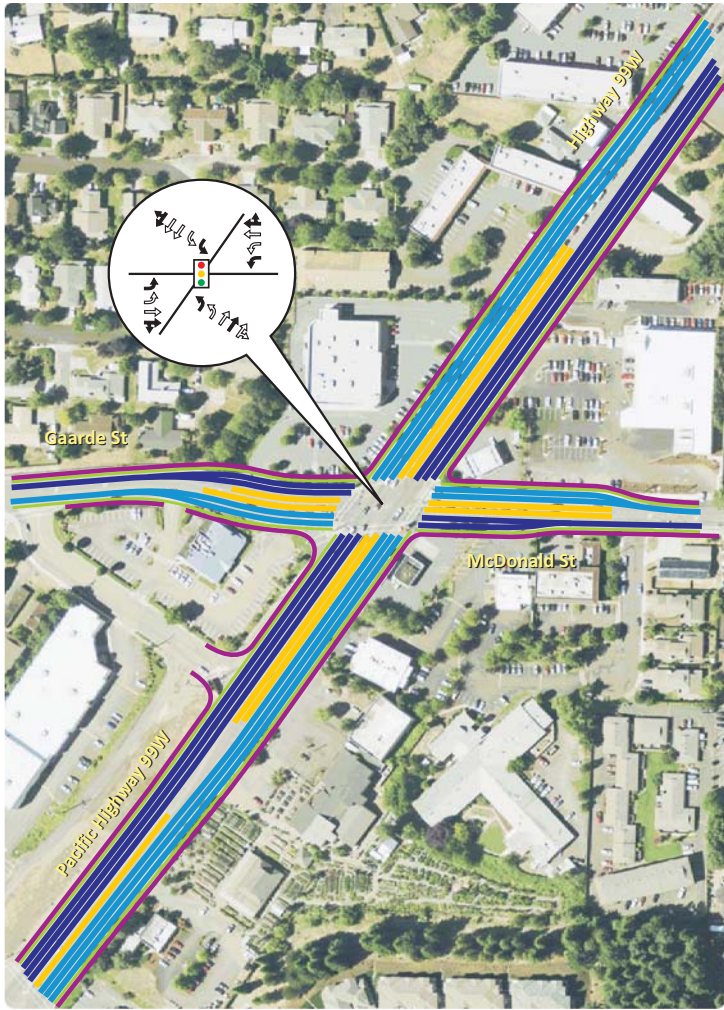


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design

CONCEPT
A

Concept A: Widen All Approaches

DESCRIPTION: This concept widens both Pacific Hwy 99W and SW Gaarde Street/SW McDonald Street by adding one through lane and one additional left turn pocket for each approach.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

COMPARISON TO NO-BUILD

Signalized Intersections

Number of Travel Lanes

Improvement to Overall Capacity

SAME

Pacific Hwy 99W:

+1 Thru
+1 Turn

Gaarde Street:

+1 Thru
+1 Turn

McDonald Street:

+1 Thru
+1 Turn

PM PEAK

**+39%
UP**

AM PEAK

**+34%
UP**

PROS

- Provides new capacity for all intersection movements

CONS

- Right-of-way needs for all approaches
- Longer pedestrian crossings on all legs of the intersection
- Potential lane-drop bottleneck north of intersection on Pacific Hwy 99W

COST ESTIMATE:



ROW ESTIMATE:

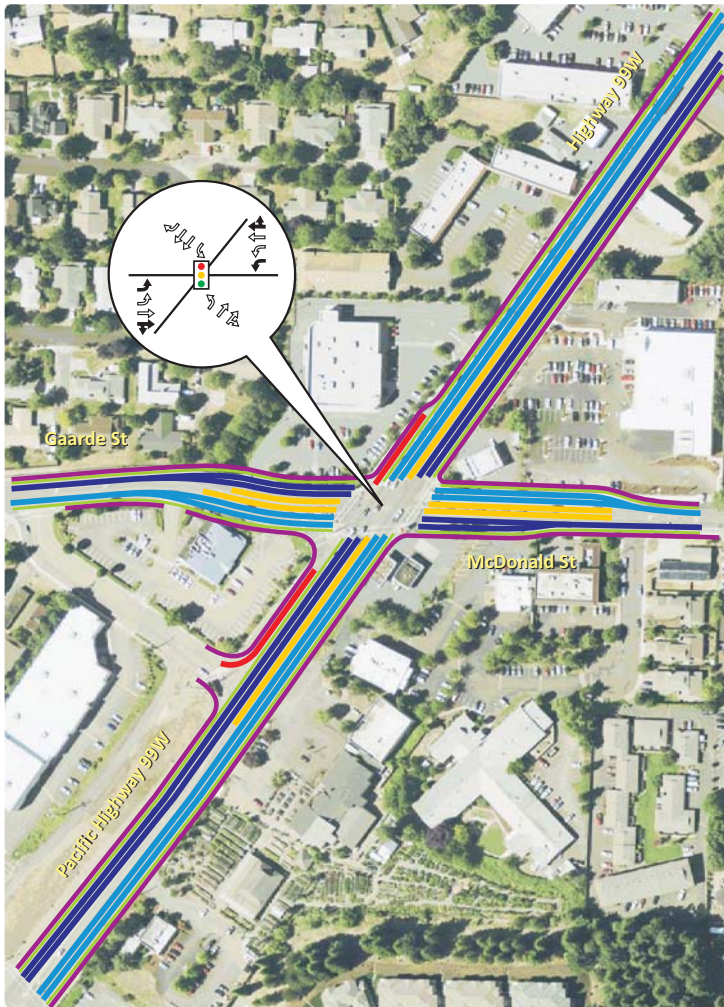


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design

CONCEPT
B

Concept B: Widen Gaarde/McDonald Streets

DESCRIPTION: This concept widens SW Gaarde Street and SW McDonald Street by adding one through lane and one additional left turn pocket for each approach. The approaches on Pacific Hwy 99W remain unchanged.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

COMPARISON TO NO-BUILD

Signalized Intersections

Number of Travel Lanes

Improvement to Overall Capacity

SAME

Pacific Hwy 99W: SAME

Gaarde Street: +1 Thru
+1 Turn

McDonald Street: +1 Thru
+1 Turn

PM PEAK	AM PEAK
+12% UP	+13% UP

PROS

- Provides new capacity for SW Gaarde Street and SW McDonald Street
- Allows for more green time for Pacific Hwy 99W

CONS

- Right-of-way needs along SW Gaarde and McDonald Streets
- Longer pedestrian crossings on SW Gaarde and McDonald Streets
- Less capacity improvement than other concepts

COST ESTIMATE:



ROW ESTIMATE:

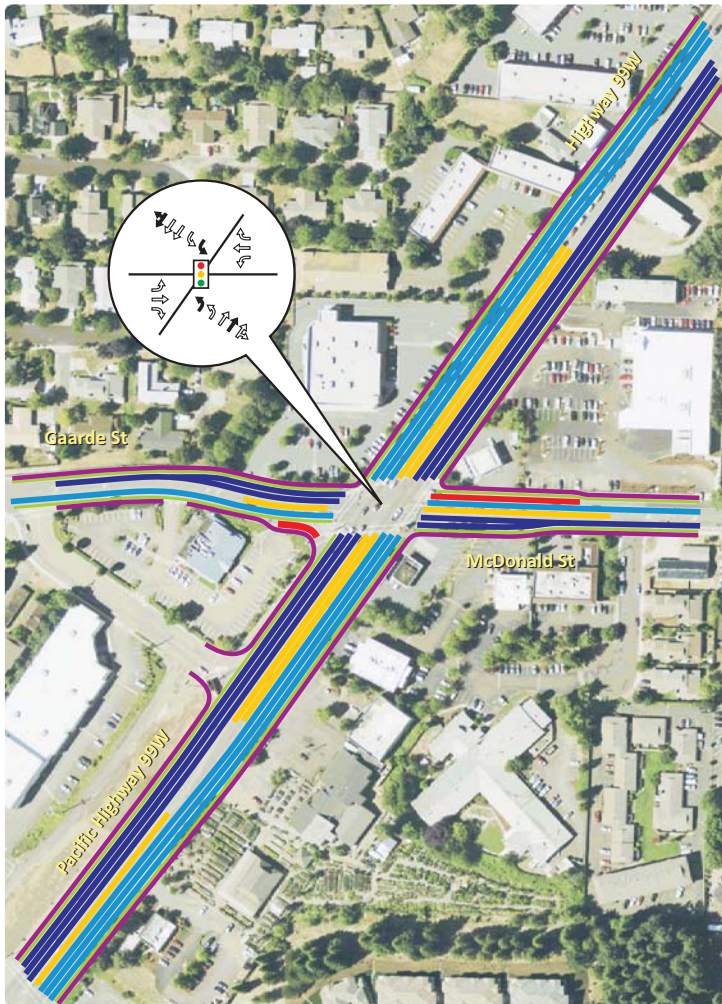


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design



Concept C: Widen Pacific Hwy 99W

DESCRIPTION: This concept widens Pacific Hwy 99W by adding an additional lane in each direction. The approaches on SW Gaarde Street and SW McDonald Street remain unchanged.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

COMPARISON TO NO-BUILD

Signalized Intersections

Number of Travel Lanes

Improvement to Overall Capacity

SAME

Pacific Hwy 99W:

Gaarde Street:

McDonald Street:

PM PEAK AM PEAK



PROS

- Provides new capacity for Pacific Hwy 99W
- Allows for more green time for SW Gaarde Street and SW McDonald Street

CONS

- Right-of-way needs along 99W
- Longer pedestrian crossings on Pacific Hwy 99W
- Potential lane-draop bottleneck north of intersection on Pacific Hwy 99W

COST ESTIMATE:



ROW ESTIMATE:

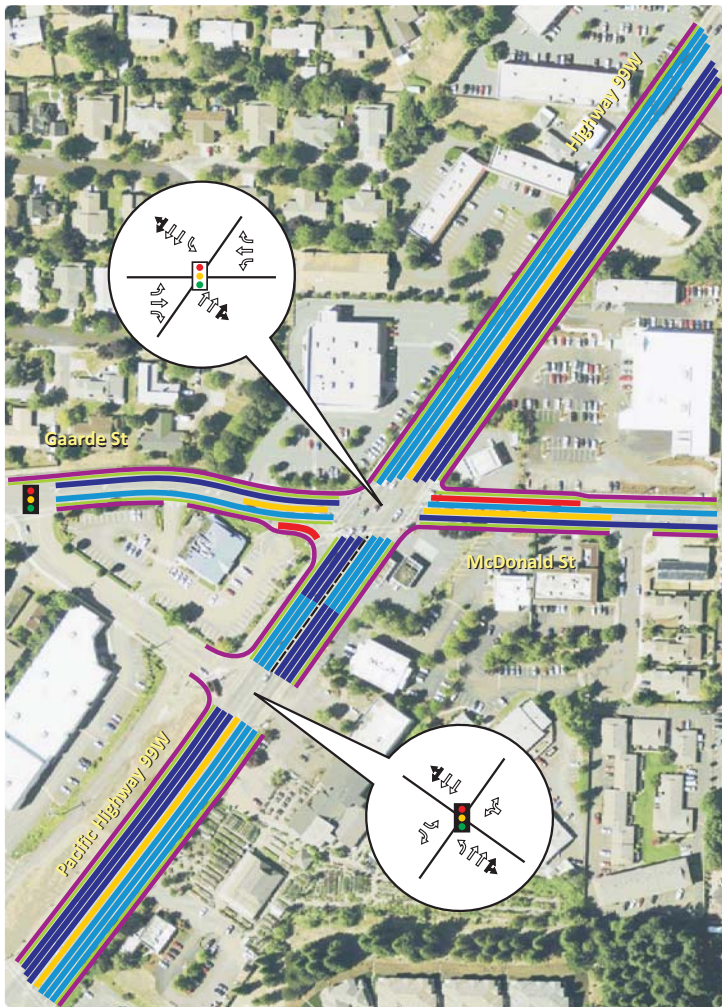


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design



Concept D: Redirect Northbound Left Turn and Widen Pacific Highway 99W

DESCRIPTION: This concept relocates the northbound left turn south on Pacific Hwy 99W to the intersection of SW Gaarde Street extension. A new signalized intersection would be installed at Pacific Hwy 99W/SW Gaarde Street extension to accommodate the relocated northbound left turn. In addition to the relocation of the northbound left turn, Pacific Hwy 99W would be widened by one additional travel lane in both the northbound and southbound directions.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

COMPARISON TO NO-BUILD

Signalized Intersections



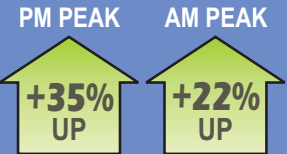
Number of Travel Lanes

Pacific Hwy 99W: +1 Thru

Gaarde Street: SAME

McDonald Street: SAME

Improvement to Overall Capacity



PROS

- Provides new capacity for Pacific Hwy 99W
- Relocate northbound left turn phase and allows better signal timing for Pacific Hwy 99W/SW Gaarde Street/SW McDonald Street

CONS

- Right-of-way needs along 99W
- Longer pedestrian crossings on Pacific Hwy 99W
- Potential lane-draop bottleneck north of intersection on Pacific Hwy 99W

COST ESTIMATE:



ROW ESTIMATE:

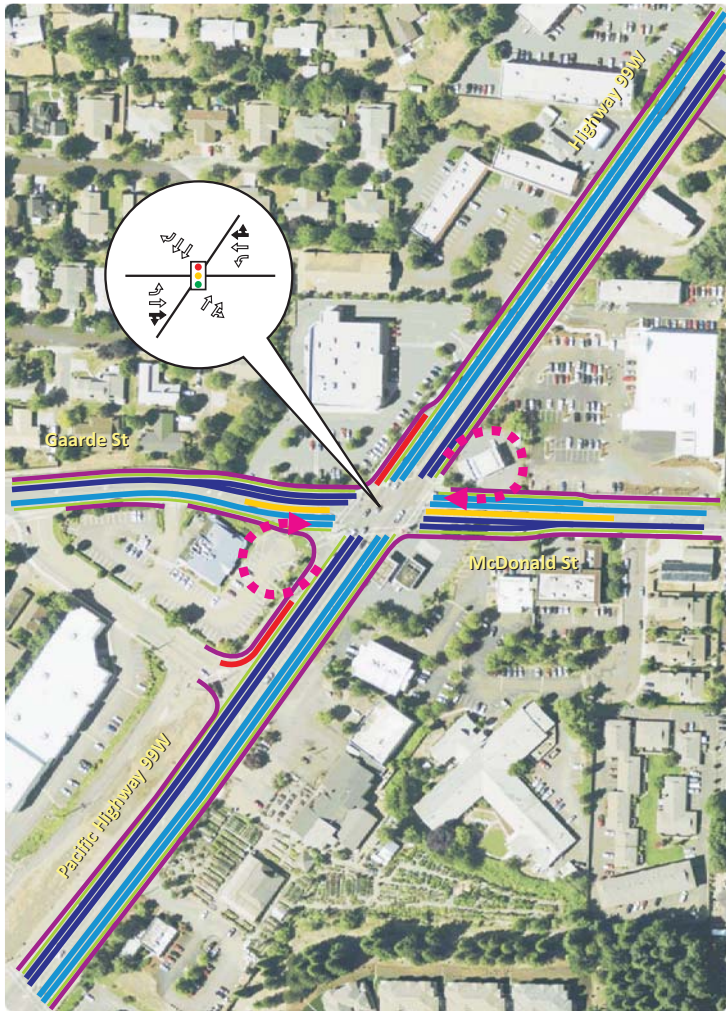


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design

CONCEPT
E

Concept E: Indirect Left Turn Loops

DESCRIPTION: This concept removes the northbound and southbound left turns from Pacific Hwy 99W and relocates them as "right turns" that loop onto SW Gaarde Street and SW McDonald Street. The new "right turns" would enter Gaarde Street and McDonald Street as through lanes approaching Pacific Hwy 99W.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

Concept Components

- Redirected Left Turns

COMPARISON TO NO-BUILD

Signalized Intersections

Number of Travel Lanes

Improvement to Overall Capacity

SAME

Pacific Hwy 99W: **SAME**

Gaarde Street: **+1 Thru**

McDonald Street: **+1 Thru**

PM PEAK AM PEAK



PROS

- Removes northbound and southbound left turn phases from signal

CONS

- Right-of-way needs (for loops) in northeast and southwest quadrants
- Left-turning vehicles must cross intersection twice

COST ESTIMATE:



ROW ESTIMATE:

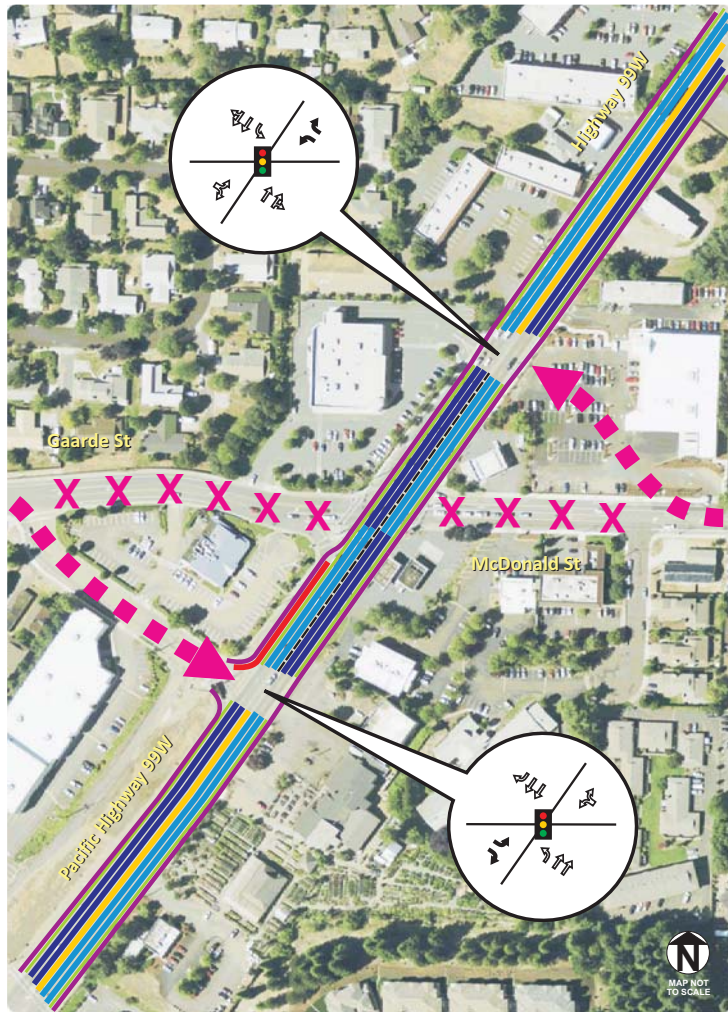


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design

CONCEPT
F

Concept F: Realign East/West Roadways

DESCRIPTION: This concept realigns both SW Gaarde Street and SW McDonald Street to become “T” intersections with Pacific Highway 99W. The two new intersections would both be signalized. The sections of SW Gaarde Street and SW McDonald that currently intersect with Pacific Highway 99W would be closed for motor vehicle traffic. East and West through traffic would need to take a left turn from the new intersection, then a right turn to continue on SW Gaarde Street or SE McDonald Street.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

