
MEMORANDUM

TO: ANDREW BEACHER, TERRIE LAYCOCK
FROM: LORNA PARKINS, MICHAEL BAKER JR., INC
SUBJECT: REQUESTED SUMMARY & DOCUMENTATION OF CTP UPDATE AND MODELING PROCESS
DATE: 7/30/2009
CC: GEORGE PHILLIPS

PURPOSE – The purpose of this memorandum is to provide a brief summary of actions taken to date with respect to the Countywide Transportation Plan (CTP) Update, including the update process, modeling, modeling assumptions and subsequent Planning Commission and Board of Supervisors actions (see attachments: Consolidated Scope of Work and Flow Chart).

Project Kick-off and Initial Model Review/Validation (August , 2006 – January, 2007)

Scope of work Task 1a and 1b and part of Task 2. Deliverables: Model Validation Memo, Stakeholder Interview Summary (11-29-07); Transportation Needs Presentation (11-30-06); Task 1 Technical Memorandum (2-23-07)

Model Update & Validation – Upon project kick-off, the base year of model was updated to 2005 (most recent available data) and 2030 land use forecasts. Model was reviewed for ability to predict 2005 actual traffic levels and adjusted to meet FHWA guidelines for margins of error in the model. Future land use was updated with COG 7.0 forecasts and future year (2030) networks were developed for the adopted (2001) CTP and the “existing + committed” network. By the end of fall, the Dulles South CPAM had been rejected and only the Arcola CPAM was reflected in changes to the land use forecasts. See attached table for data used to update the model.

Public Outreach – A project website was developed including a comment page. Meetings were held with each supervisor with invited district representatives and with Town representatives, followed by a public stakeholder “summit” meeting to which HOA, business group, environmental and other citizen groups were invited, as well as the general public.

Existing and Future Conditions Analysis – The updated model was run to assess 2005 and 2030 transportation conditions, including a comparison of 2030 conditions for the funded (“existing + committed”) and adopted CTP roadway networks.

Corridor Analysis (January – April, 2007)

Scope of Tasks 1c and 1d as detailed in Task Order #3 and part of Task 2. Deliverables: Countywide Transportation Plan Bulletin (2-15-07), Major Corridors Constraints and Opportunities Presentation (3-29-07), Traffic Abatement White Paper (6-4-07)

Model Refinement – Additional refinements to the travel model were made to improve forecasts for traffic from counties to the north and west and to refine level of service calculations to better account for the higher capacity of larger roads and the amount of peak period traffic in different corridors.

Corridor Analysis – Existing data on physical and environmental features were assembled to allow a review of environmental/community constraints on transportation improvements. The updated travel model was used to test the results of adding capacity to any major congested corridors in 3 iterations to determine where added capacity could be effective in resolving congestion.

Traffic Abatement Strategies – A series of two workshops were held with County Planning staff to present/discuss research on land-use based traffic abatement strategies and where in the county the greatest potential to apply these strategies would appear to exist.

Study Team Workshop – The study team (consultants and OTS staff) reviewed each of the major corridors based on the mapping and modeling information and developed ideas for potential alternatives to test for the CTP. Concepts included testing some new linkages, an HOV network, and potential tolling strategies.

Public Outreach – A newsletter was prepared and distributed electronically in February, 2007. Invitations to the March Transportation and Land Use Committee (TLUC) meeting were sent to the identified stakeholder list from fall outreach activities.

TLUC Presentation – The results of the corridor analysis (constraints and findings) and the workshops with staff (Opportunities – both land use/multimodal opportunities and potential alternatives) were presented to the TLUC and direction for the alternatives analysis that followed was gathered from the TLUC.

Alternatives Analysis (April, 2007)

Scope Task 1d and 1e and part of Task 2; Task Order #4. Deliverables: Major Corridors – Alternatives Analysis Presentation (4-30-07); Summary of Public Comments Dec. 2006 - April 2007 (4-30-07).

Alternatives Analysis – Based on the TLUC recommendations from March 29th, alternative future networks were tested with the travel demand model and performance results were presented on April 30th. The April 30th presentation provides details of the alternatives and results. The TLUC was asked for input on a final model run and draft CTP.

Public comments – Public comments were collected on the project website and solicited through public outreach activities. These comments were summarized, posted on the website, distributed to the TLUC, and summarized in the April 30th TLUC presentation.

Draft CTP Preparation (May, 2007)

Scope Tasks 3 and 5, Task Order #5. Deliverables: 2007 Countywide Transportation Plan Draft (5-25-07), Draft CTP Project Cost Estimates (7-31-07)

Draft CTP Development – With extensive involvement from CTP staff to update policies, project status, and other text, the draft CTP document was prepared. The draft plan projects were determined based

on TLUC input, a final travel model run, and the study team (OTS staff and consultants) recommendations.

Follow-On Activities (June, 2007 through present)

2007 Planning Commission Meetings and Workshops – Throughout the remainder of 2007, a series of meetings with the planning commission were held and workshops were held in each planning district in August/September. In the two western districts, a series of two workshops were held in which the transportation challenges were presented, input on strategies was given by citizens, and additional analysis was conducted by the consultant to evaluate alternative strategies, particularly for the Route 9 and Route 15 corridors. Presentations are on the website documents page, dated August 29, September 6, September 12 and September 17th. Public comments were taken at all of the workshops and comment summaries are also on the website documents page. The Planning Commission provided recommendations to the Board of Supervisors just before Commissioner and Supervisor terms ended at the end of 2007. Review of the draft CTP was not completed prior to the end of the Supervisors/Commissioners terms.

2008 – With the turnover of the Board of Supervisors and Planning Commission, review of the CTP was put on hold until a new schedule for completion could be established. The new Board of Supervisors received a presentation re-capping CTP development to date in June of 2008 and subsequently adopted a new schedule for completion. The adopted schedule allowed for staff to make clerical edits and organizational improvements to the previous draft CTP from August through December, 2008, before forwarding to the new Planning Commission for review in January, 2009. In addition to the adoption of the new schedule, the Board of Supervisors also concluded that the Transit Plan, which had been until then under development as part of a separate process, should be integrated into the CTP and reviewed under the same process by the Planning Commission.

