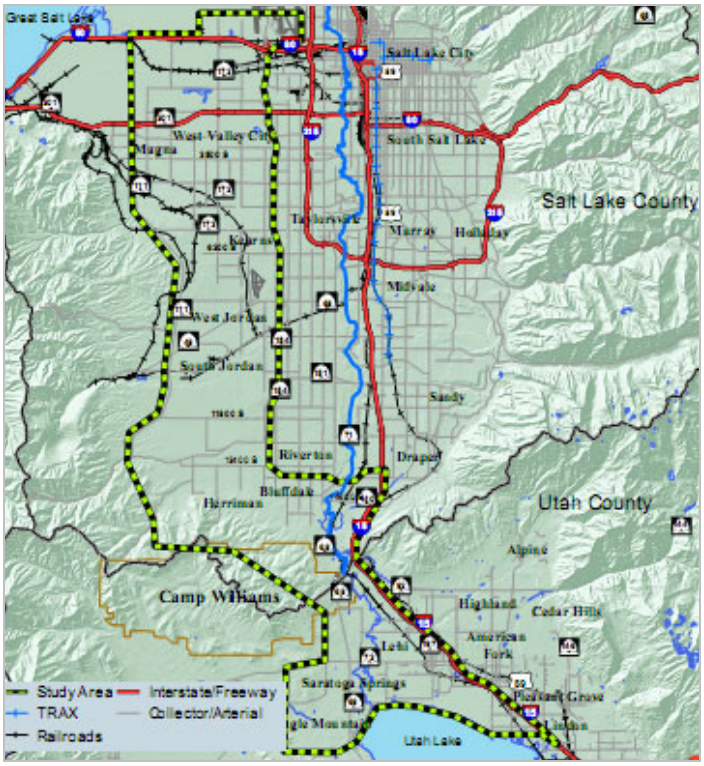
Case Study Introduction

Project Overview

The Mountain View Corridor (MVC) is a combined highway, transit, and trail system in western Salt Lake County and northwestern Utah County in Utah. The highway component of the corridor is a 35-mile north-south freeway from I-15 in Utah County to I-80 in Salt Lake County. The transit component is a 20-mile fixed guideway transitway from Herriman to the Salt Lake International Airport. The trail component runs adjacent to the freeway, where free from environmental constraints.

Figure 1: Map of Mountain View Corridor Study Area



The need for a continuous north-south transportation facility from western Salt Lake County to northern Utah County has been identified in long-range transportation plans since the 1960s. The MVC NEPA study was initiated in May 2003.[1] The environmental document was prepared by the Federal Highway Administration (FHWA) as the lead federal agency and the Utah Department of Transportation (UDOT) and the Utah Transit Authority (UTA) as project sponsors and the lead state agencies. FHWA signed the MVC Final Environmental Impact Statement (FEIS) on September 3, 2008, and the Record of Decision (ROD) on November 17, 2008. The MVC freeway will be built using a phased approach. Construction on the initial build

[1] Record of Decision of the Environmental Impact Statement, Mountain View Corridor Project in Salt Lake and Utah Counties, Federal Highway Administration, November 17, 2008, page 5.

segments of Phase 1 began in Fall 2009 for Utah County and Spring 2010 for Salt Lake County. Phase 1 of the transit component is anticipated to be constructed and operational by 2015.

The MVC project has primary and secondary purposes. The primary purpose of the MVC is to improve regional mobility by reducing roadway congestion and to improve regional mobility by supporting increased transit availability. Secondary purposes are to support local growth objectives, to increase roadway safety, and to support increased bicycle and pedestrian options.[1]

The major transportation needs in the MVC study area are a result of rapidly growing population and employment in the area. The population in the study area is expected to increase by 122% from 258,000 in 2005 to 574,000 in 2030. Employment in the study area is expected to increase by 208% from 89,000 in 2005 to 274,000 in 2030. The roadway network in the study area primarily consists of arterial streets that are not intended to accommodate a high volume of long-distance through trips and freight movements. The transit network consists primarily of local and express bus service.[2]

Travel Forecasting Summary

UDOT used the Wasatch Front Regional Council (WFRC) / Mountainland Association of Governments (MAG) regional travel demand forecasting model to develop forecasts for the MVC EIS. WFRC is the designated Metropolitan Planning Organization (MPO) for Salt Lake, Davis, and Weber counties, and MAG is the MPO for Utah County. The two MPOs share a single four-county regional travel model.

