

APPENDIX B

QUANTITY AND COST ESTIMATE CALCULATIONS



Project: Bellevue Grand Connection (BGC) - I-405 Crossing - Downtown to Eastrail
 Title: Bridge Construction Cost Estimate Calculation [Type Selection Report, Final]
 Date: July 2024

Developed by: Fernando Sunago
 Reviewed by: Stuart Bennion/Lorelei Williams

Structure Construction Cost Calculation

	Alternative 1A			Alternative 1B			Alternative 2A			Alternative 2B		
	Alt 1A & 1B	Alt 2A & 2B	Alt 3A	CIP PT Box West Tie-In/CIP PT Box I-405 X'ing w/ Pier in I-405 ROW		CIP PT Box West Tie-In/CIP PT Box I-405 X'ing w/ No Pier in I-405 ROW		Plaza Ext/CIP PT Box West Tie-In & I-405 Cross w/ Pier in I-405 ROW		Plaza Ext/CIP PT Box West Tie-In & I-405 Cross w/ No Pier in I-405 ROW		
	CIP Box [sqft]	Pl. Ext + CIP [sqft]	Cable + CIP [sqft]	Type	[\$/sqft]	Type	[\$/sqft]	Type	[\$/sqft]	Type	[\$/sqft]	
Plaza Modification/Retrofit	-	-	-	<i>Bldg Retrofit</i>	\$ 20,000,000	<i>Bldg Retrofit</i>	\$ 20,000,000	<i>Bldg Retrofit</i>	\$ 20,000,000	<i>Bldg Retrofit</i>	\$ 20,000,000	
West Tie-In	12,459	8,400	12,150	<i>CIP PT Box</i>	\$ 2,000 \$ 24,918,000	<i>CIP PT Box</i>	\$ 2,000 \$ 24,918,000	<i>CIP PT Box</i>	\$ 1,800 \$ 15,120,000	<i>CIP PT Box</i>	\$ 1,800 \$ 15,120,000	
West Node	8,998	8,998	10,219	<i>CIP PT Box</i>	\$ 2,500 \$ 22,495,000	<i>CIP PT Box</i>	\$ 2,500 \$ 22,495,000	<i>CIP PT Box</i>	\$ 2,500 \$ 22,495,000	<i>CIP PT Box</i>	\$ 2,500 \$ 22,495,000	
I-405 Crossing (West Approach)	9,129	9,129	9,129	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	
I-405 Crossing (Main Span)	14,800	14,800	14,800	<i>CIP PT Box</i>	\$ 3,000 \$ 44,400,000	<i>CIP PT Box</i>	\$ 2,500 \$ 37,000,000	<i>CIP PT Box</i>	\$ 3,000 \$ 44,400,000	<i>CIP PT Box</i>	\$ 2,500 \$ 37,000,000	
I-405 Crossing (East Approach)	9,096	9,096	9,096	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	
East Node	18,855	18,855	18,855	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	
East Node - ADA Ramp	0	0	0	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	
Eastrail Tie-In	17,505	17,505	17,510	<i>CIP PT Box</i>	\$ 1,800 \$ 31,509,000	<i>CIP PT Box</i>	\$ 1,800 \$ 31,509,000	<i>CIP PT Box</i>	\$ 1,800 \$ 31,509,000	<i>CIP PT Box</i>	\$ 1,800 \$ 31,509,000	
Vertical Circulation at West Node	-	-	-	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	
Vertical Circulation at East Node	-	-	-	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	
			Total	\$ 242,910,000	Total	\$ 235,510,000	Total	\$ 233,110,000	Total	\$ 225,710,000		
			Low (75%)	\$ 182,180,000	Low (75%)	\$ 176,630,000	Low (75%)	\$ 174,830,000	Low (75%)	\$ 169,280,000		
			High (125%)	\$ 303,640,000	High (125%)	\$ 294,390,000	High (125%)	\$ 291,390,000	High (125%)	\$ 282,140,000		