2009 – The Planning Commission began a detailed review of the revised draft CTP in January, including the Transit Plan recommendations. To date, the Commission has received six briefings and held six public input sessions, two stakeholder input meetings (for businesses and homeowners associations) and 12 work sessions to deliberate on the issues raised regarding the proposed CTP. A summary of meetings held and background information requested (including this summary) are on the website documents page. In addition, a matrix of the issues raised throughout the input process is available on the website, including Commission recommendations to date.

Attachment A: Travel Demand Model Data

Travel Demand Model Update – Data and Sources

Data	Year	Source
Traffic count data	2005	VDOT counts and traffic impact study counts provided by OTS staff
Population, household and employment data by TAZ	2005	County demographer
Forecast population, household and employment data by TAZ	2030	County demographer – using COG Round 7.0 cooperative forecasts adjusted to reflect Arcola CPAM
Base year transportation network	2005	OTS staff
Future year transportation network – existing + committed	2030	Consultant with OTS staff review, based on funded projects identified in the fiscally-constrained regional transportation plan (TransAction 2030)
Future transportation networks – all others	2030	Developed by consultant with OTS staff input and review
“External” traffic growth rates	2005-2030	Updated based on COG research on future land use and observed growth rates in surrounding counties to the north and west.

Further information about the “parent” model of the Loudoun Travel Demand model, and inputs used to create that model, are posted on the FAQ page of the www.loudounctp.com website and are also contained in the “Keeney Response Memo 7-14-09.pdf” file posted on the documents page of the website.

ATTACHMENT B: Consolidated Scope of Work

ATTACHMENT #1 SERVICE AGREEMENT

QQ-01224

SCOPE OF SERVICES

The Prime Consultant shall successfully complete the tasks and subtasks below.

TASKS

The scope of service consists of five tasks:

- Task 1: Travel Model Analysis – OTS maintains a TP+/VIPER travel demand model that is based upon the forecast model currently employed by the Metropolitan Washington Council of Government (COG). The Loudoun model makes use of COG's Round 6.3 cooperative demographic forecasts, with more traffic analysis zones (TAZs) furnished and more roadways modeled within the county. The Loudoun model also uses Round 6.2 cooperative demographic forecasts for the surrounding jurisdictions. The model addresses AM and PM peak period (i.e., three hour) and 24 hour travel for the years 2015, 2020, 2025 and 2030. For the purposes of this contract, the Consultant will work with 2030 AM, PM and 24 hour forecasted traffic. The model is calibrated to Year 2000 conditions. The Loudoun model has static assumptions about transit service, and includes a post processor that develops pseudo levels of service for Loudoun County roads based on various parameters.
- Subtask 1a (See also Task Order #1): Review of Current Model – the Consultant will review the current travel forecast model assumptions, inclusive of facilities in other jurisdictions that may influence travel patterns within Loudoun County. The Consultant will report on the suitability, including current forecast results, of the model for use in CTP update alternatives analysis. If changes to the model are needed that the Consultant believes will require its recalibration, then the need for this additional service will be documented within the context of this report. The Project Manager will make the final determination if a recalibration of the model is needed based on sound engineering judgment.

The fees to review the model assumptions and the Consultant's report will be compensated by a firm fixed price as stated on the Pricing page. Attachment #2. A recalibration of the model, if necessary, will be in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Subtask 1b (See also Task Order #2): Update and Run the Model – the Consultant will update the Loudoun County Travel Forecast model to make use of the current COG cooperative forecasts of demographic conditions for the forecast year 2030 for all available time periods (i.e., AM peak period, PM peak period, and daily). Further refinement of these forecasts based upon the status of various amendments to the Comprehensive Plan and other considerations may also be required. The Consultant will verify the future road network baseline assumptions for all network conditions based on input from OTS staff and assumptions for facilities in other jurisdictions as can be found in the COG model. The Consultant will then employ the model and post processor to simulate the effects of 2030 travel demands for all time periods for the baseline condition. The Consultant will then prepare a technical memorandum with appropriate mapping

to document the conclusions of this exercise and present an initial set of test alternatives to address areas where future deficiencies are noted.

The cost to update and run the model and prepare a technical memorandum will be compensated by a firm fixed price as stated on the Pricing page, Attachment #2. Further refinement of the forecasts based upon the status of various amendments to the Comprehensive Plan and other considerations will be in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Subtask 1c (See also Task Order #3 and #4): Corridor Sketch Planning – the Consultant will develop sketch plans of alternative transportation improvements for various corridors as may be needed. Such technical assistance will be required to determine if any alternative transportation improvement is infeasible based upon physical constraints, impractical based upon exorbitant costs relative to realized benefits, or not viable based upon neighborhood/community impacts. Requests for corridor sketch planning will be made/approved by the Project Manager. For the purpose of further analysis, the Project Manager will make the determination if an alternative transportation improvement is feasible, practical and viable following receipt of its associated sketch plan.

Sketch plans will be created in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Subtask 1d (See also Task Order #3 and #4): Develop test alternatives – As directed by the Project Manager, the Consultant will test alternative improvements to address various future deficiencies as identified in Subtask 1b. In some cases, the Consultant may be directed to undertake various sketch planning activities per Task 1c in advance of modeling the improvements. The intent here is to modify the network incrementally with up to three test alternatives for each identified deficiency and to work from the largest identified deficiencies to the smallest, so that overall network conditions can be brought as close as possible to acceptable conditions. Note here that test alternatives that impact either incorporated towns or their associated Joint Land Management Areas (JLMAs) would need to be developed in consultation with the appropriate representative(s) for the affected jurisdictions. The Consultant will prepare a second technical memorandum, similar in format to the one prepared for Subtask 1b, that will summarize the findings of this exercise and highlight recommended CTP changes. The memorandum will also identify any portions of the network that remain deficient for year 2030 conditions. Inability to effectively address future deficiencies in various parts of the network may trigger further analysis of alternative land use patterns, as described in Task 4.

