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STEP UP PHASE II STATEWIDE IMPLEMENTATION REPORT

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Carter & Burgess, Inc.

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COLORADO DEPARTMENT OF TRANSPORTATION
RESEARCH BRANCH

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16. Abstract
Strategic Transportation, Environmental and Planning Process for Urbanizing Places, or STEP UP, is an environmental streamlining pilot project involving the Colorado Department of Transportation (CDOT), the Federal Highway Administration (FHWA), the Environmental Protection Agency (EPA) and the North Front Range Metropolitan Planning Organization (NFRMPO). The primary objectives of the project are 1) development of an improved process for addressing environmental impacts related to transportation projects at the earliest possible stage, 2) development of GIS-based tools for early identification of impacts of transportation projects, 3) incorporation of a cumulative effects assessment into NFRMPO's Regional Transportation Plan process to help understand the effects of transportation development on both land use and environmental resources. This report discusses the recommended steps and costs for implementing STEP UP across Colorado.

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1 Introduction

Strategic Transportation, Environmental and Planning Process for Urbanizing Places, or STEP UP, is an environmental streamlining pilot project involving the Colorado Department of Transportation (CDOT), the Federal Highway Administration (FHWA), the Environmental Protection Agency (EPA) and the North Front Range Metropolitan Planning Organization (NFRMPO). In July 2003, the FHWA Colorado Division office received funding to carry out the STEP UP project to evaluate environmental impacts of transportation projects early in the planning process, specifically during the development of the long range Regional Transportation Plan (RTP). CDOT administers the funds for the pilot project provided to the NFRMPO. The NFRMPO was selected as the region for the pilot study due to its moderate size (approximately 350,000 people over 1,600 square miles) and its inclusion of two rapidly-growing urbanized areas.

In 2004, the Denver office of Carter & Burgess, Inc. (Carter & Burgess) was selected as the consultant for the pilot study and began work in April. The primary objectives of the project included:

1. Development of an improved process for addressing environmental impacts related to transportation projects at the earliest possible stage.
2. Development of GIS-based tools for early identification of impacts of transportation projects.
3. Incorporation of a cumulative effects assessment into NFRMPO's Regional Transportation Plan process to help understand the effects of transportation development on both land use and environmental resources.

This effort focused on the process by which projects are planned and implemented, from the creation of a Regional Transportation Plan (RTP) through the inclusion of projects in the local and state Transportation Improvements Plans (TIP/STIP), and on to the development of individual projects through the National Environmental Policy Act (NEPA) process.

The Phase I study resulted in the following recommendations:

1. The process defined and implemented by STEP UP should be formalized and extended to include resource management and planning agencies at the federal, state, and regional level.

2. A broader implementation of STEP UP needs to include formalized data-sharing and data-review agreements. Agencies that develop and maintain environmental or planning data that is crucial for STEP UP will need to realize a benefit in sharing data with the program.

3. A statewide repository for the data should be developed.

4. Further development is needed in the models used for assessing cumulative impacts. Significant research in these topics has been conducted at universities in the state, but a

complete agenda for supporting this research should be developed and reviewed by the STEP UP program.

STEP UP Phase II began in late 2005 with a focus to develop and implement a pilot program based on the modified planning process developed in Phase I (see Figure 1). Specifically, the following tasks were included in Phase II:

- Create a temporary regional environmental database with as many relevant layers as possible.
- Develop an application and provide backend support for managing GIS data while the application is in use for the pilot.
- Continue agency outreach and coordination to encourage participation in the pilot project.

Overall, the Phase II project was successful and provided input on the top corridors for the resources represented within the STEP UP application. General comments from participants indicated that they thought that both the improved process and supporting GIS application worked well and would be useful.

1.1 Report objectives

The results of Phase I and Phase II of the STEP UP project indicate that the tools and processes developed can improve the connection between environmental planning and transportation improvements. The purpose of this report is to identify the steps required for a broader statewide implementation of STEP UP.

