



Memorandum

Date: August 10, 2017
Project: NOV126

To: Mr. Steve Marshall
City of Novato
From: Zack Matley
zmatley@w-trans.com

Copy: Mr. Matt Maddox
Rincon Consultants

Subject: General Plan Circulation Analysis – Preliminary Traffic Mitigation (without Bel Marin Industrial Parks Biotech overlay)

Following is a brief update summarizing the traffic analyses that have been completed to date in support of the forthcoming General Plan Update EIR. We understand that the General Plan “Project” may include additional biotechnology-related development potential in the Bel Marin Industrial Parks area, and that an EIR Alternative will include General Plan buildout *without* this added development potential. The following results reflect the preliminary roadway mitigations that have been identified to maintain LOS D operation under this EIR Alternative (i.e., without additional biotechnology development) under cumulative conditions. Cumulative conditions reflect added traffic attributable to buildout of the City’s General Plan, added traffic associated with occupation of currently-vacant office space in the Redwood Boulevard/San Marin Drive area, and added traffic associated with growth in the unincorporated County of Marin. This information may be helpful to Staff in identifying some of the roadway infrastructure improvements to be included in the General Plan document, and will serve the base upon which the potential Biotech overlay traffic will be added.

Preliminary Intersection Mitigations

San Marin Drive/Simmons Lane

- Option 1 – Signalize intersection; maintain all lanes but restripe the San Marin Drive approaches to include separate left, through, and right-turn lanes
- or
- Option 2 – Install roundabout; the westbound approach would have a through-right lane and a left-turn pocket, and the remaining three approaches would have single lanes. One quadrant of the roundabout would have dual circulating lanes.

These improvement options are consistent with the City’s Capital Improvement Program (CIP) and prior analyses.

Redwood Boulevard/San Marin Drive

- Widen westbound San Marin Drive approach (the SMART railroad overpass) to include two left-turn lanes, two through lanes, and one right-turn lane, as well as bike lanes and a widened sidewalk on the south side of the overpass
- Widen southbound Redwood Boulevard approach to include a left-turn lane, shared left-turn/through lane, and right-turn lane
- Restripe the northbound Redwood Boulevard to include a left-turn lane, left-turn/through lane, and two right-turn lanes
- Add right-turn overlap signal phasing on the northbound and westbound approaches

These improvements differ somewhat from the CIP and prior analyses completed for the North, North Redwood Boulevard (NNRB) corridor. The railroad overcrossing would only be widened by one lane (as assumed in the CIP), though with the addition of bike lanes and a wider sidewalk the “effective” width may be closer to two added lanes (as envisioned in the NNRB study). Southbound Redwood Boulevard would require an additional vehicle lane only within 300 to 500 feet of San Marin Drive, in contrast to the CIP improvement of extending another southbound lane all the way to Wood Hollow Drive.

San Marin Drive/US 101 Southbound Ramps

- Modify the eastbound San Marin Drive approach (the SMART railroad overpass) to include a through lane, a shared through/right-turn lane, and a right-turn lane
- Provide an enhanced bicycle-pedestrian crossing at the on-ramp entrance, including modified signal phasing to include protected pedestrian and bicyclist movements across the ramp

These improvements differ slightly from the CIP and NNRB study but are needed to provide efficient upstream lane utilization, and ultimately help to minimize the number of lanes needed on the railroad overpass. The use of the recommended combination through-right and right-turn lane on the eastbound approach could be difficult for bicyclists to navigate, hence the need to provide enhanced bicycle-pedestrian crossings as well as a widened sidewalk/path on the south side of the railroad overpass.

Atherton Avenue/US 101 Northbound Ramps

- Widen the northbound off-ramp to include two left-turn lanes and a shared through/right-turn lane

This improvement is consistent with the CIP and NNRB study.

San Marin Drive/Sutro Drive

- Option 1 – Signalize intersection; maintain existing lanes
- or
- Option 2 – Install a single-lane roundabout; reduce all approaches to single-lanes, except for the southbound approach which would also include a right-turn “slip” lane

This is a new improvement/mitigation that has not previously been identified.

Novato Boulevard/Diablo Avenue

- Modify westbound Diablo Avenue to include a left-turn lane, through lane and right-turn lane
- Restripe eastbound Diablo Avenue to include a left-turn lane and shared through/right-turn lane
- Widen southbound Novato Boulevard to provide two left-turn lanes and a shared through/right-turn lane
- Eliminate channelized right-turn islands on the northbound and westbound approaches
- Add bike lanes on the westbound and southbound approaches
- Convert signal phasing to protected left-turns, plus right-turn overlap phasing on the northbound and westbound approaches; incorporate signal timing into the De Long Avenue coordinated system

These improvements should be considered draft in nature; the Public Works Department is intending to reexamine the configuration of the Novato Boulevard widening as part of the project’s upcoming CEQA review and the intersection configuration may evolve during that process. The evaluation will also examine whether Novato Boulevard to the north of Diablo Avenue needs to be widened to two through lanes in each direction, or whether single through lanes in each direction with turn pockets, bike lanes, and pedestrian improvements would be appropriate.