The cost to develop test alternatives and prepare a technical memorandum will be performed in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Task 1e (See also Task Order #3 and #4): Iterative Analysis of Select Corridors - per Subtask 1c, the Consultant will provide documentation of corridors with roads

that remain deficient after all alternative improvement scenarios have been simulated. In this eventuality, the Consultant may be requested by the Project Manager to help identify instances where alternative future land use patterns for portions of the county would help reduce travel demands for deficient roads. At the direction of the Project Manager, the Consultant will prepare modified demographic inputs to address various such locations and rerun the model. Such requests are to be made and agreed to in writing, with the extent of the work to be defined, as well as the anticipated time to complete the iterative analysis and associated costs to be defined in advance for each occurrence.

Identification of future land use patterns, the preparation of modified demographic inputs and re-running the model will be performed in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Task 2: Public Outreach – the Consultant will be responsible for developing and implementing a public outreach effort for the update of the CTP that satisfies all federal, state, and local requirements for such efforts.

Any costs for this task shall be included in the subtasks at no additional expense.

- Subtask 2a: Public Participation Program – the Consultant will develop the public participation program in consultation with the Project Manager. The program will define all public outreach efforts associated with the CTP update. Minimum elements of the program include: a project schedule with public outreach activities superimposed, documentation of the nature and frequency of each type of outreach activity, an estimate of time and materials for each activity, listing of all news outlets and other means to provide public notices and procedures for advance County review of all public outreach documentation and receipt of findings, as well as staff participation requirements from these efforts. The elements of the Public Participation Program can only be amended with the written consent of the Project Manager.

The cost to develop a Public Outreach Program will be compensated by a firm fixed price as stated on the Pricing page, Attachment #2.

- Subtask 2b: Public Meetings - the Consultant will create all presentation materials as approved, as well as prepare notices and signs for all required public meetings. The Consultant will assist in the conduct of meetings and receipt of comments, and will compile and summarize the outcomes of these efforts. The cost for any Consultant staff, materials for presentations, notices and signs shall be included as an allowance on Attachment 2.
- Subtask 2c: Project Specific Website – the Consultant will establish and maintain a project specific website to disseminate all pertinent information about the CTP update and to provide opportunities for web-based feedback in keeping with, and documentation of the cumulative public comments for further consideration. The cost to undertake this subtask will be compensated by a firm fixed price as stated on the Pricing page, Attachment #2.

- Task 3 (See also Task Order #3): CTP Text and Mapping Revisions – the Consultant will be responsible for all mapping revisions to CTP and will update the text as directed by the Project Manager.
- Subtask 3a (See also Task 5-1, in Task Order #5): Mapping Revisions – CTP mapping is currently maintained by the Office of Mapping and Geographic Information (OMAGI). OMAGI GIS platform is a combination of IBM-AIX, Unix, Citrix, NT, ArcGIS 9.1, ArcInfo, ArcView, Coverages, Shapefiles, SDE 9.1, DB2 and Geodatabases.

The Consultant will create new maps in ArcMap module of ArcGIS 9.1. OMAGI expects deliverables in both ArcMap Documents (.MXD) and output maps in Acrobat (.PDF). MXDs shall reference all layers in the Table of Contents (TOC) with relative pathnames so files can be recreated without broken links to data. Any newly created data layers shall be delivered in ArcView Shapefile (.SHP) or Personal Geodatabase (.MDB) as referenced in .MXD. MXD Layouts shall be preserved as final outputs prior to export to PDF. Maps will be created at 1:50,000 for the Countywide version and at 1:40,000 or larger for portions of the County as required by the Project Manager. Loudoun County will provide examples of the current version of CTP maps for use as a guide.

The Consultant will be responsible for preparing all CTP maps and map revisions, providing sufficient time for OTS staff to review and modify maps as necessary, and for the incorporation of new mapping in the CTP, as well as all pertinent presentation materials. All data files and maps created under the contract will become the property of the County and will be transmitted to the OMAGI Director concurrently with project closeout activities under Subtask 5c.

Creation of new maps will be performed in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Subtask 3b (See also Task 5-1, in Task Order #5): CTP Text Revisions – the Consultant will be responsible for all text modifications to the CTP, including those furnished by County staff through the Project Manager. The Consultant should anticipate that this effort will include, but not be limited to, reformatting the document to address multi-modal corridors of movement as defined above in the Project Background section, updating information about transportation facilities and studies in other jurisdictions that relate to Loudoun County, and modifications of various facility descriptions in Attachment #4. The Consultant will also be responsible for the incorporation of any supporting tables, figures and/or graphics that are required. The current CTP is written in Microsoft Word.

Text revisions will be performed in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Task 4 (See also Task Order #3): Technical Support – the Consultant will provide general technical support on an as needed basis to OTS staff charged with the development of revised policy language for the CTP. This work may include, but is not limited to: documenting transportation policies of peer jurisdictions, review

of relevant state legislation and summarizing the findings of research efforts germane to the issues to be addressed.

Technical Support will be performed in accordance with the scope of work, delivery schedule and the lump sum price agreed to in the Task Order issued to authorize this portion of the work.

- Task 5 (See also Task Order #5): Presentation of Draft and Final Revised CTP –
- Subtask 5a: Prepare Draft Revised CTP – the Consultant will prepare the draft revised CTP as directed by the Project Manager. This work will include all activities dictated by the outcome of previous tasks, as well as the incorporation of any modifications furnished by County staff through the Project Manager. The draft revised CTP will be prepared in Microsoft Word. A mock up of the finished draft, inclusive of any photos, charts, maps, or other anticipated content, shall be provided to the Project Manager for review and acceptance prior to the publication of the draft CTP.
The cost to develop a Draft Revised CTP will be compensated by a firm fixed price as stated on the Pricing page, Attachment #2.
- Subtask 5b (See also Task 5-1, in Task Order #5): Presentation of Draft Revised CTP – the Consultant will furnish one hundred (100) copies of the draft CTP, as well as all required presentation materials, to the Project Manager to allow for the timely review of the draft by the Planning Commission and Board of Supervisors. The Consultant shall insure that suitable project team members will be available during these presentations (assume three) to address any questions associated with the work performed under this contract.

