

**CITY COUNCIL STUDY SESSION ITEM**

**SUBJECT:**

Respond to Council questions on the Interim Analysis “Tipping Point” report for the East Link B7/C9T to NE 2nd Portal (B7 – Revised) alternative and review next steps to finalize the report and hold a third public open house.

**STAFF CONTACT:**

Goran Sparrman, Director, 452-4338  
David Berg, Deputy Director, 452-6468  
Maher Welaye, Project Manager, 452-4879  
*Transportation Department*

**POLICY ISSUES:**

On April 22, 2010 the Sound Transit Board revised their preliminary preferred alternative for the East Link Project to include tunnel and at-grade options: C9T 110<sup>th</sup> Tunnel and C11A 108<sup>th</sup> At-Grade. The revised preliminary preferred alternative also included the B2M option in South Bellevue, travelling along Bellevue Way and 112<sup>th</sup> Avenue Southeast from I-90 to downtown Bellevue. Subsequently, Sound Transit led the evaluation of six alternatives for the specific routing of light rail on 112<sup>th</sup> Avenue SE. On July 22, 2010 the Sound Transit Board identified a west-side running alignment based on technical analysis and feedback from affected stakeholders.

Concurrent with the 112<sup>th</sup> Avenue SE options evaluation, the City pursued additional analysis of issues related to the B7 alignment, Council’s preferred route for Segment B of the East Link Project. Areas of analysis included review of environmental analysis and constructability issues, assessment of Mercer Slough wetland functions and values, and alternative South Bellevue Station locations. The findings of this analysis were presented to Council on July 19, 2010.

At the September 13, 2010 Study Session, Council discussed the need for additional analysis of the East Link B7 alignment and design variations intended to improve performance, reduce impacts, and reduce costs. Council directed staff to return with a scope of work to allow an “apples-to-apples” comparison of the B7 alignment with modifications (“B7-Revised”). A phased approach to the scope was presented to Council on October 4. Council directed staff to proceed with Phase 1 of the B7-Revised analysis (5% Conceptual Engineering and Concept Design Report).

**DIRECTION NEEDED FROM COUNCIL:**

- Action
- Discussion
- Information

Direction on finalizing the report and holding a third public open house is needed.

**BACKGROUND/ANALYSIS:**

On May 16, the City’s consultant (ARUP North America Ltd.) presented the Interim Analysis “Tipping Point” report for the East Link light rail B7/C9T to NE 2<sup>nd</sup> Portal (B7 – Revised)

alternative. At that meeting, Council asked many questions regarding the information in the report. Staff and ARUP have responded to Council's questions in Attachment 1.

Staff will also review a timeline to finalize the report and hold a third public open house.

**ATTACHMENT:**

1. East Link B7-Revised, Interim Analysis Report follow-up Memo
2. B2M Visuals
3. Gantry Article

City of  
Bellevue



# MEMORANDUM

DATE: June 9, 2011  
 TO: Mayor Davidson, Members of the City Council  
 FROM: Goran Sparman, Transportation Director  
 SUBJECT: East Link B7-Revised, Interim Analysis Report follow-up

At the May 16th Council meeting, the City's consultant Arup North America Ltd. presented the B7-Revised Interim Analysis Report. At the meeting, Council raised questions and requested additional information regarding both the B7-Revised and the B2M alternatives.

This memo provides summary of the questions and answers as well as a timeframe on some of the requested information which requires additional time to research and prepare.

The following questions were answered by Arup:

1. *Why is the A-2 park-and-ride designed for 1450 stalls versus the South Bellevue park-and-ride under B2M, which is designed for 1400 stalls, and both park-and-rides have the same ridership of 4500?*

While the ridership forecasts from the Sound Transit model are the same between B7-Revised and B2M (as reported in the SDEIS), the auto access mode share for the A-2 station in B7-Revised is slightly higher than the South Bellevue park-and-ride station in B2M. This translates into slightly higher vehicle trips and parking generation at A-2. The Sound Transit model is sensitive to changes in the location of the station: A-2 is closer to the freeway and has longer transit access travel times (and is thus less desirable to bus-transit users connecting to East Link), which triggers an increase in the auto access mode share to the station.

In B2M, the parking requirement works out to 1,400 spaces, but Arup does not have the supporting calculation; in B7-Revised the number calculated parking demand is 1,437, which Arup rounded up to 1,450 for space design purposes. These comparisons to the B2M results are based on ridership forecast outputs provided to Arup by Sound Transit. These numbers are consistent with forecasts published for B2M in the SDEIS.

2. *What is the parking demand for the South Bellevue park-and-ride under the B2M option?*

Based on Sound Transit's ridership model, the calculated parking demand for B2M is 1,400 spaces. This is based on a slightly lower auto access mode split (and higher bus-transit mode split) compared to A-2.

3. *Would like to see a detailed cost estimate of the A-2 park-and-ride to see what is included and what is not.*

This is available in technical memo TM05 'Cost estimate update A-2 Station'.

