

**Chapel Hill – Durham Transit Corridor
SW Durham Alignment Evaluation by TTA Staff,
in conjunction with TJCOG and members of the 15/501 work group
August 22, 2005 (D R A F T)
August 31, 2005 (R E V I S E D D R A F T)**

This summarizes the Triangle Transit Authority’s additional evaluation of the C3 alternative for the Southwest Durham Transit Corridor analysis as requested by the DCHC MPO Transportation Advisory Committee, at their meeting on August 10, 2005.

Evaluation of Private Property in Transit Corridor

A number of private property lots are affected by the different alignments, including total private property acreage needed for an alignment. Assumed 60’ right-of-way for all alignments, even though A and B alignments are planned with a parallel street corridor with a 120’ ROW. No additional acreage has been considered for slope easements.

Alignment A: 12 properties, 7.8 acres

Alignment B1: 18 properties, 8.6 acres

Alignment B3: 18 properties, 7.7 acres
(B2 has more property impact)

Alignment C2: 24 properties. .4 acres
(C1 has more property impact)

Note: C2 ROW is adjacent to the Farrington Road ROW.

Alignment C3:

Option 1. Transit corridor is outside the I-40 ROW, *with no buffer* between transit corridor and I-40 ROW.

23 properties, 9.3 acres

Option 2. Transit corridor is within the I-40 ROW.

13 properties, 4.5 acres

(C4 is similar)

Location of the Transit Corridor adjacent to I-40

Potentially, there are two options for Alignment C3, depending upon the HOV project and the transit technology used. Because of the development pressures that currently exist in the SW Durham area,

an adjacent 60' transit corridor should be established outside of the current I-40 ROW. It is unclear at this time as to where to exactly establish the corridor limits, since the I-40 ROW does not have a continuous smooth property line along this study area. However, the following lays out several issues related to the two options.

Option 1. Place the transit corridor outside the I-40 ROW. The 60-foot transit corridor should be allowed within the 100' MTC buffer area beside the I-40 ROW. This will allow a remaining 40-foot buffer of landscaping and will require either dedication or reservation (with eventual purchase) of the 60 feet of private property where the corridor would run.

The study of topographical change outside the I-40 ROW shows that there is no advantage for alignment C3 over any of the other alignments. In fact, the topography along this alignment may have more hills than any of the other alignments. The topographical profile shows that the C3 alignment would have a similar or a slightly higher elevation to the I-40 roadway.

Option 2. Place the transit corridor within the I-40 ROW. *This introduces issues of Federal ownership of the ROW and associated Interstate Highway corridor protection issues. However, if this option would remain viable, additional engineering and environmental studies could lead to a design that includes transit within the existing I-40 ROW.*

Generally there is enough room within the I-40 280' wide right-of-way, which varies to 340' wide, to include a 24' wide transit route with 18' shoulders on each side (total of 60') and the existing drainage-way on the side of I-40. The backs of two properties along I-40 are affected by this alignment and are included in the list above. Half of the alignment length along I-40 will require some amount of graded slope. This may affect a small part of 2 additional properties.

There are plans for HOV lanes on I-40 in this area. The NCDOT has proposed three different designs to be considered: Simple, Complex, or Elevated:

1. The Simple HOV design has one HOV lane added in each direction. No additional travel lanes are proposed. The HOV design is 170' wide. To add a 60' transit R/W and graded slopes within the 280' I-40 ROW would require a total of 2 additional acres from the back of several properties.
2. The Complex HOV design has one protected HOV lane added in each direction. The HOV design is 210' wide. To add a 60' transit R/W and graded slopes partially within the 280' I-40 ROW would require a total of 4 additional acres from the back of several properties.
3. The Elevated HOV design has two HOV lanes in each direction. To add a 60' transit R/W and graded slopes within the 280' I-40 ROW would require a total of 2 additional acres from several properties

If the transit corridor ultimately becomes a BRT, then the Complex or Elevated HOV Design could also serve as the transit corridor and no additional property would be needed alongside I-40.

