795043, -122.290263063613], [47.5221738989232, -122.290855084202], [47.5230875680519, -122.291157375455], [47.5245807916024, -122.291657963137], [47.5257345023034, -122.292090812165], [47.5269533341544, -122.292638393529]]	●○○
EM-3	Moderate shallow and DS landslide hazard	I-5 Mainline	1100	[[47.5269556595131, -122.292649383466], [47.5287327389994, -122.293325522018]]	●○○
EM-4	DS landslide deposit downslope; some DS landslide hazard upslope	I-5 Mainline	2100	[[47.5351562899344, -122.296721543543], [47.5366564259795, -122.298023905597], [47.5379585671852, -122.299568454722], [47.5387747076197, -122.300545740184]]	●○○
EM-5	DS landslide deposit upslope; some shallow and DS landslide hazard	I-5 Mainline	1100	[[47.544312703446, -122.306502906742], [47.5455571047893, -122.307736615136], [47.5465116829987, -122.308874742081]]	●○○
EM-6	DS landslide deposit upslope; moderate DS landslide hazard; high shallow landslide hazard but risk may be low due to elevated roadway	I-5 Mainline	12100	[[47.5606568370136, -122.321774345469], [47.5619185352138, -122.321675571811], [47.5634957040793, -122.321407242779], [47.5650295398611, -122.321057485049], [47.5671661306112, -122.320637455196], [47.5688678170064, -122.320277864703], [47.5715101321683, -122.320039867297], [47.5741709333097, -122.319897141802], [47.5762200688503, -122.319751520561], [47.5769122535096, -122.319632766046], [47.5788621178241, -122.31915621947], [47.5798394573576, -122.319111204081], [47.5808484589469, -122.319285814674], [47.5828196986189, -122.319815998187], [47.5833118707679, -122.319902962444], [47.5842027117079, -122.320059643076], [47.5857153660422, -122.320197631569], [47.5870559029982, -122.320294253252], [47.587942193315, -122.320421654663], [47.5886312336049, -122.320543425079], [47.589801438809, -122.3208393721], [47.5906028485636, -122.321044577673], [47.5912870522615, -122.321158932063], [47.5918348972916, -122.321138129379], [47.5937146815351, -122.320739718616]]	●○○
EM-7	Margin of DS landslide deposit to the east; some historic landslide activity prior to I-5 construction	I-5 Mainline	500	[[47.5992323333628, -122.321683269658], [47.6000786818398, -122.322600927391]]	●○○
EM-8	DS landslide deposit; moderate DS landslide hazard	I-5 Mainline	4800	[[47.6252418245108, -122.328474858402], [47.6265313419704, -122.328511922684], [47.6273707055792, -122.328455778537], [47.6283882186717, -122.327981498955], [47.6296161436399, -122.326885646883], [47.6305222842628, -122.32587538144], [47.6313474130971, -122.325023311608], [47.6324922060784, -122.324246060023], [47.6332443997029, -122.323877170339], [47.6341788569285, -122.323528088717], [47.6346718070241, -122.323367052226], [47.63548116771, -122.323153039715], [47.6361614088541, -122.323004658728], [47.6366848361297, -122.322964911556]]	●○○
RW-161.27	One wall cutting on a recovery ramp.	I-5 SB Ramps	200	[[47.5490274, -122.3142044], [47.5487784, -122.313819]]	●○○
RW-161.31	Seems to be 2 walls holding approaches of Bridge 5/533A. Significant because it's cutting on a recovery ramp.	I-5 NB ramps	700	[[47.5483083, -122.3196598], [47.5486037, -122.3179462]]	●○○
RW-161.32	Seems to be 2 walls holding approaches of Bridge 5/533E-N. Significant because it's cutting on a recovery ramp.	I-5 NB ramps	300	[[47.5497783, -122.3135995], [47.5501431, -122.3142077]]	●○○
RW-162.78A	One large retaining wall. One of the "Tiered Walls". Failing will block a "Recovery Ramp".	I-5 NB ramps	300	[[47.5691708, -122.3197967], [47.569717, -122.3196578]]	●○○
