

DOWLING ROAD/SEWARD HIGHWAY INTERCHANGE RECONSTRUCTION

Project No.: CFHWY00359

DESIGN STUDY REPORT

APPENDICES A- I

**STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES**

PREPARED BY: Lounsbury and Associates, Inc.
5300 A Street
Anchorage, AK 99518

April 24th, 2020

APPENDIX A

Approved Design Criteria and Design Designation

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Interstate, Urban Principal Arterial Terrain: Rolling
Freeway – Seward Highway
 Present ADT (2019): 58,400 Mid-Design ADT (2030): 64,000 Design ADT (2040): 69,100
 DHV (%): 8,400 Trucks (%): 5 Directional Split (%/%) : 55/45
 Pavement Design Year: 2040 Pavement Design ESAL:
 Design Turning Vehicle: WB-
109D
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 8.2.1, p. 8-1	70 mph	70 mph	No
Lane Width	Travel	GB Section 8.2.4, p. 8-2	12 ft	12 ft	No
	Auxiliary	N/A	N/A	N/A	No
Shoulder Width	Outside	GB Section 8.2.4, p. 8-2	10 ft	10 ft	No
	Inside	GB Section 8.2.4, p. 8-2	10 ft	10 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-9	2040 ft	2040 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6 %	6 %	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34	730 ft	730 ft	No
Grade	Min. ²	GB Section 3.4.2, p. 3-119	0.5%	0.5%	No
	Max.	GB, Section 8.2.7, Table 8-1	4%	4%	No
Cross Slope		GB Section 8.2.4, p. 8-2	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 8.2.8, p. 8-3	HL 93	HL 93	No

¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15	0.4%	0.4%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	138 ft	138 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34	247	247	No
	K (sag)	GB Section 3.4.6, Table 3-36	181	181	No
Lateral Offset to Obstruction		GB Section 8.2.10, p. 8-5	2.0 ft	2.0 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		30 ft	30 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		26-30 ft	26-30 ft	No
Bicycle Lane Width		N/A	N/A	N/A	No
Sidewalk/Pathway Width		N/A	N/A	N/A	No
Intersection Sight Distance*, Passenger Car	Left Turn (GB Case B1)	N/A	N/A	N/A	No
	Right Turn (GB Case B2)	N/A	N/A	N/A	No
	Crossing (GB Case B3)	N/A	N/A	N/A	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	GB Section 8.4.2, p. 8-10	Depressed or Barrier		No
	Width		22-26 ft	26 ft	No
Illumination		RPRL	0.6cd/m ²	0.96cd/m ²	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO “A Policy on Geometric Design on Highways and Streets”, 2011; RDG – AASHTO “Roadside Design Guide”, 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 4/24/2020
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Urban Arterial – Dowling Road Terrain: Level

Present ADT (2019): 25,600 Mid-Design ADT (2030): 28,100 Design ADT (2040): 30,400
 DHV (%): 2,800 Trucks (%): 5 Directional Split (%/%) : 50/50
 Pavement Design Year: 2040 Pavement Design ESAL:
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 2.3.6, p.2-57	20-45 mph	45 mph	No
Lane Width	Travel	GB Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
	Auxiliary	GB Section 9.7.1, p. 9-124 & Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
Shoulder Width	Outside	GB Section 7.3.3, p. 7-30 & Section 7.3.2, Table 7-3, p. 7-5	0-8 ft	0 ft	No
	Inside	GB Section 7.3.3, p. 7-30 & Section 7.3.2, Table 7-3, p. 7-5	0-8 ft	0 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-9	643 ft	645 ft	No
Superelevation Rate, e, max		GB Section 8.2.6, p. 8-3	6%	0%	No
Stopping Sight Distance (SDD), min		GB Section 3.2.2, Table 3-1, p. 3-4 & GB Section 7.2.2, Table 7-1, p. 7-3	360 ft	>360 ft	No
Grade	Min. ²	GB, Section 7.3.2, p. 7-28	0.3%	0.4%	No
	Max.	GB, Section 7.3.2, Table 7-4	6%	2%	No
Cross Slope		GB, Section 7.3.2, p. 7-29	1.5-3%	2.0%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 7.3.5, p. 7-38	HL 93	HL 93	No

