Lake Champlain Bridge Replacement Alternatives - Matrix Analysis

		Conventional Bridge Types		Signature Bridge Types			
		Long-Span Steel Girder Bridge	**Segmental Concrete Bridge (Cast-In-Place or Precast)**	**Steel Composite Cable-Stayed Bridge**	**Concrete Extradosed Bridge**	**Network Tied Arch Bridge**	**Modified Network Tied Arch Bridge**
QUALITATIVE	**Image**						
	Bridge Description	Combination of haunched (main span) and uniform depth (approaches) steel plate or twin trapezoidal HPS steel box girders made composite with a precast or cast-in-place conventionally reinforced HPC deck. All steel will be metalized for enhanced corrosion protection. The substructures are founded on drilled shafts/caissons socketed into rock.	Precast, post-tensioned single cell segmental box girder built in balanced cantilever; variable depth for the main channel spans and constant depth for the approach spans. Pier segments and variable depth segments may be cast-in-place. HPC used in both superstructure and substructure. The substructures are founded on drilled shafts/caissons socketed into rock.	Conventional two tower cable-stayed bridge with a steel composite superstructure comprised of steel edge girder with floorbeams framing supporting precast decks. Since deck for the main span is not readily replaceable, a 2" wearing surface must be replaced periodically. All steel will be HPS and metalized for enhanced corrosion protection. Substructures and pylons are supported on drilled shafts/caissons socketed into rock.	Similar to a cable-stayed bridge but using a stiff, deep concrete superstructure and low towers. Superstructure framing is edge girder with floorbeams supporting a precast concrete deck. Since deck for the main span is not readily replaceable, a 2" wearing surface must be replaced periodically. Substructures and pylons are supported on drilled shafts/caissons socketed into rock.	The main channel span is a basket handle arch with a network cable arrangement and internally redundant box tie girders supporting a composite precast deck system. Hangers are stay cables for corrosion protection and replaceability. The approach spans are steel plate girders. All steel is HPS and metalized for enhanced corrosion resistance. Substructures are founded on drilled shafts/caissons socketed into rock.	Similar to the Network Tied Arch, the main channel span is a basket handle arch with a network cable arrangement and internally redundant box tie girders supporting a composite precast deck system. Hangers are stay cables for corrosion protection and replaceability. The steel girder approach spans adjacent to the main span cantilever to meet the arch and provide a smoother transition. All steel is HPS and metalized for enhanced corrosion resistance. Substructures are founded on drilled shafts/caissons socketed into rock.
	Advantages	Lowest initial cost; High degree of redundancy; Deck replaceable; Lighter weight superstructure resulting in reduced foundation costs; Contractor familiarity; Construction minimally impacted by cold weather	Use of precast segmental construction results in a high degree of initial quality	Visually pleasing; Efficient use of steel; Moderate degree of redundancy & safety; Lighter weight superstructure resulting in reduced foundation costs; Balanced cantilever construction	Visually pleasing; Moderate degree of redundancy & safety; Moderate weight superstructure; Balanced cantilever construction	Visually pleasing; Enhanced redundancy & safety; Efficient use of steel; Deck replaceable; Light weight superstructure resulting in reduced foundation costs; Float in construction for arch erection	Visually pleasing; Enhanced redundancy & safety; Efficient use of steel; Deck replaceable; Light weight superstructure resulting in reduced foundation costs; Float in construction for arch erection
	Disadvantages	Less visually pleasing; Difficult to maintain navigational vertical clearance with deep tapered section over main channel span	Less visually pleasing; Heaviest superstructure requires largest foundations; Non-replaceable deck; Maintenance costs (overlay replacement); Segmental erection impacted by cold weather; Heavy lifting equipment required; Difficult to maintain navigational vertical clearance with deep tapered section over main channel span	High initial cost; Less efficient for span under 600 ft; Non-replaceable deck; Maintenance costs (overlay replacement); Longer construction time	High initial cost; Less efficient for span under 600 ft; Non-replaceable deck; Maintenance costs (overlay replacement); Longest construction time	Complex fabrication for arch span	Complex fabrication for arch span
QUANTITATIVE	**Aesthetics**	**YOU DECIDE**					
	Construction Costs	Lowest	Moderate	Higher	Higher	Moderate	Moderate
	Construction Time	Shortest	Moderate	Longer	Longer	Moderate	Moderate
	Environmental Impact	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
	Bridge Safety & Serviceability	Best	Good	Good	Good	Better	Better
	Maintenance Costs	Lower	Moderate	Higher	Higher	Lower	Lower

HPC = High Performance Concrete
HPS = High Performance Steel