2 Objectives of Statewide Implementation

This section describes the objectives related to implementing STEP UP on a statewide basis.

2.1 Integrate Environmental Assessments into Transportation Planning

STEP UP was initiated in response to Section 1309 of the Transportation Equity Act for the 21st Century (TEA-21) as a pilot project for NFRMPO. Section 1309 mandates Environmental Streamlining in order to help achieve the timely delivery of transportation projects while protecting and enhancing environmental resources. STEP UP will increase consideration of environmental impacts early within the transportation planning process and help ensure that projects selected for funding are able to proceed more quickly through the environmental review process. STEP UP will result in a model process that:

- identifies environmental issues early in the development of the long-range Regional Transportation Plans,
- encourages early and continued involvement by resource agencies,
- creates a better link between transportation, environmental, and land use planning, and
- assists in the implementation of transportation improvements that protect the environment, enhance the quality of life, and promote community values.

2.2 Improved Data Management

Transportation planning and the associated permitting process generate large quantities of environmental data. Although CDOT has begun to compile a statewide repository of data resulting from transportation planning projects, this effort is relatively new. In addition, CDOT's efforts are more focused on compiling data that CDOT has paid to collect and less on building a comprehensive data repository. Furthermore, much of the data required for a transportation planning project is derived from base data that is owned by state and federal resource agencies.

The interactive STEP UP website allows resource agencies secured access to their own data, as well as provides a common repository for information related to environmental resources.

2.3 Improved Data Access

Transportation planning requires access to accurate and up-to-date environmental data if the process is to attempt to reduce impacts to the environment. However, in most cases, this data is not available to transportation planners at the beginning of a project. Only after an extensive (and expensive) study does the data become available to allow for thorough analysis. Because the planning process is focused on narrowing the list of potential alternatives, data received later in the process may be less likely to significantly alter the project than data that is available at the outset.

It is important to provide transportation planners with early access to the available data. Additionally, planners need to understand the limitations of the data so that it is used properly in analyses.

Some resource agencies have concerns about providing access to their data. Reasons for the concerns include:

- Desire to recoup costs for compiling data – It is expensive to gather and maintain extensive data sets. For this reason, data providers often depend on the revenue generated from user fees for their data.

- Misuse of data – Some environmental data sets have the potential to be misused if allowed to be accessed by the public. For example, vulnerable historical and cultural resources could be exposed to a greater risk of damage if their locations are made public.

- Incorrect Analyses – Many environmental data sets have not been thoroughly checked for errors or other mistakes or may have unknown origins. Some resource agencies are concerned that faulty data may result in incorrect analyses.

2.4 Meet regulatory requirements

At the conclusion of Phase I, FHWA and FTA issued joint guidance regarding the integration of transportation planning and the NEPA processes. While these guidelines are voluntary, they strongly encourage the consideration of planning products as part of the development of long-range transportation plans in preparing NEPA documents for projects included in the long-range plans. In order for these planning products to be used in the NEPA process, they must meet certain requirements established by NEPA. Documents describing purpose and need, alternatives development and evaluation, existing conditions, and environmental consequences are all elements included in the NEPA documentation that may originate from the transportation planning process. The guidelines describe how elements of the transportation planning process might be incorporated into a NEPA analysis and the standards these elements would need to meet.

The joint guidance both coincides with and supports the recommendations of the STEP UP project. The STEP UP process encourages early agency involvement and consideration of environmental factors in developing projects for inclusion in the long-range transportation plan. Furthermore, the process, through the environmental screening, results in a project that has been developed to avoid or minimize impacts. The STEP UP model process also assist in class of action determinations, development of a clear purpose and need statement, and generation of preliminary cost estimates for NEPA studies. CDOT guidance on preparing long-range plans and environmental stewardship set the stage for transportation planning regions to develop plans that will be useful during NEPA documentation. In particular, these plans should help integrate the development of Corridor Visions and consideration of the natural and built environment early in the planning process.