Redwood Boulevard/South Novato Boulevard

- Option 1 – Signalize intersection; maintain existing lanes
or
- Option 2 – Install a single-lane roundabout; reduce all approaches to single-lanes, except for the eastbound approach which would also include a right-turn “slip” lane

This is a new improvement/mitigation that has not previously been identified.

LOS Summary Tables

The following intersection, roadway segment, and freeway Level of Service calculation summaries are being provided for your reference.

Table 1 – Existing and Existing plus Project Alternative Peak Hour Intersection Levels of Service

Study Intersection Approach	Existing Conditions				Existing plus Project Alternative			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. San Marin Dr/Simmons Ln	29.9	D	74.6	F	45.9	E	100.8	F
Mitigated: Traffic Signal	-	-	-	-	17.7	B	20.2	C
Mitigated: Roundabout	-	-	-	-	12.0	B	14.9	B
2. San Marin Dr/W Campus Dr	4.8	A	4.7	A	4.8	A	6.5	A
3. San Marin Dr/E Campus Dr	1.0	A	2.2	A	1.6	A	4.4	A
4. Redwood Blvd/San Marin Dr	29.5	C	38.2	D	35.8	D	**	F
Mitigated: Widen overpass and SB Redwood Blvd; modify intersection	-	-	-	-	28.1	C	42.4	D
5. US 101 S/San Marin Dr	12.2	B	10.1	B	14.4	B	11.6	B
6. US 101 N/Atherton Ave	13.6	B	19.7	B	17.8	B	27.1	C
7. Redwood Blvd/Olive Ave	25.8	C	28.2	C	29.6	C	36.0	D
8. Redwood Blvd/Grant Ave	14.6	B	16.7	B	16.7	B	23.3	C
9. Novato Blvd/San Marin Dr-Sutro Ave	23.8	C	59.9	F	39.8	E	89.6	F
Mitigated: Traffic Signal	-	-	-	-	25.9	C	32.9	C
Mitigated: Roundabout	-	-	-	-	7.7	A	10.1	B
10. Wilson Ave/Novato Blvd	21.7	C	18.5	B	24.6	C	21.3	C
11. Simmons Ln/Novato Blvd	47.5	D	14.1	B	47.9	D	14.4	B
12. Grant Ave/Novato Blvd	16.2	B	14.3	B	16.7	B	15.2	B
13. 7th St-Tamalpais Ave/Novato Blvd	19.5	B	26.5	C	20.0	B	29.1	C
14. Diablo Ave/Novato Blvd	35.9	D	59.2	E	63.6	E	93.5	F
Mitigated: Add SB left-turn lane and modify intersection	-	-	-	-	35.9	D	38.4	D
15. Redwood Blvd/Diablo Ave-DeLong Ave	37.9	D	31.5	C	41.5	D	41.6	D

Table 1 – Existing and Existing plus Project Alternative Peak Hour Intersection Levels of Service

