Chapter 4 Alternative Analysis Intro

1 What alternatives were considered?

Alternatives to improve I-5 traffic operations included 10 northbound alternatives (N1-N10), 6 southbound alternatives (S1-S6), and 5 reversible roadway alternatives (R1-R5). Each alternative was initially evaluated separately to determine the traffic operations benefits as a stand alone improvement. This section provides a one to two page summary for each of the stand alone improvement projects.

The alternatives were then grouped into logical combinations to evaluate the added traffic operations benefit of considering several improvements together. Combination alternatives included 5 in the northbound direction (NC1-NC5), and 4 in the southbound direction (SC1-SC4). A one to two page summary is also provided for each of the combination alternatives.

2 What was evaluated for each alternative?

A project description, identification of potential benefits and impacts, and implementation challenges are identified for each alternative. Project benefits focus on travel speed, travel time, and overall congestion in the vicinity of the improvement. A design analysis has not been undertaken for all the alternatives; therefore, how each alternative might be implemented will require further study. Some alternatives may require significant deviations from accepted roadway geometric design standards and may have high associated construction costs.

3 What were the analysis results?

A summary of the analysis results for each alternative are shown on Exhibits 4-1 and 4-2 for the individual alternatives, and on Exhibit 4-3 for the combination alternatives.

Exhibit 4-1 Draft AM Peak Period Results

AM Peak Period Results

Alternative	Description	Study Segment	Segment Length (miles)	AM Period (5:00 AM to 10:00 AM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Northbound Mainline									
N1	Manage NB HOV lane operations north of Spokane Street	NB Mainline - Interurban Ave to n/o I90	8.8	23	19	-17%	18	15	-17%
N2	Meter NB Spokane Street On-Ramp	NB Mainline - s/o Spokane Off to n/o I-5 CD Off	2.4	17	31	82%	16	20	25%
		NB Mainline - Interurban Ave to n/o I90	8.8	23	44	91%	18	23	28%
N3	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD	NB Mainline - Interurban Ave to n/o I90	8.8	23	49	113%	18	29	61%
N4	Add a second lane to the NB I-5 CD roadway between the I90 EB Off-ramp and Dearborn Street On-Ramp	NB I-5 CD - Begin to End	1.5	28	30	7%	24	26	8%
		NB Mainline - Interurban Ave to n/o I90	8.8	23	23	0%	18	18	0%
N5	Add a NB lane between Seneca Street Off and SR 520 Off	n/o Seneca Off to s/o SR 520 Off	2.4	47	52	11%	41	51	24%
		Interuban Avenue to 205th Street	21.8	33	33	0%	29	29	0%
		n/o SR 520 Off to n/o Ravenna	2.1	58	59	2%	58	58	0%
		NB Mainline - n/o I-5 CD Off to n/o SR 520 Off	3.5	23	23	0%	20	22	10%
N6	Shift NB Mercer Street On-Ramp from left to right side	NB Mainline - n/o Seneca Off to s/o Ravenna Off	3.5	52	53	2%	47	51	9%
N7	Add a transit-only shoulder lane between Olive Way On-Ramp and SR520 Off-Ramp	NB Mainline - n/o Olive On to s/o SR 520 Off (Transit Vehicles)	1.4	43	53	23%	32	52	63%
N8	Add a transit-only shoulder lane between Olive Way On-Ramp and SR520 Off-Ramp and Meter the Olive Way On-Ramp	NB Mainline - n/o Seneca off to n/o SR520 Off	2.5	47	55	17%	41	52	27%
N9	Add a NB mainline lane between SR 520 On-Ramp and NE 45th Off-Ramp	NB Mainline n/o SR 520 On to s/o Ravenna Off	1.7	59	60	2%	59	59	0%
N10	Add a NB mainline lane between Ravenna Boulevard and Northgate Way	NB Mainline - s/o 45th Off to n/o 130th Off	4.7	59	60	2%	59	60	2%
Southbound Mainline									
S1	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp	SB Mainline - s/o Northgate On to s/o 45th On	3.5	23	28	22%	20	27	35%
S2	Add a SB mainline lane between s/o SR 520 On-Ramp and s/o Spokane Street On-Ramp	SB Mainline - s/o 85th On to s/o Spokane Street	8.7	53	56	6%	52	55	6%
S3	Shift SB SR 520 On and Off ramps from left hand side to right hand side	SB Mainline - s/o Northgate On to n/o Union Off	6.5	26	40	54%	23	37	61%
S4	Manage SB HOV Lane Operations between Mercer Street and Spokane Street	SB Mainline - s/o 85th On to s/o Corson	10.4	34	36	6%	32	34	6%
S5	Meter SB Yale On-Ramp	SB Mainline - s/o SR 520 to n/o Forest Street	4.2	53	53	0%	52	52	0%
S6	Add a second lane to SB I-5 CD south of I90 Off-Ramp	SB I-5 CD - Begin to End	1.4	55	55	0%	55	55	0%

Exhibit 4-1 Draft AM Peak Period Results (continued)

AM Peak Period Results

Alternative	Description	Study Segment	Segment Length (miles)	AM Period (5:00 AM to 10:00 AM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Reversible Lanes									
R1	Add a second lane along the south end portion of the Reversible lanes to maintain two lanes to/from the Mainline	Reversible Lanes - s/o 42nd Street to End	3.7	41	55	34%	44	55	25%
R2	Add an HOV ramp connection between reversible lanes and SR 520	Reversible Lanes - s/o Ravenna On to End (AM)	4.4	43	41	-5%	46	41	-11%
R3	Modify Stewart to HOV-only and Cherry/Columbia to GP (all lanes open to GP south of Stewart Street Off-Ramp)	Reversible Lanes - s/o 42nd Street to End	3.7	41	54	32%	44	54	23%
R4	Modify Stewart to HOV-only and Pine/Pike to GP	Reversible Lanes - s/o 42nd Street to End	3.7	41	41	0%	44	44	0%
R5	Modify Stewart to HOV-only (Pine/Pike & Cherry/Columbia remain HOV-only)	Reversible Lanes - s/o 42nd Street to End	3.7	41	24	-41%	44	32	-27%

Legend:

- Short-term projects with traffic operational benefits
- Long-term projects with traffic operational benefits
- Projects with little or no traffic operational benefits or have constructability/feasibility issues

Exhibit 4-2 PM Peak Period Results

PM Peak Period Results

Alternative	Description	Study Segment	Segment Length (miles)	PM Period (2:30 PM to 7:30 PM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Northbound Mainline									
N1	Manage NB HOV lane operations north of Spokane Street	NB Mainline - Interurban Ave to n/o I90	8.8	40	40	0%	26	28	8%
N2	Meter NB Spokane Street On-Ramp	NB Mainline - s/o Spokane Off to n/o I-5 CD Off	2.4	24	55	129%	20	31	55%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	58	45%	26	41	58%
N3	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD	NB Mainline - Interurban Ave to n/o I90	8.8	40	58	45%	26	51	96%
N4	Add a second lane to the NB I-5 CD roadway between the I90 EB Off-ramp and Dearborn Street On-Ramp	NB I-5 CD - Begin to End	1.5	33	40	21%	17	21	24%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	40	0%	26	23	-12%
N5	Add a NB lane between Seneca Street Off and SR 520 Off	n/o Seneca Off to s/o SR 520 Off	2.4	40	57	43%	31	43	39%
		Interurban Avenue to 205th Street	21.8	37	37	0%	25	25	0%
		n/o SR 520 Off to n/o Ravenna	2.1	44	38	-14%	32	27	-16%
		NB Mainline - n/o I-5 CD Off to n/o SR 520 Off	3.5	30	35	17%	26	28	8%
N6	Shift NB Mercer Street On-Ramp from left to right side	NB Mainline - n/o Seneca Off to s/o Ravenna Off	3.5	40	40	0%	31	33	6%
N7	Add a transit-only shoulder lane between Olive Way On-Ramp and SR520 Off-Ramp	NB Mainline - n/o Olive On to s/o SR 520 Off (Transit Vehicles)	1.4	30	54	80%	23	53	130%
N8	Add a transit-only shoulder lane between Olive Way On-Ramp and SR520 Off-Ramp and Meter the Olive Way On-Ramp	NB Mainline - n/o Seneca off to n/o SR520 Off	2.5	40	56	40%	31	55	77%
N9	Add a NB mainline lane between SR 520 On-Ramp and NE 45th Off-Ramp	NB Mainline n/o SR 520 On to s/o Ravenna Off	1.7	41	42	2%	30	30	0%
N10	Add a NB mainline lane between Ravenna Boulevard and Northgate Way	NB Mainline - s/o 45th Off to n/o 130th Off	4.7	42	44	5%	29	34	17%
Southbound Mainline									
S1	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp	SB Mainline - s/o Northgate On to s/o 45th On	3.5	25	37	48%	13	13	0%
S2	Add a SB mainline lane between s/o SR 520 On-Ramp and s/o Spokane Street On-Ramp	SB Mainline - s/o 85th On to s/o Spokane Street	8.7	23	55	139%	17	53	212%
S3	Shift SB SR 520 On and Off ramps from left hand side to right hand side	SB Mainline - s/o Northgate On to n/o Union Off	6.5	19	30	58%	13	17	31%
S4	Manage SB HOV Lane Operations between Mercer Street and Spokane Street	SB Mainline - s/o 85th On to s/o Corson	10.4	24	55	129%	19	53	179%
S5	Meter SB Yale On-Ramp	SB Mainline - s/o SR 520 to n/o Forest Street	4.2	23	50	117%	20	26	30%
S6	Add a second lane to SB I-5 CD south of I90 Off-Ramp	SB I-5 CD - Begin to End	1.4	42	42	0%	39	39	0%