Any costs for this task will be included in subtask 5a at no additional expense.

- Subtask 5c: Project Closeout Activities – the Consultant will incorporate any changes to the draft CTP directed by the Project Manager at the conclusion of the County's review process. The Consultant shall deliver an original of the final revised CTP, an electronic copy of the final revised CTP in Microsoft Word, as well as all presentation materials and any remaining deliverables, to the Project Manager upon request. The Consultant will keep the CTP update website in service for a period of 30 days during which time all comments and inquiries will be directed to ots@loudoun.gov.
The cost to develop and deliver the Final Revised CTP will be compensated by a firm fixed price as stated on the Pricing page, Attachment #2.

METHODS AND PROCESS

It is understood that, in the course of preparing the CTP update, the Consultant shall solicit input from the Loudoun County Board of Supervisors, County Administration, the Office of Transportation Services, incorporated towns, transportation providers (government and non-profit) and project managers of regional initiatives and citizen groups. The Consultant may also consider relevant national and regional public transportation standards.

DELIVERABLES

The following deliverables shall be provided. The County will issue payment upon acceptance of the deliverables and/or the completion of tasks contained in this section.

- Subtask 1a – report on the suitability of the Loudoun County Travel Forecast Model
- Subtask 1b – updated Loudoun County Travel Forecast Model for 2030 baseline conditions; **Technical Memorandum #1: Revised 2030 Baseline Forecasts and Recommended Test Alternatives**
- Subtask 1c – results of corridor sketch planning exercises, as applicable
- Subtask 1d – updated Loudoun County Travel Forecast Model for 2030 alternatives; **Technical Memorandum #2: Alternatives Analysis and Initial Recommendations**
- Subtask 1e – results of iterative land use analyses, as applicable
- Subtask 2a – Public Participation Program
- Subtask 2b – presentation materials, notices and signs; **Technical Memorandum #3: Summary of Public Comments**
- Subtask 2c – compiled and summarized additional public comments obtained from project website
- Subtask 3a – all GIS data files and maps
- Subtask 5a – mock up of draft CTP update
- Subtask 5b – One hundred (100) copies of draft CTP update; all required presentation materials
- Subtask 5c – Original of the final CTP update; electronic copy of final CTP update in Microsoft Word; all required presentation materials; any remaining paper or electronic files that are County property per the contract

Consultant shall provide the following presentations:

Up to three presentations to the Loudoun County Planning Commission with the completion of Subtasks 1b, 1d and 1e

Interim Report (milestone-based): Loudoun County Planning Commission;
Loudoun County Transportation and Land Use Committee

Final Report (end of study): One presentation each - Loudoun County Transportation and Land Use Committee and the Loudoun County Board of Supervisors.

Task Order #1 – Travel Model Validation

Scope

Current model performance needs to improve. The traffic assignments produced using Round 7.0 are not as accurate as previous results obtained from using Round 6.3 socioeconomic data. This is partly due to changes in the geographic distribution of the data and partly due to changes in the zonal allocation percents in Loudoun County. The zonal allocation changes are partly due to information obtained from the newly developed zonal allocation tool and partly due to discussions with Loudoun County regarding some MWCOG zones that required allocation percentage changes. Trip generation/distribution accuracy with respect HBW trips has decreased because the CTPP targets have been revised.

While some of the model performance measures indicate are within acceptable accuracy, there are several key benchmarks that are not acceptable:

- HBW trips estimated for Loudoun County are high compared to CTPP target
- Estimated travel flows from Fairfax to Loudoun County over-estimated by 95%
- Traffic assignment on freeways is high by almost 22% compared to an acceptable error of 7%.
- The correlation of modeled to observed volumes for link volumes in Loudoun County (R^2 value) is only 0.72 versus a desired value of at least 0.88
- Volumes on corridors that will be studied in the plan update show significant differences from counted volumes

Baker will undertake revising/calibrating the model to produce more reliable traffic volume estimates for the base year conditions. Suggested changes include the following:

Review and adjust trip generation geographic factors to better match HBW trips with new 2000 Census Transportation Planning Package (CTPP) targets. These adjustments will be “district-based” and justifiable based the on character of land use/development. Adjustments will account for influence of special generators, such as the Dulles Airport, in the designated planning corridors

Review and adjust trip distribution “K” factors to better replicate inter and intra-jurisdictional trip flows in response to new CTPP targets

Review traffic counts on the network to ensure that counts are correctly coded and examine instances where the same count is shown on multiple contiguous links for the same facility. Generally, the uncertainty of data quality for the base year traffic county database contributes to overall relative error. In many cases, the traffic count data are not real counts but factored data, i.e., an actual traffic count taken from an earlier year multiplied by a growth factor to derive the 2000 count. In other cases, a single count is coded on multiple links.

Review and adjust travel speeds and capacities as coded in the base year network, with particular attention focused on the study corridors.

The above adjustments will be implemented incrementally and systematically to evaluate the effects of each adjustment before proceeding to the next step. This provides control over the model adjustments and a better understanding of the model interactions. Ultimately, these adjustments will produce new highway trip assignments on roadways in Loudoun County.

