

ADDENDUM  
Revised Work Scope for  
Chapel Hill/Carrboro Strategic Long Range Transit Plan  
*Final (4/20/07)*

**Introduction**

This revised work scope replaces the previous scope for the completion of the Chapel Hill Long Range Transit Plan included as Attachment 1: Scope of Work--Draft 4—January 12, 2007. Contract signed by the Town of Chapel Hill on February 20, 2007.

The goal of the strategic long range plan is to propose the development of a more robust transit system for the Chapel Hill/Carrboro community that will successfully divert a significant share of travelers from automobiles to transit. The main goal is to increase the current transit travel share as a means to generally reduce the growth in automobile traffic and the need for parking at Carolina North and other key locations in the community.

**Scope of Work for Strategic Long Range Transit Plan**

Work Task 0: Project Development

Ted Rieck, AICP, will serve as project manager and will be the day-to-day contact. His goal is to make the project progress smoothly. His experience in many transit operations and planning projects will prove invaluable in developing a long range transit plan for the Chapel Hill-Carrboro area.

Through the Transit Study Committee (TSC) and a separate Technical Committee (TC), TranSystems will pursue a team-orientated approach with the Towns of Chapel Hill and Carrboro as well as the University of North Carolina. TranSystems believes a successful project outcome will depend on a close and collegial atmosphere among the study participants. It is anticipated that meetings with the TSC and TC will occur sequentially in a time period not requiring more than one night overstay by the consultant team. It is also anticipated that in support of these meetings that the Town of Chapel Hill will arrange for meeting space as well as any needed audio/visual equipment and materials.

A project kick-off meeting will be the key to successfully completing this task. At this meeting the key project team members will meet to clarify project goals and establish communication protocols. We will also review the study area, assumptions, approach and division of responsibilities, and refine, as needed, the consultant scope of work and schedule as required to meet study objectives. The project schedule will be confirmed with interim meetings tentatively scheduled.

Finally, this task also provides for briefing presentations by the project manager at the end of this study to the appropriate governing bodies of the Towns of Carrboro and Chapel Hill as well as the University of North Carolina. It is anticipated that these presentations can be made in one business trip consuming no more than two overnight stays.

Work Task 1: Define Chapel Hill/Carrboro Transit Market



This task will define the travel markets which have destinations within the corporate limits of the Towns of Chapel Hill and Carrboro. This would include the UNC campus as well as the planned Carolina North development. These markets will be defined for both the present and the future. The future will be the year 2035 depending on the availability of outputs from the regional travel model (i.e., the Triangle Regional Model or TRM). Following the review of the model (see work task 3 below) a 2035 projection will be run by the Triangle Regional Model Service Bureau (TRM) of the Institute for Transportation Research and Education (ITRE) at North Carolina State University.

The definition of the travel markets will follow these basic steps with the goal to determine travel linkages:

1. Identify key travel nodes in community (e.g., UNC Main Campus, Carolina North, downtowns of Carrboro and Chapel Hill, and University Mall, Chapel Hill/Carrboro)
2. Develop likely nodal connections (which will be based on generalized travel not, necessarily, specific roads/corridors)
3. Identify external to internal travel intercept points ("gateways")
4. Review TRM home interview survey and transit on-board survey (from 2005 and 2006, respectively) for particular insights on existing Chapel Hill/Carrboro transit market
5. Identification of assumptions for baseline 2035 transportation network is an important input in order that the future transportation network is understood and incorporated in the long range transit plan.

*Task Documentation:* The overall task will be documented in a draft and final report with initial results presented graphically to Town staff and members of the two advisory committees.

#### Work Task 2: Develop Service Concept for 2030/2035

This work task will identify the types of services and investment levels for nodal connections. This initial concept will not, necessarily, depict specific roads or corridors of operation. Rather, generalize connections and symbolic representations of service types will be used. Some service types that may be considered include:

- "Gateway Services" to key nodes (expanded and higher investment versions of today's park and rides)
- Major Nodal connections (may also be part of "Gateway Services")
- Intermediate nodal connections.
- Community based services
- Identify transit investment level at nodes (including TOD).
- Identify high, medium and low investment services (such as fixed guide way, BRT, else).

*Task Documentation:* The overall task will be documented in a draft and final report with initial results presented graphically to Town staff and members of the two advisory committees.

