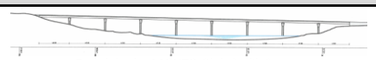
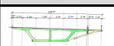
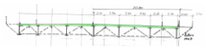
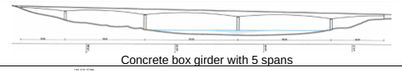
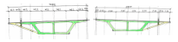
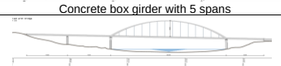
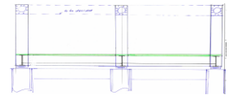
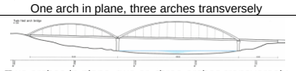
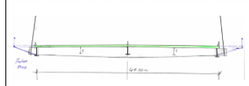
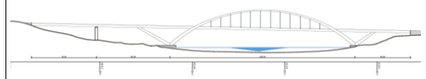
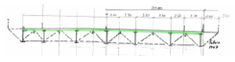
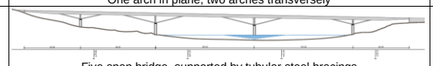
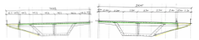
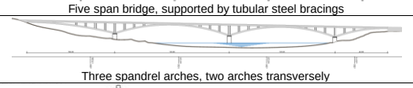
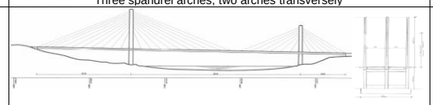
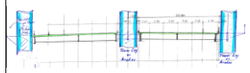
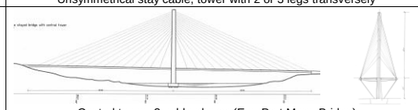
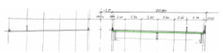
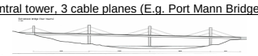
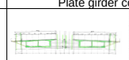
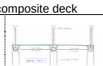
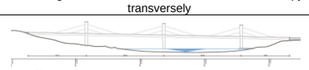
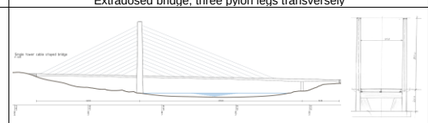
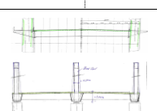
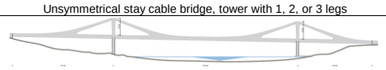
Sakatoon Freeway Bridge Option Study

2020-08-21

1 = Low (Good) | 2 = medium (Fair) | 3 = high (Poor)

Option No.	Type	Layout	Spans between EJs [m]	Feasible Superstructure Types		Total No. of Piers	No. of Piers in the Water	No. of Piers in West Bank	Slope Stability Risk	Environmental Considerations	Compatible with Local Bridges	Constructibility	Expandability for Future added Lanes/MUP	Capital Cost	Life Cycle/O&M Cost	Aesthetics	Overall	Remarks
				Var A	Var B	Foundations												
1	Prestressed Concrete Girder	 Box girder (or AASHTO Girder) with 9 spans	41-7 x 47-40 = 410	 Two independent concrete boxes	Precast Beams (AASHTO girders	8	4	2	3	3	3	2	3	2	3	3	22	Concrete boxes, incrementally launched, would be the first choice in Europe, since it is the most economical and robust type for shorter spans. But many piers in the water increases constructablity problems.
2	Steel Composite Box or Steel Plate Girder	 Composite girder with 6 spans	60-4 x 73-58 = 410	 Multiple plate girder (local standard)		5	2	1	2	3	1	2	2	1	2	3	16	European style would be a box girder; likley multiple plate girder in Us or Canada.
3	Haunched Prestressed Concrete Box Girder	 Concrete box girder with 5 spans	60-2 x 105-90-50 = 410	 Two concrete box girder		4	1	1	2	3	3	2	3	2	2	3	20	Steel composite box girder may also be feasible.
4	Tied Arch	 One arch in plane, three arches transversely	65-200-75-70 = 410	 Steel plate girder with concrete slab		3	0	1	2	2	2	3	2	2	3	2	18	Piers might be a bit to close too the shore, with a 215 m span this situation would improve and the cost would increase only marginally.
5	Tied Dual Arch	 Two arches in plane, two or three arches transversely	65-200-145 = 410			2	0	0	1	2	2	3	2	3	3	2	18	
6	Through Arch	 One arch in plane, two arches transversely	60-225-120 = 410	Cross section at the arch: two inclined arches  Alternative cross section at the sidespans		2	0	0	1	2	2	3	2	3	2	1	16	Capital cost is considered to be similar as Option 7; the omitted pier on the west bank is offset by the larger spans.
7	Through Arch (with additional pier)	 One arch in plane, two arches transversely	60-200-80-70 = 410	 Steel Plate Girder with concrete slab		3	0	1	2	2	2	3	2	3	2	1	17	
8	Braced Composite Girder	 Five span bridge, supported by tubular steel bracings	60-105-105-80-60 = 410	 Twin steel composite box girders		4	1	1	2	3	2	3	2	3	2	3	20	Sundsvall Bridge (Sweden) type.
9	Spandrel Arch	 Three spandrel arches, two arches transversely	60-105-105-80-60 = 410	 Prestressed solid concrete or composite girders		3	1	1	2	3	2	3	2	3	2	2	19	Main pier on the left shifted into the west bank.
10	Unsymetrical Stay Cable	 Unsymmetrical stay cable, tower with 2 or 3 legs transversely	60-225-125 = 410	 Plate girder composite deck		2	0	0	1	1	3	1	2	2	1	1	12	Minimum number of piers with simple construction procedure.
11	Central Tower Stay Cable	 Central tower, 3 cable planes (E.g. Port Mann Bridge)	200-210 = 410	 Plate girder composite deck		1	1	0	1	3	3	1	2	3	2	2	17	
12	Extradosed	 Extradosed bridge with small column on the abutment, three pylon legs transversely	60-120-120-110 = 410	 Twin concrete box girder	 Tripple steel box girder	3	1	0	1	3	3	2	3	2	2	2	18	Small column placed on the abutment to support the deck and avoid critical pier locations. Main pier on the left placed not directly at shore.
13	Extradosed	 Extradosed bridge, three pylon legs transversely	75-120-120-90 = 405			3	2 (one placed near the shore)	1 near the critical slope	2	3	3	2	3	2	2	2	19	
14	Unsymetrical Single Tower Stay Cable	 Unsymmetrical stay cable bridge, tower with 1, 2, or 3 legs	60-225-125 = 410	 Plate girder composite deck		2	0	0	1	1	3	1	2	3	2	1	14	
15	Steel Girder Bridge with External "Sail"	 Three span bridge, supported by external steel boxes	85-210-115 = 410	 Steel composite box girders		2	0	0	1	2	3	3	2	3	2	2	18	Transverse shape needs further study. European examples are composed of box girders.