The WFRC/MAG regional travel model is implemented within the CUBE/Voyager modeling software with the application written in TP+ scripting. The model includes 1,296 internal Transportation Analysis Zones within the 4-county region. External traffic entering and exiting the region does so through 24 external zones. The model is based on the traditional four-step modeling process of trip generation, trip distribution, mode choice, and trip assignment. The WFRC/MAG model incorporates these steps and adds an auto ownership model that is sensitive to urban design variables. The model has a feedback loop between trip distribution and assignment that allows travel congestion to influence trip distribution.[3]

UDOT selected 2030 as the forecast year for the MVC EIS. This was done to be consistent with the WFRC and MAG Regional Transportation Plans, which also have 2030 as their horizon year.

Case Study Illustration of the Guidance

The MVC study provides good illustrations of three of the key considerations contained in FHWA's *Guidance on the Application of Travel and Land Use Forecasting in NEPA*. The development and execution of the travel demand model for MVC used a collaborative process with area stakeholders that began with outreach during the NEPA scoping process, continued through several model updates, and included analysis of the effects of sequencing the transit and roadway improvements that was documented in the FEIS. These activities represent pre-planning of the modeling effort, using flexibility in the model to analyze performance and impacts of the alternatives, and managing the project and associated level of effort effectively and in coordination with other agencies with jurisdiction. This case study emphasizes considerations 3. Scoping and Collaboration on Methodologies, 4. Forecasting in the Alternatives Analysis, and 5. Project Management Considerations, of the guidance.

[1] *Mountain View Corridor Final Environmental Impact Statement,* Chapter 1: Purpose and Need for Action, September 2008, page 1-5.

[2] *Mountain View Corridor Final Environmental Impact Statement,* Chapter 1: Purpose and Need for Action, September 2008, pages 1-7, 1-11, and 1-12.

[3] WFRC & MAG Transportation Model Documentation, 2005 Base Year Model, Version 6.0, May 2007, pages 9 and 11.

Key Consideration 3 of the Guidance: Scoping and Collaboration on Methodologies

Reaching Consensus on Forecasting Methodologies

Peer review and collaboration were important parts of the MVC forecasting process. This effort began in conjunction with the NEPA scoping process and involved the efforts of Envision Utah, a nonprofit organization, to define appropriate land use inputs to the model.

Growth Choices Process

The MVC EIS used a unique set of land use inputs to evaluate the build alternatives, referred to the "Growth Choices" land use. The collaborative Growth Choices process involved governmental agencies and stakeholder groups and focused on the relationship between transportation and land use specifically within the study area of the MVC project. The process was intended to help cities in the MVC study area understand the relationship between land use policy changes and transportation choices, and to facilitate agreement on a vision of future development with unified land use and transportation policies. At the end of the process, a "Vision Scenario" was developed and agreed upon by the participants. Within the MVC study area, the Vision Scenario imagines increased population densities and mixed-use developments along transit corridors.[1]

Given that the project area encompassed the jurisdictions of two MPOs, two counties, and numerous communities and governmental organizations, and given lessons learned during other projects in the region such the controversial Legacy Parkway Project, the project's sponsors recognized the importance of facilitating agreement about the vision of future development among the parties with interest. UDOT contracted Envision Utah, a public/private partnership and nonprofit organization based in Salt Lake City, to facilitate decision-making on the growth scenarios for MVC. Envision Utah's mission is the study of the effects of long-term growth in the greater Wasatch area in Utah. The process developed by Envision Utah for MVC was referred to as the "Growth Choices" process.

The advisory group established for the Growth Choices process consisted of the governmental organizations mentioned, along with private developers, nongovernmental organizations such as the Sierra Club, elected officials, and religious organizations.

The NEPA scoping process was combined with workshops for the Growth Choices process. Six scoping meetings/workshops were held, with an emphasis on interactive exercises. The meetings were attended by roughly 300 people. From the feedback provided during the meetings, and with the aid of GIS, three growth scenarios were developed that eventually fed into the development of a composite Vision Scenario. The Vision Scenario balanced improvements among roadway and transit modes and considered land use goals.