RW-162.78B	Seems to be 2 walls holding approaches of Bridge 5/536N-W. Significant because it's cutting on a recovery ramp.	I-5 NB	300	[[47.5691646, -122.3200684], [47.5698893, -122.3199815]]	●○○
RW-163.10 A	A large wall cutting on a recovery ramp. One of the "Tiered Walls". Failing together with RW-163.10 B can block I-5 NB.	I-5 NB ramps	900	[[47.5747629, -122.3193611], [47.5756173, -122.3194937], [47.57625, -122.319476], [47.5770941, -122.3193998]]	●○○
RW-163.10 B	A separator wall of I-5 NB and SB. One of the "Tiered Walls". Failing together with RW-163.10 A can block I-5 NB.	I-5 Separator	500	[[47.575058, -122.3200547], [47.5761835, -122.319945]]	●○○
RW-164.33	Seems to be 2 walls holding approaches of Bridge 5/539E. Failing can block I-5 NB and SB.	I-5 SB	700	[[47.5917687, -122.3212934], [47.5920527, -122.3212625], [47.5924003, -122.321203], [47.593445, -122.3211669]]	●○○
RW-164.95	Seems to be 2 walls holding approaches of Bridge 5/545W. Failing can block I-5 SB	I-5 SB CD	2300	[[47.5997125, -122.3227351], [47.600071, -122.3231376], [47.6005905, -122.3237921], [47.6010123, -122.3243315], [47.6016863, -122.325133], [47.602882, -122.3266224], [47.6036861, -122.3274038]]	●●○
RW-165.16	A retaining wall adjacent to the ramp from Cherry to I-5 SB, failing can block this recovery ramp.	I-5 SB Ramps	800	[[47.602313, -122.3261641], [47.6027953, -122.3268034], [47.6030941, -122.3270959], [47.6037001, -122.3276541]]	●○○
RW-165.48	A large retaining wall adjacent to a recovery ramp from Cherry St. to I5 NB	I-5 NB ramps	2000	[[47.6058571, -122.328299], [47.6067853, -122.3291291], [47.6077979, -122.3300587], [47.6087157, -122.3306731], [47.6090123, -122.3308941], [47.6102949, -122.3310304]]	●●○

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December 1, 2022

Vulnerability Analysis Level of Effort
 RETAINING WALLS & EMBANKMENTS
 Lower (●○○) - 150 to 550 hours
 Medium (●●○) - 551 to 1,150 hours
 Higher (●●●) - 1,151 to 2,500 hours

Structure ID	Retaining Wall or Embankment Notes	Route Type	Length (ft)	Retaining Wall or Embankment Map Coordinates	Estimated Seismic Vulnerability Analysis LOE
RW-165.76	A large wall holding a recovery ramp from I-5 SB to Union St. Failing will also block this ramp and at least 2 lanes on I-5 SB.	I-5 SB Ramps	1800	[[47.6108092,-122.3320157],[47.6109195,-122.3317523],[47.6110061,-122.3316321],[47.6121579,-122.3310168], [47.6150756,-122.3297323]]	●●○
RW-165.84	A large retaining wall. Part of it it adjacent to I-5 NB. The rest is adjacent to I-5 NB ramp to E Olive Way, failing can block this recovery ramp.	I-5 NB/I-5 NB Ramp	2000	[[47.6112818,-122.3307921],[47.612943,-122.3300683],[47.6133108,-122.3299067],[47.6136556,-122.3297055], [47.6162262,-122.3286414]]	●●○
RW-166.06	A large retaining wall holding ramp to E Olive Way. Failing can block this recovery ramp.	I-5 NB	1700	[[47.6142222,-122.3295876],[47.6159441,-122.328928],[47.6165574,-122.3287072],[47.6171729,-122.3285177], [47.6185675,-122.3282245]]	●●○
RW-166.16	A large retaining wall. A short part of the wall is adjacent to the ramp from E Olive Way. Most of the wall is adjacent to I-5 NB, failing together with RW-166.52, RW-166.85 or RW-166.93 can block I-5.	I-5 NB/I-5 NB Ramp	6000	[[47.6175607,-122.3281373],[47.6187658,-122.3280669],[47.6207648,-122.3280289],[47.6229875,-122.3280603],[47.6268839,-122.3280403],[47.6278953,-122.3277441],[47.6293178,-122.3267376],[47.6317318,-122.3243576], [47.6323933,-122.3239558]]	●●●