Exhibit 4-2 PM Peak Period Results (continued)

PM Peak Period Results

Alternative	Description	Study Segment	Segment Length (miles)	PM Period (2:30 PM to 7:30 PM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Reversible Lanes									
R1	Add a second lane along the south end portion of the Reversible lanes to maintain two lanes to/from the Mainline	Reversible Lanes - Begin to s/o 42nd Street Off	3.7	57	34	-40%	20	17	-15%
		NB Mainline n/o I-5 CD Off to SR 520 Off	3.7	28	42	50%	25	35	40%
		NB Mainline n/o I-5 CD Off to Reversible s/o 42nd Off	4.6	33	37	12%	18	19	6%
R2	Add an HOV ramp connection between reversible lanes and SR 520	Reversible Lanes - Begin to Ravenna Off (PM)	4.4	46	41	-11%	29	28	-3%
R3	Modify Stewart to HOV-only and Cherry/Columbia to GP	Reversible Lanes - Begin to s/o 42nd Street Off	3.7	57	57	0%	20	22	10%
R4	Modify Stewart to HOV-only and Pine/Pike to GP	Reversible Lanes - Begin to s/o 42nd Street Off	3.7	57	52	-9%	20	20	0%
R5	Modify Stewart to HOV-only (Pine/Pike & Cherry/Columbia remain HOV-only)	Reversible Lanes - Begin to s/o 42nd Street Off	3.7	57	59	4%	20	24	20%

Legend:

Short-term projects with traffic operational benefits
Long-term projects with traffic operational benefits
Projects with little or no traffic operational benefits or have constructability/feasibility issues

Exhibit 4-3 Combo Results

Combo Results

Alternative	Description	Study Segment	Segment Length (miles)	PM Period (2:30 PM to 7:30 PM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Northbound Mainline									
NC1	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD, Add a NB lane between Seneca Street Off and SR 520 Off, Add a NB mainline lane between Ravenna Boulevard and Northgate Way	NB Mainline - Interurban Ave to 205th Street	21.8	37	44	19%	25	30	20%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	59	48%	26	52	100%
		NB Mainline - Ravenna to 205th Street	7.8	37	38	3%	29	31	7%
NC2	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD, Add a NB lane between Seneca Street Off and SR 520 Off, Add a NB mainline lane between Ravenna Boulevard and Northgate Way, Meter Olive Way On-Ramp	NB Mainline - Interurban Ave to 205th Street	21.8	37	52	41%	25	34	36%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	59	48%	26	52	100%
		NB Mainline - Ravenna to 205th Street	7.8	37	48	30%	29	34	17%
NC3	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD, Add a NB lane between Seneca Street Off and Northgate Way	NB Mainline - Interurban Ave to 205th Street	21.8	37	45	22%	25	29	16%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	59	48%	26	52	100%
		NB Mainline - Ravenna to 205th Street	7.8	37	39	5%	29	27	-7%
NC4	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD, Add a NB lane between Seneca Street Off and 205th Street	NB Mainline - Interurban Ave to 205th Street	21.8	37	55	49%	25	42	68%
		NB Mainline - Interurban Ave to n/o I90	8.8	40	59	48%	26	52	100%
		NB Mainline - Ravenna to 205th Street	7.8	37	56	51%	29	54	86%
Southbound Mainline									
SC1	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp, Meter Yale Avenue On-Ramp	SB Mainline - 205th Street to Interurban Avenue	21.8	32	54	69%	21	37	76%
SC2	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp, Meter Yale Avenue On-Ramp, Add a second lane to SB I-5 CD south of I90 Off-Ramp	SB Mainline - 205th Street to Interurban Avenue	21.8	32	54	69%	21	37	76%
SC3	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp, Meter Yale Avenue On-Ramp, Manage SB HOV Lane Operations between Mercer Street and Corson Avenue	SB Mainline - 205th Street to Interurban Avenue	21.8	32	55	72%	21	54	157%
SC4	Add a SB mainline lane between 85th St Off-Ramp and SR 522 On-Ramp, Manage SB HOV Lane Operations between Mercer Street and Corson Avenue	SB Mainline - 205th Street to Interurban Avenue	21.8	32	55	72%	21	54	157%

Alternative	Description	Study Segment	Segment Length (miles)	AM Period (5:00 AM to 10:00 AM)					
				2004 Average Speed (mph)			2030 Average Speed (mph)		
				No-Build	Build	Percent Difference	No-Build	Build	Percent Difference
Northbound Mainline									
NC5	Braid Spokane Street NB On-ramp with exit ramp to I-5 CD, Add a NB lane between Seneca Street Off and 45th	NB Mainline - Interurban Ave to 205th Street	21.8	33	49	48%	29	39	34%
		NB Mainline - Interurban Ave to n/o I90	8.8	23	49	113%	18	31	72%

Alternative N1: Manage Northbound High-Occupancy Vehicle Lanes

1. What is the project?

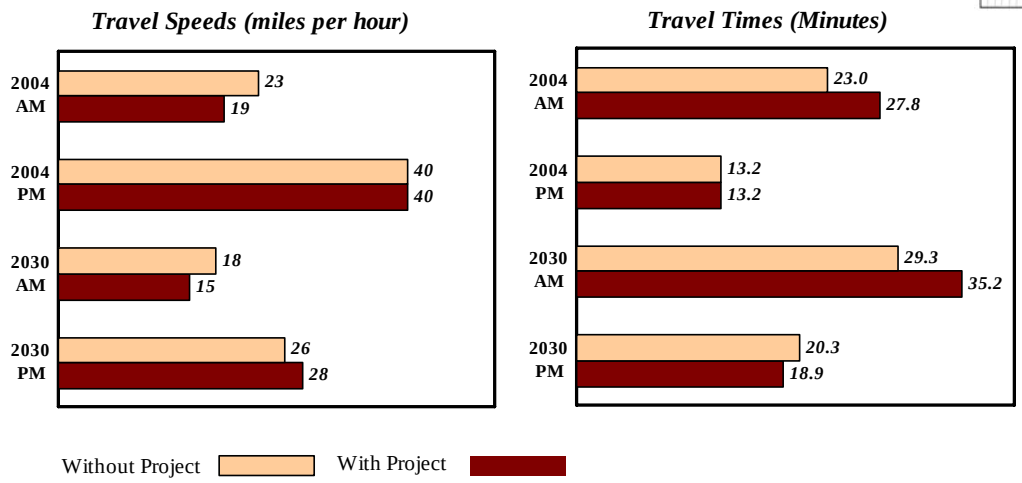
The project would allow general-purpose traffic to use the existing high-occupancy vehicle (HOV) lane along northbound I-5 between I-90 and S Spokane Street during high-volume time periods. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would increase the traffic volume on the existing northbound I-5 HOV lane north of S Spokane Street. This lane near S Dearborn Street allows general-purpose traffic to exit to the reversible roadway (PM peak only).

During the morning commute period, added general-purpose traffic merging into the mainline lanes would slightly worsen traffic operations along the I-5 corridor between Interurban Avenue and I-90. During the evening commute period, the project would have negligible benefits to travel speeds and travel times along the I-5 corridor between Interurban Avenue and I-90. The charts below show how the project would change average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Northbound Mainline: Interurban Avenue to n/o I90 (8.8 miles)



3. What are the implementation challenges with this project?

Constructing the project would not pose a challenge. However, allowing general-purpose traffic to use an existing HOV lane may be viewed by some as counter to the long standing policy of encouraging HOV use by providing travel time and reliability advantages over general purpose-traffic.

Alternative N2: Meter Northbound Spokane Street On-Ramp

1. What is the project?

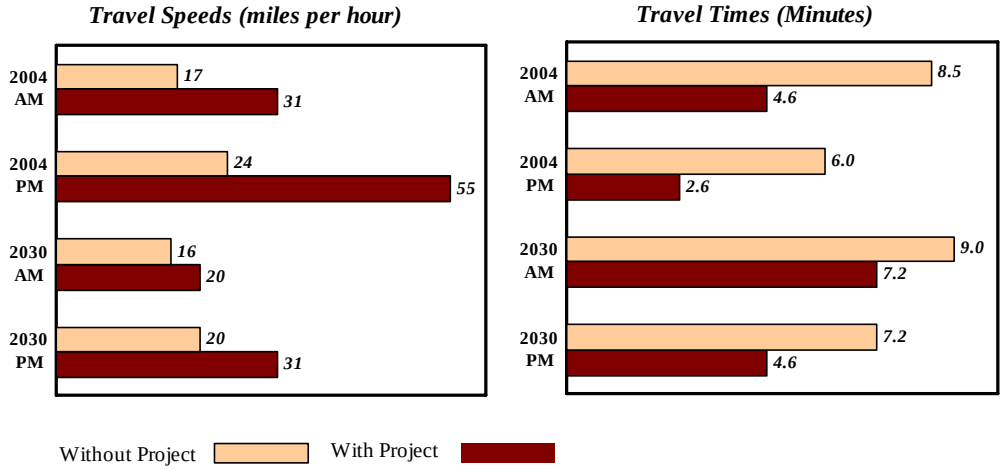
The project would provide a ramp meter on the S Spokane Street on-ramp to control the amount of traffic entering northbound I-5. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The S Spokane Street ramp meter would reduce traffic volumes on northbound I-5, improving travel speeds and travel times along the corridor between S Spokane Street and I-90. The charts below show the improved average travel speeds and travel times along the I-5 study segment that the project would create during the peak 5-hour morning and evening commute periods.