The project employed the results of the Growth Choices process directly in several ways:

- **Incorporation in the Purpose and Need**. Both primary and secondary objectives identified as part of the Growth Choices process were reflected in the Purpose and Need statement for the project, including reducing roadway congestion, supporting increased transit availability, increasing roadway safety, supporting non-motorized transportation options, and supporting local growth objectives.
- **Incorporation of the transportation elements of the Vision Scenario in the alternatives analysis**. While it was initially assumed that the Growth Choices Vision Scenario would result in an alternative that would stand alone for analysis in the EIS, during the course of the study it was decided to incorporate the land use and transit elements of the Vision Scenario into all the alternatives. One outcome of this approach was the maximization of transit usage in the traffic forecasts used in the EIS.

[1] Mountain View Corridor Technical Report #05: Overall Travel Demand Modeling Methodology, September 23, 2008, page 2.

- **Incorporation in the impact assessment**. Land use under the Growth Choices Vision Scenario was used to evaluate the indirect impacts of the build alternatives and to compare them to the No-Action Alternative.

Coordination and Peer Review

Coordination and peer review were ongoing elements of the modeling process. The MVC consultant team worked closely with the MPO staff, who maintain the WFRC/MAG model, and their modeling consultant, who helped build the model. Peer review involved the MPOs, their consultant, and FHWA. This coordination was key during the development of the toll and managed lanes forecasting capability. Extensive internal review was conducted with close collaboration among three consulting firms with varying degrees of expertise in the WFRC/MAG model, travel forecasting, and toll forecasting for investment grade studies.

Aside from agency and consulting staff charged with building and operating the model, coordination also occurred with the Sierra Club throughout the study. The Sierra Club, which along with Utah Moms for Clean Air, held membership on the project's Air Quality Working Group (AWG), was also a participant in the Growth Choices process. Following completion of the DEIS, the Sierra Club was provided with the files from the travel demand model for review.

Documentation of Scoping and Interaction with Other Agencies

The Growth Choices process was a distinct, but related, effort from the development of the NEPA document and travel demand modeling for MVC. As such, it produced a study document that became an appendix to the FEIS. The "Mountain View Corridor Growth Choices Study" provided an overview of the process, discussed the workshops and feedback provided at them, explained the process for creating the scenarios, discussed the lessons learned, and included the signatures of the key stakeholder representatives, documenting their endorsement of the goals of the study. The study document itself adopted a glossy, reader-friendly format with numerous graphics and maps to illustrate the results of the study process.

Key Consideration 4 of the Guidance: Forecasting in the Alternatives Analysis

Overview of Transportation-Related Effects and Impacts

The travel demand model was used to analyze the effect that the sequence of construction—implementation of transit improvements versus roadway improvements—would have on land use, air quality, and travel performance in the study area. All of these issues were identified as concerns during the Growth Choices process, and were codified in the Mountain View Vision Voluntary Agreement, a copy of which is included in the Growth Choices study document. This agreement, which was signed by all of the communities, the MPOs, several interest groups (including the Sierra Club), and at least one developer, included a recommendation that the sequencing of transportation investments be considered with a goal of reducing the rate of growth of the vehicle miles of travel and improving air quality. The issue of the sequencing of the modes had been identified during the scoping process and continued to be an issue of concern throughout the Growth Choices process and into the development of the FEIS.

Objective Application of Forecasting Data and Methods

Consistent and objective application of forecasting data and methods is central to providing an equitable analysis of alternatives considered during a study. The MVC study, by developing and using the Vision scenario from the Growth Choices process, maintained consistency in the land use assumptions and no-build networks used in the model while evaluating alternatives.

These assumptions varied somewhat during the sequencing analysis that was completed during the development of the FEIS, which assessed the land use changes associated with the order in which transit and roadway improvements were constructed. The Vision Scenario continued to be a consistent input in the analysis; however, the addition of compact land use scenarios provided a broader assessment of impacts. The

impact of different sequencing options was addressed through both qualitative and quantitative analyses. The qualitative analysis involved interviews with professional staff from communities in the study area and with developers. The quantitative analysis used version 6.0 of the WFRC/MAG travel forecasting model to analyze land use and implementation scenarios for 2015 and 2030. This is discussed in more detail under the heading "Addressing Land Development or Redistribution Effects."

Refinement of the Analysis During Screening

During the course of the MVC EIS process, it was decided that the possibility of building the MVC freeway as a toll road would be studied. At that time the WFRC/MAG travel model was unable to analyze toll facilities. Therefore, the project team updated the model, with additional consulting support and an internal peer review process, in order to perform the required tolling analysis.