Highway trip assignment validation utilizes volume summaries to perform an overall evaluation of the highway and transit performance as compared to observed demand. Validation of highway assignment is an iterative process of checking model volumes against count to gauge model performance. Highway trip assignment entails testing the ability of the travel model to replicate observed 2000 conditions. Several measures presented below can be used as a benchmark to evaluate the performance of the modeling process on the highway side:

- Total assigned traffic volumes divided by the total counted traffic volumes, for all links that have counted volumes. Error should be less than 5 percent.
- The same measure as stated above, but differentiated by roadway functional class. Maximum error:
 - Freeways 7 percent
 - Principal Arterials 10 percent
 - Minor Arterials 15 percent
 - Collectors 25 percent
- Linear correlation between assigned and counted link volumes should be greater than 0.88 for the entire modeled region.
- Magnitude of assigned vehicle-miles traveled (VMT) should be within 5 percent of annual urban area estimates
- Assigned VMT by function class for an urbanized areas should approximate the distribution:

Freeway/Expressway	18-23%
Principal Arterials	37-43%
Minor Arterials	25-28%
Collectors	12-15%
- VMT per person and per household will also be examined for reasonableness based on sources such as the *National Personal Travel Survey*.

Baker will evaluate assigned screenline and cutline volumes as compared to observed counts using the industry standards for allowable error. Validation will be based on daily volumes only; although time-of-day assignments will be examined for accuracy.

Final deliverables for the project will include a technical memorandum detailing the base year model validation. The documents will include tabular and narrative summaries. Documents will be delivered as hard copy and electronically.

Task Order #2 – Additional Activities to Complete Model Update and Task 1b

As specified in the Subtask 1b portion of the CTP Update scope of Work (page 1-2 of the Attachment #1 to Service Agreement QQ-01224), the following tasks comprise the scope of this task:

- Update the model to make use of the current COG forecasts
- Further refinement of the land use forecasts as needed to reflect the status of CPAMs
- Verification of future road network baseline assumptions for all network conditions based on input from OTS staff and assumptions for facilities in other jurisdictions as can be found in the COG model
- Employ the model and post processor to simulate the effects of 2030 travel demands
- Prepare a technical memorandum to document the conclusions of the exercise and present an initial set of test alternatives to address areas where future deficiencies are noted.

As the Baker and OTS project managers have discussed, the effort required to develop the future year networks and the extent of model runs and post-processing to deliver the requested information for OTS and Transportation/Land Use Committee consideration extend beyond the original scope and budget. In addition, Baker has been asked to represent the OTS and the CTP update at two meetings outside the scope of work, one with VDOT regarding the South Dulles CPAM, and one with the Dulles Loop Implementation Group to discuss the CTP Update and VDOT's study of Route 50. Finally, the original scope and budget did not include costs for an anticipated traffic count program; however, the model development has proceeded without this anticipated expense due to additional work by Baker staff to gather and develop extensive databases of existing traffic counts, both from OTS and VDOT.

Baker has attempted to provide as much additional service as possible within the existing fixed price agreement. This includes the development of information for the November 27th Transportation/Land Use Committee and Planning Commission through combined effort under Task 1b and Task 2b (Public Meetings), given that these meetings are being held as public meetings under the Public Involvement Plan. Other examples include extensive work not included in this task order to develop and interpret unique deficiency measures and development of information on the transit system to be presented with the model output on the roadway network.

The following supplemental tasks are proposed as Task Order #2 under Task 4: Technical Support to address the additional work necessary to accomplish the Model Update and completion of Task 1b as it has evolved:

1. Model and Network Adjustments

a. Network Updates – complete the extensive network adjustments needed to properly reflect the 2005, 2030 CLRP and 2030 CTP networks, including corrections to the network not related to the future model networks.

The areas of network adjustment that fall out of the scope of Task 1b are primarily developing networks for two 2030 model runs rather than one (both CLRP and CTP), and to a lesser extent, making corrections to the network that had nothing to do with the future networks as the networks went through multiple revisions (these also affected 2005). Note that the scope of work at the top of page 2, attachment #1 to the Service Agreement, indicates we will use “assumptions for facilities in other jurisdictions as can be found in the COG model” and we did one round of review in memo form (attached) to develop the CLRP network assumptions, then we sent OTS the table listing the differences between the CLRP and CTP which George Phillips verified for our initial model update and run (see e-mail attachment). However, based on our meeting with OTS staff on November 9th, a second, more detailed review and update of the networks was requested as a combined effort of both Baker and OTS staff. In the end, we developed two 2030 networks for the CLRP and CTP model runs, neither of which is a simple reflection of the COG model networks in other jurisdictions. Thus a portion of the network updating extended beyond the scope of work.

b. Model Script for Measures/Output – While the scope of work calls for implementation of the post-processor, the deficiency measures agreed upon by OTS and Baker required development of new script to produce unique information from the model runs, such as lane-miles at each level of service and percent of through-trips in Loudoun County only. The incremental portion of this effort which extends beyond the original scope and budget is included in this Task order.

c. Rubbersheeting – While a portion of the existing model was rubber-sheeted to match the actual road network in GIS, the OTS staff requested additional portions of the network to be truthed to the road network maps for communication with the Transportation/Land Use Committee and the public. Also, some of the network adjustments precipitate additional/corrected rubber-sheeting.

To clarify how this relates to the project scope and the portion that was included in the initial service agreement, some further explanation is needed. The rubbersheeting or "truthing" of the network is the step that allows us to display the model results directly on a GIS map of the roadway network. This step perhaps relates more closely to Task 3 of the Scope of Work (which is not included in the initial service agreement), but it was done during Task 1b because Baker and OTS did not want to show the TLUC and the public the model results on the VIPER

network (i.e. straight lines). Because we already had a significant portion of the network rubbersheeted, we asked OTS to identify whether any additional roadway areas needed to be rubbersheeted on the map we gave OTS in October to see if we could fit this in as an incremental effort. At the time we let the OTS PM know verbally that the work could be labor-intensive and we'd have to see how it would work out. It turned out that our initial rubber-sheeting effort was only about a day of effort, which we thought we could absorb. However, after we committed to this course of action, the ultimate extent of the CLRP and CTP network changes required a lot more rubbersheeting to be able to display the future networks. At this point, we were committed to this course of action in preparation for the TLUC meeting and it had to be done immediately or we wouldn't have been ready for the meeting. This effort taken now will help minimize the cost of Task 3 when we scope it, but to meet the needs of Task 1b and the public involvement effort, which evolved to include the November 27th TLUC meeting and the display of the model results, it had to be done before the scoping of Task 3.

d. Research and incorporation of existing traffic counts – The scope of work anticipated an additional expense to conduct traffic counts as a basis for increasing the model coverage for post-processing (i.e., to report volumes and level of service on the roadway network). In lieu of this program, Baker was able to provide a sufficient database of existing traffic counts at substantially lower expense; however, this research and database development extends beyond the original scope and budget. The task order includes the incremental effort to bridge the gap between the anticipated traffic count research and that which allows Task 1b to proceed without the additional expense of field counts.