#### Work Task 3: Review Triangle Regional Model (TRM)

Transportation modeling will be used to forecast peak period and daily travel demands by mode and to help evaluate the impact of various transportation improvements and land use changes. The existing TransCAD-



based Triangle Regional Model (TRM) has been developed with the capability of undertaking transit analyses. Transit data for Capital Area Transit (CAT), NC State University Wolfline, Triangle Transit Authority (TTA), Durham Area Transit Authority (DATA), Duke University Transit, and Chapel Hill Transit (CHT) are coded in the current version. We understand that in 2005, the model was updated to reflect a 2002 base year and migrated to the TransCAD 4.8 platform, and steps were made in preparation to develop a 2005 base year version of the model. In 2006, the Institute for Transportation Research and Education at North Carolina State University (ITRE) has been working to integrate enhancements developed for the TTA New Starts analyses into the TRM.

We anticipate that the TRM will be adequate to perform much of the necessary transportation system analysis work for the Transit Plan. This option would be desirable because it represents a regionwide standardized approach to transportation analysis. However, we do anticipate that some post-processing / GIS-based procedures will be required to estimate some policies, programs and infrastructure investments whose impacts may not be able to be captured fully by the TRM. Such improvements might include bicycle and pedestrian investments, transportation demand management (TDM) programs and transit-oriented development (TOD) enhancements. In addition, it may be desirable to define and set up a windowed subarea analysis framework to enable network analysis with greater detail in the study area vicinity. The TranSystems Team is expert in developing such adaptations.

The transportation model used for the project will include the ability to represent existing travel behavior, including public transit, Park & Ride, bicycling and pedestrian activity. Most major metropolitan area regional forecasting models include transit and Park & Ride capability. Non-motorized modes are rarely fully represented in models. For an area like Chapel Hill, where pedestrian and bicycle activity can represent a significant share of movements, it is important to be able to estimate, and understand, pedestrian and bicycle traveler demand responses to transportation system changes, particularly non-motorized facility or environment enhancements. The TranSystems Team has a great deal of expertise in this area, including contributing to the research for a forthcoming Transit Cooperative Research Program (TCRP) report on traveler response to pedestrian and bicycle system changes. Further, the TranSystems Team compiled the seminal work on bicycle and pedestrian demand estimation, which compiled all available methods for forecasting non-motorized travel for the Federal Highway Administration.<sup>1</sup>

The basic steps in model review will be to:

- a). review the adequacy of detail in the inputs, including the zone system and zonal data (e.g., household, employment, transit access, and parking information), networks for highway and transit modes, and bicycle and pedestrian facility coverage;
- b). determine the availability of supplemental data such as new home interview survey information for use in the effort;
- c). review the model's structure for and ability to respond to changes in key policy variables;
- d). review model design and/or output for general sensitivity to changes in inputs;
- e). identify gaps, such as any in geographic detail or extent, demand or supply characteristics, or model capabilities, as related to the desired use of the model for this project, such as for calculating target transit mode shares as described in the Long Range Transit Plan Discussion Paper; and,

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<sup>1</sup> *Guidebook on Methods to Estimate Non-Motorized Travel*, U.S. Federal Highway Administration, Office of Safety R&D, prepared by Cambridge Systematics, Inc., 1999.

f). check study area model validation with available modal share and ridership data. On this latter effort, we can compare the available information to the model outputs, describe how these results could affect the forecasting effort, and suggest ways of improving or adapting to the model's performance.

Once the review is undertaken, recommendations will be made for any enhancements or alterations for use with this project. Gaps would likely be addressed through the adjustment of inputs or the use of special post-processing tools. For example, for enhanced bicycle and pedestrian analysis, it may be possible to develop benefits estimates using a GIS analysis or other sketch-planning methods. Such recommended method(s) would be described as a product of the review.

The TranSystems Team will review the transportation improvements or changes incorporated in the 2030 TRM with the Towns, University, DCHC MPO, Orange County, North Carolina Department of Transportation (NCDOT), and Triangle Transit Authority (TTA). The TranSystems Team will develop a network of existing projects and one of committed and currently-planned projects to reflect only those improvements that are likely to be in place by 2030. The list of future year projects will be compiled for review and approval of the project manager or the technical review team. Similarly, socioeconomic and other zonal input data would be assembled and offered for review by the project stakeholders. The future year network will serve as a key scenario against which other scenarios can be compared.