The mode choice and traffic assignment models were modified to include the choice to use a toll facility, HOV facility, or an HOT facility as discrete choices in the mode choice model. This allowed toll facilities to compete directly with transit and HOV lanes. Using data supplied by other members of the project team, the constants and parameters associated with the tolling aspects were adjusted to come up with a reasonable usage of the toll facility and a reasonable comparison of toll trips to time saved. Particular attention was paid to toll diversion curves, which showed the percentage of drivers who would be willing to use a toll facility for different amounts of time savings. Diversion curves and model parameters from other regions were compared to output from the WFRC/MAG travel model.

Addressing Land Development or Redistribution Effects

The MVC project applied three different approaches to addressing land development and redistribution, each of which was applicable to a different stage of the project and completed in reaction to changes in conditions or input from stakeholders. The first was the Growth Choices process, which maintained the control totals of the MPO's forecasts but reallocated population and employment based on input from stakeholders. This effort was initiated at the beginning of the study. The second was the sequencing analysis that considered the redistribution effects of implementing transit alternatives before and in conjunction with roadway alternatives. This effort was undertaken during the development of the FEIS. The final effort was a sensitivity test of the MPO's 2007 revised land use forecasts, which differed from the Growth Choices Vision scenario that had been adopted for the project. For this approach, a sensitivity test was completed by UDOT consultants to determine the effect that using the latest MPO forecasts would have on prior work. This effort also occurred during the development of the FEIS.

Growth Choices Process

The MVC EIS used a unique set of land use inputs, referred to the "Growth Choices" land use, for evaluating the build alternatives. The Growth Choices process was a collaborative effort that involved governmental agencies and stakeholder groups. The process was intended to help the cities in the MVC study area understand the relationship between land use policy changes and transportation choices and to facilitate agreement on a vision of future development with unified land use and transportation policies.

Through a series of public workshops, three growth scenarios were developed reflecting a range of development possibilities. More information on the Growth Choices process can be found in Chapter 3, Growth Choices[1], in the FEIS. At the end of the process, a "Vision Scenario" was developed and agreed upon by the participants. The Vision Scenario was a composite of three distinct land use scenarios that were developed using data gathered during the Growth Choices workshops and then enhanced using GIS. Within the MVC study area, the Vision Scenario envisions increased population densities and mixed-use developments along transit corridors.

Sequencing Analysis

[1] Federal Highway Administration and Utah Department of Transportation. Mountain View Corridor Final Environmental Impact Statement. September 2008. pp. 3-1 to 3-22.

Two different approaches were used to analyze the potential for the sequence of transportation improvements to affect land development and redistribution. The qualitative process used an interview process to gather information from local officials and developers about the area would develop differently if transit were implemented before the roadway elements of the alternatives and if it would result in more transit-oriented development being constructed along the proposed transit alternative.

Local officials interviewed during for the qualitative analysis noted that municipalities would not be likely to make land use decisions based on the sequencing of the alternatives. Rather, land use decisions would continue to be made in accordance with adopted plans. However, if the transit alternative were constructed first, then it would be likely that plans would be altered at some point to create higher density development adjacent to the transit alternative. The interviewees, however, thought that the scope of the land use changes in their plans would be limited to areas near the transit alternative and were unlikely to result in changes throughout their communities.

Similarly, developers interviewed held the opinion that their plans were not dependent on the timing of the modal alternatives. In general, developers are reactive to the adopted land use plans of the communities in which they operate, as well as market conditions.

The quantitative process used Version 6.0 of the WFRC/MAG model to apply a numerical approach to the analysis. The quantitative process analyzed a near-term year of 2015 and a long-term horizon of 2030, focusing on the following characteristics:

- Person trips by purpose and mode
- Daily transit trips that have an origin or destination in the study area
- Daily boardings for the 5600 West Transit Alternatives, Dedicated Right-of-Way Transit Option
- Peak period transit share for trips that have an origin or destination in the study area
- Peak hour transit share for trips that have an origin or destination in the study area
- Vehicle miles traveled for the study area and the region
- Hours of delay in the study area

The model runs compared scenarios that considered land use and transportation improvements in various combinations. The No-Action Alternative was included for comparison. The transportation options considered were:

- No action
- Transit implemented first
- Tolled and non-tolled highway improvements, implemented after transit and at the same time

For the forecast year of 2015, the results of the modeling showed less than 1 percent difference in regional auto trips between the alternatives of building transit first versus building transit in conjunction with a MVC roadway improvement. For this period, the difference in transit trips generated between the no-action scenario and the best performing transit scenario, which combined a transit-first option with concentrated development from the Growth Choices scenario applied only in the area adjacent to the transit line, was in the range of 5 percent. Of note was the finding that the transit-only scenarios resulted in a substantial increase in roadway delay by 2015. The amount of delay depended on whether the roadway alternative was tolled or non-tolled.