Relating this to the contract scope and budget, we budgeted a certain level of effort to collect and interpret existing counts, which was limited in part by the budget constraints the County asked us to incorporate during negotiation. In our detailed budget (attached), we had 68 hours for all data collection, and 48 hours specifically for 2006 traffic count/ridership review. We did not include in the initial service agreement the anticipated cost (which we indicated in our initial budget proposal would be up to \$20,000) for a traffic count program. What has happened is that we avoided this large cost of a vendor count program by extensively "mining" the existing data, particularly tracking down and incorporating extensive VDOT data, which took more effort than was budgeted for that component of data collection and the specific count review. However, in so doing, we saved the *planned* cost of a traffic count program for Task 1b. The aspect of this which is specifically out of scope is the incorporation of a detailed and comprehensive historical count database from VDOT, which we did not know existed or could be obtained at the time the project was scoped. Our scope says we will look at existing VDOT counts on a selected set of links identified by Baker and OTS and gear up for a traffic data collection program. (First paragraph under Subtask 1b on page 115 of our proposal scope of work.) While not detailed, this referred to the VDOT count book data that is available on-line. However, after OTS specified the areas of needed count coverage, Baker was able to obtain and process this VDOT database which more than covered the areas needed; we learned that the VDOT counts were for 2005 which was deemed sufficiently current by Baker and OTS; and we researched the specifics of the count database (were physical counts done, how was peak hour determined, is directional breakdown reflected in the ADT calculations, etc.) before

deciding to use them in lieu of physical counts. Obtaining, researching and processing this count database falls outside of the scope.

2. Additional Model Runs

a. Additional CTP Runs – The scope of work calls for one 2030 model run, but because the CTP includes projects not part of a financially constrained “existing plus committed” network, OTS staff have requested 2030 model runs for the constrained long range plan (CLRP) as well as the CTP.

b. Review/analysis of the CTP runs – In addition to conducting the additional model runs, some incremental effort is involved in reviewing the CTP model runs and comparing them to the base year and 2030 CLRP model runs.

3. Extra Meetings – OTS staff have requested Baker staff to attend meetings outside the scope of work, including a VDOT meeting on the proposed South Dulles CPAM on July 31 and a meeting of the Dulles Loop Implementation Group on November 13th and 28th. Only the incremental staff time to attend these meetings is requested to be covered by this task order.

4. Additional Documentation – due to the addition of the CTP update model run, the documentation for Task 1b will require some additional effort.

Deliverables: The deliverables for this Task Order are primarily expansions of those for Task 1b, including presentation of results for the additional 2030 CTP model runs, delivery of updated traffic count databases for 2003-2005, and delivery of enhanced networks for base year, 2030 CLRP and 2030 CTP models.

Scope of Work – Task Order #3 Corridor Studies Phase I

The following tasks comprise all or portions of Tasks 1c, 1d, 1e, 3 and 4 from the contract scope of work. The work is to be conducted according to the detailed scope of work for that follows and the task order budget, attached. The correlation between Task order tasks (which begin with a “3”) and contract scope of work tasks is explained at the end of the scope of work. The corridors referred to in the scope of work are defined as the fourteen corridors from the contract scope of work (attached).

Task 3-1: Model Refinements for Corridor Analysis

a. External Trips. The Consultant will research the commuting patterns and trends and the forecasts of population in Jefferson County, WV, and Clark, Frederick and Fauquier Counties, VA. The Consultant will also review documentation associated with the external trip estimation process used in both version 1 and version 2.1d Draft #50 of the TPB modeling process. In addition, the consultant will examine data, such as CTPP 2000 journey-to-work travel patterns, to provide a foundation for validating external trip estimates produced by the Loudoun County model. If necessary, the Consultant will teleconference with MWCOG staff to discuss the assumptions used in the 2030 COG model regarding trends in commuting from areas external to the TPB model region.

Based on the above activities, the Consultant will determine post-processing adjustments are needed to adequately forecast the commuter traffic from these counties. Post-processing adjustments can be applied if external trip travel patterns are accurate, and the number of external stations needing revision is small or the number of impacted links is small. Selected link analysis can provide details on external travel for impacted links such that an appropriate link volume adjustment can be made to account for changes in external travel. This must be done judiciously as it assumes no change in route choice caused by the impact of external travel on links.

b. Level of Service. Based on OTS staff review and fieldwork conducted in Task 3-2, the Consultant will determine whether the LOS methodology applied to roadway links needs to be altered. Coding in the LOS processor will be adjusted accordingly. Also, minor modifications (i.e., no more than 2 days’ effort) to the LOS methodology may also be developed (if needed) to accurately portray transitional areas in/near towns or similar hybrid conditions.

c. CPAM Updates. Based on input developed by county staff, the Consultant will update the socioeconomic data in the 2030 model to reflect the changes in the development levels under the Rural and Arcola CPAMs approved in 2006.

Task 3-2: Corridor Demand

The consultant will execute the 2030 CTP (+ Arcola CPAM) model to estimate forecasted traffic volumes and will develop an automated procedure to determine the number of lanes needed on each facility in the corridors based on satisfying estimated demand. The metric for determining when a link satisfies demand is maximum lane volume at level of service (LOS) D. The results will be refined based on existing analyses of traffic operations, OTS input, and stakeholder observations obtained in prior outreach. This process requires iteration of the model as changes in lanes results in changes in capacity which impacts travel patterns and systemwide travel demand on individual facilities. It is anticipated that up to 3 iterations of this process will be required to reach a determination of required lanes on each facility.