The project would lower on-ramp volumes by approximately 600 to 700 vehicles per hour on the S Spokane Street on-ramp during peak periods. This restriction would divert most of this traffic to other local streets and highways and thereby increase local traffic congestion on those roadways. Some of the major roadways that may experience more traffic congestion due to this project include S Spokane Street, Alaskan Way Viaduct, 1st Avenue S, 4th Avenue S, and Airport Way S.

Study Segment - I5 Northbound Mainline: S Spokane Street to I90 (2.4 miles)



3. What are the implementation challenges with this project?

Because the project would divert a significant amount of S. Spokane Street traffic to other local roadways during peak periods, appropriate mitigation measures should be evaluated on those roadways prior to installing a ramp meter on the S Spokane Street on-ramp. In addition, the northbound on-ramp has limited storage capacity and vehicle queues forming behind the ramp meter could impact other traffic on the Spokane Street Viaduct.

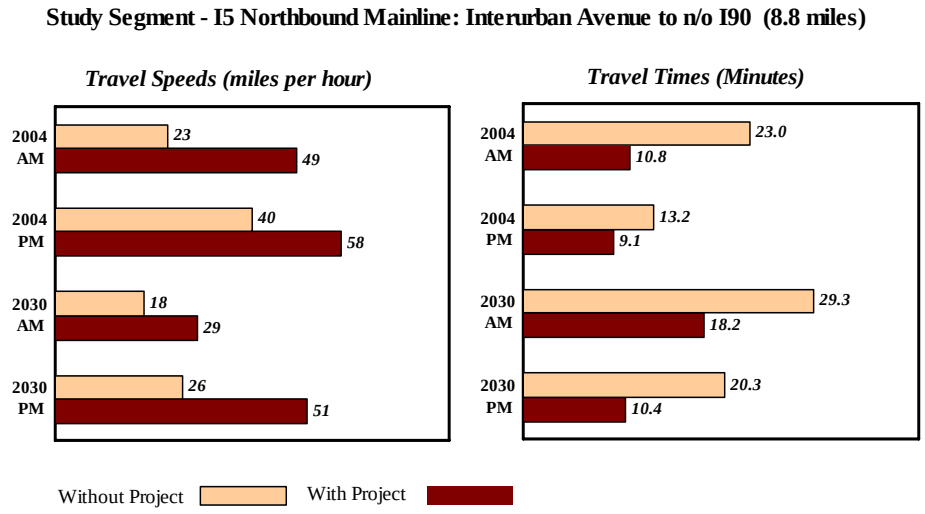
Alternative N3: Braid Northbound S Spokane Street On-Ramp with the Existing I-5 Collector-Distributor Road

1. What is the project?

The project would close the existing I-5 exit ramp to the northbound I-5 Collector-Distributor road and braid the Spokane Street on-ramp with the northbound I-5 Collector-Distributor road. This would extend the northbound I-5 Collector-Distributor road south to S Spokane Street. The project would also provide three exiting lanes at the northbound Spokane Street/Columbian Way exit ramp. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would remove the major weave segment on northbound I-5 between the S Spokane Street/Columbian Way on-ramp and the I-5 Collector-Distributor off-ramp. This would improve travel speeds and travel times significantly along the I-5 corridor between Interurban Avenue and I-90. The charts below show how the project benefits average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.



3. What are the implementation challenges with this project?

Project costs would be high due to a significant amount of structure and retaining walls for the new ramp. Construction phasing and traffic control would also be a challenge. Environmental impacts are unknown at this point and given the scale of the project could become a consideration.

Alternative N4: Northbound I-5 Collector-Distributor Road Improvements

1. What is the project?

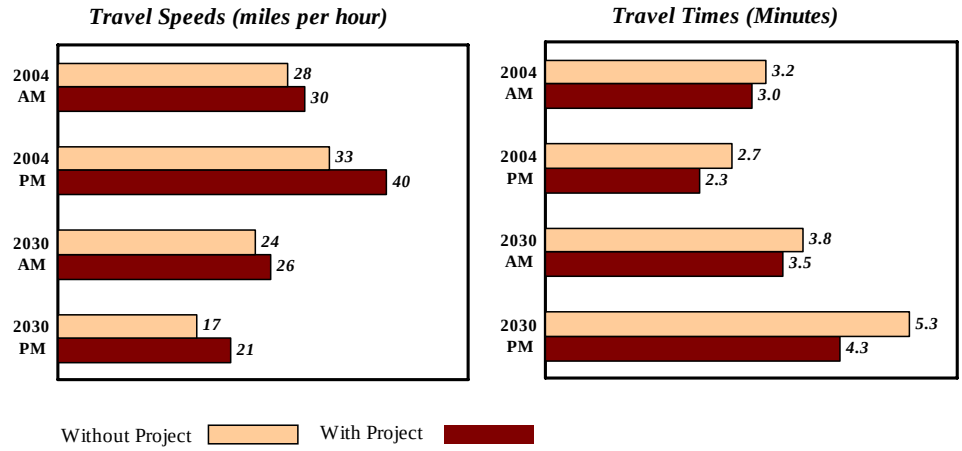
The project would add a second lane along the northbound I-5 Collector-Distributor (CD) road between the I-90 eastbound off-ramp and the S Dearborn Street on-ramp. The project would also change the S Dearborn Street on-ramp configuration from an add lane to a merge lane along the I-5 CD road. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would improve traffic operations somewhat along the I-5 CD road. The chart below shows the resulting improved average travel speeds and travel times along the northbound I-5 CD road during the peak 5-hour morning and evening commute periods.

The existing lane configuration of the I-5 CD exit ramp includes two lanes. One lane drops to I-90 and the second lane continues onto the CD. This lane configuration underutilizes the capacity of the I-5 CD exit ramp and therefore causes vehicles queuing from the I-5 CD exit to spill back onto the I-5 mainline. The project would allow both exit lanes to be used to reach the CD and would increase the lane utilization and capacity of the I-5 CD exit ramp. The project would also provide additional storage space along the northbound I-5 CD during peak periods when queued vehicles spill back onto the I-5 mainline.

Study Segment - Northbound I5 CD: Begin to End (1.5 miles)



3. What are the implementation challenges with this project?

The construction costs would be relatively low because of the project's short distance. The project would require some short-term detours or ramp closures.

Alternative N5: Add a Northbound Lane between Seneca Street and SR 520

1. What is the project?

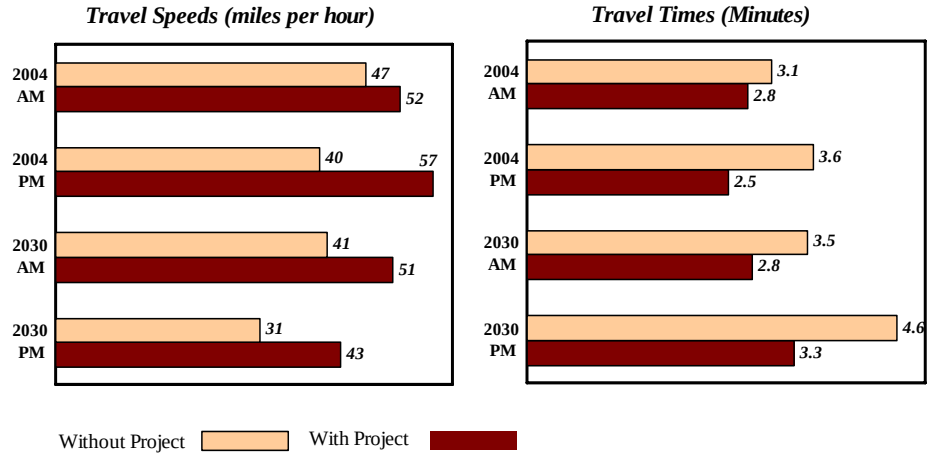
The project would add a northbound mainline lane between Seneca Street and SR 520. The additional lane would end at the SR 520 off-ramp, resulting in two lanes dropping to SR 520. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

With additional capacity from the added lane, the project would improve travel speeds and travel times along the section of I-5 between Seneca Street and SR 520. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

With increased a higher vehicle discharge flow rate through the section of I-5 between Seneca Street and SR 520, the downstream sections north of SR 520 would experience higher traffic volumes and lower travel speeds during the PM peak period. The travel speeds between SR 520 and Ravenna Boulevard would drop by approximately 15 percent during the PM peak period. Added benefit to travel speeds and travel times would exist if this project was combined with Alternatives N9 and N10.