Impact of Proposed Major Transportation Corridor Overlay (MTC)

It is important to consider the impact of any buffer requirements on future acquisition and location costs for transit. Currently, a MTC overlay district exists for the I-40 corridor in this portion of Durham. This overlay district requires a 100' buffer along the I-40 ROW, or as specified in the underlying zoning. The Durham City-County Planning Department has indicated that the transit corridor could be located within the I-40 MTC buffer. Streets or easements are allowed to cross the buffer, so long as they are designed to minimize clear views through the buffer. Nor would the dedication of a road corridor for transit within the I-40 MTC buffer add to the I-40 right of way. Allowance of a transit corridor within the buffer might ease future acquisition costs if land subject to the existing overlay requirements is valued lower than land for other corridor alignments.

Collector Street Plan for SW Durham

The Collector Street Plan is scheduled for completion during 2005-2006. The C3 alignment will integrate better with a collector street plan considering the nature and location of roads in this portion of SW Durham. Alignment C3 has an advantage over the other alignments in that it could be grade separated from the north-south roads, while avoiding any east-west streets that may be added.

The *SW Durham Alignment Evaluation* by TJCOG listed all alignments as having 2 roadway crossings, except for alignment C3, which has 4 roadway crossings. Two of these crossings involve parallel, non-collector low-volume residential roads: Wendell Road and Crescent Drive. It is a good assumption that one or both of these streets will be redesigned to not cross the transit corridor when the Collector Street Plan is completed. Also, at the south location where alignment C3 turns west away from I-40, Farrington Road parallels I-40 closely and is 14' higher in elevation. This is a good condition for taking the transit corridor under Farrington Road. The 4th road crossing is at George King Road, which all other alignments cross, except alignment A. This location is also where a stream passes under the road, making it a natural low point in the topography. This crossing may be a good candidate for grade separation.

Alignment C3 has the best possibility for being completely grade separated. Alignment A will most likely have an additional crossing when Lancaster Dr. is extended to the east. Alignment C2 may have several crossings added for property access on the west side of Farrington Rd.

Farrington Road and George King Road establish good locations for the future north-south collector streets. New collector streets will be needed for the east-west connections in this area. Alignment C3 has an advantage over all other alignments in that it could be grade separated from the north-south roads, while avoiding any east-west streets that may be added. Alignment C3 may ultimately have less street crossings than all other alignments once the Collector Street Plan is completed.

C3 Alignment Adjustments and Costs

Additional study of the C3 alignment may allow for the corridor to be straightened through the upper portion of the Corps of Engineers land (with Corps approval). This would avoid the tight curves around the "bump" near the Meadowmont area. It would also reduce the corridor length over 200 feet.

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Farrington Road bridge at I-40 will need to be lengthened for the transit corridor if the design for the corridor includes a grade separation allowing transit to pass underneath Farrington Road and if the corridor is placed outside of the I-40 ROW. Other alternatives assume an at-grade crossing of Ephesus Church Road in this vicinity. Lengthening the bridge will add \$1-\$2 million in cost to alternate C3. Also, grade separating Farrington Road to the south will add \$2 million in cost, however, this last cost is an optional improvement over the other alignments, and would not need to be added into the cost summary. The grade separation under Farrington Road Bridge is a good design decision whether or not a north station is chosen to be built.

A Few Points About Cost Estimates

The estimated capital costs of fixed guideway for all the corridors examined for this portion of Durham are based on *very general, unit-based costs* and consider only distance, number of stations, number of stream crossings and number of road crossings as variables. It assumes a light rail transit (LRT) technology and that all road crossings are at-grade.

Based on this simplified approach, the entire 14-mile, 13-station line between Duke University Medical Center and UNC-Chapel Hill Medical Center (the segment covered by the original MIS study) would have a capital cost of about \$300-600 million dollars. Note that the fiscally-constrained 2030 DCHC MPO Long Range Transportation Plan has a total capital cost of \$300 million for this segment plus the extension to Horace Williams Airport (Carolina North). This suggests that either the estimate used for the current evaluation is very conservative, or the LRTP costs may be substantially underestimated.