2.5 Agency Involvement

The STEP UP Steering Committee has identified that the participation of state and federal resource agencies, many of which have a regulatory role in the permitting or approval of transportation projects, along with the involvement of local agencies as a key and underlying element of the STEP UP initiatives. Outreach to agencies that were not part of the Steering Committee occurred through two stakeholder meetings in 2003 and 2004 and through a set of outreach presentations to a group of specific agencies.

Early and continued resource agency involvement is a key component to the success of STEP UP. Resource agency involvement at the planning level provides for early identification of environmentally sensitive areas within a region. This information can then be used by local and regional planners in identifying and screening projects for inclusion in the Regional Transportation Plan. Resource agencies also will be able to comment on and review projects much sooner in the process. Through this early agency involvement, projects will move into the development phase with an improved consideration of environmental impacts.

3 Implementation Requirements

3.1 Business Process

Through the work performed during Phase I and Phase II of this project, a new environmental planning process has been developed. For STEP UP to succeed this new process must be formally adopted and supported by CDOT and the resource agencies involved in transportation planning. In addition, this new process requires environmental data that is extensive, accurate and accessible to those who are using STEP UP.

Carter & Burgess recommends that Colorado's implementation of STEP UP follow a similar path as Florida's "Efficient Transportation Decision-Making" (ETDM) Process. First, we recommend developing a memorandum of understanding to be signed by CDOT, Resource Agencies, and the MPOs that outline their commitment and support for STEP UP within their respective agencies to the maximum extent feasible given existing legal authority, staffing and budget.

Second, we recommend that each CDOT region appoint a STEP UP coordinator and that a primary STEP UP coordinator be identified among the staff of CDOT Division of Transportation Development (CDOT DTD). These CDOT staff will be responsible for defining and refining the STEP UP process, and will serve as the primary point of contact for transportation planning being performed within the CDOT regions.

Third, we recommend appointing a committee consisting of representatives from CDOT and each relevant resource agency to finalize the STEP UP process and develop the plan to implement it state-wide. This committee would require a number of meetings to discuss the existing STEP UP process and the path forward. The final product of this committee will be a finalized STEP UP process and a set of recommendations for its implementation.

Fourth, we recommend developing a framework for collecting, compiling and managing environmental data. It is too costly to conduct an extensive data mapping study that would provide the extensive data set, with the required accuracy, to support the STEP UP process. However, there are numerous, ongoing data collection efforts being conducted within Colorado that could provide quality data for a small geographic area of the State. If the data from these studies is compiled in a centralized repository, over time the centralized repository will contain sufficient data to support STEP UP.

3.2 Application

The website that was developed during the Phase II study was intended as a conceptual test of the ultimate website that will support the STEP UP process. Along with the current functions, the final version of the website should include the following features:

- Project Descriptions – The existing website includes project descriptions that may need to be revised based on the new transportation planning process being defined by CDOT. In early 2006, CDOT and MPOs began developing a new transportation planning process as part of the long-range plan. This new process doesn't identify individual projects, but rather defines corridors and the goals of those corridors. Projects then

must correlate with the overall corridor vision. The current project form within the STEP UP application should be updated to ensure that it supports the revised transportation planning process.

- Overlay Analysis – One of the key concepts discussed during the STEP UP planning meetings related to the website was the concept of being able to use the website to perform overlay analyses, where the impacted areas of one environmental resource could be overlain by the impacted areas from another. The current website allows the user to perform this type of overlay analysis in a visual sense but does not quantify the relative impacts.

- Data Upload and Download – The final application should support easy upload and download of data in order to encourage those people that have data to share that data with the STEP UP initiative. As discussed above, high quality and extensive data is key to the success of STEP UP.

- Reporting Features – The final STEP UP application should allow users to easily export the comments that have been collected into a format (e.g., Excel) that could be included in a report.

- Better Mapping – The interactive map currently in the STEP UP application is rather small and can be slow. The final STEP UP application should include a larger map that is more integrated into the rest of application.