The 2030 analysis considered the same transportation options as the 2015 analysis, but it also considered additional Growth Choices scenarios. As with the 2015 forecasts, concentrated growth near the transit line, from either scenario, resulted in increased daily transit trips. As before, transit-only scenarios resulted in increases in roadway delay compared to scenarios in which the roadway and the transit were constructed at the same time.

For both analysis years, the factor that had the most positive influence on transit ridership was the density of land use, particularly near the transit line. The timing of the implementation of the roadway alternatives had less influence on transit ridership; however, by delaying roadway improvements, vehicle hours of delay increased substantially.

Review of New MPO Forecasts

In 2007, prior to the FEIS, the MPO released a revised land use forecast, which differed from the land use forecast used in the DEIS. The 2007 forecast redistributed growth in the region, resulting in a 25 percent decrease in the vehicle miles traveled on the Preferred Alternative.

To assess the differences in the forecasts, an independent consultant was engaged to determine which forecast should be used as the study continued. The consultant determined that the 2007 forecast had not been thoroughly vetted and identified some data errors in the project 2007 projections which resulted in the latest forecast overestimating redevelopment and underestimating development. The consultant recommended continuing with the 2005 forecast used in the DEIS.

For more information about the 2007 forecast, see the "Consistency" section in the discussion of Key Consideration 5 of the Guidance: Project Management Considerations.

Documentation of Forecasting in Alternatives Analysis

Multiple technical memoranda were developed to document the methodology and results of the travel model development. In addition, separate documentation was developed, both for the file and for public distribution, to document the Growth Choices process. Some of these materials were integrated directly into the DEIS and FEIS.

Key Consideration 5 of the Guidance: Project Management Considerations

Potential for Reevaluating Analysis

During the course of the MVC EIS process, the WFRC/MAG model and associated land use inputs went through several modifications. Five different model versions with five different land use data inputs were used throughout EIS process. Sensitivity analyses were performed with each model change to determine how much these changes affected the traffic forecasts.

One change in model versions was directly attributable to the MVC project. When it was decided that the MVC EIS would consider tolling as a means of funding the investments in the corridor, the WFRC/MAG model had to be modified to include this capability. The MVC EIS Team, which included toll modeling experts from around the country, performed this modification. Toll model data and sensitivities from other regions were used to ensure that the model performed adequately in developing toll road volumes.