Study Intersection Approach	Existing Conditions				Existing plus Project Alternative			
	AM Peak		PM Peak		AM Peak		PM Peak	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
16. DeLong Ave/Reichert Ave	21.0	C	25.1	C	21.9	C	24.8	C
17. US 101 S/DeLong Ave	10.6	B	20.2	C	20.5	C	27.1	C
18. US 101 N/DeLong Ave	11.5	B	29.5	C	12.2	B	23.7	C
19. Redwood Blvd/Lamont Ave	10.5	B	10.8	B	10.6	B	11.1	B
20. Redwood Blvd/Landing Ct	3.4	A	3.4	A	6.2	A	5.4	A
21. S Novato Blvd/Center St	15.8	B	19.9	B	15.9	B	20.0	B
22. S Novato Blvd/Arthur St	18.2	B	13.1	B	17.8	B	13.9	B
23. S Novato Blvd/Rowland Blvd	49.3	D	35.6	D	51.4	D	36.5	D
24. Redwood Blvd/Rowland Blvd	20.9	C	29.3	C	22.3	C	36.4	D
25. US 101 S/Rowland Blvd	9.0	A	13.0	B	11.2	B	17.4	B
26. US 101 N/Rowland Blvd	16.7	B	30.4	C	18.5	B	34.1	C
27. Rowland Blvd/Rowland Way	8.2	A	15.2	B	8.3	A	14.8	B
28. Rowland Blvd/Vintage Way	5.9	A	17.6	B	9.3	A	20.5	C
29. S Novato Blvd/Sunset Pkwy	29.2	C	21.5	C	38.9	D	24.3	C
30. S Novato Blvd/Redwood Blvd	**	F	33.7	D	**	F	40.2	E
Mitigated: Traffic Signal	-	-	-	-	46.6	D	17.3	B
Mitigated: Roundabout	-	-	-	-	10.9	B	7.4	A
31. Ignacio Blvd/Alameda del Prado	19.1	B	16.6	B	18.8	B	16.6	B
32. US 101 S/Ignacio Blvd-Enfrente Rd	29.0	C	22.1	C	32.7	C	23.6	C
33. US 101 N/Bel Marin Keys Blvd-Nave Dr	20.2	C	20.9	C	31.7	C	24.0	C
34. Bel Marin Keys Blvd/Commercial Blvd	7.3	A	16.9	B	7.4	A	16.3	B
35. Bel Marin Keys Blvd/Digital Dr	12.4	B	24.8	C	12.2	B	23.2	C
36. US 101 N/Nave Dr	13.6	B	13.1	B	15.5	B	14.6	B
37. Nave Dr/Hamilton Center	7.0	A	11.7	B	8.8	A	14.9	B
38. Nave Dr/N Hamilton Pkwy	16.0	B	17.0	B	18.0	B	18.5	B
39. Nave Dr/Main Gate Dr	9.9	A	9.7	A	13.1	B	15.3	B
40. Nave Dr/Bolling Dr	12.7	B	16.2	B	17.5	B	21.7	C
41. Alameda del Prado/Nave Dr (Overpass)	21.2	C	14.8	B	32.1	D	19.2	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; ** = delay greater than 120 seconds;
Bold text = deficient operation; **Shaded cells** = conditions with recommended improvements; SB=Southbound

Table 2 – Cumulative with Project Alternative Peak Hour Intersection Levels of Service

Study Intersection Approach	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
1. San Marin Dr/Simmons Ln	63.9	F	**	F
Mitigated: Traffic Signal	19.4	B	22.2	C
Mitigated: Roundabout	13.9	B	28.6	C
2. San Marin Dr/W Campus Dr	5.5	A	9.2	A
3. San Marin Dr/E Campus Dr	6.4	A	11.9	B
4. Redwood Blvd/San Marin Dr	36.2	D	**	F
Mitigated: Widen overpass and SB Redwood Blvd; modify intersection	30.4	C	48.0	D
5. US 101 S/San Marin Dr	25.5	C	20.8	C
6. US 101 N/Atherton Ave	25.8	C	65.3	E
Mitigated: Widen to provide dual left-turn lanes	31.9	C	36.4	D
7. Redwood Blvd/Olive Ave	31.2	C	36.8	D
8. Redwood Blvd/Grant Ave	17.3	B	25.1	C
9. Novato Blvd/San Marin Dr-Sutro Ave	39.0	E	**	F
Mitigated: Traffic Signal	26.4	C	28.5	C
Mitigated: Roundabout	8.9	A	11.9	B
10. Wilson Ave/Novato Blvd	26.3	C	22.2	C
11. Simmons Ln/Novato Blvd	52.0	D	14.8	B
12. Grant Ave/Novato Blvd	17.1	B	14.3	B
13. 7th St-Tamalpais Ave/Novato Blvd	21.1	C	32.0	C
14. Diablo Ave/Novato Blvd	61.2	E	111.4	F
Mitigated: Add SB left-turn lane and modify intersection	37.0	D	39.6	D
15. Redwood Blvd/Diablo Ave-DeLong Ave	42.2	D	46.2	D
16. DeLong Ave/Reichert Ave	22.2	C	25.8	C
17. US 101 S/DeLong Ave	22.6	C	23.8	C
18. US 101 N/DeLong Ave	12.1	B	25.1	C
19. Redwood Blvd/Lamont Ave	10.6	B	11.2	B
20. Redwood Blvd/Landing Ct	6.9	A	5.4	A
21. S Novato Blvd/Center St	15.9	B	20.0	C
22. S Novato Blvd/Arthur St	18.3	B	14.0	B
23. S Novato Blvd/Rowland Blvd	51.5	D	40.2	D
24. Redwood Blvd/Rowland Blvd	22.3	C	43.9	D
25. US 101 S/Rowland Blvd	11.6	B	20.4	C
26. US 101 N/Rowland Blvd	20.0	B	35.1	D

Table 2 – Cumulative with Project Alternative Peak Hour Intersection Levels of Service