The current website application does provide many of the features that are necessary for successful implementation of this project. Some of these features include the following:

- Easy to Use – The website must be easy to use in order to minimize the amount of training required and the associated support costs.

- Available to Users – The website must be available to users in their native working environment through the internet.

- Integrates Data Sources – The website must integrate the various sources of data that are necessary to perform the environmental analyses envisioned within STEP UP.

- Computer Agnostic – Ideally, the website would be able to run on any computer used by a potential user. However, given the wide variety of computers currently in use, it is more reasonable to develop a website that will run on the majority of computers.

- Network Friendly – The website should not require a high-speed network connection to the internet, due to the limited connections available to a number of potential users.

3.3 Data Management

3.3.1 Data access and licensing

The revised business process developed during the STEP UP project relies upon the availability of geographic environmental resource data to guide transportation planning. However, due to the high cost of collecting and maintaining this data, it is unreasonable to assume that data could be collected to specifically support STEP UP. Rather, the STEP UP effort needs to leverage the efforts of other organizations that own or manage environmental data.

The level of GIS use within these other organizations varies greatly. Some organizations have well-established GIS departments that support internal business processes by maintaining geographic datasets. Other organizations do not have geographic information but instead maintain tabular databases. For STEP UP to succeed, the core environmental data layers from all of the disparate sources need to be compiled into one comprehensive repository.

Once the data are compiled into one location, it is important to maintain metadata. Metadata describes the data, including the source of the data, inherent inaccuracies and appropriate uses. Without supporting metadata, the usefulness of the GIS data is limited.

3.3.2 Data security

Some of the resource agencies involved in the STEP UP project had concerns regarding data security that stemmed from two primary sources. First, there were concerns about their data being copied to another organization's computers and the security on those other computers not being sufficient to protect the data from unprotected access. Second, there was concern about the data being used inappropriately by the STEP UP users. For example, if a map within STEP UP shows the location of a bald eagle nest, that map could endanger the bald eagles that use the nest if it were shared with the public.

To some degree, data security issues can be minimized by ensuring that good computer security practices are followed at the host site. Computer systems can offer excellent data security if security practices are carefully followed.

Some data may be too sensitive to allow it to be mapped. In this case, the STEP UP process may have to be modified so that the resource agency identifies whether or not a project impacts an environmental resource instead of the transportation planner performing this analysis.

Another solution to data security issues is to "blur" the data when it is shown on the map. For example, instead of placing a dot on the map to indicate the location of an eagle's nest, the word "Eagle" could be printed in the approximately location of the nest. Since it is more difficult to identify the center of a string of characters than it is the center of a dot, it would be more difficult to identify the exact location of the eagle's nest. Another approach is to turn off a layer at a preset scale range. For example, eagle's nests could be shown as dots on the map until the user zooms in to a preset level, at which point the dot either disappears or is represented differently (such as with text).

It is also possible to limit the group of people that can view layers on the map. Some users may not be able to see the eagle nest layer unless they have been granted access to that layer. There could even be a certification process that is required before users can see certain layers.

3.3.3 Data availability

There is already an ongoing effort within the Colorado Department of Local Affairs to compile a comprehensive GIS database. Currently, the focus of this effort is on compiling imagery and not vector-based GIS data. However, the computer hardware and software infrastructure exists to support other data types in the future. At this time, this effort does not include environmental data. However, it is possible that the STEP UP database could be stored on these servers and thus leverage the existing computer hardware and software.

3.3.4 Data maintenance

As described above, some organizations have well-developed GIS departments that support their existing internal business process, whereas other organizations don't have any GIS data. For those organizations that have established GIS programs, it is possible to either tap in to their existing datasets from the STEP UP website or to periodically copy their data from the source to the STEP UP servers. In either case, the owning organization would be responsible for maintaining the data and how it is represented within STEP UP.

For those organizations that do not have GIS programs, there are a couple of options that could allow their data to be included within the STEP UP website. First, these organizations could implement their own GIS program with a goal to support STEP UP. In implementing Florida's ETDM process, for example, FDOT reimbursed some resource agencies for their costs to purchase computer hardware and software as well as for their personnel's time to support the process.