Concept Components

- Realigned Roadway
- Closed Roadway
- Raised Traffic Separator

COMPARISON TO NO-BUILD

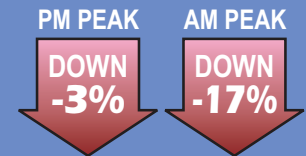
Signalized Intersections



Number of Travel Lanes

- Pacific Hwy 99W: SAME
- Gaarde Street: SAME
- McDonald Street: SAME

Improvement to Overall Capacity



PROS

- Replaces one complicated intersection with two simpler (3 leg) ones
- Removes center turn lane along Pacific Highway 99W between two new intersections for access management

CONS

- Right-of-way needs to relocate intersection
- Appears to perform worse overall than the no-build option
- Vehicles traveling east and westbound through the intersection must turn twice

COST ESTIMATE:



ROW ESTIMATE:

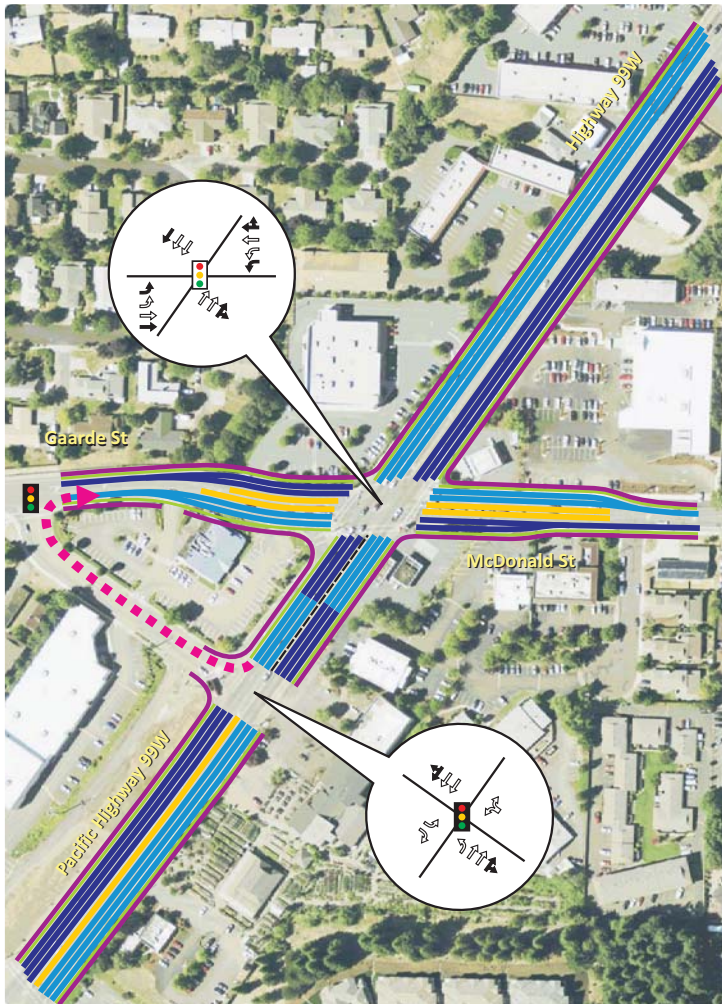


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design



Concept G: Redirect Northbound Left Turn and Indirect Southbound Left Turn

DESCRIPTION: This concept relocates the northbound left turn south on Pacific Hwy 99W to the intersection of SW Gaarde Street extension. A new signalized intersection would be installed at Pacific Hwy 99W/SW Gaarde Street extension to accommodate the relocated northbound left turn. In addition to the relocation of the northbound left turn, Pacific Hwy 99W would be widened by one additional travel lane in both the northbound and southbound directions.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