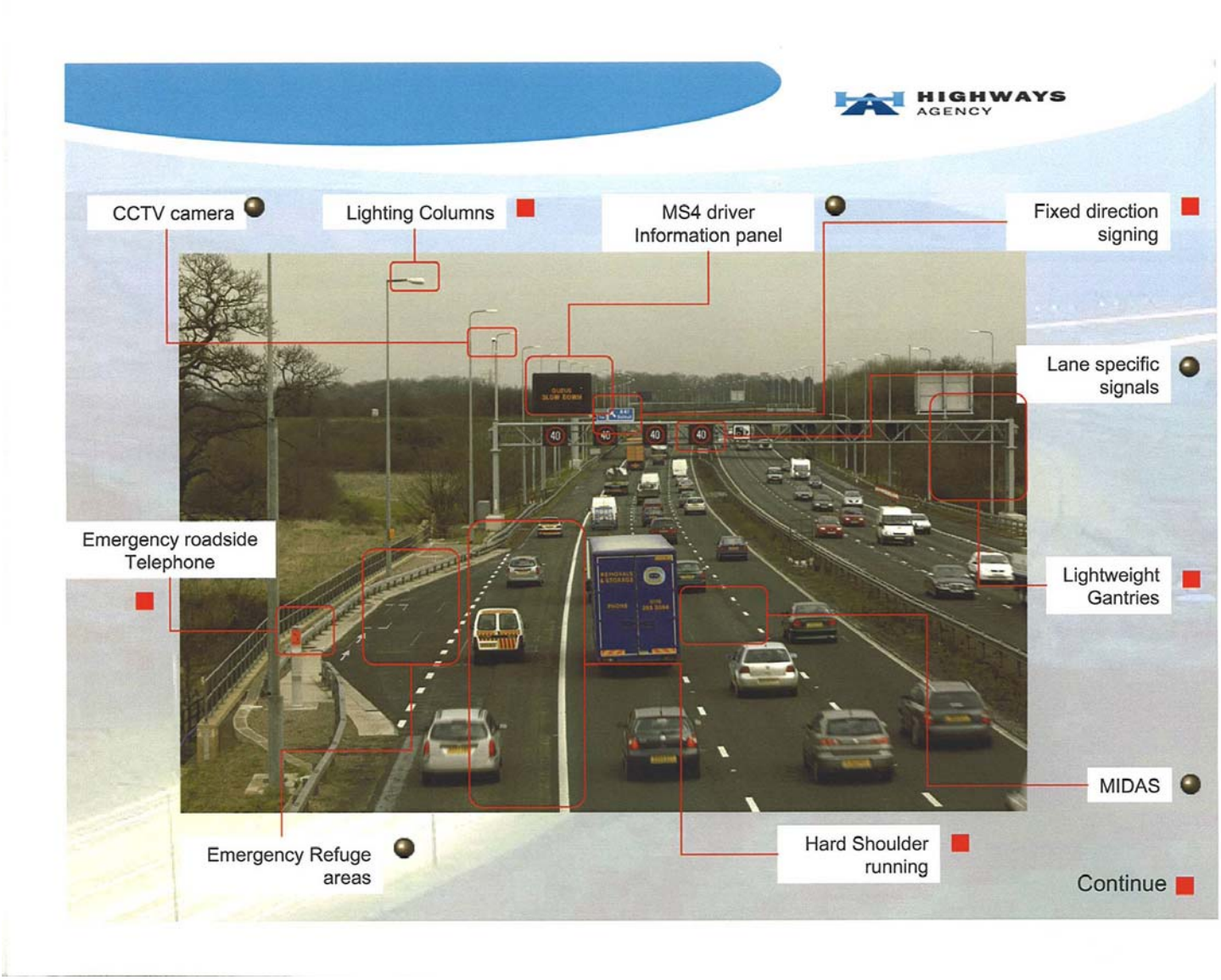
Study Segment - I5 Northbound Mainline: Seneca Street to SR 520 (2.4 miles)



3. What are the implementation challenges with this project?

The project would require more significant design standard deviations compared to the current configuration, including limited shoulder widths. Active traffic management concepts such as reducing travel speeds during high-volume periods and closing the outside lane during lower-volume periods are being explored to minimize the impact of the design standard deviations. Some examples of active traffic management concepts that have been implemented in Europe are shown in the following figure.

Exhibit- Active Traffic Management Concepts



Alternative N6: Shift Northbound Mercer Street On-Ramp

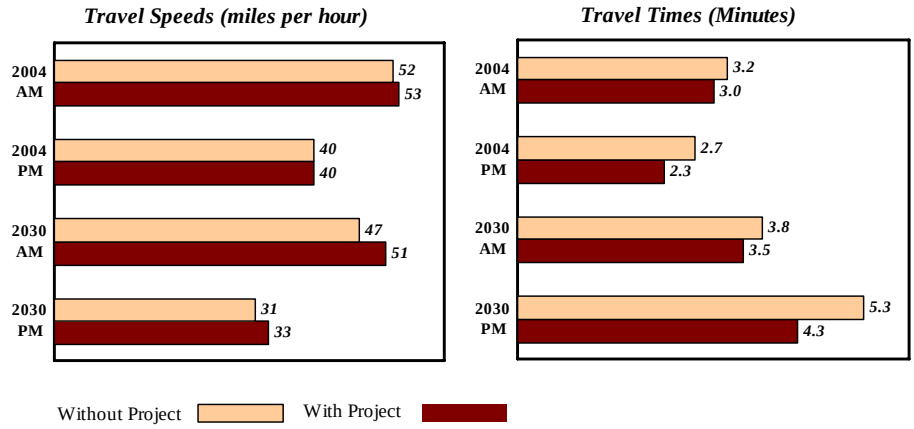
1. What is the project?

The project would shift the existing northbound Mercer Street on-ramp to enter the freeway mainline from the right side instead of the left side. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would not completely stop the weaving activity between Mercer Street and SR 520 and therefore would slightly improve travel speeds and travel times along I-5 between Seneca Street and Ravenna Boulevard. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Northbound Mainline: Seneca Street to Ravenna Boulevard (3.5 miles)



3. What are the implementation challenges with this project?

Construction costs would be high because the ramp modification would require a tunnel under I-5. In addition, the project has the potential to have short term and/or long term environmental and possibly community impacts given the constrained environment.

Alternative N7: Add a Northbound Transit-Only Shoulder Lane between Olive Way and SR 520

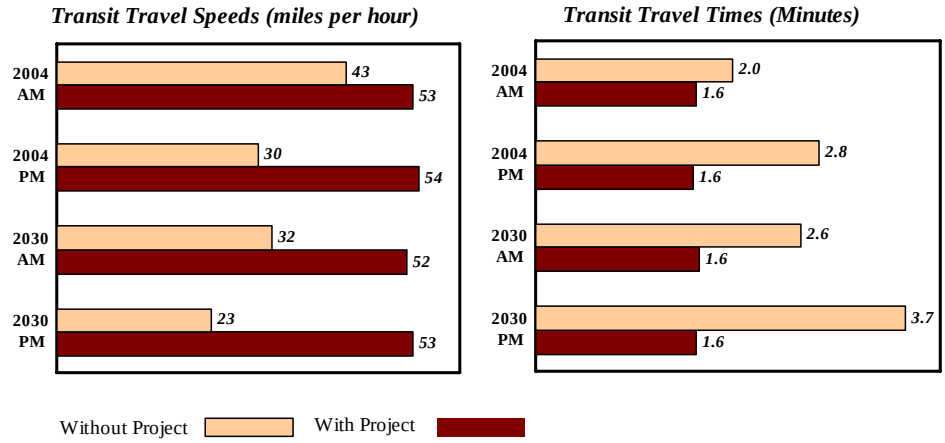
1. What is the project?

The project would add a transit-only northbound shoulder lane between Olive Way and SR 520 during weekday peak periods. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The transit-only lane would allow transit vehicles to bypass any traffic congestion on I-5 between Olive Way and SR 520, which would significantly improve travel speeds and travel times for the transit vehicles. The charts below show the resulting improved average travel speeds and travel times for transit along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Northbound Mainline: Olive Way to SR 520 (1.5 miles)



3. What are the implementation challenges with this project?

During peak periods, the existing shoulder lane on northbound I-5 north of Olive Way would be used by transit vehicles only and would not be available for emergency use. The project would not require any significant construction on I-5.

Alternative N8: Add a Northbound Transit-Only Shoulder Lane between Olive Way and SR 520 and Meter Olive Way On-Ramp

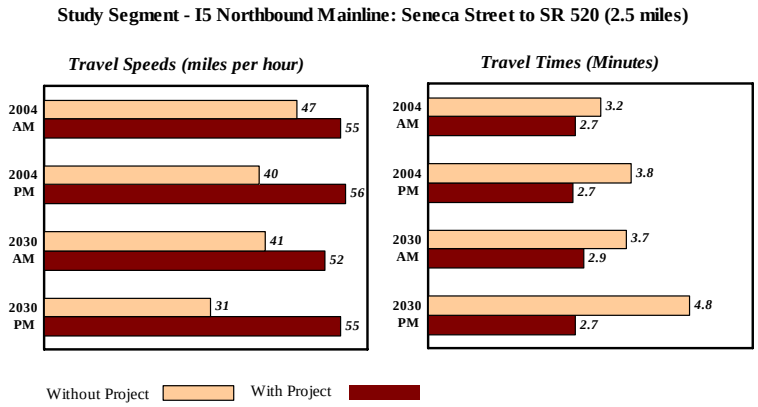
1. What is the project?