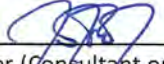
¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

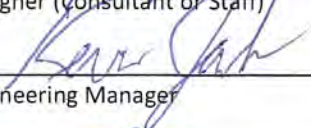
² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15	0.54%	0%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	56 ft	56 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34	61	61	No
	K (sag)	GB Section 3.4.6, Table 3-36	79	79	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	3.0 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		24-28 ft	24-28 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		18-20 ft	18-20 ft	No
Bicycle Lane Width		AASHTO Bicycle Guide, Anchorage Bicycle Plan	5 ft	0 ft	No
Sidewalk/Pathway Width		GB Section 4.17.1, p. 4-56	4-10 ft	10 ft	No
Intersection Sight Distance*, Passenger Car	Crossing (GB Case B1)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
	Left/Right Turn (GB Case B2)	GB Section 9.5.3, p. 9-36 to 9-40	430 ft	>430 ft	No
	Crossing (GB Case B3)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		GB Section 2.5.1, p. 2-71	Partial		No
Median	Treatment	GB Section 7.3.3, p. 7-33	Raised Curb		No
	Width		4-50 ft	6-50 ft	No
Illumination	Dowling Road	RPRL	1.2 fc	1.6fc	No
	Roundabouts	DGRL	2.4 fc	2.4 fc	
Curb Type		ASD	Sloping		No

* Attach calculations

Notes: – AASHTO “A Policy on Geometric Design on Highways and Streets”, 2011; RDG – AASHTO “Roadside Design Guide”, 2011; ASD – Alaska Standard Plans Manual; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14); DGRL – IES Design Guide for Roundabout Lighting (DG 19-08)

Proposed by:  Date: 9/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

Example Calculations for Intersection Sight Distance

Calculation Sheet for Cases B1, B2, and B3 (Intersection Sight Distance, Passenger Car)

EQUATIONS:

1.) $t_g = t_g + (n - 1) * (0.5)$, if $n > 2$

t_g = time gap for minor road vehicle to enter the major road (s)

t_g = time gap at design speed of major road (s)

n = number of lanes to cross

2.) $ISD = 1.47 * V_{major} * t_g$ (from Green Book, pg. 9-37, Equation 9-1)

ISD = Intersection Sight Distance (length of the leg of sight triangle along the major road) (ft)

V_{major} = design speed of the major road (mph)

CASE B1: Left Turn from the Minor Road (Green Book, pg. 9-36)

Given: $n = 3$ lanes, $V_{major} = 45$ mph, $t_g = 7.5$ s (from Green Book, pg. 9-37, Table 9-5);

$$t_g = 7.5 + (3 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

CASE B2: Right Turn from the Minor Road (Green Book, pg. 9-40)

Given: $n = 0$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = t_g = 6.5 = 6.5 \text{ s}$$

$$ISD = 1.47 * 45 * 6.5 = 429.975 \text{ ft} \Rightarrow \text{use } 430 \text{ ft}$$

CASE B3: Crossing Maneuver from the Minor Road (Green Book, pg. 9-43)

