Port Mann/Highway 1 Improvement Project
Kiewit/Flatiron Design Build

July 29, 2010

Presentation Prepared by J. Mahoney
The Project

- Total project cost $2.5 billion (Canadian)
- Financed by tolls – about $3 each direction.
- Total project length 37 km (McGill St in Vancouver to 216\textsuperscript{th} in Langley)
- The new Port Mann bridge
  - 10 lanes (existing bridge has 5 lanes).
  - Replaces the existing 45 year old bridge.
  - Includes Rapid Bus service from Langley to Burnaby SkyTrain.
  - Can accommodate installation of light rapid transit underneath the main deck at a future date.

Project Information

• Project website
  – http://www.pmh1project.com/

• Port Mann/Highway 1 Improvement Project—PP shows status as of Summer 2010

• Project construction started August 2008.

• Port Mann Bridge to be operational by December 2012.

• All of project complete by December 2013.
Approximate project limits

North Vancouver
Vancouver
Burnaby
Port Mann
Surrey
Langley
Coquitlam
Richmond
YVR

All satellite images in PP from Google Maps
Surrey side of bridge
Coquitlam side of bridge
The New Port Mann Bridge

• Three major parts
  – Cable-stayed main bridge across Fraser River.
    • Main span 470 m.
    • South span 190 m.
    • North span 190 m.
  – South approach
    • 350 m constructed using 327 precast sections with HMA road surface.
  – North approach
    • 820 m constructed using 831 precast sections also with an asphalt surface.

Source: PMH1 newsletter—Summer 2010
The New Bridge

- Designer: T.Y. Lin International
- Materials
  - New bridge deck requires 25,000 tonnes of HMA
  - 28,000 tonnes of rebar
  - 13,000 tonnes of structural steel

Source: PMH1 newsletter—Summer 2010
Sources: (1) PMH1 newsletter—Summer 2010, (2) PowerPoint for Professor’s Tour, 2010-07-29, Kiewit Flatiron presented by Scott Hanson, Marine Foundation Manager.

78 drilled shafts 2.5 m in diameter with average depth = 53 m.

129 driven piles 1.8 m in diameter with average depth = 67 m.

30 drilled shafts 2.5 m in diameter with average depth = 31 m and 122 driven piles 1.8 m diameter with average depth = 44 m.
S1 Pylon Construction

October 22, 2009

October 26, 2009

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
S1 Pylon Construction

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east

November 1, 2009

December 1, 2009
S1 Pylon Construction

December 3, 2009

December 18, 2009

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
S1 Pylon Construction

December 21, 2009

January 20, 2010

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
South Abutment pile driving and pier construction

November 20, 2010

February 26, 2010

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
South Abutment pier construction

March 26, 2010

April 26, 2010

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
South Abutment pier construction

May 26, 2010

June 26, 2010

Images from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
South Abutment pier construction

July 26, 2010

Image from: http://www.earthcam.com/clients/britishcolumbia/portmann/?cam=pm_east
Existing Port Mann Bridge

- Steel tied arch bridge spanning the Fraser River
- Carries 127,000 vehicles per day (8% trucks) on 5 lanes
- Longest arch bridge in Canada
- Opened June 12, 1964 with construction starting in 1957
- Owner: British Columbia Ministry of Transportation
Photos taken July 30, 2010
Fraser River from existing Port Mann bridge (view to east)
South Approach
Precast segments used for approaches

First full span composed of 22 precast segments
Most piers have 3 columns
Places precast segments together as units, then post-tensioned followed by placement onto bridge bearings.
Epoxy is applied between precast segments
Joint between two precast segments
S1 pylon under construction—ultimate height 160 m (525 ft)
Formwork for column which is one of three for this pier.
North approach construction
View to the north
$10 million required to build temporary construction trestle which extends from north shore of Fraser River
Sheet piling removed following construction of pier footings
Installation of sheet pile cofferdam prior to dewatering. Temporary structure allows removal of water to construct new pier
Elevator has capacity for 30 persons
Cooling tubes which use river water. Concrete placed in pylon is defined as mass concrete and must be cooled during early curing. Following sufficient cure time, tubes are grouted closed.
Grounding cable for lightening strikes—one in each corner.
Largest rebar size is 57M (or #18) which is 2.257” in diameter.
Threaded rebar connection or coupler. Replaces rebar splices

End anchor which can eliminate bent bar (or hook) requirements
View upriver and the Port Mann bridge to be replaced
Sampling concrete for cylinder preparation
Precast segments for approaches
Segments moved from precast yard to south approach via truck over the existing Port Mann bridge. Require use of two eastbound lanes.
Segment ready for storage
The End