4. *In regard to a straight station requirement versus curved station, is there a process for looking for a deviation to allow for a curved station; how do we propose that to Sound Transit; has it been done before; and would it save any costs?*

Based on discussions with Sound Transit, we understand that deviations to the Sound Transit Design Criteria Manual require approval by the Sound Transit Board.

LRT vehicles are straight and anything other than straight platform requires careful management of stepping distances. Straight track through a station is a standard criterion for new LRT systems. Curved track would impact operations, passenger convenience, ADA requirements, and safety. Specifically, the federal DOT's updated ADA Standards for Transportation Facilities (2006) - requires a maximum 3" horizontal gap between the station edge and the light rail vehicle door. This gap also allows for the lateral motion of the LRV.

Curved stations are feasible – there are a number of locations where this has been done previously including the San Francisco Muni Castro Street Station opened in 1982.

A curved platform, though an unusual proposal at concept stage, is not out of the question. We would suggest getting acceptance in principle at the earliest opportunity from relevant parties. Given the context of this study, it is not clear how such acceptance could be obtained.

If curved track were used it would be possible to maintain an alignment closer to the I-405 on the east side of the Sheraton Hotel which could reduce the impact on the property and may allow the building to be maintained.

5. *What would be the travel time with and without the East Main station, and how would that affect ridership?*

Station dwell time (the time the LRT vehicle is stopped in a station) is typically between 40 and 75 seconds

Under all of the alternatives, B7-Revised, B7/C9T, and B2M, each alternative in segments B and C (to the south end of the Bellevue Transit Center Station) have two stations:

B7-Revised: A-2 Station and East Main Station  
B7/C9T: 118th SE Station and East Main Station  
B2M: South Bellevue Station and SE 8th Station

While the stations have different locations, the travel times along Segment B should be roughly the same and independent of the location of the Segment B station. In reality, very minor travel time differences will occur due to station spacing. This affects the acceleration, deceleration, and top speed of the trains. But these differences will “wash out” over the length of Segment B and along the entire route.

6. *In regard to the B7-R alignment, rather than going to a NE 2<sup>nd</sup> portal, could the alignment make a turn and go to a tunnel at Main St.?*

An alignment as described is likely to be feasible. It would affect the B7-Revised alignment in a number of ways, including:

- a) East Main station would move further south to allow for the station to be on a tangent length
- b) Moving East Main Station south would extend the length of alignment in cut and might conflict with the Sturtevant Creek crossing

Further analysis would be required to investigate this alternative.

City staff comment: B7 was elevated approaching Red Lion and across the Red Lion site, allowing for an elevated connection over 112<sup>th</sup> into the C9T tunnel portal at Main/110<sup>th</sup> Pl. Previous discussions with ST found that moving the tunnel portal to the east side of 112<sup>th</sup>/Main would add roughly \$30m to the cost. This would probably be roughly applicable to the B7-R profile at the Red Lion. This would be essentially the same as the CE layout for alternative B3/C9T in the SDEIS (Sheet Number C-23)

7. *If we were to use the value of the easement transaction Sound Transit just purchased, would that increase or decrease the cost estimate for the BNSF corridor used in the B7-R cost estimate?*

The details of this transaction are not yet publicly available.

8. *In reading the technical memo, it looks like we did use updated 2010\$ on the right of way numbers. Will you please clarify?*

The right of way costs included in the Interim Analysis Report present the costs provided by Sound Transit and use 2007\$. In the separate, right of way cost prepared by the project team (available in technical memo TM08) 2010\$ are used.

9. *Asked to see an example of a gantry system*

Attached are two documents describing the system. These two web-sites provide additional information <http://www.deal.it/> and <http://www.flatironcorp.com/index.asp?w=pages&r=9&pid=42&n=115>

10. *The ridership at East Main station is 2500 for B7-R, compared with 3000 for B7/C9T. Why are the ridership numbers reported differently for the same station at the same location?*

The difference in ridership from the Sound Transit model is mostly due to the relative location of the next station down the line under the two alternatives. In B7-R, the A-2 station on Bellevue Way generates 4,500 riders and is an attractive option for residents on the west side of the City. In B7/C9T, the 118th St station, which is closer to East Main and not as attractive a location to many residents, generates 1,500 riders. A-2 is attracting some riders away from East Main in B7-R, while the East Main and 118th stations in B7/C9T results in a situation where East Main is the most attractive option. The relative location of neighboring stations in the Sound Transit model is enough to result in varying ridership forecasts

11. *Would like to see a comparison of the A-2 park-and-ride walking distance to other similar facilities in the region.*

Figure 7 in the A-2 Station Concept Design Report (TM03) provides comparative walking distance for transit facilities. The maximum walking distances for the A-2 station is 1300 ft.

City staff comment: The maximum walking distance for the Mountlake Terrace P&R is around 750 feet. For the Eastgate P&R from the parking structure to the bus stop at the direct access ramps on I-90 is 900 feet, and for Canyon Park park-and-ride is around 1,100 feet.