The project would add a transit-only northbound shoulder lane between Olive Way and SR 520 and also turn on the existing ramp meter on the Olive Way on-ramp to control the amount of traffic entering northbound I-5. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The transit-only lane would allow transit vehicles to bypass any traffic congestion along the I-5 corridor between Olive Way and SR 520, which would significantly improve travel speeds and travel times for the transit vehicles. The Olive Way ramp meter would reduce the traffic volumes on northbound I-5 and therefore improve traffic operations for all vehicles traveling between Seneca Street and SR 520. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

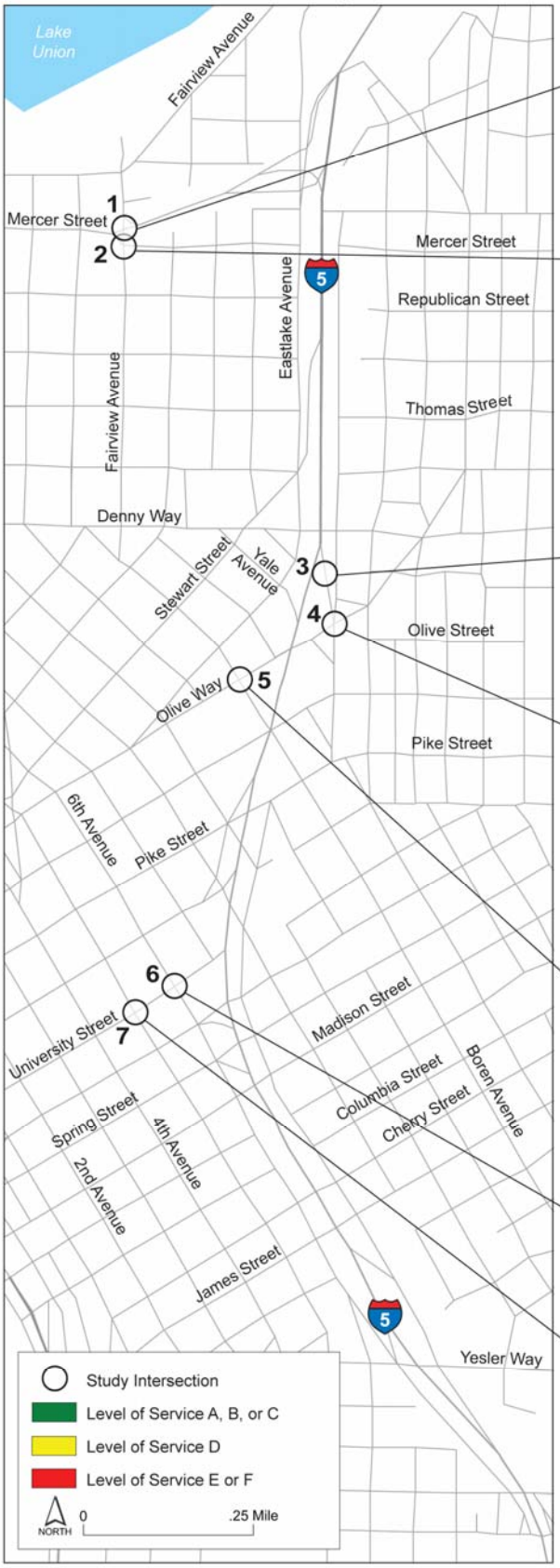
The project would restrict approximately 400 to 500 vehicles per hour on the Olive Way on-ramp during evening peak periods. This restriction would divert some traffic to other local streets and thereby increase the traffic congestion on those roadways. Some of the major roadways that may experience more traffic congestion due to this project are shown on the figure on the next page and include Mercer Street, University Street, and 5th Avenue.

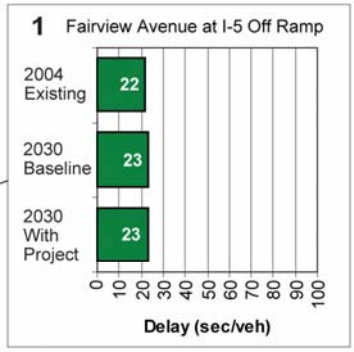


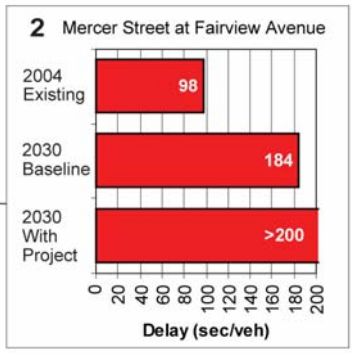
3. What are the implementation challenges with this project?

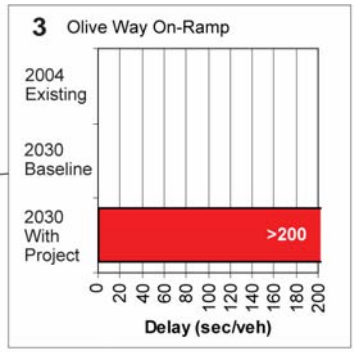
Because the project would divert some Olive Way traffic to other local roadways during peak periods, appropriate mitigation measures should be evaluated on those roadways prior to turning on the ramp meter on the Olive Way on-ramp. In addition, the ramp has limited storage space and queues that might develop behind the meter could interfere with transit and HOV access to the ramp as well as impede through movements on Olive Way.

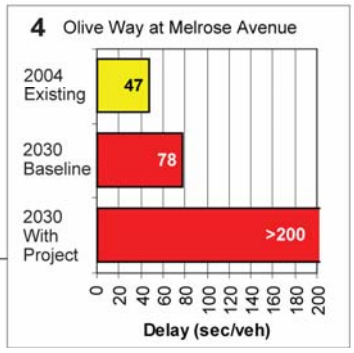
Alternative N8 Weekday PM Peak Hour Level of Service and Delay Results

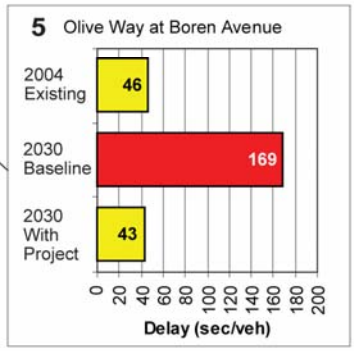


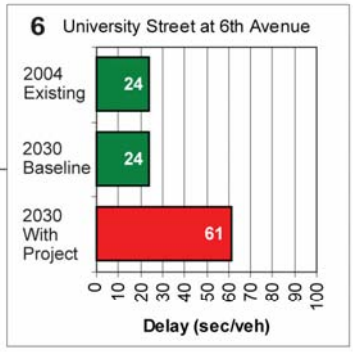


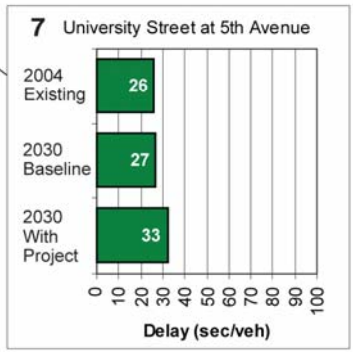












Alternative N9: Add a Northbound Lane between SR 520 and NE 45th Street

1. What is the project?

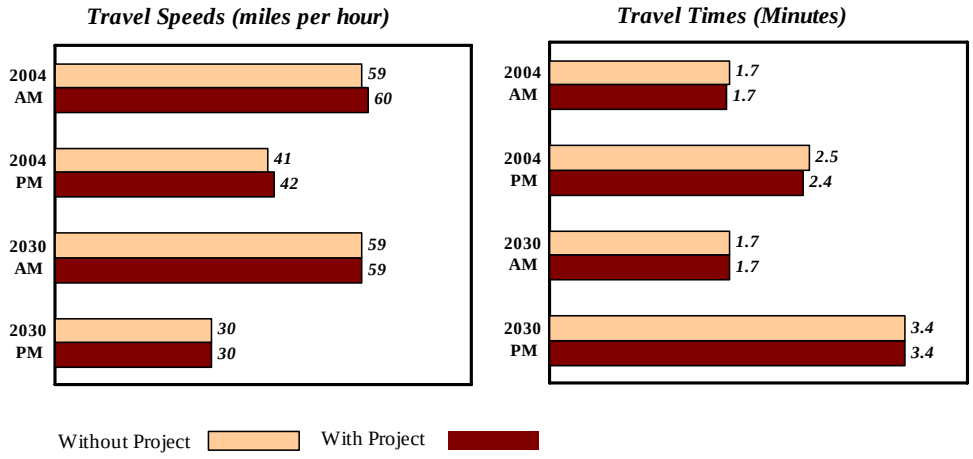
The project would add a northbound mainline lane between SR 520 and NE 45th Street, ending as a drop lane to NE 45th Street. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

With an additional lane and capacity, the project would improve travel speeds and travel times along the section of I-5 between SR 520 and NE 45th Street.