	Alternative 3A			Alternative 3B			Alternative 4			Alternative 5		
	Alt 3B	Alt 4	Alt 5	Cable Sta. West Tie-In/CIP 405 Cross w/ Pier in I-405 ROW		Cable Sta. West Tie-In/CIP PT Box I-405 Cross w/ No Pier in I-405 ROW		Cable Sta. West Tie-In/Net. Arch 405 Cross Signature		Steel Truss West Tie-In & I-405 Cross Signature		
	Cable + CIP [sqft]	Cable + Ar [sqft]	Tru + Tru [sqft]	Type	[\$/sqft]	Type	[\$/sqft]	Type	[\$/sqft]	Type	[\$/sqft]	
Plaza Modification/Retrofit	-	-	-	-	\$ 3,000,000	-	\$ 3,000,000	-	\$ 3,000,000	-	\$ 3,000,000	
West Tie-In	12,150	11,899	11,899	<i>Signature</i>	\$ 3,500 \$ 42,525,000	<i>Signature</i>	\$ 3,500 \$ 42,525,000	<i>Signature</i>	\$ 3,500 \$ 41,646,150	<i>Signature</i>	\$ 3,500 \$ 41,646,150	
West Node	10,219	10,219	10,219	<i>CIP PT Box</i>	\$ 2,500 \$ 25,547,500	<i>CIP PT Box</i>	\$ 2,500 \$ 25,547,500	<i>CIP PT Box</i>	\$ 2,500 \$ 25,547,500	<i>CIP PT Box</i>	\$ 2,500 \$ 25,547,500	
I-405 Crossing (West Approach)	9,129	9,129	9,129	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,258,000	<i>Precast</i>	\$ 1,600 \$ 14,606,400	<i>Signature</i>	\$ 4,000 \$ 36,516,000	
I-405 Crossing (Main Span)	14,800	14,800	14,800	<i>CIP PT Box</i>	\$ 3,000 \$ 44,400,000	<i>CIP PT Box</i>	\$ 2,500 \$ 37,000,000	<i>Signature</i>	\$ 4,000 \$ 59,200,000	<i>Signature</i>	\$ 4,250 \$ 62,900,000	
I-405 Crossing (East Approach)	9,096	9,096	9,096	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	<i>CIP PT Box</i>	\$ 2,000 \$ 18,191,000	<i>Precast</i>	\$ 1,600 \$ 14,552,800	<i>Signature</i>	\$ 4,000 \$ 36,382,000	
East Node	18,855	18,855	18,855	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	<i>CIP PT Box</i>	\$ 2,500 \$ 47,138,265	
East Node - ADA Ramp	0	0	0	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	<i>N/A</i>	\$ - \$ -	
Eastrail Tie-In	17,510	17,510	17,510	<i>CIP PT Box</i>	\$ 1,800 \$ 31,518,180	<i>CIP PT Box</i>	\$ 1,800 \$ 31,518,180	<i>Precast</i>	\$ 1,600 \$ 28,016,160	<i>Precast</i>	\$ 1,600 \$ 28,016,160	
Vertical Circulation at West Node	-	-	-	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	
Vertical Circulation at East Node	-	-	-	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	<i>Vert. Circul.</i>	\$ 8,000,000	
			Total	\$ 246,580,000	Total	\$ 239,180,000	Total	\$ 249,710,000	Total	\$ 297,150,000		
			Low (75%)	\$ 184,940,000	Low (75%)	\$ 179,390,000	Low (75%)	\$ 187,280,000	Low (75%)	\$ 222,860,000		
			High (125%)	\$ 308,230,000	High (125%)	\$ 298,980,000	High (125%)	\$ 312,140,000	High (125%)	\$ 371,440,000		

Construction Unit Cost Assumptions

Construction contingency, right of way, placemaking under the nodes, and cost of construction management are **excluded**.

- Plaza Modification - For Alternatives 1 & 2, a significant structural retrofit is expected. Therefore, assume \$20 million for the retrofit cost. For Alternatives 3 through 5, minor structural retrofit and landscaping upgrade are expected. Therefore, assume \$3 million.
- West Tie-In - For Alternative 1, falsework over the existing parking garage is complicated. Therefore, assume \$2,000/sqft. For Alternative 2, construction of CIP PT box girders should be conventional. Therefore, assume \$1,800/sqft. For signature bridge, assume \$3,500/sqft.
- West Node - Due to complex geometry of the node structure, post-tensioning operation may be more challenging than regular girder structure. Therefore, assume \$2,500/sqft.
- I-405 Crossing (West Approach) - Construction of the approach structure is expected to be more standard than I-405 crossing since it does not require traffic control. Therefore, assume \$2,000/sqft for CIP PT box girder alternative, \$250/sqft cheaper than the main span for the signature bridge.
 - For Alternative 4, the approach spans are precast girders. Therefore, assume \$1,600/sqft.
- I-405 Crossing (Main Span) - Construction of the CIP PT box girders over I-405 is more complicated than approach structure. Alternatives "with Pier in I-405 ROW" includes the cost of ramp reconstruction; unit cost is \$500/sqft higher.
 - Construction of signature bridge over I-405 is also complicated and signature structures are often more expensive. Therefore, assume \$4,000 for network tied arch and \$4,250 for steel truss.
- I-405 Crossing (East Approach) - See assumptions noted under "I-405 Crossing (West Approach)".
- East Node - Due to complex geometry of the node structure, post-tensioning operation may be more challenging than regular girder structure. Therefore, assume \$2,500/sqft.
- East Node - ADA Ramp - Not included.
- Eastrail Tie-In - Construction of precast girder is often quicker and more cost effective than CIP PT box girders. Therefore, assume \$1,600/sqft for precast and \$1,800/sqft for CIP PT box girders.
- Vertical Circulation at West Node - Construction cost of the elevator core structure, elevator installation, and stairs. Assume \$8 million.
- Vertical Circulation at East Node - Construction cost of the elevator core structure, elevator installation, and stairs. Assume \$8 million.