Given: $n = 5$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = 6.5 + (5 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Urban Arterial Terrain: Level
Dowling Road & Seward Highway Interchange Frontage Roads – Brayton Drive
 Present ADT (2019): 3,400 Mid-Design ADT (2030): 3,800 Design ADT (2040): 4,100
 DHV (%): 360 Trucks (%): 3 Directional Split (%/%): N/A
 Pavement Design Year: 2040 Pavement Design ESAL:
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 2.3.6, p.2-57	20-45 mph	45 mph	No
Lane Width	Travel	GB Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
	Auxiliary	GB Section 9.7.1, p. 9-124 & Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
Shoulder Width	Outside	GB Section 7.3.3, p. 7-30 & Section 7.3.2, Table 7-3, p. 7-5	0-8 ft	4 ft	No
	Inside	GB Section 7.3.3, p. 7-30 & Section 7.3.2, Table 7-3, p. 7-5	0-8 ft	2 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-9	643 ft	643 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6 %	6 %	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34	360 ft	360 ft	No
Grade	Min. ²	GB, Section 7.3.2, p. 7-28	0.3%	0.5%	No
	Max.	GB, Section 7.3.2, Table 7-4	6%	4%	No
Cross Slope		GB Section 8.2.4, p. 8-2	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 7.3.5, p. 7-38	HL 93	HL 93	No


¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

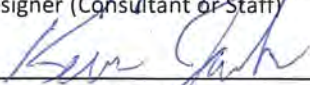
² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15	0.54%	0.54%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	56 ft	56 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34	61	61	No
	K (sag)	GB Section 3.4.6, Table 3-36	79	79	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	3 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		20-26 ft	20-26 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		14-16 ft	14-16 ft	No
Bicycle Lane Width		AASHTO Bicycle Guide, Anchorage Bicycle Plan	5 ft	5 ft	No
Sidewalk/Pathway Width		GB Section 4.17.1, p. 4-56	1-10 ft	5 feet	No
Intersection Sight Distance*, Choose an item.	Left Turn (GB Case B1)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
	Right Turn (GB Case B2)	GB Section 9.5.3, p. 9-36 to 9-40	430 ft	>430 ft	No
	Crossing (GB Case B3)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Partial		No
Median	Treatment	GB Section 7.3.3, p. 7-33	Raised Curb		No
	Width		4-50 ft	4-10 ft	No
Illumination		RPRL	1.2 fc	1.2 fc	No
Curb Type		ASD	Sloping		No

* Attach calculations

Notes: GB – AASHTO “A Policy on Geometric Design on Highways and Streets”, 2011; RDG – AASHTO “Roadside Design Guide”, 2011; ASD – Alaska Standard Plan Manual; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 9/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

Example Calculations for Intersection Sight Distance

Calculation Sheet for Cases B1, B2, and B3 (Intersection Sight Distance, Passenger Car)

EQUATIONS:

1.) $t_g = t_g + (n - 1) * (0.5)$, if $n > 2$

t_g = time gap for minor road vehicle to enter the major road (s)

t_g = time gap at design speed of major road (s)

n = number of lanes to cross

2.) $ISD = 1.47 * V_{major} * t_g$ (from Green Book, pg. 9-37, Equation 9-1)

ISD = Intersection Sight Distance (length of the leg of sight triangle along the major road) (ft)

V_{major} = design speed of the major road (mph)

CASE B1: Left Turn from the Minor Road (Green Book, pg. 9-36)

Given: $n = 3$ lanes, $V_{major} = 45$ mph, $t_g = 7.5$ s (from Green Book, pg. 9-37, Table 9-5);

$$t_g = 7.5 + (3 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

CASE B2: Right Turn from the Minor Road (Green Book, pg. 9-40)

Given: $n = 0$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = t_g = 6.5 = 6.5 \text{ s}$$

$$ISD = 1.47 * 45 * 6.5 = 429.975 \text{ ft} \Rightarrow \text{use } 430 \text{ ft}$$

CASE B3: Crossing Maneuver from the Minor Road (Green Book, pg. 9-43)