Alternatively, the website host for STEP UP could provide GIS management services to the resource agencies. In this scenario, the host GIS personnel would work as an extension of the resource agency and function as their GIS department, specifically focused on supporting the STEP UP process.

Last, it is possible that the GIS data for a resource agency could be stored on the host computer but managed remotely by the owning resource agency.

3.3.5 Staff Resources

There are three primary roles that are necessary for the successful implementation of STEP UP. First, there is a need for a Data Manager. This person would work with the resource agencies to ensure that the environmental data required to support the STEP UP analyses is loaded and managed within the STEP UP system. The Data Manager would work with the resource agencies to either accept revised data files once edits have been made, or to make the edits directly to the GIS data given input from the resource agency staff.

The second role needed for the successful implementation of STEP UP is a Trainer. This person would be the primary evangelist behind STEP UP and would be able to provide in-depth

training and support to the transportation planners throughout the state. Ideally, this person would be a CDOT employee who is involved in the transportation planning process.

Last, a Systems Manager is needed to ensure the STEP UP servers and databases are available for use. This role is probably not a full-time position and would ideally be an employee of the hosting organization.

3.3.6 Computer Hardware Resources

The computer hardware that is necessary to support the STEP UP process includes host servers, GIS data management workstations and networking components. Each of these sets of computer hardware are discussed below.

Carter & Burgess recommends using three servers to support the STEP UP application. The first server would host the database software and ArcSDE, an ESRI software that supports storing GIS features within a relational database. The second server would host the web-based mapping software, ArcIMS or ArcGIS Server. The third server would be the web server. Each of these three servers should be true server computers, with redundant power supplies and other critical components. To ensure redundancy in the case of hardware failure, it may be possible to install each software component on more than one server. If one server fails, the backup server will take over that function of the website. At the very least, a support plan that provides for quick turnaround in the case of hardware failure should be purchased and all of the servers should be kept under maintenance to ensure replacement parts can be acquired quickly.

The GIS data that is made available through the STEP UP website will have to be edited and managed using GIS software. As described above, some organizations have their own GIS departments and therefore their own computer GIS hardware and software. Other departments do not have GIS workstations available to them. In these cases, either the host organization can provide GIS services to these organizations or these organizations can purchase their own computers for staff who are working on STEP UP. Most GIS software, such as ArcGIS, runs well on modern personal computers and therefore doesn't require any special computer hardware.

The last hardware component necessary to support a statewide implementation of STEP UP is the networking components. The STEP UP servers will need to have access to the internet through a firewall and router.

3.3.7 Computer Software Resources

The prototype website is comprised of three primary software components. First, the website is developed using Microsoft Active Server Pages .Net (ASP .Net). Second, the maps are generated using software from Environmental Systems Research Institute (ESRI) called ArcIMS. ArcIMS works together with another ESRI software called ArcSDE that allows geographic data to be stored in a relational database. The third and last component is the relational database itself, which is Microsoft SQL Server. The database stores both the geographic data used to create the maps as well as the tabular data presented in the website.

3.3.8 Computer Network Resources

The website server requires a high-speed network connection to the internet because of the potential for numerous users to be simultaneously accessing the website. These high speed network connections are relatively common and affordable.

Users will also require a connection to the website through the internet. Ideally, this connection should also be high-speed, but a cable modem or digital subscriber line (DSL) connection is sufficient.

3.4 Agency Participation

One of the key ideas behind STEP UP is to change when Resource Agencies review projects and comment on their environmental impact. A consequence of this is that the Resource Agencies end up reviewing more projects earlier in the project development cycle than in the past. Ultimately, the Resource Agencies may spend less overall time than previously because each project review is less extensive and the data are readily available through the STEP UP website. During the transition from the existing project review process to the process facilitated by STEP UP, the Resource Agencies may be involved in both extensive reviews and more minimal STEP UP project reviews at the same time. The additional reviews during the transitional period may stretch the capacities of the relevant Resource Agencies.