Task 3-3: Constraints and Opportunities Analysis

a. Constraints. Based on data provided by OTS, the GIS department and the planning department, the Consultant will compile the available data on the constraints for the corridors:

- ★ Land use as identified in the Comprehensive Plan, major developments
- ★ ROW – both existing and potential with setbacks based on electronic files of as-builts, County-provided data on proffers and mandatory setbacks in the corridors, and other existing, electronic data sources provided by the county and/or VDOT
- ★ Environmental constraints (historic, wetland/water, parks, and community facilities, plus any utilities per data provided by the county)

For four of the corridors, only the countywide GIS data will be used for corridor analysis and no additional constraints analysis will be gathered. Those four corridors are Route 671, Route 734, Route 704 and Route 50 west of Lenah (i.e., the area of the Route 50 Traffic Calming Study). To complete the constraints analysis for the remaining 10 corridors, the Consultant will review aerial photographs and conduct limited windshield surveys to verify the constraints and/or ROW information provided by the County. No more than 4 days of aerial photography review and 6 days' field work and/or supplemental research (such as gathering other existing data sources) is anticipated to complete this component of the study under this task order. The Consultant will prepare GIS mapping that identifies the maximum ROW in each corridor and will review this information with OTS and Planning Department staff.

b. Areas of Opportunity. In a half-day workshop with Planning Department and OTS staff, the Consultants and county staff will agree on the criteria for areas that have the opportunity to reduce travel demand through: (1) implementation of design standards under the comprehensive plan; and/or (2) increased availability of transit service. The Areas of Opportunity will also be defined during the workshop, with limited follow-up GIS analysis to complete the identification of these areas. The GIS, land use and ROW analysis conducted in 3-3 a. above will inform the workshops activities and facilitate identification of the Areas of Opportunity.

Task 3-4: 2030 Build-Out Analysis.

a. 2030 Build-Out. Based on the constraints identified in Task 3-3, the consultant will modify the 2030 CTP network by using an automated process to apply the constraints identified in Task 3.3a and apply the transportation model to determine the maximum traffic the corridors can serve and quantify excess demand. As defined above, excess demand is the traffic on each link that exceeds the maximum volume at LOS D.

b. Travel Demand Management. The consultant will identify a range of traffic abatement measures including transit, land use and travel demand solutions, as well as a range of effective capacity increases that can be implemented through traffic systems management. The product will be a White Paper on strategies and assumptions used to address traffic congestion through more efficient, integrated design of land use patterns & transportation networks. Key topics could include:

- ★ Transit-ready development
- ★ Proximity of housing to jobs
- ★ Network/land use density

The White Paper would discuss potential improvements that could be achieved by applying strategies proposed to opportunity areas identified in 3-3 b, and could explore the general applicability and issues relevant to the county as a whole. Some key illustrations or graphic examples of these strategies, as applied to select opportunity areas, will be produced to support understanding of the strategies.. These measures will be based on the Consultants' experience in other locations and knowledge of literature as applicable to conditions in Loudoun County.

c. Reporting Results. The consultant will meet with OTS staff to review results of the analysis and will share a preliminary presentation electronically prior to presenting the results to the TLUC and Planning Commission. A special, joint meeting of the TLUC and Planning Commission will be requested by OTS staff to present the results of the analysis. The presentation will report the steps in developing the build-out analysis, the corridor results, and the range of traffic abatement and system management results that can be applied to the corresponding Areas of Opportunity. At this meeting, initial input on the strategies/recommendations to address excess demand will be solicited. The meeting will be advertised to encourage public attendance, and a workshop with stakeholders will be held the same day as the meeting (afternoon or evening) to provide small group workshop-style input to the development of recommendations.

Task 3-5: Preparation/Research for Final Alternatives Analysis and CTP Update

a. Intersection Analysis. The Consultant will research the performance (in terms of delay on adjacent roadway links) of single- and multi-lane roundabouts compared to signalized intersections with comparable through-put and/or physical footprint. The Consultant will develop traffic thresholds and criteria for signalized intersections, roundabouts and interchanges, based

primarily on model output. This will enable recommendations for the Alternative Analysis phase that follows this Task Order.

b. Applying Traffic Abatement and System Management Strategies. The Consultant will conduct a workshop with OTS and Planning Department staff to jointly evaluate how well Loudoun County's existing land use/transportation plans, guidelines and policies support the Traffic Abatement and system Management Strategies identified in the white paper from Task 3-4b. For example, the team will discuss transit oriented development regulations, access management, mixed use areas and their design guidelines, and other relevant topics that focus on existing county policies in areas that have the potential to implement the White Paper recommendations. The county staff will direct the consultant to relevant portions of County regulations. In the workshop, the Consultant and county staff will discuss the White Paper and the relevant county regulations as developed and implemented to date. The Consultant will identify potential areas for revision within existing plans, guidelines and policies, and determine if there are any areas that need further, more detailed evaluation in subsequent tasks. The deliverable from this meeting will be a meeting summary, as well as findings and recommendations for policy revisions that support the traffic abatement strategies. The workshop will also determine if further evaluation of the County's policy and ordinance framework is necessary.

Meetings

The following meetings are included in the scope of work under the tasks and sub-tasks indicated in parentheses:

- ★ Meeting with staff on environmental constraints data (Task 3-3a.)
- ★ Meeting with staff on ROW limits after data collection and field work (Task 3-3a.)
- ★ Planning Department/OTS Workshop I (Task 3-3b.)
- ★ Meeting to review draft results with OTS staff (Task 3-4c.)
- ★ Combined TLUC/PC and public presentation (Task 3-4c.)
- ★ Stakeholder workshop same day as TLUC/PC meeting (Task 3-4c.)
- ★ Meeting with VDOT and/or others for roundabout/intersection research (Task 3-5a.)
- ★ Planning Department/OTS Workshop II (Task 3-5b)

In addition to these specific meetings, one additional meeting with staff and/or other jurisdictions/agencies is included in this Task Order (specified as Extra Meetings in the budget).