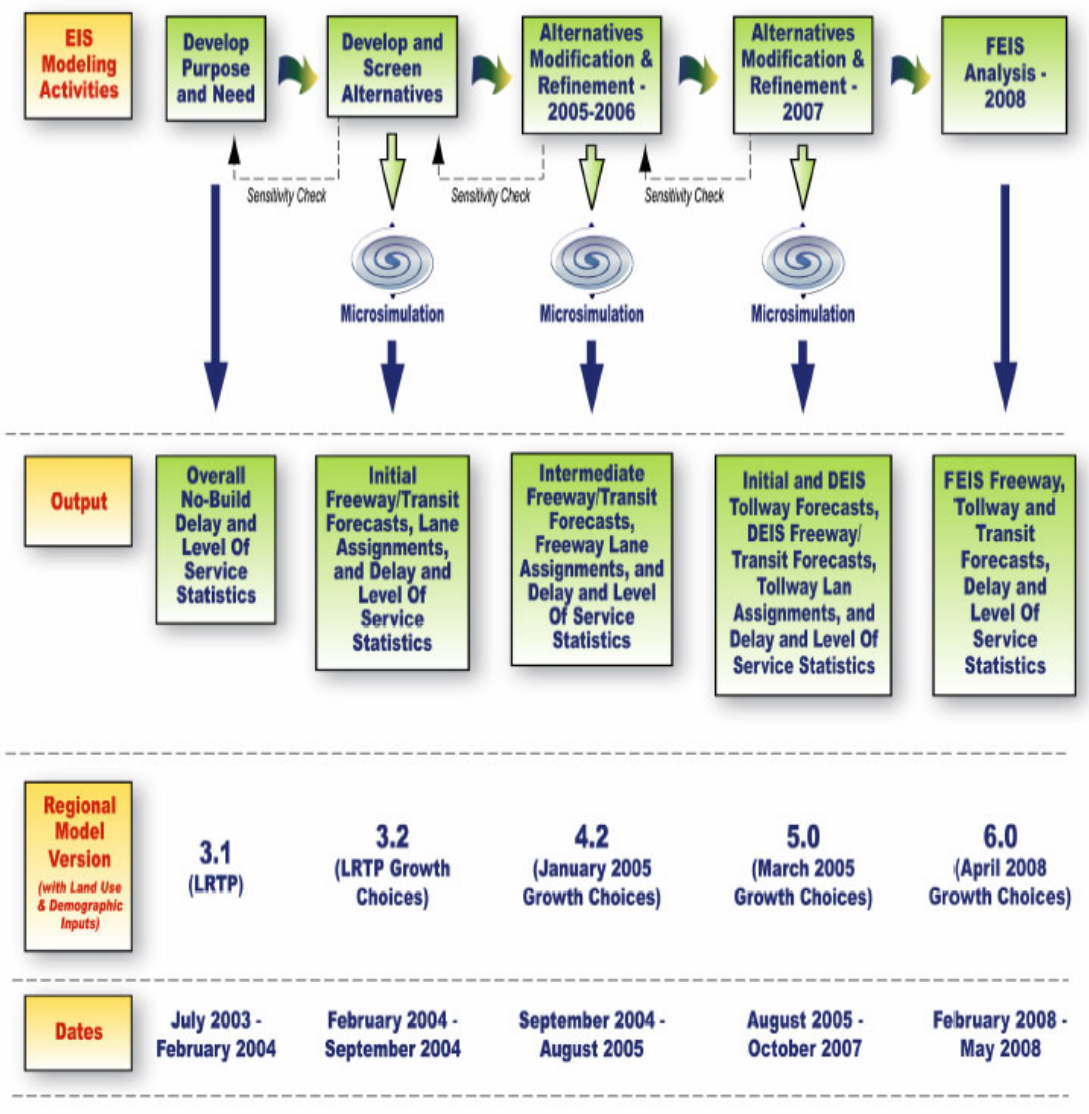
The EIS process comprised four separate phases—Purpose and Need, Initial Screening, Refined Screening, and Final Analysis—each of which used a different version of the model. Figure 1 lists each EIS process phase and the corresponding model version and SE data set used, along with a brief summary of changes that were made from the previous version.

With each round of analysis and each new model, sensitivity tests were completed to understand the implications of the new model on forecasts and prior decisions. The MVC study occurred during a period of intensive model development work in the region and the goal of the MVC Team was to use current data and models, even if it meant redoing some of the analysis. The use of sensitivity tests and documentation of the model changes and effects of model changes helped make this manageable. More information is available in MVC Technical Report #5, "Overall Travel Demand Modeling Methodology."

Consistency

The MVC EIS took 6 years to complete. During that time, the Wasatch Front Regional Council released three different long-range land-use projections to 2030. The first land-use projections were available when the study began. The second set of projections was released in 2005, following changes to the Utah Governor's Office of Planning and Budget county-level growth projections. The 2005 WFRC projections in Salt Lake County were quite similar to the previous projections in terms of the allocation of anticipated growth, with differences due mainly to a revised set of macro-economic assumptions about the overall magnitude of population and employment growth by county. The third set of projections was released by WFRC in 2007, just before the Final EIS was prepared. The 2007 WFRC projections are very different from prior long-range growth forecasts produced by WFRC, and that difference warranted a very careful review of the land use forecasts.

Figure 2: MVC Modeling Process[1]



[1] *Source: MVC FEIS Figure 2-1.2*

WFRC's 2007 land use forecast assumed much more redevelopment and infill of built-out neighborhoods on the east-side of Salt Lake County compared to the projections produced in previous years. Generally speaking, WFRC's 2007 forecast assumed that more development will be concentrated along established transportation corridors, with less growth placed in emerging growth areas. The 2007 WFRC forecast assumed much higher growth east of Bangerter Highway than the 2005 forecast, and conversely, the 2007 forecast for the west-side of Salt Lake County went down substantially relative to prior forecasts. Residential growth on the land inside the MVC study area decreases by more than 20 percent and nonresidential growth by nearly 50 percent.