In Florida, the DOT compensated the Resource Agencies in various manners for their participation in the ETDM process. This compensation took various forms including direct compensation for additional staff and computer hardware and software.

4 Implementation Costs

This section discusses the estimated costs for implementing STEP UP on a statewide basis. According to the Florida ETDM case study description on FHWA's website, FDOT estimates that it spent $1.75 million to implement their system and process, and that technology related to the GIS application was the most expensive component. This estimate does not include the cost for compiling and managing the Florida Geo Data Library since it had been funded in prior years.

4.1 Business Process

The business process that was defined in the Phase I and Phase II STEP UP projects needs to be formally adopted before STEP UP can have widespread acceptance and adoption within the state. As described in the previous section, Carter & Burgess recommends working with the Resource Agencies to develop and adopt a memorandum of understanding (MOU) that formalizes their commitment and support to STEP UP. Coordinating with the Resource Agencies, drafting the MOU, and gaining Resource Agency acceptance is expected to cost approximately $100,000 but could be significantly less because of the coordination that was included as part of Phases I and II. Specific tasks that could be performed in developing the MOU include the following:

- Coordinating and conducting a kickoff meeting with the Resource Agencies and other interested parties to discuss the objectives behind STEP UP. During this meeting, a schedule should be established for identifying concerns about implementing STEP UP.

- A prototype MOU should be developed based on the MOU's that were implemented in Florida.

- Individual meetings should be conducted with each Resource Agency to gather their concerns and discuss potential remedies. The concerns and responses should be formally addressed (i.e., through technical memos). The prototype MOU should be provided to the Resource Agencies for their review and comment.

- The design of the STEP UP application should be modified so that it addresses the maximum number of concerns that were identified by each Resource Agency.

- Some Resource Agency concerns will need to be addressed through changes to the business process. The STEP UP flowchart should be modified accordingly and the documentation should be updated.

- The comments on the prototype MOU should be compiled and formally addressed. A MOU should be prepared for each Resource Agency.

- A meeting should be held with all of the Resource Agencies and interested parties to discuss the changes that were made to the application and process. During this meeting, the Resource Agencies should be encouraged to voice their concerns regarding the MOU.

- A final meeting should be held during which each Resource Agency will be asked to sign the MOU.

The MOU will pave the way for continued development of the STEP UP process with the Resource Agencies and other transportation planning entities within the state. Carter & Burgess recommends documenting the process to a fine level of detail in a series of user's manuals. These manuals would describe each step in the STEP UP process and the people or agencies responsible for that step. In addition to illustrating how transportation will be performed under STEP UP, these manuals will solidify the process and commitments needed by Resource Agencies. The final part of the manuals will be formalized commitments signed by each Resource Agency, MPO and CDOT that indicate their commitment to implementing STEP UP by a selected date. Developing these manuals and gaining signatures from all of the affected parties is expected to cost approximately $400,000.

Training will be required to teach staff from CDOT, MPOs and Resource Agencies the new STEP UP process as well as how to use the website. Phase II indicated that the website requires minimal training, but we expect more discussion and training will be necessary regarding the new process. Florida's experiences indicated much resistance to implementation from Resource Agencies and FDOT staff. Developing presentation and training materials and performing training classes during the first year of operation is expected to require $100,000. On-going support is expected to require an additional $20,000 per year.

4.2 Application

The prototype website developed during Phase II was meant to be a proof-of-concept website to test whether or not it could be an effective tool for achieving the STEP UP goals. Enhancements and changes were identified during the testing that should be addressed before full-scale implementation. The cost of these changes is estimated at $200,000.

4.3 Data Access, Licensing, Security and Maintenance

STEP UP requires that transportation planners have access to relevant environmental resource data. The environmental and project data will be provided through the STEP UP website and therefore costs are minimal.