Deliverables

Deliverables for this Task Order are:

- ★ GIS Mapping of environmental constraints and maximum available right-of-way (Task 3-3a.)
- ★ White Paper on traffic abatement possible from land use design, travel and transit strategies (Task 3-4b.)
- ★ Presentation of Build-Out Analysis as specified in Task 3-4c.
- ★ Summary of TLUC/PC meeting recommendations and Stakeholder Workshop recommendations for alternatives analysis (Task 3-4c.).

★ Design Audit recommendations (Task 3-5b.).

Relationship to Contract Scope of Work

The foregoing scope of work for Task Order #3 is based on a more detailed and updated interpretation of the Tasks 1c, 1d, 1e, 3 and 4 in the contract scope of work. Specifically, this task order covers the initial feasibility review of corridors as specified in Task 1c; the initial assessment of corridor capacity and demand that enables prioritization of corridors and alternatives analysis in Task 1d; initial assessment of potential land use strategies and their effectiveness for Task 1e, through the identification of Areas of Opportunity, development of the White Paper in task 3-4b, and assessment of the white paper recommendations relative to county regulations in task 3-5b; development of GIS mapping in partial completion of Task 3a; and specific technical review and enhancement of the travel demand model in Task 4. This task order also includes additional public outreach in Task 3-4c that is not included in the project Public Involvement Plan and is supplemental to the Task 2b public involvement allowance, with the exception of advertising, the allowance for which was not used for the public involvement activities to date.

Scope of Work – Task Order #4 CTP Alternatives Analysis

The following tasks comprise remaining portions of Tasks 1c, 1d, and 1e, from the contract scope of work. The work is to be conducted according to the detailed scope of work that follows and the task order budget, attached.

Task 4-1: CTP Update Alternatives Analysis (Contract Scope of Work Tasks 1c, 1d and 1e)

a. The Consultant will conduct travel demand model runs to test the alternatives identified by the TLUC and participants in the meeting at the end of the Phase I Corridor Analysis, as well as alternatives developed by the Consultant to address remaining congestion. The model runs will be done iteratively, with alternatives grouped so that cause and effect relationships between improvements and traffic patterns can be discerned. Up to 4 model runs with up to three permutations of each will be conducted, including one run that tests a toll scenario and one with managed lanes.

b. As needed, environmental constraints such as ROW limits, adjacent land use, slope, large water/sewer lines, and floodplains will be checked in GIS to shape the final CTP recommendations and their cost development.

c. Based on the model runs and any final analysis of environmental constraints, the Consultant will develop final recommendations for the CTP and present them to the TLUC. This analysis will include assessment of intersection approach volume and general recommendations for intersection treatment (signal, roundabout, or interchange) at major intersections (i.e., all those involving a principal or minor arterial intersecting with at least a minor collector). The recommendations will be based on post-processing of model runs and not operational analysis.

d. Any excess demand remaining after reasonable and feasible recommendations will be identified. Based on the land use policy review and implementation strategies developed under Task Order #3, the Consultant will identify specific land use and/or travel demand management strategies that have the potential to address the excess demand. The amount of demand reduction with these strategies will not be specifically quantified but ranges of potential impacts will be estimated where possible.

Meetings: One meeting with OTS staff to review the alternatives analysis. The meeting with the TLUC in late April to review results will be conducted under the public involvement allowance.

Deliverables: Presentation to the TLUC documenting alternatives analysis and final recommendations

Scope of Work – Task Order #5 Completion of CTP Update

The following tasks comprise remaining portions of Task 3 from the contract scope of work, as well as an extension of Task 5 not previously scoped or budgeted to provide ongoing support for CTP adoption through December, 2007. The work is to be conducted according to the detailed scope of work that follows and the task order budget, attached.

Task 5-1: CTP Update (Contract Scope of Work Tasks 3a, 3b and 5b)

a. If needed after the TLUC meeting in Task 4.1, a final model run will be conducted of final CTP recommendations.

b. The Consultant will update the CTP maps to reflect recommendations for roadway improvements, transit facilities and services, and corridor recommendations (such as access management, corridor preservation, etc.). The mapping update will include the incorporation of the trail system in the General Plan.

c. The Consultant will revise the text for the CTP draft, adding to the edits provided by staff to reflect the full CTP policy and technical recommendations. (Additional edits to the draft are included in Task 5, already under contract.)

d. The Consultant will develop cost estimates of the CTP recommendations, per state requirements passed in 2005 and effective in July, 2007.

Task 5-2: CTP Adoption (Contract Scope of Work Task 5 extended).

a. The Consultant will attend ongoing Planning Commission and/or Board of Supervisors meetings to answer questions and will conduct incremental analysis within reason (such as re-running travel demand model with minor changes) to support the process of CTP update review and adoption by the Planning Commission and Board of Supervisors, respectively. Additional analysis covered by this task order is limited to those defined in the budget attachment.

b. The Consultant will extend maintenance of the project website until CTP adoption and will update the summary of public comments on the website every two months until December, 2007.

Meetings

The following meetings are included in the scope of work:

- Meet with OTS staff up to three times during planning commission and board of supervisors review of the CTP Update
- Attend up to five Planning Commission or Board of Supervisors Meetings to support the review and adoption of the CTP Update (Note that one Planning Commission and one Board of Supervisors Meeting are included in Task 5 as already scoped and budgeted in the initial Consultant contract.)

Deliverables

Deliverables for this Task Order are:

- Draft and Final CTP Text and Maps (initial copies included in Task 5, already under contract; electronic revisions and one final copy included in this Task Order).
- Updated summaries of public comments on the website (up to 3)

ATTACHMENT C: CTP Update Process Flow Chart