The project would increase the vehicle discharge rate through the section of I-5 between SR 520 and NE 45th Street, causing the downstream sections north of NE 45th Street to experience higher traffic volumes and lower travel speeds. Overall, the project would result in negligible improvement of traffic operations along the I-5 corridor between SR 520 and Ravenna Boulevard. The charts below show the resulting average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods. Travel speeds and travel times would improve more if this project were combined with Alternatives N5 and N10.

Study Segment - I5 Northbound Mainline: SR 520 to Ravenna Boulevard (1.7 miles)



3. What are the implementation challenges with this project?

This project requires widening the Ship Canal Bridge, which would be costly. Construction phasing and staging to maintain traffic flow through the area would also be challenging.

Alternative N10: Add a Northbound Lane between Ravenna Boulevard and NE Northgate Way

1. What is the project?

The project would add a northbound mainline lane between Ravenna Boulevard and NE Northgate Way, terminating just north of the NE Northgate Way interchange. The adjacent figure shows the project area.

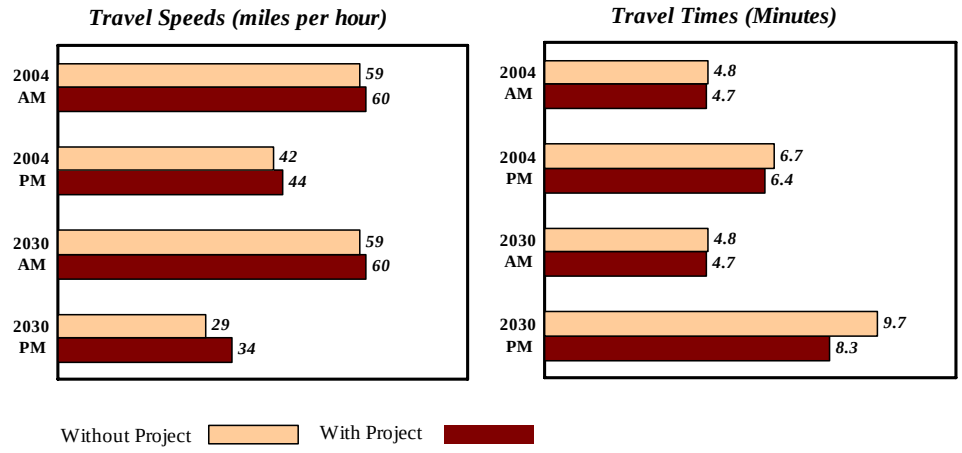
2. What are the potential benefits and impacts of this project?

With an additional lane and capacity, the project would improve travel speeds and travel times along the section of I-5 between Ravenna Boulevard and NE Northgate Way.

The project would increase vehicle discharge flow rate through the section of I-5 between Ravenna Boulevard and NE Northgate Way, causing the downstream sections north of NE Northgate Way to experience higher traffic volumes and lower travel speeds. Overall, the project would improve traffic operations somewhat during peak periods along the I-5 corridor between NE 45th Street and N 130th Street.

The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods. Travel speeds and travel times would improve more if this project were combined with Alternatives N5 and N9.

Study Segment - I5 Northbound Mainline: NE 45th Street to NE 130th Street (4.7 miles)



3. What are the implementation challenges with this project?

To widen approximately 3 miles of the corridor, the project would need to reconstruct several structures and retaining walls. Project costs would be high. Portions of this section of I-5 will be impacted by Sound Transit's planned Light Rail extension to Northgate. Constructing both projects concurrently may result in some cost savings.

Alternative S1: Add a Southbound Mainline between NE 85th Street and SR 522

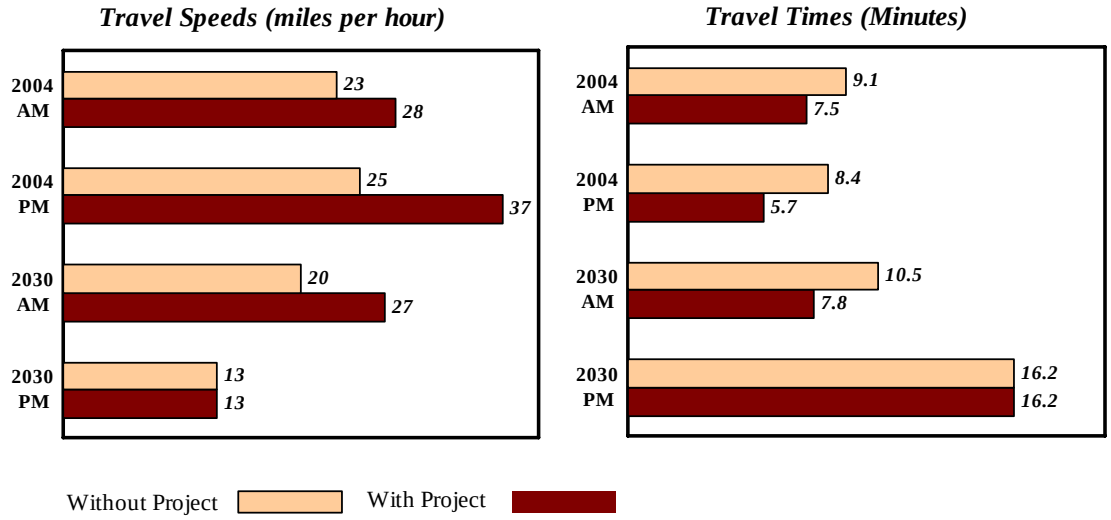
1. What is the project?

The project would add a southbound mainline lane between NE 85th Street and SR 522. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would provide an additional lane and capacity along the segment between NE 85th Street and SR 522. The project would improve travel speeds and travel times along the section of I-5 between NE Northgate Way and NE 45th Street, especially during the AM peak period. Under 2030 PM peak hour traffic conditions, vehicle queues that begin downstream of the project location are so severe that they extend north of NE Northgate Way. Therefore, the project would not improve traffic operations in the study area without other improvements such as Alternative S2. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Southbound Mainline: NE Northgate Way to NE 45th Street (3.5 miles)



3. What are the implementation challenges with this project?

This widening project would reconstruct several structures and retaining walls. The project costs would be moderate.

Alternative S2: Add a Southbound Mainline Lane between SR 520 and S Spokane Street

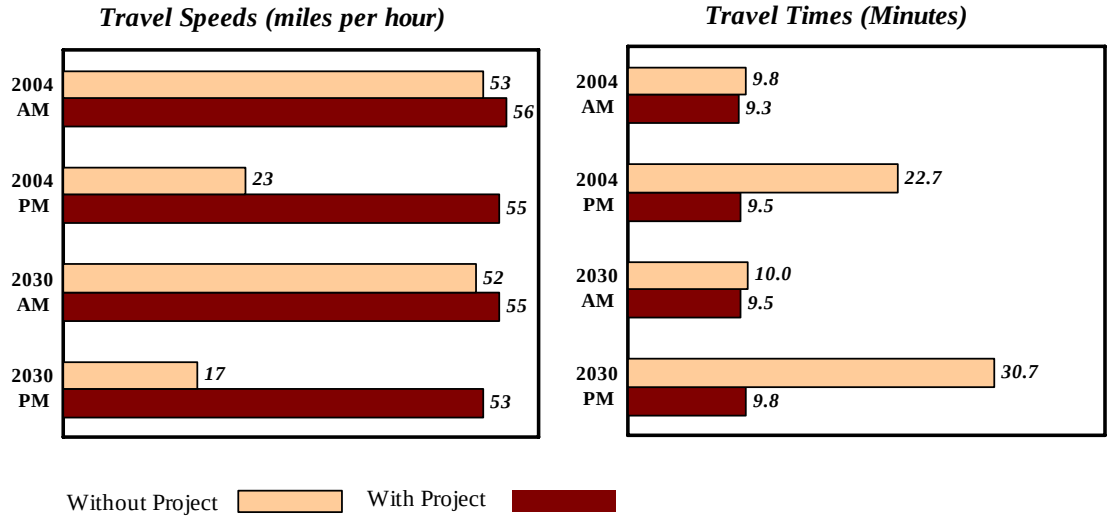
1. What is the project?

The project would add a southbound mainline lane between SR 520 and S Spokane Street. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

With an additional lane and capacity, the project would improve travel speeds and travel times significantly along the section of I-5 between NE 85th Street and S Spokane Street. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Southbound Mainline: NE 85th Street to S Spokane Street (8.7 miles)



3. What are the implementation challenges with this project?

Widening over 5 miles of the I-5 corridor through Downtown Seattle would be costly. Several structures and retaining walls would be reconstructed. Construction phasing and staging to maintain traffic flow through the area would also be challenging.