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Structure Unit Cost & Segment Comparison

\$/sqft Compare	Alternative 1A	Alternative 1B	Alternative 2A	Alternative 2B	Alternative 3A	Alternative 3B	Alternative 4	Alternative 5	Max	Min
Plaza Modification	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
West Tie-In	\$ 2,000	\$ 2,000	\$ 1,800	\$ 1,800	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 3,500	\$ 1,800
West Node	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500
I-405 Crossing (West Approach)	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 1,600	\$ 4,000	\$ 4,000	\$ 1,600
I-405 Crossing (Main Span)	\$ 3,000	\$ 2,500	\$ 3,000	\$ 2,500	\$ 3,000	\$ 2,500	\$ 4,000	\$ 4,250	\$ 4,250	\$ 2,500
I-405 Crossing (East Approach)	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 1,600	\$ 4,000	\$ 4,000	\$ 1,600
East Node	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500	\$ 2,500
East Node - ADA Ramp	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Eastrail Tie-In	\$ 1,800	\$ 1,800	\$ 1,800	\$ 1,800	\$ 1,800	\$ 1,800	\$ 1,600	\$ 1,600	\$ 1,800	\$ 1,600
Vertical Circulation at West Node	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Vertical Circulation at East Node	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Total Cost Compare	Alternative 1A	Alternative 1B	Alternative 2A	Alternative 2B	Alternative 3A	Alternative 3B	Alternative 4	Alternative 5	Max	Min
Plaza Modification	\$ 20,000,000	\$ 20,000,000	\$ 20,000,000	\$ 20,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 3,000,000	\$ 20,000,000	\$ 3,000,000
West Tie-In	\$ 24,918,000	\$ 24,918,000	\$ 15,120,000	\$ 15,120,000	\$ 42,525,000	\$ 42,525,000	\$ 41,646,150	\$ 41,646,150	\$ 42,525,000	\$ 15,120,000
West Node	\$ 22,495,000	\$ 22,495,000	\$ 22,495,000	\$ 22,495,000	\$ 25,547,500	\$ 25,547,500	\$ 25,547,500	\$ 25,547,500	\$ 25,547,500	\$ 22,495,000
I-405 Crossing (West Approach)	\$ 18,258,000	\$ 18,258,000	\$ 18,258,000	\$ 18,258,000	\$ 18,258,000	\$ 18,258,000	\$ 14,606,400	\$ 36,516,000	\$ 36,516,000	\$ 14,606,400
I-405 Crossing (Main Span)	\$ 44,400,000	\$ 37,000,000	\$ 44,400,000	\$ 37,000,000	\$ 44,400,000	\$ 37,000,000	\$ 59,200,000	\$ 62,900,000	\$ 62,900,000	\$ 37,000,000
I-405 Crossing (East Approach)	\$ 18,191,000	\$ 18,191,000	\$ 18,191,000	\$ 18,191,000	\$ 18,191,000	\$ 18,191,000	\$ 14,552,800	\$ 36,382,000	\$ 36,382,000	\$ 14,552,800
East Node	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265	\$ 47,138,265
East Node - ADA Ramp	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Eastrail Tie-In	\$ 31,509,000	\$ 31,509,000	\$ 31,509,000	\$ 31,509,000	\$ 31,518,180	\$ 31,518,180	\$ 28,016,160	\$ 28,016,160	\$ 31,518,180	\$ 28,016,160
Vertical Circulation at West Node	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000
Vertical Circulation at East Node	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000	\$ 8,000,000