RW-166.52	A large retaining wall holding a recovery tunnel to Mercer St.	I-5 NB ramps	1900	[[47.6208746,-122.3283633],[47.6230573,-122.3283453], [47.6243837,-122.328349], [47.6248145,-122.3285331], [47.6250934,-122.3288822],[47.6251468,-122.3289934], [47.6253338,-122.3296154]]	●●○
RW-166.78	A large retaining wall holding a recovery tunnel from Mercer St. to I-5 SB.	I-5 SB Ramps	2300	[[47.6230606,-122.3284786],[47.6243338,-122.328495],[47.6248501,-122.3287343],[47.6251454,-122.3292611],[47.6252491,-122.3300059], [47.6246953,-122.3329053]]	●●○
RW-166.85	A large retaining wall adjacent to the ramp from Mercer St. to I-5 NB. Failing together with RW-166.16 will block I-5 NB	I-5 NB ramps	1800	[[47.6252226,-122.3309682],[47.6255991,-122.3298268],[47.6259814,-122.329308],[47.6264615,-122.3286974],[47.6270077,-122.3283519], [47.6284868,-122.3277203]]	●●○
RW-166.93	A large retaining wall adjacent to I-5 express lanes/ramps. Failing together with RW-166.16 can block I-5 NB.	I-5 Express Ramp/I-5 Express	2300	[[47.6274454,-122.3283319],[47.6290619,-122.3274648],[47.6298502,-122.3267519],[47.6315137,-122.3249317], [47.6322508,-122.3243726]]	●●○
RW-167.67	A retaining wall holding ramp to 520 EB. Failing together with RW-167.68 can block I-5 NB.	I-5 NB ramps	1800	[[47.6366925,-122.3226625],[47.6392137,-122.3224835],[47.6408827,-122.3223503], [47.6413201,-122.3221999]]	●●○
RW-167.68	A wall separator separating I-5 express lanes and I-5 NB. Failing together with RW-167.67, RW-168.04 can block I-5 NB.	I-5 NB/I-5 Express	3400	[[47.6371082,-122.3229041], [47.6463621,-122.3226247]]	●●●
RW-167.94A	Seems like 2 walls holding the ramp from 520 EB. Failing with RW-167.94B can block I-5 SB.	I-5 SB Ramps	500	[[47.6402469,-122.323319], [47.6413617,-122.3232963]]	●○○
RW-167.94B	A large retaining wall adjacent to I-5 SB. Failing with RW-167.94A can block I-5 SB. On top of the wall are sound barriers.	I-5 SB	1900	[[47.6401543,-122.323319], [47.6452257,-122.3230865]]	●●○
RW-168.04	A retaining wall adjacent to I-5 NB. Failing together with RW-167.68 can block I-5 NB.	I-5 NB	200	[[47.6420707,-122.3224792], [47.6424997,-122.3224701]]	●○○
RW-168.08	A retaining wall holding the ramp from 520 WB. A large part of the wall is adjacent to I-5 NB. Failing together with RW-167.68 can block I-5 NB	I-5 NB ramps	2000	[[47.6426011,-122.3209483],[47.6426694,-122.3216088],[47.6428135,-122.3219538],[47.6430228,-122.3222157],[47.6434676,-122.3223917],[47.6441014,-122.3224598], [47.6468574,-122.3223864]]	●●○
RW-169.11	Seems like 2 walls holding the ship canal bridge. Failing together with RW-169.19 can block I-5 SB.	I-5 SB/I-5 Express Lanes	900	[[47.6579285,-122.3224897], [47.6603586,-122.322326]]	●○○
RW-169.17	Seems like 2 walls holding the ship canal bridge. Failing can block I-5 NB.	I-5 NB/I-5 Express	800	[[47.6582285,-122.3224801], [47.6603586,-122.322326]]	●○○
RW-169.19	A retaining wall holding the ramp from UW district. A large part of the wall is adjacent to I-5 SB. Failing together with RW-169.11 can block I-5 SB.	I-5 SB Ramps	1900	[[47.6586718,-122.3226736],[47.6609832,-122.3225885],[47.6621357,-122.3225797],[47.6628325,-122.3226951], [47.6636609,-122.3227618]]	●●○
RW-170.54	A retaining wall holding a recovery ramp to Lake City Way NE.	I-5 NB ramps	700	[[47.6781946,-122.320334], [47.6798468,-122.3201668]]	●○○
RW-170.64	A retaining wall holding a recovery ramp from Lake City Way.	I-5 SB Ramps	300	[[47.6795048,-122.3212634], [47.6801764,-122.3213747]]	●○○