Alternative S3: Shift Southbound SR 520 Ramps

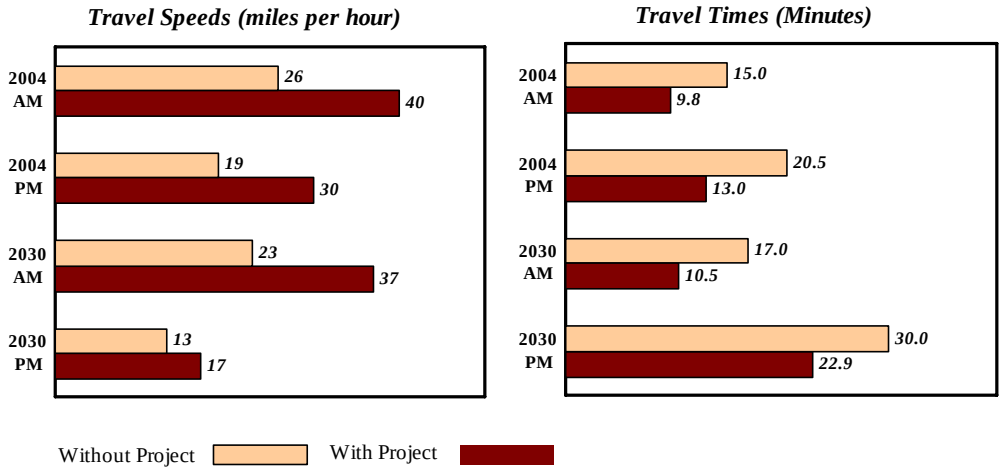
1. What is the project?

The project would shift the existing southbound SR 520 on- and off-ramps from the left side to the right side. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The project would substantially improve the major weave segment along southbound I-5 between the NE 45th/50th Street on-ramps and the SR 520 off-ramp across the Ship Canal Bridge. The project would also improve the major weave segment between the SR 520 on-ramp and the Mercer Street off-ramp. This would improve the travel speeds and travel times significantly along the I-5 corridor between NE Northgate Way and Union Street. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

Study Segment - I5 Southbound Mainline: NE Northgate Way to Union Street (6.5 miles)



3. What are the implementation challenges with this project?

The project costs would be high. New overpasses or tunnels would likely need to be constructed for the ramp connections. In addition, the project might have environmental and community impacts given the very tight constraints in the area.

Alternative S4: Manage Southbound High-Occupancy Vehicle Lane

1. What is the project?

The project would allow general-purpose (GP) traffic to use the existing high-occupancy vehicle (HOV) lane along southbound I-5 between Mercer Street and Corson Avenue during high-volume periods. The adjacent figure shows the project area.

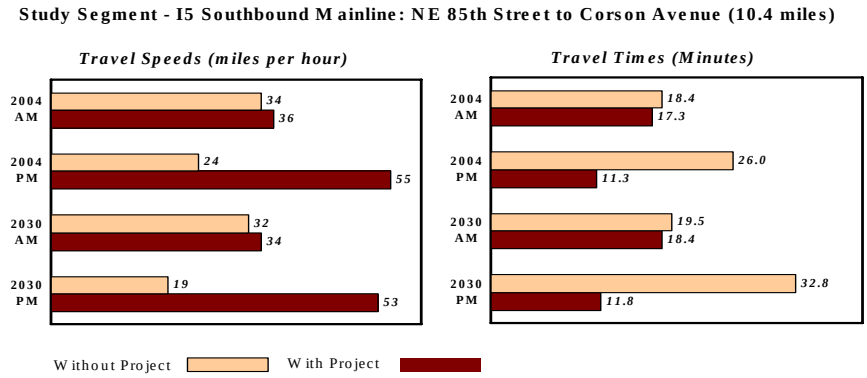
2. What are the potential benefits and impacts of this project?

The existing lane configuration along southbound I-5 south of the Mercer Street on-ramp results in the following major weave movements:

- Mercer Street on-ramp GP vehicles are forced to weave to GP lanes.
- I-5 southbound HOVs weave to the HOV lane that starts at the Mercer Street on-ramp.
- Yale on-ramp HOVs weave to the HOV lane.
- Some of the Mercer Street on-ramp vehicles weave to downtown exits.

Other weaving movements between the Yale on-ramp and Union and Columbia/James off-ramps compound the weaving activity in this area and cause congestion to occur.

The project would significantly reduce the first three weaving movements identified above. This would reduce the traffic congestion, improve safety, and improve travel speeds and travel times significantly along southbound I-5 between NE 85th Street and Corson Avenue. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak five-hour morning and evening commute periods.



3. What are the implementation challenges with this project?

Allowing GP traffic in an HOV lane has some sight distance and design speed constraints. Active traffic management concepts such as reducing travel speeds during high-volume periods and closing the outside lane during lower-volume periods are being explored to minimize the impact of the design deficiencies of the existing HOV lane. Allowing GP traffic to use an existing HOV lane may also be viewed by some as counter to the long standing policy of encouraging HOV use by providing travel time and reliability advantages over GP traffic.

Alternative S5: Meter Southbound Yale Avenue On-Ramp

1. What is the project?

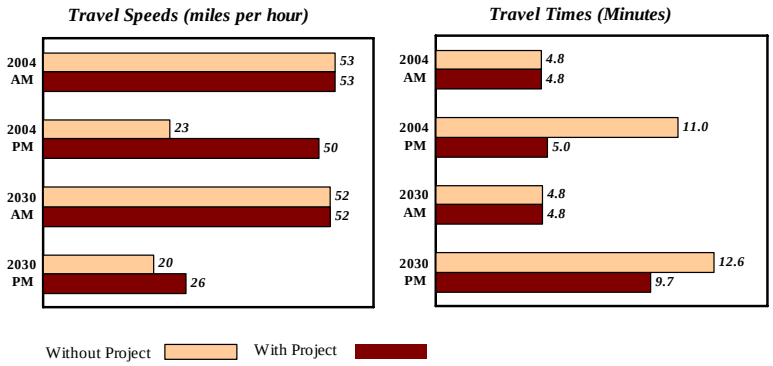
The project would provide a ramp meter on the Yale Avenue on-ramp to control the amount of traffic entering southbound I-5. The adjacent figure shows the project area.

2. What are the potential benefits and impacts of this project?

The Yale Avenue ramp meter would reduce the traffic volume through this complex weaving section on the I-5 southbound corridor and therefore improve the travel speeds and travel times along southbound I-5 between SR 520 and S Forest Street. The charts below show the resulting improved average travel speeds and travel times along the I-5 study segment during the peak 5-hour morning and evening commute periods.

The project would restrict approximately 300 to 500 vehicles per hour on the Yale Avenue on-ramp during peak periods. This restriction would divert most of this traffic to other local streets and highways and thereby increase the traffic congestion on those roadways. The figures on the following pages show intersection level of service and delay for some of the affected local streets during the AM and PM peak hours. Some of the major roadways that may experience more traffic congestion due to this project include Spring Street and 5th Avenue.

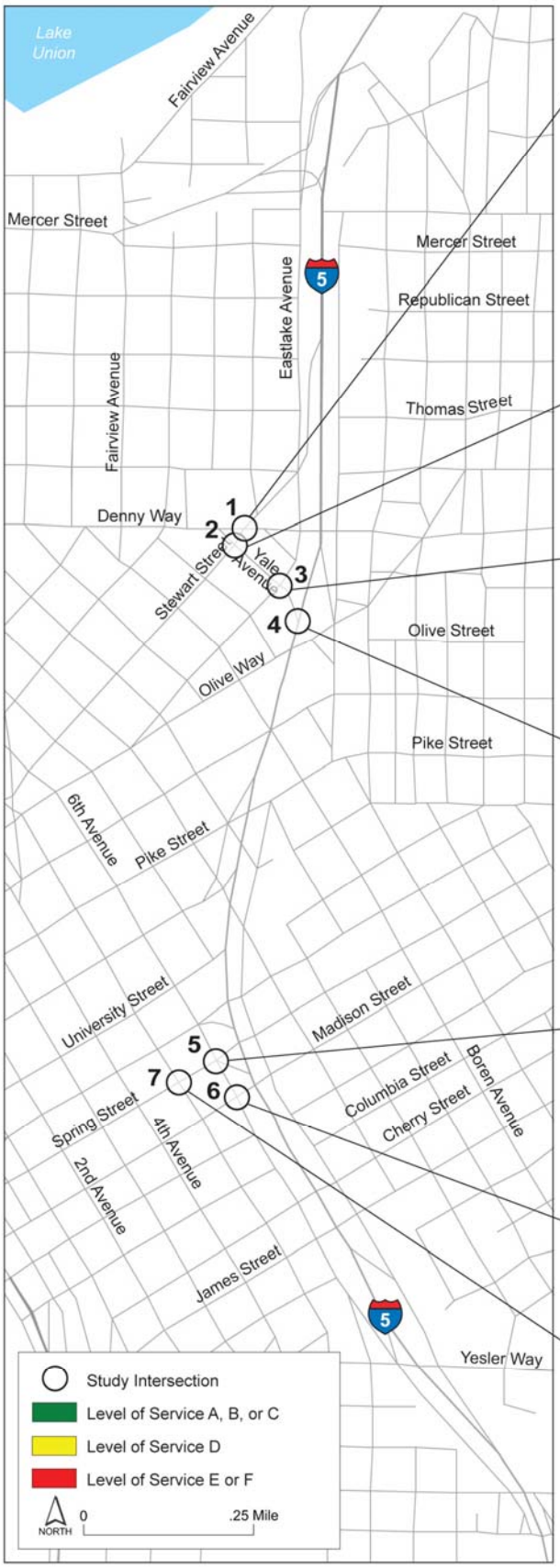
Study Segment - I5 Southbound Mainline: SR 520 to S Forest Street (4.2 miles)

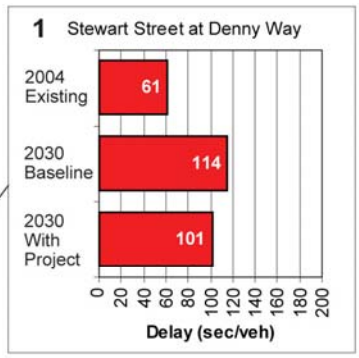


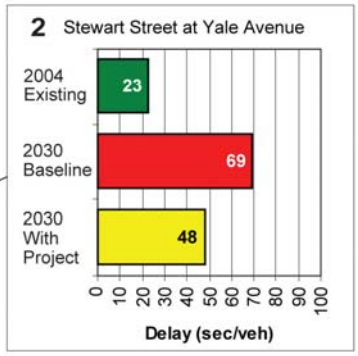
3. What are the implementation challenges with this project?