Also, at the SeaTac airport station, the distance from the station to the terminal's door is 1000 feet.

*12. Discuss the impacts to deleting the East Main station. Cost and Ridership.*

A high level review of this was carried out and is reported in the Interim Analysis Report:

Overall Ridership reduced by 1,000  
Savings of approx. \$40M for station  
And potential to reduce impact on Sheraton with potential savings of approx \$20M

*13. The ridership report from Arup says in multiple places that the SBPR station has 5,500 boardings in 2030. It says the information comes from the SDEIS. See the attached link to Appendix D, the Transportation portion, of the SDEIS: [http://projects.soundtransit.org/Documents/pdf/projects/eastlink/deis\\_2010Nov/Appendix%20D\\_Transportation.pdf](http://projects.soundtransit.org/Documents/pdf/projects/eastlink/deis_2010Nov/Appendix%20D_Transportation.pdf)*

*There is a table on page D-10 that says the B2M/C9T is 4,500 boardings in 2030 at the South Bellevue Station. The SE 8th Station adds 500 boardings, and the total for Segment B is 5,500 (nevermind that 4,500 and 500 do not equal 5,500). Is there some other source for the 5,500 boardings at SBPR?*

This is a typographic error and will be corrected.

The following questions were answered by City staff:

*14. In 1995 WSDOT built a structure from southbound I-405 to westbound I-90 which was built on a series of pilings. How did WSDOT handle the crossing structure as opposed to how Arup's proposal is handling the Mercer Slough crossing?*

WSDOT briefed Council in late 2010 regarding soil movement and associated risks in the Mercer Slough. They noted that all I-90 structures across the Slough are experiencing similar movements and that geotechnical studies are ongoing and therefore the State has not reached conclusions about cause and effect. Therefore, the degree of risk and possible remedies to the apparent structural instabilities is not definitively known.

*15. In regard to the South Bellevue park-and-ride foundation design, is it on pilings in the peat soils?*

Sound Transit boring logs in the South Bellevue park-and-ride were provided to Council via email on January 27, 2011. Only one of ten boring logs found peat. The log indicates that the peat occurred at 25' below the surface and the peat lens is 12' thick with 25' of competent soil covering the peat lens.

The current Sound Transit design has the Station itself supported by eight foot diameter drilled shafts reaching 60 feet deep. The parking structure itself is supported by four foot diameter drilled shafts reaching 35 feet deep.

*16. Need to better understand traffic mitigation impacts to South Bellevue under the various alternatives*

The SDEIS describes the transportation impacts of B2M on p. 3-11 and the design of the proposed mitigation in Appendix H, Sheet B-3 and B-4. Subsequent to the publication of the SDEIS, WSDOT has indicated that the proposed design with a signal at SE 30<sup>th</sup> as shown in the SDEIS is not acceptable. As reported verbally by Goran Sparrman at the Council meeting, the City, Sound Transit, and WSDOT have been exploring other mitigation scenarios at the South Bellevue Station with B2M.

*17. Would the necessary mitigations for the A-2 park-and-ride also be necessary for the B2M South Bellevue park-and-ride? Particularly in relation to traffic mitigation at SBPR. Have these been factored into Sound Transit's cost estimates for South Bellevue park-and-ride?*

No, the South Bellevue Station at the existing park-and-ride requires different mitigation than the A-2 station, as explained by Goran Sparrman at the Council meeting.

As indicated previously, the City has been discussing a mitigation scenario with ST that improves upon what was assumed in SDEIS on page 3-11 for the SBP&R. Sound Transit's cost estimates include the traffic mitigation presented in the SDEIS. All mitigation alternatives under consideration have comparable costs.

*18. What would be the net impact if the South Bellevue park-and-ride was eventually returned to the Mercer Slough park? What is the size and would that net a positive impact?*

It is unclear whether the existing South Bellevue park-and-ride could be converted back into wetland. The site will have to be excavated on an average of 20 to 25 feet down to the Slough elevation which can make it very costly.

If converted to park land in its entirety, around 11.5 acres would be converted.

*19. If B7-R was done, could the land currently occupied by the South Bellevue park-and-ride be added back into the park (for mitigation)?*

Yes. It may require purchase of the property from WSDOT.

*20. In comparing the alignments, please do an independent side-by-side comparison of the B2M to B7R for all impacts including parkland, residential and business. Also please include what the impact would be for removing the S. Bell P&R and how much square feet that would return to the slough.*

A key data comparison of the B2M and B7R alignments was provided to Council via email on Friday, May 13 (Attached). See previous responses regarding the existing South Bellevue park-and-ride.

*21. Would like to see more comparative analysis of the B2M to the B7-R. The analysis should include impacts; traffic impact to Bellevue Way, stations and 112<sup>th</sup>; construction impact. How do these options interact with the Best Practices Report? Provide a briefing on how the best practices interact with both options.*

As stated previously, a key data comparison of the B2M and B7R alignments was provided to Council via email on Friday, May 13 (attached). Additional analysis will require considerable effort and time to prepare (about six to eight weeks). At Council direction we can start this work immediately.