As mentioned in Task 1 above, the TRM Service Bureau will run a 2035 travel demand analysis and provide the team with a "research" or "testing" grade model tool. This is expected by April 30, 2007. The Project Team, led by Cambridge Systematics, will review the future year travel demand analysis to assist stakeholders and other decision-makers understand the size of potential travel markets. The scope of anticipated transportation improvements is understood to include the adopted elements of the 2035 DCHC Long Range Transportation Plan and other improvements as delineated by the Transit Study Committee. Year 2035 socio-economic projections will be used to estimate future travel demand by mode of travel.

Our process in working through this task will be to:

- a). develop and assemble future horizon year information, including zonal and network data, including making necessary adjustments to ensure a single horizon year (i.e., 2035);
- b). apply the forecasting tools to project future travel demand patterns;
- c). perform calculations to develop corridor capacity and performance measures;
- d). prepare summary information to highlight issues and use for Transit Plan development. GIS will be used to assist in the preparation of this summary information.

#### Work Task 4: Development of Basic Service Concepts

Based on work task 2 above, the concepts will be further defined and developed. The level of concept development will include general alignment (though not necessarily specific routes, only general corridors of travel to be depicted), basic frequencies, vehicle quantity and type, projected ridership as well as order of magnitude operating and capital costs. Ridership will be projected using sketch planning techniques.

The goal of this task is to initially evaluate a series of transit technologies that could potentially work as nodal connections and following the "high, medium, and low" investment described in work task 2. In an effort to minimize the time and cost in determining these investments, the following six basic alternatives will be



evaluated and reduced to one primary transit alternative per nodal connection. Further, any alternative is assumed to operate wholly within the corporate limits of Chapel Hill and Carrboro.

The initial alternatives (which implicitly will consider technical variations of each to be roughly equivalent to each other) to be considered are:

1. Light rail
2. Express Bus
3. Bus Rapid Transit (BRT) in dedicated right-of-way
4. BRT on street with mixed traffic
5. Streetcar
6. Local Bus, including community circulators and flexible services.

The evaluation will be based on common characteristics associated with the mode and the degree to which the corridors have such characteristics. Comparison of the ridership potential of these alternatives will be based on the application of sketch planning and/or elasticity based techniques. No application of the TRM will be used in this level of analysis. The characteristics to be used include the following:

- Typical transit markets served
- Population/housing densities
- Typical passenger travel distances
- Typical stop spacing
- Productivity in terms of riders per hour
- Typical hourly passenger capacity
- Operating and Capital Cost

*Task Documentation:* The overall task will be documented in a draft and final report with initial results presented graphically to Town staff and members of the two advisory committees.

#### Work Task 5: Transit Orientated Development guidelines

This task will involve the preparation of guidelines for the Towns to evaluate current and future development for the incorporation of transit supportive elements. Special focus will be on the emerging Carolina North development. The preparation of guidelines will follow these basic steps:

##### *Subtask 5.1: Review Current Land Use Regulations, Development Patterns, and Area Land Use Plans*

The TranSystems Team will talk with planning departments and review ordinances regarding the status of land use development in the Chapel Hill-Carrboro community. Allowable densities, set backs, street orientation, parking rations, and restrictions relating to mixed use development are among the items that will be discerned in the regulations. Chapel Hill's Comprehensive Plan, equivalent documents from Carrboro, and the Carolina North Master Plan will also be reviewed to determine the future pattern of development.

##### *Subtask 5.2: Conduct a Field Trip of the Key Nodes and Candidate TOD Sites*



The TranSystems Team will photograph and map a series of sites for consideration as candidates for the TOD Prototypes.

*Subtask 5.3: Develop TOD Typologies*

The TranSystems Team will develop TOD typologies for downtown, major mixed use development and neighborhoods.

*Subtask 5.4: Develop Guidelines for Each TOD Typology*

The TranSystems Team will develop land use (Density/Mixed Use/Far/Parking Ratios, etc.) and design guidelines (Streets/Sidewalks/Parking/Setbacks/Building Guidelines Principles (Form and Materials)/Landscaping, etc.) for each TOD Typology.

*Subtask 5.5: Develop and Illustrate TOD Prototypes*

The TranSystems Team will apply the TOD Guidelines to three prototypical sites/nodes (based on actual sites in the three corridors) and develop illustrative site plans for each.