Numerous Resource Agencies expressed concern about data falling into the wrong hands during the Phase II project. Carter & Burgess recommends addressing these security concerns with the resource agencies through a series of meetings. During these meetings, the Resource Agencies would be asked to voice their concerns and then potential solutions could be discussed. It is likely that the solutions will take the form of data licensing or use agreements between the STEP UP host and the Resource Agencies. Organizing and conducting the meetings, drafting the security agreement and gaining Resource Agency acceptance is expected to cost approximately $100,000.

Maintaining the environmental and project data shown within the STEP UP website is primarily a manual activity. The labor costs for the required staff are described in the following section.

4.4 Staff Resources

Carter & Burgess recommends two staff positions to support the STEP UP website. Each of these positions is described below.

The first position, a full-time GIS data manager, will be responsible for compiling, editing and managing the environmental data included in the STEP UP website. This position will require close coordination with the Resource Agencies and the MPOs. This position will cost approximately $150,000 per year, including health insurance and other employee benefits.

The second position will be the STEP UP coordinator. Ideally, this person would work for CDOT and have an environmental and transportation planning background. This person will be responsible for training, ensuring participants are doing what they need to do and generally facilitating the process. This position will cost approximately $150,000 per year, including health insurance and other benefits.

4.5 Computer Hardware Resources

The current prototype website is currently supported by three servers, as follows:

- Web Server - One server is dedicated serving the website to users. This server runs Microsoft Internet Information Server (IIS) and is connected to the internet via a hardware device called a firewall.

- Map Server – A second server creates the maps shown in the website using the ESRI ArcIMS software.

- Database Server – A third server runs the relational database software, Microsoft SQL Server, and ESRI's ArcSDE software. The purpose of this server is to store data and provide it to the map server and web server when needed.

In addition to these servers, there are additional hardware components necessary to support the website. These include a firewall device and a network switch for connecting to the internet connection.

The current computer hardware is sufficient to support a state-wide implementation of STEP UP. Carter & Burgess is willing to continue to host the STEP UP website as long as there is either a maintenance contract in place to offset the costs of maintaining the servers or work is actively being performed to develop the STEP UP website or process.

If the STEP UP website is not going to be hosted from Carter & Burgess, replacing the current computer hardware is expected to cost approximately $50,000.

4.6 Computer Software Resources

Implementing STEP UP statewide should not affect the software needed. The current software and approximate price of each is shown below:

- Microsoft Windows Server Operating System - $1,000 per server (3 servers are recommended)
- Microsoft Internet Information Servers (IIS) – Included with Windows Server
- Microsoft SQL Server - $6,000
- ESRI ArcGIS (includes ArcIMS and ArcSDE) - $15,000

4.7 Computer Network Resources

As described in the previous section, the STEP UP server requires a high speed connection to the internet. The estimated cost for this computer connection is $200 per month.

4.8 Conclusion and Recommendation

Carter & Burgess believes that a state-wide implementation of STEP UP will cost approximately $ 1 million which is significantly less than the $ 1.75 million that was spent implementing the Florida ETDM process. Unlike Florida, where, according to the FHWA website, the majority of the cost was associated with developing the GIS-based application, Carter & Burgess believes that a majority of the cost for implementing STEP UP will be spent in meetings with Resource Agencies and preparing documentation. Changing the business process used by Colorado for transportation planning will be time consuming and extensive.

However, there are numerous cost-saving strategies that could be employed. First, CDOT could continue to utilize the current servers at Carter & Burgess that are hosting the STEP UP website. Carter & Burgess will allow the website to remain on our servers and use the other hardware (e.g., firewall and internet connection) as long as we have an active contract with CDOT for STEP UP-related work. Since the hardware and software are not significant cost items within the statewide implementation, this option would probably not result in significant cost savings versus a statewide implementation.

Second, CDOT could try implementing STEP UP for transportation planning along the front range instead of statewide. This would reduce the number of MPOs that would require coordination, but would not reduce the number of Resource Agencies that would require developing a MOU. Therefore, this option would probably not result in significant cost savings versus a statewide implementation.