*22. If there was a station at A-2, could this be used as part of a future ST-3 alignment to Eastgate and Issaquah?*

As addressed by Goran Sparrman at the May 16 Council meeting, the A-2 station could be used as part of a future ST-3 alignment provided that further analysis is needed.

*23. An altitude cross section of A-2 station as compared to existing I-90 and I-405 would be helpful. Also, I asked Maher to do a similar engineering of light rail phase 3 if it used the A-2 station and then stayed with I-90 and went under I-405.*

City staff will prepare the requested information and forward to Council upon completion.

*24. Would like to get the cost including contingencies on the B2M South Bellevue park-and-ride.*

The only available information at this time is based on the KPFF South Bellevue Station Alternative Location Analysis Report. The estimated cost for the B2M South Bellevue Station shown in the report is \$129m. By adjusting the estimate to follow more closely with Sound Transit's methodology, the revised cost would be approximately \$146m.

*25. Would like to see B2M option numbers tabulated next to the B7-R numbers in the Interim Analysis report.*

Key data point comparison provided to Council via email on 5/13/11. A copy of the data point comparison sheet is also attached.

*26. In regard to the San Diego light rail project – provide a list without the narrative of what the cost estimate includes and does not include.*

Please see 4/26/11 e-mail from Van de Kamp to Councilmember Robertson/Council. Copy of the email is also attached.

*27. Does the A-2 station draw more ridership from Mercer Island than South Bellevue park-and-ride?*

Fluctuation in projected boarding in south Bellevue and on Mercer Island is a result of differing station access and desirability. Ridership projections for B7 indicate comparatively lower ridership in segment B than other segment B alignment alternatives. In the B7 scenario more riders board the system on Mercer Island because the B7 station would be difficult to access. Segment B boardings are higher with the B7-R and B2M alternatives than B7 and lower on Mercer Island. This is because these stations provide better access to riders boarding on the east side, either by auto or bus-transfers. These boardings are from riders originating on the eastside, rather than Mercer Island. The B2M South Bellevue Station would draw about the same number of riders as the A-2 station.

*28. Will buses operate more slowly due to the A-2 station, and are there operating cost implications to this?*

For information on bus travel time analysis and cost impact, please refer to technical memo TM04 'South Bellevue Traffic Impact', page 34.

*29. Would like to see a comparable visual of the South Bellevue park-and-ride structure, similar to what ARUP did for A-2. Would like to see a visualization of the B2M station and the B2M alignment structure along Bellevue way.*

Attached are visual renderings of the South Bellevue Station, prepared by Sound Transit. Currently, the City and Sound Transit do not have any additional visual renderings of the B2M alignment structure along Bellevue Way between the South Bellevue Park and Ride and I-90.

*30. Would like to explore various options through segment C to reduce costs.*

Potential Study Session topic was suggested by some Councilmembers.

If you have any questions about this information, please feel free to contact any of us:

Goran Sparrman, Transportation Director, [GSparrman@bellevuewa.gov](mailto:GSparrman@bellevuewa.gov), 425-452-4338