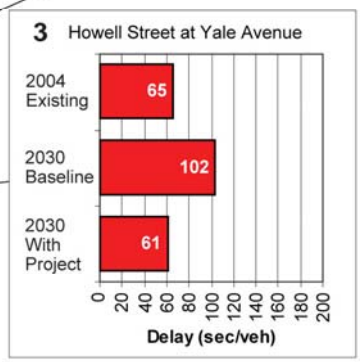
Because the project would divert some Yale Avenue traffic to other local roadways during peak periods, appropriate mitigation measures should be evaluated on these roadways prior to installing a ramp meter on the Yale Avenue on-ramp. In addition, ramp storage is very limited and queues that develop behind the meter may interfere with other traffic movements along Yale Avenue and Howell Street, as well as possibly Denny Way and Stewart Street.

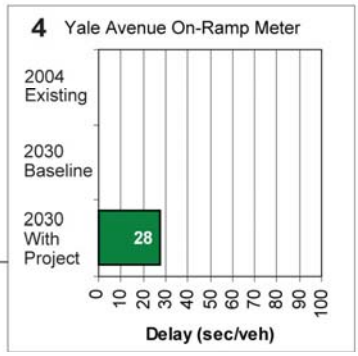
Alternative S5 Weekday AM Peak Hour Level of Service and Delay Results

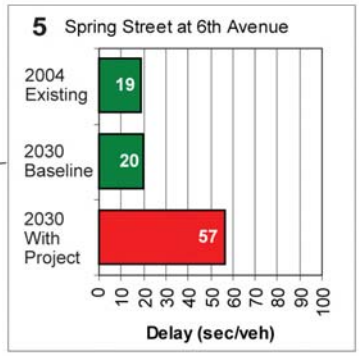


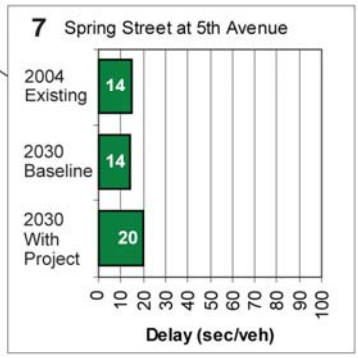
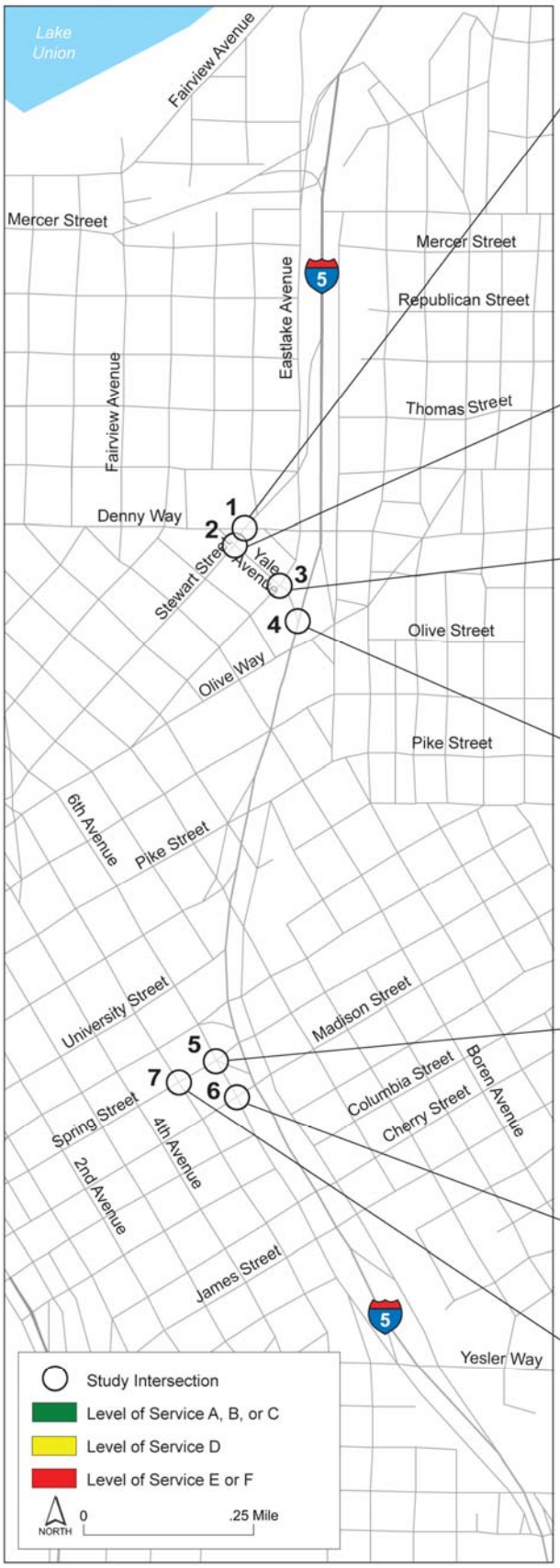
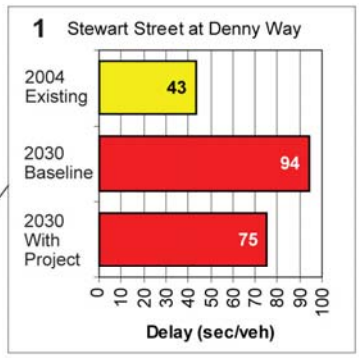
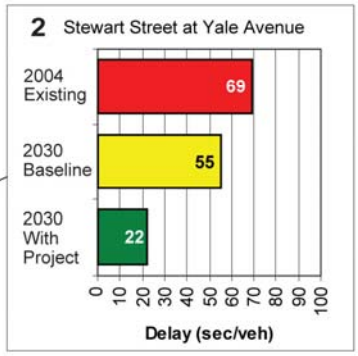
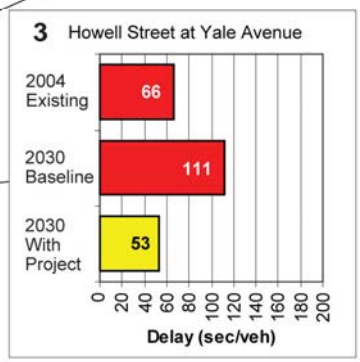
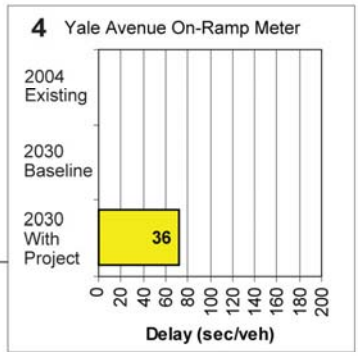
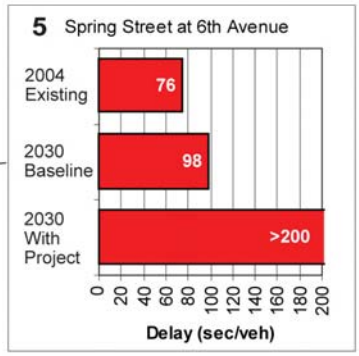
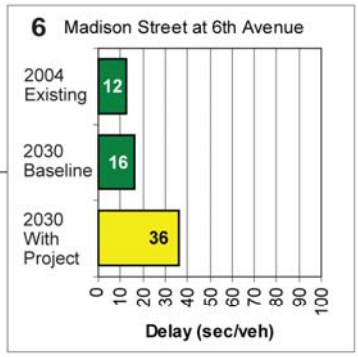
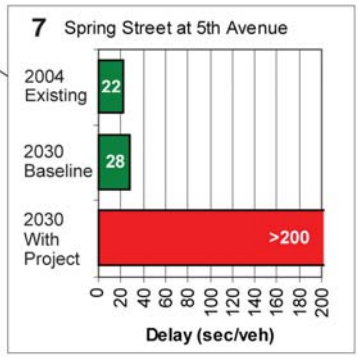












Alternative S5 Weekday PM Peak Hour Level of Service and Delay Results