Given: $n = 5$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = 6.5 + (5 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Urban Arterial Terrain: Level
Dowling Road & Seward Highway Interchange Frontage Roads – Homer Drive
 Present ADT (2019): 2,500 Mid-Design ADT (2030): 2,800 Design ADT (2040): 3,000
 DHV (%): 430 Trucks (%): 8 Directional Split (%/%) : N/A
 Pavement Design Year: 2040 Pavement Design ESAL: _____
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 2.3.6, p.2-57	20-45 mph	45 mph	No
Lane Width	Travel	GB Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
	Auxiliary	GB Section 9.7.1, p. 9-124 & Section 7.3.3, p. 7-29	10-12 ft	12 ft	No
Shoulder Width	Outside	GB Section 7.3.3, p. 7-30	10 ft	10 ft	No
	Inside	GB Section 8.2.4, p. 8-2	10 ft	10 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-9	643 ft	643 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6 %	6 %	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34	360 ft	360 ft	No
Grade	Min. ²	GB, Section 7.3.2, p. 7-28	0.3%	0.5%	No
	Max.	GB, Section 8.2.7, Table 8-1	6%	4%	No
Cross Slope		GB Section 8.2.4, p. 8-2	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 7.3.5, p. 7-38	HL 93	HL 93	No

¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

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Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15	0.54%	0.54%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	56 ft	56 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34	61	61	No
	K (sag)	GB Section 3.4.6, Table 3-36	79	79	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	3 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		20-26 ft	20-26 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		14-16 ft	14-16 ft	No
Bicycle Lane Width		AASHTO Bicycle Guide, Anchorage Bicycle Plan	2-8 ft	4 ft	No
Sidewalk/Pathway Width		GB Section 4.17.1, p. 4-56	1-10 ft	5 feet	No
Intersection Sight Distance*, Choose an item.	Left Turn (GB Case B1)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
	Right Turn (GB Case B2)	GB Section 9.5.3, p. 9-36 to 9-40	430 ft	>430 ft	No
	Crossing (GB Case B3)	GB Section 9.5.3, p. 9-36 to 9-40	565 ft	>565 ft	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	GB Section 7.3.3, p 7-33	Raised curb		No
	Width		4-50 ft	4-10 ft	No
Illumination		RPRL	1.2 fc	1.2 fc	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO "A Policy on Geometric Design on Highways and Streets", 2011; RDG – AASHTO "Roadside Design Guide", 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 4/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

Example Calculations for Intersection Sight Distance

Calculation Sheet for Cases B1, B2, and B3 (Intersection Sight Distance, Passenger Car)

EQUATIONS:

1.) $t_g = t_g + (n - 1) * (0.5)$, if $n > 2$

t_g = time gap for minor road vehicle to enter the major road (s)

t_g = time gap at design speed of major road (s)

n = number of lanes to cross

2.) $ISD = 1.47 * V_{major} * t_g$ (from Green Book, pg. 9-37, Equation 9-1)

ISD = Intersection Sight Distance (length of the leg of sight triangle along the major road) (ft)

V_{major} = design speed of the major road (mph)

CASE B1: Left Turn from the Minor Road (Green Book, pg. 9-36)

Given: $n = 3$ lanes, $V_{major} = 45$ mph, $t_g = 7.5$ s (from Green Book, pg. 9-37, Table 9-5);

$$t_g = 7.5 + (3 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

CASE B2: Right Turn from the Minor Road (Green Book, pg. 9-40)

Given: $n = 0$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = t_g = 6.5 = 6.5 \text{ s}$$

$$ISD = 1.47 * 45 * 6.5 = 429.975 \text{ ft} \Rightarrow \text{use } 430 \text{ ft}$$

CASE B3: Crossing Maneuver from the Minor Road (Green Book, pg. 9-43)

Given: $n = 5$ lanes, $V_{major} = 45$ mph, $t_g = 6.5$ s (from Green Book, pg. 9-40, Table 9-7);

$$t_g = 6.5 + (5 - 1) * (0.5) = 8.5 \text{ s}$$

$$ISD = 1.47 * 45 * 8.5 = 562.275 \text{ ft} \Rightarrow \text{use } 565 \text{ ft}$$

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Interstate, Urban Principal Arterial Freeway Terrain: Level
Dowling – Seward NB On Ramp