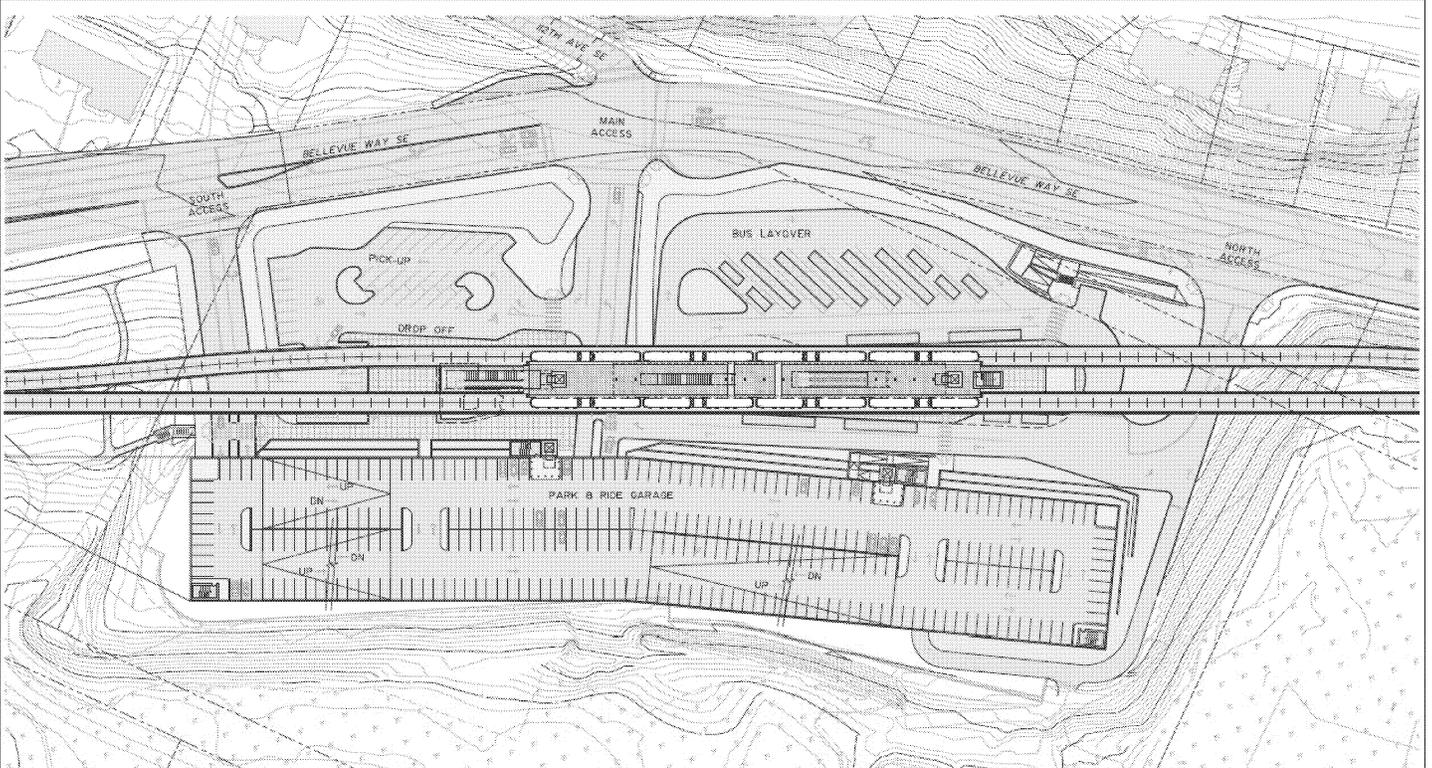
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Cc: Steve Sarkozy, City Manager  
Brad Miyake, Deputy City Manager  
Myrna Basich, Assistant City Manager

# EAST LINK: SOUTH BELLEVUE STATION



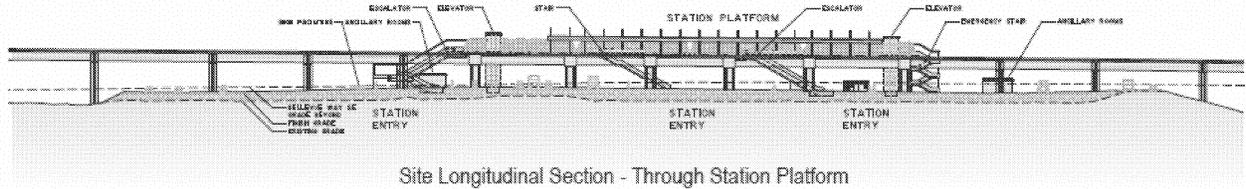
Site Area Plan - Station Platform Level

Interim Preliminary Engineering

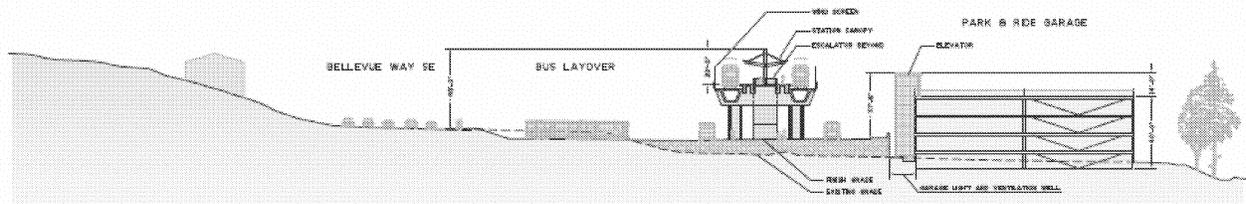


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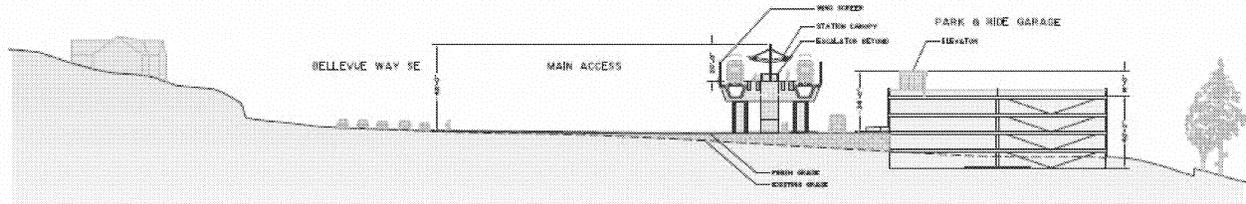
# EAST LINK: SOUTH BELLEVUE STATION