Using these unit costs, the various alternatives would lead to cost increases on the order of 5% or less over the base case (Alternative A), with B3 having the smallest increase over A (\$4 to \$8 million or 1-2%) and C3 the largest increase (\$15 to \$29 million or 4-5%).

Actual costs and cost differences may vary significantly from these basic assumptions, depending on a number of unknown factors, including:

- i. *Type of technology used.* Whether light rail or bus rapid transit is used (e.g., some BRT service scenarios may be significantly less than LRT costs).
- ii. *Land acquisition costs.* Whether some alternatives are more likely to result in dedication of ROW (no public cost) or reservation of ROW (government must eventually buy the property at the then-market value). If the latter, whether some alternatives pass through more expensive land than other alternatives. For example, the C3, located within the 100-foot MTC overlay, would pass through land on which structures are currently prohibited, and thus may be less valuable on a per-acre basis than land on which buildings could be constructed.
- iii. *Number of stations.* All of the alternatives except A assume two stations. If the "northern" station in Alternative A is replaced by a "southern" station in the B and C alternatives, instead of supplemented with it, each of the B and C alternative costs would drop \$2-3 million.
- iv. *Linkage to I-40/NC 54.* If there will eventually be an I-40/NC 54 transit line linked to the 15-501 line, by extending all the way from the Durham-Orange line east to I-40, the C3 and

C4 alternatives would result in costs initially that would be otherwise incurred in extending a line to RTP along the I-40/NC 54 corridor.\

- v. *Specific engineering design details* associated with the eventual service, including:
 - a. whether or not there are grade separations at certain roads,
 - b. the precise location of the transit way and its relationship to topography, other transportation facilities (e.g. any HOV facility associated with I-40)
 - c. whether noise or other community and environmental mitigation costs might be higher or lower for different alternatives.
- vi. *User benefits*. To the extent that Federal New Starts grants are requested for construction, a cost benefit analysis would be conducted that calculates Transportation User Benefit Hours (or TSUB), utilizing SUMMIT software. Currently, the regional transit model is being revised and unavailable for TSUB analysis to determine whether a higher cost alternative might yield a better user benefit result when compared to a lower cost alternative.

Alignment C3 in Summary

- If the corridor is placed inside the I-40 ROW, construction costs may decrease, making it more comparable to other alignments. However, this option raises potentially difficult Interstate Highway ROW encroachment issues and requires that a request and agreement be made with the Department of Transportation. This option would likely be difficult to resolve in the short term.
- Land acquisition costs may be reduced for C3 if located in the I-40 MTC overlay district.
- C3 has fewer private properties dramatically affected by access issues, and neighboring property owners prefer it.
- C3 may be a better alignment with respect to noise impacts and environmental mitigation requirements due to its proximity to I-40, decreasing noise mitigation costs relative to other alignments.
- In the future it will potentially have fewer street crossings, and is the best alignment for total grade separation.
- Potential ridership is greater and cost/effectiveness may be increased relative to other alignments, due to zoning allowances for increased development density around the southern station area served by the C3 corridor.
- The C3 topography is the most difficult of any of the alignments if the 60 feet corridor is outside the I-40 ROW.
- The alignment could be shortened by 200' if approved by the Corps of Engineers.
- There may be an additional cost of \$1-\$2 million if Farrington Road bridge needs to be extended.
- Overall, costs are estimated as previously described (memo dated 6/29/05, TJCOG), with a cost range for the C3 estimated at an increase of \$15 to 29 million over the base Alignment A. However, if the northern station is not constructed for the C3 alternative (or any of the other alternatives to the base Alignment A), then the costs would be reduced by \$2 to 3 million over the base Alignment A. This would revise the cost estimate for C3 to \$13 to 26 million over the base alignment A.

9/7/05