 Present ADT (2019): 6,400 Mid-Design ADT (2030): 7,000 Design ADT (2040): 7,600
 DHV (%): 920 Trucks (%): 5 Directional Split (%/%) : N/A
 Pavement Design Year: 2040 Pavement Design ESAL: _____
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 10.9.6, Table 10-1, p. 10-89	35-60 mph	35-60 mph	No
Lane Width	Travel	GB Section 10.9.6, p. 10-102	12 ft	12 ft	No
	Auxiliary	N/A	N/A	N/A	No
Shoulder Width	Outside	GB Section 10.9.6, p. 10-102	8-10 ft	8 ft	No
	Inside	GB Section 10.9.6, p. 10-102	2-4 ft	4 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-8, p. 3-44	1330 ft	1330 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6%	6%	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34, p. 3-155	425 ft	425 ft	No
Grade	Min. ²	GB Section 3.4.2, p. 3-119	0.5%	0.5%	No
	Max.	GB Section 10.9.6, p. 10-92	5%	5%	No
Cross Slope		GB Section 10.9.6, p. 10-93	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 8.2.8, p.8-4	HL 93	HL 93	No

¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15, p. 3-61	0.50%	0.50%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	24 ft	24 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34, p. 3-155	84	84	No
	K (sag)	GB Section 3.4.6, Table 3-36	96	96	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	1.5 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		24-28 ft	24-28 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		18-20 ft	18-20 ft	No
Bicycle Lane Width		N/A	N/A	N/A	No
Sidewalk/Pathway Width		N/A	N/A	N/A	No
Intersection Sight Distance*, Passenger Car	Left Turn (GB Case B1)	N/A	N/A	N/A	No
	Right Turn (GB Case B2)	N/A	N/A	N/A	No
	Crossing (GB Case B3)	N/A	N/A	N/A	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	N/A	N/A		No
	Width		N/A	N/A	No
Illumination		RPRL	0.8 fc	1.0 fc	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO "A Policy on Geometric Design on Highways and Streets", 2011; RDG – AASHTO "Roadside Design Guide", 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 4/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Interstate, Urban Principal Arterial Freeway Terrain: Level
Dowling – Seward SB On Ramp

 Present ADT (2019): 5,300 Mid-Design ADT (2030): 5,900 Design ADT (2040): 6,300
 DHV (%): 760 Trucks (%): 5 Directional Split (%/%) : N/A
 Pavement Design Year: 2040 Pavement Design ESAL: _____
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA	SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹	GB Section 10.9.6, Table 10-1, p. 10-89	30-60 mph	30-60 mph	No
Lane Width	Travel	GB Section 10.9.6, p. 10-102	12 ft	No
	Auxiliary	N/A	N/A	No
Shoulder Width	Outside	GB Section 10.9.6, p. 10-102	8 ft	No
	Inside	GB Section 10.9.6, p. 10-102	4 ft	No
	Auxiliary	N/A	N/A	No
Horizontal Curve Radius, min	GB Section 3.3.5, Table 3-8, p. 3-44	1330 ft	1330 ft	No
Superelevation Rate, e, max	HPCM Section 1160.5.6, p. 1160-22	6%	6%	No
Stopping Sight Distance (SDD), min	GB Section 3.4.6, Table 3-34, p. 3-155	425 ft	425 ft	No
Grade	Min. ²	GB Section 3.4.2, p. 3-119	0.5%	No
	Max.	GB Section 10.9.6, p. 10-92	5%	No
Cross Slope	GB Section 10.9.6, p. 10-93	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	No
Design Loading Structural Capacity ¹	GB Section 8.2.8, p.8-4	HL 93	HL 93	No

¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15, p. 3-61	0.50%	0.50%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	24 ft	24 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34, p. 3-155	84	84	No
	K (sag)	GB Section 3.4.6, Table 3-36	96	96	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	1.5 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		24-28 ft	24-28 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		18-20 ft	18-20 ft	No
Bicycle Lane Width		N/A	N/A	N/A	No
Sidewalk/Pathway Width		N/A	N/A	N/A	No
Intersection Sight Distance*, Passenger Car	Left Turn (GB Case B1)	N/A	N/A	N/A	No
	Right Turn (GB Case B2)	N/A	N/A	N/A	No
	Crossing (GB Case B3)	N/A	N/A	N/A	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	N/A	N/A		No
	Width		N/A	N/A	No
Illumination		RPRL	0.8 fc	1.0 fc	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO "A Policy on Geometric Design on Highways and Streets", 2011; RDG – AASHTO "Roadside Design Guide", 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 4/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Interstate, Urban Principal Arterial Freeway Terrain: Level
Seward NB –Dowling Off Ramp

 Present ADT (2019): 3,800 Mid-Design ADT (2030): 4,200 Design ADT (2040): 4,600
 DHV (%): 560 Trucks (%): 5 Directional Split (%/%) : N/A
 Pavement Design Year: 2040 Pavement Design ESAL:
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 10.9.6, Table 10-1, p. 10-89	35-60 mph	35-60 mph	No
Lane Width	Travel	GB Section 10.9.6, p. 10-102	12 ft	12 ft	No
	Auxiliary	N/A	N/A	N/A	No
Shoulder Width	Outside	GB Section 10.9.6, p. 10-102	8-10 ft	8 ft	No
	Inside	GB Section 10.9.6, p. 10-102	2-4 ft	4 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-8, p. 3-44	1330 ft	1330 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6%	6%	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34, p. 3-155	570 ft	570 ft	No
Grade	Min. ²	GB Section 3.4.2, p. 3-119	0.5%	0.5%	No
	Max.	GB Section 10.9.6, p. 10-92	5%	5%	No
Cross Slope		GB Section 10.9.6, p. 10-93	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 8.2.8, p.8-4	HL 93	HL 93	No


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² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15, p. 3-61	0.50%	0.50%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	24 ft	24 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34, p. 3-155	84	84	No
	K (sag)	GB Section 3.4.6, Table 3-36	96	96	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	1.5 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		24-28 ft	24-28 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		18-20 ft	18-20 ft	No
Bicycle Lane Width		N/A	N/A	N/A	No
Sidewalk/Pathway Width		N/A	N/A	N/A	No
Intersection Sight Distance*, Passenger Car	Left Turn (GB Case B1)	N/A	N/A	N/A	No
	Right Turn (GB Case B2)	N/A	N/A	N/A	No
	Crossing (GB Case B3)	N/A	N/A	N/A	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	N/A	N/A		No
	Width		N/A ft	N/A	No
Illumination		RPRL	0.8 fc	1.0 fc	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO "A Policy on Geometric Design on Highways and Streets", 2011; RDG – AASHTO "Roadside Design Guide", 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 4/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

PROJECT DESIGN CRITERIA

Project Name: Dowling Road & Seward Highway Interchange Reconstruction
 State Project No.: CFHWY00359 Federal Project No.: TBD
 Functional Classification: Interstate, Urban Principal Arterial Freeway Terrain: Level
Seward SB – Dowling Off Ramp
 Present ADT (2019): 7,700 Mid-Design ADT (2030): 8,500 Design ADT (2040): 9,100
 DHV (%): 1,100 Trucks (%): 5 Directional Split (%/%) : N/A
 Pavement Design Year: 2040 Pavement Design ESAL: _____
 Design Turning Vehicle: WB-67
 Project Type: New Construction/Reconstruction NHS: Non-NHS:

FHWA 10 CONTROLLING DESIGN CRITERIA		SOURCE	STANDARD	AS PROPOSED	EXCEPTION ¹
Design Speed ¹		GB Section 10.9.6, Table 10-1, p. 10-89	35-60 mph	35-60 mph	No
Lane Width	Travel	GB Section 10.9.6, p. 10-102	12 ft	12 ft	No
	Auxiliary	N/A	N/A	N/A	No
Shoulder Width	Outside	GB Section 10.9.6, p. 10-102	8-10 ft	8 ft	No
	Inside	GB Section 10.9.6, p. 10-102	2-4 ft	4 ft	No
	Auxiliary	N/A	N/A	N/A	No
Horizontal Curve Radius, min		GB Section 3.3.5, Table 3-8, p. 3-44	1330 ft	1330 ft	No
Superelevation Rate, e, max		HPCM Section 1160.5.6, p. 1160-22	6%	6%	No
Stopping Sight Distance (SDD), min		GB Section 3.4.6, Table 3-34, p. 3-155	425 ft	425 ft	No
Grade	Min. ²	GB Section 3.4.2, p. 3-119	0.5%	0.5%	No
	Max.	GB Section 10.9.6, p. 10-92	5%	5%	No
Cross Slope		GB Section 10.9.6, p. 10-93	1.5-2%	2%	No
Vertical Clearance	Bridge	HPCM Section 1130, Table 1130-1, p. 1130-5	16.5 ft	17 ft	No
	Overhead Utilities	HPCM Section 1130, Table 1130-1, p. 1130-5	20.5 ft	20.5 ft	No
Design Loading Structural Capacity ¹		GB Section 8.2.8, p.8-4	HL 93	HL 93	No

¹ On low speed roadways (<50 mph) on the NHS, only Design Speed and Design Loading Structural Capacity require a Design Exception; all other criteria require a Design Waiver. For projects off the NHS, all criteria require a Design Waiver.

² Minimum grade is not one of the FHWA 10 Controlling Design Criteria and will require a Design Waiver for any variance.


OTHER DESIGN CRITERIA		SOURCE	STANDARD	AS DESIGNED	WAIVER
Superelevation Transition, Δ		GB Section 3.3.8, Table 3-15, p. 3-61	0.50%	0.50%	No
Bridge Clear-Roadway Width		GB Section 8.2.8, p. 8-4	24 ft	24 ft	No
Vertical Curvature (min)	K (crest)	GB Section 3.4.6, Table 3-34, p. 3-155	84	84	No
	K (sag)	GB Section 3.4.6, Table 3-36	96	96	No
Lateral Offset to Obstruction		GB Section 7.3.4, p. 7-37	1.5 ft	1.5 ft	No
Surfacing Material		HCPM Section 1180.3, p. 1180-1	Paved	Paved	No
Clear Zone	Slope (fill)	HCPM Section 1130, Table 1130-2, p. 1130-6	4:1 or flatter	4:1 or flatter	No
	Width (fill)		24-28 ft	24-28 ft	No
	Slope (cut)		4:1 or flatter	4:1 or flatter	No
	Width (cut)		18-20 ft	18-20 ft	No
Bicycle Lane Width		N/A	N/A	N/A	No
Sidewalk/Pathway Width		N/A	N/A	N/A	No
Intersection Sight Distance*, Passenger Car	Left Turn (GB Case B1)	N/A	N/A	N/A	No
	Right Turn (GB Case B2)	N/A	N/A	N/A	No
	Crossing (GB Case B3)	N/A	N/A	N/A	No
Passing Sight Distance		N/A	N/A	N/A	No
Degree of Access Control		HPCM Section 1190.3, p. 1190-2	Full		No
Median	Treatment	N/A	N/A		No
	Width		N/A ft	N/A ft	No
Illumination		RPRL	0.8 fc	1.0 fc	No
Curb Type		N/A	N/A		No

* Attach calculations

Notes: GB – AASHTO "A Policy on Geometric Design on Highways and Streets", 2011; RDG – AASHTO "Roadside Design Guide", 2011; HPCM – Alaska Highway Preconstruction Manual; RPRL – IES Recommended Practice for Roadway Lighting (RP-8-14)

Proposed by:  Date: 9/24/20
Designer (Consultant or Staff)

Recommended by:  Date: 5/14/20
Engineering Manager

Accepted by:  Date: 5/12/2020
Regional Preconstruction Engineer