Site Longitudinal Section - Through Station Platform



Site Cross Section - Through Bus Layover Area



Site Cross Section - Through Main Access Driveway



Interim Preliminary Engineering



7.14.2010

# EAST LINK: SOUTH BELLEVUE STATION



Station Bird's Eye View

Interim Preliminary Engineering



7.14.2010

# EAST LINK: SOUTH BELLEVUE STATION



Station Hillside House View

Interim Preliminary Engineering



7.14.2010

# EAST LINK: SOUTH BELLEVUE STATION



Station Street Level View



Interim Preliminary Engineering



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# EAST LINK: WINTERS HOUSE



Site Area Plan - Winters House To Berry Farm Access Road

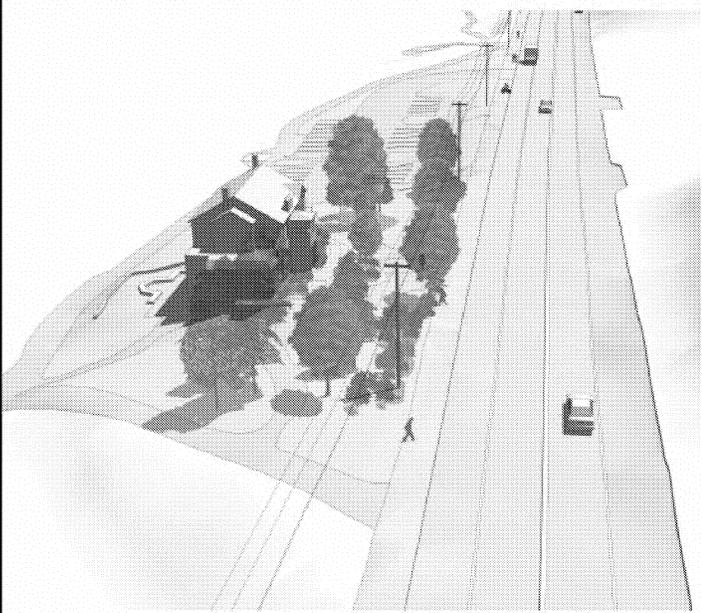


Interim Preliminary Engineering

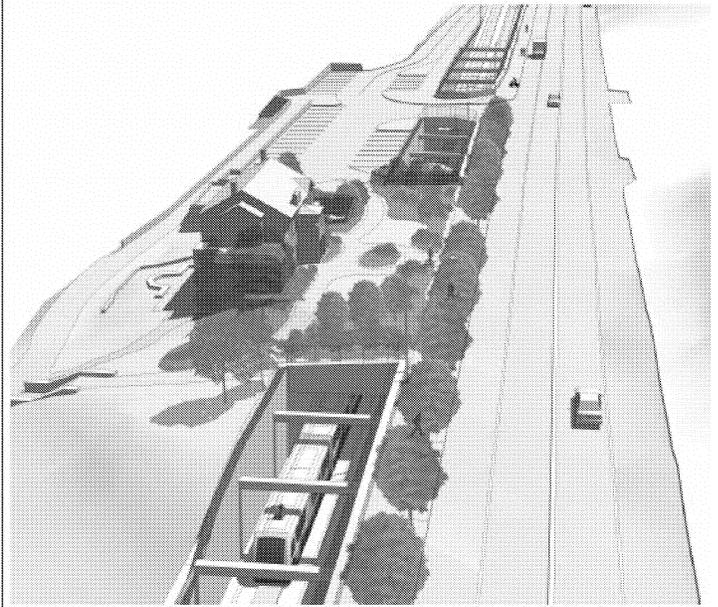


7.14.2010

# EAST LINK: WINTERS HOUSE



Existing



Proposed

Bird's Eye View



Interim Preliminary Engineering



7.14.2010

# EAST LINK: WINTERS HOUSE



Existing



Proposed

Street View



Interim Preliminary Engineering



7.14.2010

New construction system  
protects environmentally  
sensitive areas

## TECHNOLOGY DRIVEN

by Craig A. Shutt

Constructing the new Washington Bypass, an upgraded alternative route for U.S. Route 17 in Beaufort County, N.C., created unique challenges beyond traditional bypass construction. The \$192-million project, encompassing 6.8 miles of roads, includes two major interchanges and bridges that span environmentally sensitive lands. To meet the variety of needs, especially the goal of minimizing impact to wetlands, the construction team created an innovative

gantry system that drives piles, sets precast bents, and erects beams. After the deck is cast, the gantry progresses to the next span.