*Task Documentation:* TOD Guidelines Report with Illustrative Examples.

Work Task 6: Develop Conceptual Nodal Improvements

The nodes identified in work task 1 above will be developed to determine the level of capital improvement that may be warranted. The level of improvement could range from simple “park and ride” facilities, to small bus stations to major transit centers with mixed use development. Analogous examples of each major type of improvement will be given. Further, generalized locations of these facilities will also be made and tie in as appropriate with TOD guidelines developed in work task 5.

*Task Documentation:* The overall task will be documented in a draft and final report with initial results presented graphically to Town staff and members of the two advisory committees.

Work Task 7: Test Conceptual Network with High Investment Corridors

This work task will test the conceptual network from work task 4 above to determine impact on traffic diversion. It is anticipated that the network will consist of two or more “high investment” corridors. Up to two “runs” with *full network* with a “maximum” and “minimum” level to help determine the priority of high investment corridors. Individual corridor model runs will not be made.

Application of the travel demand model from work task 3 will be part of the evaluation procedure in helping discern the priority of high investment corridors.

*Task Documentation:* The overall task will be documented in a draft and final report with initial results presented graphically to Town staff and members of the two advisory committees.

Work Task 8: Identify and Develop Two “High Investment” Corridors



The top two high investment corridors from work task 7 will be further developed at the conceptual level. As appropriate, the high investment corridor concept will show approximate station locations, typical cross section, vehicle types, and basic operating characteristics of the proposed service investment.

In addition to the concept design, the work of this task will include the development of a general operating plan. The operating plan will be a high level look at how the leading alternative will actually operate on the street. The plan will generally consist of maps as well as tabular information regarding service frequencies, service spans, and hours and miles of operation. Operating assumptions will be based on analogous situations as field testing may not be entirely practical at this stage.

*Task Documentation:* The overall task will be documented in a draft and final report.

#### Work Task 9: Financing Plan for High Investment Corridors

TranSystems will prepare operating, maintenance, life-cycle, and capital cost estimates for the two high investment corridors developed in work task 7 above. The costs will be developed in both current and future dollars and include associated bus network modifications and will be based on industry standard costs as adjusted for conditions similar to the Triangle area. Operating and maintenance cost estimates for bus service will be based on CHT's current operating costs, as well the proposed changes in operations (and costs) associated with the service increases. Bus operating costs will be developed based on CHT's current cost structure, supplemented by discussions with staff to identify all relevant proposed changes in operations. TranSystems has prepared operating cost estimates for many transit systems and is familiar with a variety of financial structures. Operating costs for transit modes not currently operated in the metropolitan area (e.g., LRT) will be developed based on information from other comparable transit systems.

The work program for this subtask will:

- Develop unit costs for all items of work.
- Aggregate basic unit costs to represent costs of typical sections (per unit length) and stations.
- Develop costs for systemwide elements (e.g. vehicles, maintenance shops and power supply, if necessary).
- Develop factors for add-on costs (e.g. design, administration, contingencies).
- Perform a quantity takeoff of each conceptual construction element depicted in the plan and profile drawings.
- Incorporate costs for vehicle procurement as developed from the ridership forecasting work.
- Develop a base or "best" cost for each alternative.
- Develop a project implementation schedule for each alternative.
- Prepare a year-by-year capital cost expenditure based on the project implementation schedules for use in the financial analysis and to guide the operations and maintenance cost estimates.

Bus system capital costs will be based on the area's most recent experience, supplemented by the experience of the TranSystems Team, as appropriate.

The Team will develop conceptual cost estimates associated with procuring required rights of ways. For some modes and alternatives new rights of way may not even be required. For other alternatives, such as



rail-based modes or Bus Rapid Transit operating on a new busway, new rights of way may be required, whether they operate within the confines of a public street or upon an existing active railway right of way. Using a public street versus using an active railroad line has different cost implications which must be considered including:

- 1) property acquisition or railway track access fees,
- 2) roadway widening or railway right of way widening,
- 3) maintenance of roadway traffic or train traffic (if an active rail line is used).

The TranSystems Team will use locally applicable real estate costs to determine required property acquisition. For railway track access fees or other railway related access issues, we will use comparable fees from railway-negotiated agreements.