Study Intersection Approach	AM Peak		PM Peak	
	Delay	LOS	Delay	LOS
27. Rowland Blvd/Rowland Way	8.4	A	15.1	B
28. Rowland Blvd/Vintage Way	9.4	A	21.2	C
29. S Novato Blvd/Sunset Pkwy	39.1	D	24.3	C
30. S Novato Blvd/Redwood Blvd	**	F	48.8	E
Mitigated: Traffic Signal	46.8	D	17.5	B
Mitigated: Roundabout	12.7	B	7.7	A
31. Ignacio Blvd/Alameda del Prado	19.1	B	17.2	B
32. US 101 S/Ignacio Blvd-Enfrente Rd	33.7	C	24.3	C
33. US 101 N/Bel Marin Keys Blvd-Nave Dr	33.3	C	24.6	C
34. Bel Marin Keys Blvd/Commercial Blvd	7.6	A	16.8	B
35. Bel Marin Keys Blvd/Digital Dr	12.3	B	25.1	C
36. US 101 N/Nave Dr	15.8	B	15.0	B
37. Nave Dr/Hamilton Center	8.9	A	16.8	B
38. Nave Dr/N Hamilton Pkwy	18.0	B	19.1	B
39. Nave Dr/Main Gate Dr	13.2	B	15.4	B
40. Nave Dr/Bolling Dr	17.4	B	22.0	C
41. Alameda del Prado/Nave Dr (Overpass)	33.6	D	19.6	C

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service; ** = delay greater than 120 seconds;
Bold text = deficient operation

Roadway Segment Operation

Table 3 – Existing and Existing plus Project Alternative PM Peak Hour Roadway Segment LOS

Study Segment Direction	Existing		Existing plus Project	
	Speed	LOS	Speed	LOS
Novato Boulevard – San Marin Drive to Eucalyptus Avenue				
Eastbound	29	A	28	A
Westbound	27	A	25	A
Novato Boulevard – Eucalyptus Avenue to Diablo Avenue				
Eastbound	22	B	20	B
Westbound	27	A	26	A
S. Novato Boulevard – Diablo Avenue to US 101				
Northbound	26	A	22	B
Southbound	30	A	30	A
Bel Marin Keys Drive – US 101 to Digital Drive				
Eastbound	18	C	18	C
Westbound	19	C	19	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Table 4 – Cumulative with Project Alternative PM Peak Hour Roadway Segment Levels of Service

	Speed	LOS
Novato Boulevard – San Marin Drive to Eucalyptus Avenue		
Eastbound	26	A
Westbound	21	B
Novato Boulevard – Eucalyptus Avenue to Diablo Avenue		
Eastbound	18	C
Westbound	25	A
S. Novato Boulevard – Diablo Avenue to US 101		
Northbound	21	B
Southbound	29	A
Bel Marin Keys Drive – US 101 to Digital Drive		
Eastbound	17	C
Westbound	19	C

Notes: Speed is measured in miles per hour; LOS = Level of Service

Freeway Operation

Table 5 – Peak Hour Freeway Operation within City of Novato

Freeway Segment	Existing Conditions		Existing plus Project Alternative	
	AM	PM	AM	PM
US 101 Northbound				
Density	12.0	28.2	13.4	30.8
LOS	B	F ¹	B	F¹
US 101 Southbound				
Density	39.1	17.7	41.1	19.6
LOS	F ¹	B	F¹	C
SR 37 Eastbound				
Density	7.9	18.2	8.2	18.9
LOS	A	C	A	C
SR 12 Westbound				
Density	17.4	9.8	18.0	10.4
LOS	B	A	B	A

Notes: Density is measured in passenger cars per mile per lane; LOS = Level of Service; **Bold** values = Project increases density by greater than 1% on segment operating at LOS E or worse; ¹ Per HCM guidance, LOS F is reported if one or more individual components of the freeway operates at LOS F, even if the freeway segment overall has an average density that indicates a higher LOS

Table 6 – Cumulative with Project Alternative Peak Hour Freeway Operation within City of Novato

Freeway Segment	AM	PM
US 101 Northbound		
Density	14.6	32.8
LOS	B	F ¹
US 101 Southbound		
Density	46.3	19.9
LOS	F	C
SR 37 Eastbound		
Density	8.7	21.1
LOS	A	C
SR 12 Westbound		
Density	19.5	11.2
LOS	C	B

Notes: Density is measured in passenger cars per mile per lane; LOS = Level of Service; ¹ Per HCM guidance, LOS F is reported if one or more individual components of the freeway operates at LOS F, even if the freeway segment overall has an average density that indicates a higher LOS