The bridge construction represents the second part of a three-part project, explains Maria Rogerson, assistant resident engineer with the North Carolina Department of Transportation (NCDOT). The first part, begun in February 2008, focused on widening

### profile

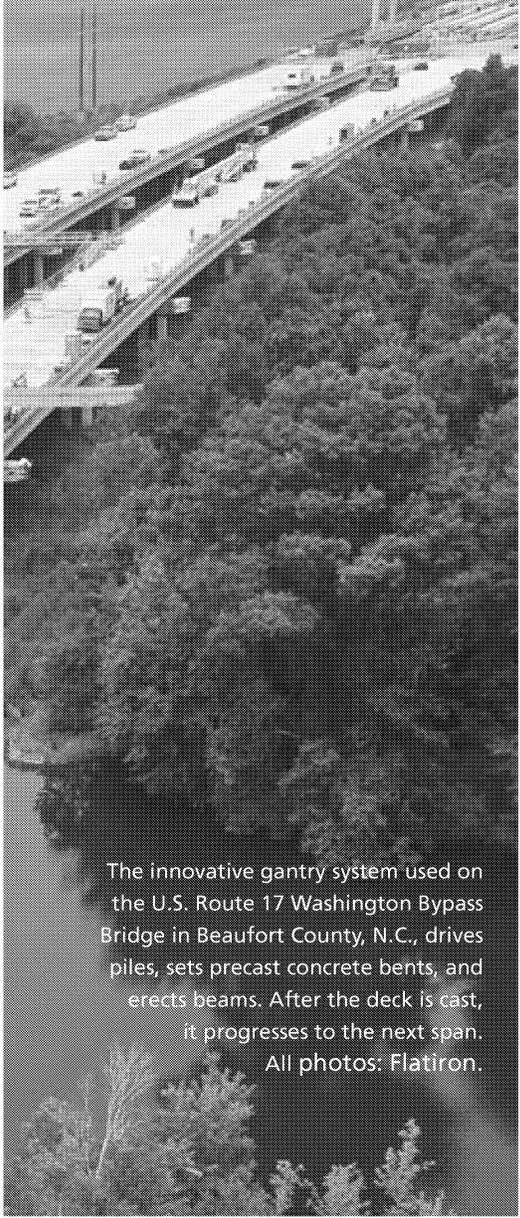
#### U.S. ROUTE 17 WASHINGTON BYPASS / BEAUFORT COUNTY, N.C

**DESIGN-BUILDER:** Flatiron/United, a joint-venture company comprising Flatiron Construction Corp., Longmont, Colo., and United Contractors Inc., Chester, S.C.

**ENGINEER OF RECORD:** Earth Tech Inc., Long Beach, Calif.

**PRECASTER:** Coastal Precast Systems, Chesapeake, Va., a PCI-certified producer

**GANTRY:** Deal, Italy



The innovative gantry system used on the U.S. Route 17 Washington Bypass Bridge in Beaufort County, N.C., drives piles, sets precast concrete bents, and erects beams. After the deck is cast, it progresses to the next span. All photos: Flatiron.

## Design-Build Opens Opportunity

"What gave us the ability to be a little bit creative on this project was the design-build process," says Rogerson. The state has created several smaller design-build projects prior to this one, she notes, but the delivery method has not been used extensively. Bidders were scored both on their creativity in meeting the variety of needs, as well as the cost to deliver the bridge. Three companies were short-listed based on their bids and technical proposals. Initially, all three bids came in too high, so adaptations were made to make the design more cost efficient. It is the largest design-build project in the state.

"The design-build process cuts the timeframe on construction before the NCDOT acquires the bridge, because the contractor is responsible for final design, right-of-way access, and construction in their contract," Rogerson explains.

The Flatiron competitively priced proposal was accepted because, among other features, it did not require the use of a temporary work bridge to erect the structure, which would have had more impact on the wetlands, she notes. "Their design required less clearance in the wetland areas, only 30 ft from the edge of the bridge, with minimal impact below." Executing this concept then became the design-build team's responsibility.

## Innovative Gantry System

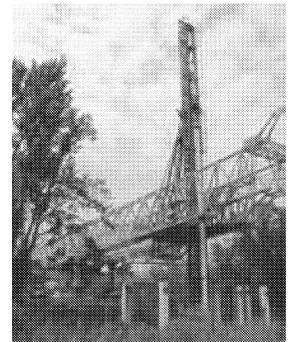
The bridge is being constructed using two 592-ft-long, patent-pending gantry systems starting from each end of the bridge. Each gantry consists of two parallel and connected trusses that are long enough to reach over four spans of the bridge. The gantry system begins at one end of the bridge and drives the piles for each bent. Approximately 1227 30-in.-square, precast, prestressed concrete hollow piles will be driven to support 140 spans including both portions of the Y-shaped split at the end. Each span is about 121 ft long. Earlier, test piles had been driven near the bridge's alignment to confirm the length of the piles and tip elevations.

The precast concrete piles and girders were fabricated off site while the pile caps were cast on site at a precasting yard set up at the south end of the bridge. The components are inspected and approved at both sites prior to delivery to the gantry.

## Gantry Operation

The precast piles and beams are delivered to staging areas at the north and south abutments and then loaded onto a special carrier that comprises two trucks, one driving forwards and one driving backwards, explains Elie H. Homs, vice president of engineering services at Flatiron Constructors Inc. and developer of this top-down concept.

the southern 4 miles of two-lane roadway to four lanes. Construction of the new 2.8-mile-long bridge, spanning wetlands along the 6.8-mile-long section of roadway, is now underway. It will be followed by widening 4 miles of highway north of the bridge under a contract to be let toward the end of 2009. The goal is to create an accessible 70-mph corridor from Virginia down to Wilmington, N.C., she explains.