Concept Components

- Redirected Left Turns

COMPARISON TO NO-BUILD

Signalized Intersections



Number of Travel Lanes

- Pacific Hwy 99W: +1 Thru
- Gaarde Street: +1 Thru +1 Turn
- McDonald Street: +1 Thru +1 Turn

Improvement to Overall Capacity

- PM PEAK: +43% UP
- AM PEAK: +36% UP

PROS

- Provides new capacity for most movements
- Removes northbound left turn phase and allows reallocation of green time at intersection
- Provides more direct route for vehicles turning left on to SW Gaarde Street

CONS

- Right-of-way needs in intersection area
- Longer pedestrian crossings on all legs
- Potential lane-drop bottleneck north of intersection on Pacific Hwy 99W

COST ESTIMATE:



ROW ESTIMATE:

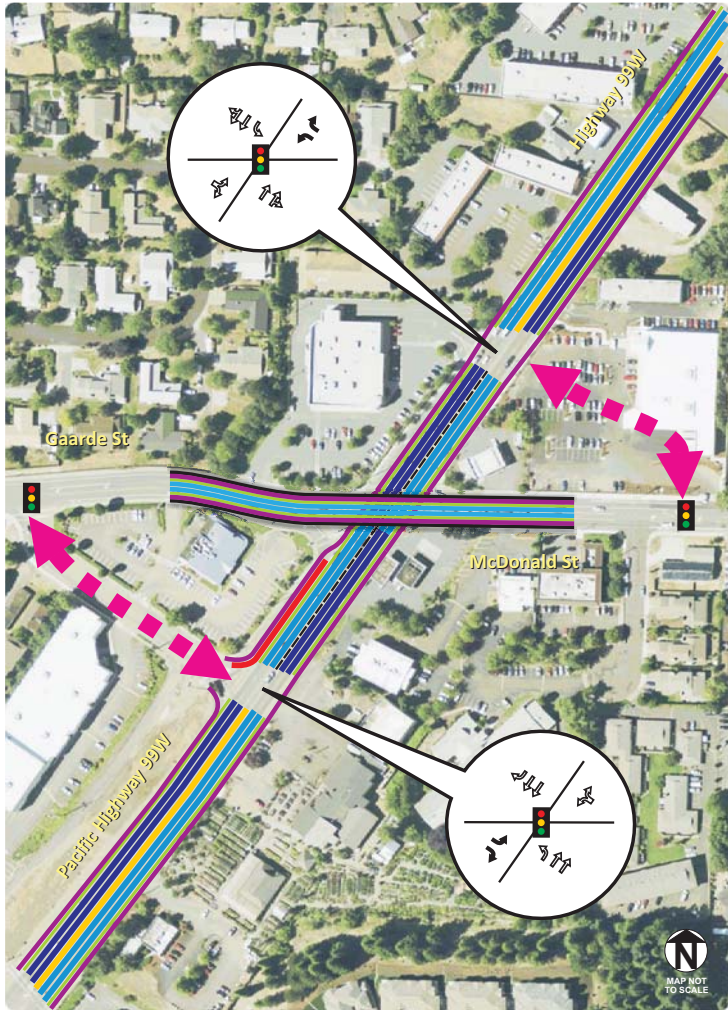


Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design



Concept H: Grade Separate Intersection with Redirect Northbound Left Turn

DESCRIPTION: This concept grade separates the intersection of Pacific Hwy 99W with SW Gaarde Street and SW McDonald Street. To accommodate turning movements, additional signalized intersections are created at the SW Gaarde Street extension with SW Pacific Hwy 99W and SW Gaarde Street, and two new intersections are created connecting SW McDonald Street with Pacific Hwy 99W.