Another key part of this documentation will be an assessment of the recommended alternative(s) under New Starts or Small Starts criteria. As Small Starts criteria are in development, there will be discussion on how this assessment will be performed under the New Starts program. However, if Small Starts criteria become available in time for this portion of the study, then the evaluation will be based on those criteria. As appropriate, a modified approach will be discussed with the Transit Study Committee. Evaluation based on Small Starts criteria presumes that the data collected previously is applicable and also presumes the new criteria are similar in concept to the New Starts criteria. If the Small Starts criteria are vastly different than expected and materially impact the study's budget, then the TranSystems Team will discuss such impacts with the study committee and staff.

The New Starts Criteria, which are used for federal funding decision-making, emphasize transportation and related mobility benefits. The cost-effectiveness of a proposed project is based on an assessment of user benefits such as travel time savings for transit and automobile users and improved accessibility to jobs for low income households who typically depend on transit, attraction of new transit ridership, and the annualized costs of providing the service. The local interests have had a wide variety of other goals for the project including attracting new businesses and residential development to boost the tax base or supply job opportunities. These types of evaluation measures are more likely to be evaluated qualitatively or through proxy measures.

The TranSystems Team will evaluate the options in terms of the FTA New Starts Criteria. The FTA defines seven criteria:

- Mobility Improvements
- Environmental Benefits
- Operating Efficiencies
- Cost Effectiveness
- Transit Oriented Development
- Local Financial Commitment
- Other Factors

The FTA uses these defined criteria to standardize the comparison of projects nationwide for funding eligibility. Most of these new criteria are already universally in use, so formalizing their application does not radically depart from past practice. TranSystems will calculate or estimate the measures to the extent that data has been fully developed.





*Task Documentation:* This overall task will be documented in a draft and final report.

Work Task 10: Develop Implementation and Staging Plan.

This work task will involve the development of a multi-year, multi-phase plan for implemented the recommended service in the targeted corridors. This plan will be developed in tandem with the financial plan (work task 9 above). As the TranSystems Team consists of former transit system operators, we can develop an implementation plan that both meets the transportation needs of the community, we can also develop a plan that is operationally feasible.

The plan will consist of a prioritization of services to implemented, major milestones for the acquisition of equipment and personnel, and pre-implementation work. Further, strategic decisions regarding land and right-of-way acquisition as well as work with the overall Triangle region will be factors in the implementation plan.

*Task Documentation:* This overall task will be documented in a draft and final report.

Work Task 11: Study Documentation

This work task will involve the preparation of a draft and final report documenting the above tasks. It is anticipated that the draft report will be distributed electronically to Town staff before being circulated to the study committees.

Strategic Long Range Transit Plan Proposed Project Schedule

| Work Task No. Title   | Apr-07 | May-07 | Jun-07 | Jul-07 | Aug-07 | Sep-07 | Oct-07 | Nov-07 | Dec-07 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 Project Development   |        |        |        |        |        |        |        |        | ◆      |
| 1 Define Chapel Hill/Carrboro Transit Market  | ■      |        | *      |        |        |        |        |        |        |
| 2 Develop Service Concept for 2030/2035   |        |        | *      |        |        |        |        |        |        |
| 3 Triangle Regional Model   | ■      |        |        |        |        |        |        |        |        |
| 4 Develop Basic Service Concepts  |        |        |        | ■      | *      |        |        |        |        |
| 5 Transit Orientated Development Guidelines   | ■      |        | *      |        |        |        |        |        |        |
| 6 Develop Conceptual Nodal Improvements   |        |        |        | ■      | *      |        |        |        |        |
| 7 Test Conceptual Network   |        |        |        |        |        | ■      | *      |        |        |
| 8 ID Two High Investment Corridors  |        |        |        |        |        |        | ■      | *      |        |
| 9 Develop Financing Plan  |        |        |        |        |        |        |        | ■      | *      |
| 10 Develop Implementation and Staging Plan  |        |        |        |        |        |        |        | ■      | *      |
| <p><b>Meetings</b></p> <p>* <i>Transit Study Committee and Technical Committee 5 meetings (Work Tasks 1/2/5, 4/6, 7,8,9/10)</i></p> <p>◆ <i>Final Governing Body Presentation</i></p> |        |        |        |        |        |        |        |        |        |