The pile is loaded into the lead with an attachment for the hammer clamped to its top. The lead then rotates the pile into a vertical position for driving.

## PRECAST, PRESTRESSED CONCRETE BRIDGE / NORTH CAROLINA DEPARTMENT OF TRANSPORTATION, OWNER

**BRIDGE DESCRIPTION:** Precast concrete bridge consisting of 140 spans (116 spans plus two parallel structures of 12 spans) each about 121 ft long, with 1227 precast, prestressed concrete hollow piles, 922 precast beams, 140 precast post-tensioned pile cap bents and cast-in-place concrete deck

**PILE DRIVING EQUIPMENT:** Birmingham, Hamilton, Ont., Canada

**BRIDGE CONSTRUCTION COST:** \$192 million



The gantry system is used to attach pile caps in three pieces to the precast concrete piles.

The trucks position the pile under the tail of the gantry, where two separate trolleys lift each end. The pile is threaded into the lead and an attachment for the hammer is clamped to the top of the pile. The trolleys move to the end of the gantry, and the lead rotates the pile into a vertical position for driving.

The entire gantry is mounted on front and rear supports. Each support can move independently forwards, backwards, and sideways. The front support can be moved to the right while the back can be moved to the left, to skew the positioning, or they can be moved in the same direction to keep components parallel, Homsí explains. The sideways movement allows the gantry to be positioned to reach the locations of the piles and the beams.

On typical spans, the gantry drives nine piles and then sets the precast concrete caps in three pieces on the piles. The caps

are post-tensioned and infill concrete is placed. The concrete infill is loaded into buckets and transported to the leading end of the truss using the gantry trolley. The trolley maneuvers the bucket into the position required for concrete placement.

Next, seven beams are placed by the gantry and the concrete deck is cast. Once the 3500-psi concrete compressive strength is achieved, the gantry moves forward, and the cycle is repeated for the next span.

"This new method allowed the Flatiron/United team to break the record for top-down construction for this type of precast beam bridge by constructing 120-ft-long spans without relying on ground-based support equipment," says Homsí. The truss eliminated the need to erect a temporary bridge and significantly reduced the environmental impact. Fewer trees had to be cut down using this method.



On typical spans, the gantry drives nine piles, then sets the precast concrete caps in three pieces on the piles. The caps are then post-tensioned and infill concrete placed.

Mark Mallett, project manager for the Flatiron/United joint venture, explains, "The gantries are essentially a bridge-building assembly line. There are three spans of bridge under construction in the launching cycle at all times. It is one challenge to get the gantry to perform each of its tasks and another to synchronize these tasks so that all three spans can be built simultaneously."

The gantry progresses in a "caterpillar" mode of movement, Homsí says, stretching out the front support to its new location and retracting the rear support as construction progresses. The gantry is driving piles for the leading or first span as the deck is cast on the second span and the deck concrete is curing in the third span.

Achieving the needed concrete strength at the rear of each segment was the key to being able to progress, Rogerson notes. About four spans could be set each month. "It moved along pretty well."

All of the construction is moving smoothly, she adds. There are penalties of \$10,000 per day for late completion, but no one is worried at this point. "So far, we're remaining on schedule," she says. Meeting that schedule with such an innovative approach to the construction will no doubt gain the attention of other departments of transportation, as more states look for ways to complete projects quickly while minimizing the impact to their sensitive environmental areas.

### Environmental Challenge

The challenges were significant for the design team. The key element was building the 2.8-mile-long bridge over sensitive wetlands that could not be disturbed and opening it to traffic by November 2010, bringing it in line with the widening projects planned to the north and south. Complicating this process was a moratorium by the state Wildlife Resource Commission for no "in water" pile-driving work from February 15 to June 15 to allow for fishery hatching of three species.



*The innovative top-down construction method results in minimal disturbance to the wetlands during the construction operation. The only permanent impact is the actual pile footprint.*

Key Observation Point 1a (looking east from deck of private residence located west of Bellevue Way SE)

1. Existing Condition



2. Simulation of Preferred 112th SE Modified Alternative (B2M)



Key Observation Point 1b (looking northeast in front of Winters House from the west side of Bellevue Avenue SE)

1. Existing Condition



2. Simulation of Preferred 112th SE Modified Alternative (B2M)



Key Observation Point 2 (looking northeast along 112th Avenue SE from intersection of Bellevue Way SE and 112th Avenue SE)

1. Existing Condition



2. Simulation of Preferred 112th SE Modified Alternative (E2M)



Key Observation Point 3 (looking north along 112th Avenue SE at SE 6th Street)

1. Existing Condition



2. Simulation of Preferred 108th NE At-Grade Alternative (CIIA)