Land use forecasts are the most critical input to a transportation model. People and jobs generate the need for travel, and the spatial separation of people and jobs largely accounts for travel patterns. The 2007 changes to WFRC's 2030 land use forecasts in Salt Lake County resulted in a 25 percent decrease in vehicle miles travelled on the proposed Preferred Alternative.

Given the dramatic changes in travel demand in the MVC corridor, an outside consultant was hired to review the various land-use forecasts and to provide a recommendation to the MVC Team regarding what land use forecasts to assume. A thorough study was conducted in four phases:

1. Review the methodological differences that led to differences in land-use projections.
2. Examine recent and long-term growth trends in Salt Lake County to understand existing development patterns and emerging trends.
3. Produce an independent forecast of growth for Salt Lake County, relying on available data on vacant land, environmental constraints, and land use plans.
4. Compare the different forecasts and trends and make an informed recommendation to the project team and WFRC regarding reasonable forecasts for land use growth in the study area.

The outcome of the review was a recommendation to continue using the forecasts developed in 2005, with a few relatively minor changes. It was found that the forecasts produced in 2007 included some unfortunate data errors, had not been thoroughly vetted, and generally overestimated redevelopment and underestimated development in the rapidly growing portions of the region. The land use projections developed in 2005 and used in the MVC DEIS were comparable to an independent land use projection developed by the consultant both in total and in terms of the allocation of growth at the travel analysis zone level. The independent forecast and the forecast used in the DEIS both were consistent with development trends, with the availability of vacant land in the county, with specific plans of developers, and with the adopted land use plans in the corridor.

Therefore, the MVC EIS forecasts are based on a different land use projection than was used by the MPO at the time for long-range planning. The justification for this difference came from a careful review of the land use growth patterns in the region and the reasonableness of the various available forecasts. This analysis was documented in a separate study, "Review of the Wasatch Front Regional Council's Latest Land-Use Projections." The documentation was included in project files and also in Appendix 2A of the FEIS, and was therefore directly available for resource agency review. Further, the results of the independent consultant's work were coordinated with WFRC, who concurred in writing with the recommendation to continue using the 2005 forecast in the FEIS.

Enhanced Communication between NEPA Study Team and Forecasting Practitioners

While the project did not have a formalized Project Management Plan, internal coordination on MVC was structured and effected through regular team meetings. The UDOT and consultant project managers and appropriate task leads and met on a regular basis throughout the project for interdisciplinary discussions about the status of major tasks and study products.

Agencies with jurisdiction, including the MPOs, were involved in formal (scoping) and informal coordination. The information coordination consisted of project-level meetings and coordination at key points in the project development, such as purpose and need, alternatives development and refinement, and in advance of

field studies for resource issues. The MPOs were involved in additional coordination as new travel demand and land use models were adopted or released.

The project also benefited from having one UDOT project manager throughout the course of the project, including into implementation. This consistency aided in ensuring that project issues were treated equitably throughout the NEPA process, that relationships with key stakeholders and team members had time to be well-developed, and that important concerns were not accidentally discarded through transitions in project leadership. Additionally, several of the major tasks leads, including the environmental lead, were consistent throughout the project.

Senior management reviews were conducted on a less frequent, but still regular basis. Such senior reviews served dual purposes: (1) providing timely direction from leadership on critical issues and decisions, and (2) creating an opportunity for briefing senior staff on the status of the project and any concerns that other state or federal agencies may have.

Additional Background and Sources

FEIS and ROD

The FEIS was produced as an eight volume document. Much of the information used in this case study was contained in Volume 1 and associated appendices. Chapter 1 of the FEIS contained the purpose and need for the project. Chapter 2, Alternatives, and Appendix 2A contained detail about the revised travel demand model. The Growth Choices process is discussed in Chapter 3 and land use is discussed in Chapter 4. Chapter 29, which is contained in Volume 3, was a source for the sequencing discussion.

FHWA signed the MVC Final Environmental Impact Statement (FEIS) on September 3, 2008, and the Record of Decision (ROD) on November 17, 2008.

Documents available online at: *http://www.udot.utah.gov/mountainview/content/feis*

Technical Reports

- WFRC & MAG Transportation Model Documentation, 2005 Base Year Model, Version 6.0, May 2007
- Mountain View Corridor Technical Report #05: Overall Travel Demand Modeling Methodology, September 23, 2008
- Mountain View Corridor Growth Choices Study, Appendix 3A of the FEIS

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