LEGEND

Travel Lanes & Modes

- █ - Right Turn Only Lane
- █ - Through or Through/Right Lane
- █ - Left Turn Only Lane
- █ - Receiving/Departure Lanes
- █ - Bicycle Lane
- █ - Sidewalks

Intersection Geometry

- Existing Lane Geometry
- New/Potential Lane Geometry
- Existing Signal Control
- New Signal Control

Concept Components

- Redirected Roadway

COMPARISON TO NO-BUILD

Signalized Intersections



Number of Travel Lanes

- Pacific Hwy 99W: SAME
- Gaarde Street: SAME
- McDonald Street: SAME

Improvement to Overall Capacity

- | | | |
|--|---------|---------|
| | PM PEAK | AM PEAK |
| | | |

PROS

- Replaces skewed four-leg intersection with two offset T-intersections

CONS

- Right-of-way needs in order to relocate SW McDonald Street intersection
- Major capital cost for grade separation
- Access changes for properties on grade-separated facilities

COST ESTIMATE:



ROW ESTIMATE:



Pacific Highway 99W/Gaarde/McDonald Intersection Improvement Conceptual Design

Summary of Concepts

	Description	Capacity Improvement		Cost	Right-of-Way
		AM Peak	PM Peak		
CONCEPT A	Widen All Approaches				
CONCEPT B	Widen Gaarde/McDonald Streets				
CONCEPT C	Widen Pacific Hwy 99W				
CONCEPT D	Redirect Northbound Left Turn and Widen Pacific Hwy 99W				
CONCEPT E	Indirect Left Turn Loops				
CONCEPT F	Realign East/West Roadways				
CONCEPT G	Redirect Northbound Left Turn and Indirect Southbound Left Turn				
CONCEPT H	Grade Separate Intersection with Redirect Northbound Left Turn				

99W/Gaarde/McDonald Intersection: Performance of Alternatives against No-Build, Year 2035 AM and PM Peak Hour

Concept	AM Critical Movements (V/C)		PM Critical Movements (V/C)				Overall V/C	
	NBT	EBT	NBL	SBT	EBT	WBL	AM	PM
No-Build	1.58	1.27	1.71	1.49	1.21	1.62	1.49	1.55
A: Widen all approaches with dual left turns and additional through lane	36%	30%	43%	32%	25%	41%	34%	39%
B: Widen Gaarde/McDonald approaches only	9%	29%	13%	9%	25%	20%	13%	12%
C: Widen 99W approaches only	26%	12%	26%	22%	7%	27%	22%	23%
C1: Add northbound and southbound through lanes and second northbound left turn lane to 99W	26%	12%	26%	22%	7%	27%	22%	23%
C2: Add southbound through lane, second northbound left turn lane, and northbound right turn pocket on 99W	9%	3%	26%	23%	7%	23%	9%	23%
D: Relocate northbound left and widen 99W with additional through lane	26%	12%	50% ⁴	30%	17%	38%	22%	35%
E: Indirect north/south left turns	3%	21%	21%	16%	13%	19%	6%	14%
F: Realigned east/west roadways	-20% ¹	-13% ¹	15% ¹	-13% ¹	-25% ¹	8% ⁶	-18% ¹	-4% ⁶
G: Relocate and double northbound left, widen Gaarde/McDonald with dual lefts and additional throughs, southbound indirect left	39%	20% ²	74% ⁴	38%	25%	46%	36%	43%
H: Grade-separated intersection with realigned turning movements	1% ³	20% ²	26% ⁴	11% ⁴	1% ²	34% ³	6% ⁴	15% ⁴

¹ Comparison intersection is 99W/Gaarde

² Comparison intersection is Gaarde/Gaarde Extension

³ Comparison intersection is 99W/McDonald Extension

⁴ Comparison intersection is 99W/Gaarde Extension

⁵ Comparison movement is northbound through

⁶ Comparison intersection is 99W/McDonald

< 1.0 V/C

≥ 1.0 V/C