	Alternative 1A	Alternative 1B	Alternative 2A	Alternative 2B	Alternative 3A	Alternative 3B	Alternative 4	Alternative 5
Total	\$ 242,910,000	\$ 235,510,000	\$ 233,110,000	\$ 225,710,000	\$ 246,580,000	\$ 239,180,000	\$ 249,710,000	\$ 297,150,000

Max \$ 297,150,000 Alternative 5
 Min \$ 225,710,000 Alternative 2B



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Cost Estimate Summary for Final TS&L Report

Alternative	Bridge Structure Alternative Combination	Construction Cost Estimate		
		Average	Low (75%)	High (125%)
1A	CIP PT Box Girder West Tie-In + CIP PT Box Girder with Pier in I-405	\$ 242,910,000	\$ 182,180,000	\$ 303,640,000
1B	CIP PT Box Girder West Tie-In + CIP PT Box Girder without Pier in I-405	\$ 235,510,000	\$ 176,630,000	\$ 294,390,000
2A	Plaza Extension & CIP PT Box Girder West Tie-In + CIP PT Box Girder with Pier in I-405	\$ 233,110,000	\$ 174,830,000	\$ 291,390,000
2B	Plaza Extension & CIP PT Box Girder West Tie-In + CIP PT Box Girder without Pier in I-405	\$ 225,710,000	\$ 169,280,000	\$ 282,140,000
3A	Cable Stayed West Tie-In + CIP PT Box Girder with Pier in I-405	\$ 246,580,000	\$ 184,940,000	\$ 308,230,000
3B	Cable Stayed West Tie-In + CIP PT Box Girder without Pier in I-405	\$ 239,180,000	\$ 179,390,000	\$ 298,980,000
4	Cable Stayed West Tie-In + Network Tied Arch over I-405	\$ 249,710,000	\$ 187,280,000	\$ 312,140,000
5	Steel Truss West Tie-In + Steel Truss over I-405	\$ 297,150,000	\$ 222,860,000	\$ 371,440,000



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Construction Cost of Similar Projects

	Publicly Stated Cost [\$]	Approximate Deck Area [sqft]	Cost per Deck Area [\$/sqft]	Type	Cost source:
John Lewis Memorial Bridge	\$ 56,000,000	26,556	\$ 2,109	Mostly Precast, ~20% signature	https://cascade.org/news/2021/09/new-bike-and-pedestrian-bridge-seattles-northgate-neighborhood-victory-connectivity
Seattle Waterfront Overlook Walk	\$ 70,000,000	33,300	\$ 2,102	CIP Box	https://www.seattletimes.com/seattle-news/politics/seattle-starts-construction-on-overlook-walk-from-pike-place-market-to-downtown-waterfront/#:~:text=The%20Overlook%20Walk%20project%20is,bridge%20is%20about%20%2470%20million.
Sound Transit I-405 Crossing		24,300	\$ -	CIP Box	
Redmond Technology Station Ped Bridge		47,700	\$ -	Precast	
Overlake Pedestrian Bridge	\$ 10,400,000	4,160	\$ 2,500	Truss (no landscaping)	https://www.seattletimes.com/seattle-news/transportation/new-walk-bike-bridge-debuts-access-to-microsoft-and-light-rail/#:~:text=Redmond%20spent%20%2410.4%20million%20for,planning%20and%20community%20development%20director.
Marion Street (Colman Dock) Ped Bridge	\$ 6,300,000	3,020	\$ 2,086	CIP Box -ish	https://www.theurbanist.org/2023/11/11/new-marion-street-pedestrian-bridge-caps-off-colman-dock-rebuild/#:~:text=The%20City%20of%20Seattle%20and,was%20closed%20in%20early%20November.
Fairview Ave Bridge	\$ 52,000,000	36,900	\$ 1,409	Precast	
Totem Lake	\$ 22,360,000	12,000	\$ 1,863	Truss (no landscaping)	https://www.theurbanist.org/2023/05/16/coming-pedestrian-bridges-will-create-invaluable-connections-on-the-eastside/
Blumenauer Bridge (Portland)	\$ 19,000,000	11,400	\$ 1,667	Truss (no landscaping)	https://www.kgw.com/article/news/local/blumenauer-tours-blumenauer-bridge/283-6cc1ac99-ccc0-4b9c-a662-6de4dfae53ab
Vancouver (WA) Land Bridge	\$ 26,740,214	16,000	\$ 1,671	CIP Box	Note: Inflated at 5% year from 2008 (typ. construction cost inflation).