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M E M O R A N D U M

DATE: July 10, 2006

TO: Metropolitan King County Councilmembers

FROM: Cheryle A. Broom, County Auditor

SUBJECT: Study of King County Roads Concurrency Program

Attached for your review is the Roads Concurrency Study report. This study was conducted by Mirai Transportation Planning and Engineering under a contract with the King County Auditor's Office. The Roads Concurrency Program is mandated by the state Growth Management Act, which requires that infrastructure needed to support new development be in place concurrent with the development. The primary objective of the study was to assess the validity of the transportation modeling practices used by the Roads Services Division for the program, and to assess the impact of policy changes to the program adopted by the County Council in 2004.

The general study conclusions relating to modeling practices were that the concurrency program is overly complex, uses questionable modeling practices, and that quality control over modeling needs improvement. The study conclusions relating to the impact of the 2004 adopted policy changes were that these changes will allow more development countywide, but less development in certain areas, primarily in the rural area of unincorporated King County. The study also concluded that changes to technical modeling practices by Roads Services Division staff in 2004 had a greater impact to concurrency results than the County Council's changes to concurrency policies.

The County Executive's response to the study concurred with five of the study recommendations, partially concurred with three recommendations, and did not concur with three recommendations. The Executive Response, and the Auditor's Comments on the response, are included as appendices D and E in the report.

The Auditor's Office sincerely appreciates the cooperation received from the Roads Services Division management and staff.

CB:jl

Report on King County Concurrency Modeling Review

For

King County Auditor's Office
King County Council

Prepared by
Mirai Transportation Planning & Engineering

With

David Evans and Associates

July 2006

Mirai
Transportation
Planning &
Engineering

King County Concurrency Modeling Review

Executive Summary

Introduction

The state Growth Management Act (GMA) requires that before new development can be approved in congested areas, adequate transportation facilities must be in place concurrent with the development. This requirement is known as concurrency. Local jurisdictions must set standards for the level of service to be provided by the transportation network. These service standards are used for assessing the performance of the network, and to define how much traffic congestion will be accepted before accepting or denying new development. If a new development would cause congestion to exceed the adopted standards, the development must reduce its size, implement travel demand reduction programs, or be denied.

King County implemented a transportation concurrency program in 1995. In 2004, the King County Council adopted significant changes to the level of service standards and methods used for the concurrency program. These changes involved: 1) lowering the level of service standard (i.e. accepting more congestion before denying development) in the urban area of the county and, 2) the introduction of a new method for calculating traffic congestion based on travel time for 36 heavily-traveled "monitored corridors."

Following the 2004 amendments, councilmembers had questions concerning the impact of the changes on future development patterns and needed transportation improvements. The King County Council directed in the 2005 budget that the King County Auditor's Office contract for a study of the concurrency program in King County, to include a review of the potential impacts of the 2004 changes. The Auditor's Office contracted with Mirai Transportation Planning and Engineering (Mirai) to conduct the study. Mirai was asked to assess the impact of the level of service changes on development patterns and the need for transportation improvements in the unincorporated area of King County. Mirai was further asked to review whether the Road Services Division follows standard transportation planning and engineering practices in its transportation modeling for the concurrency program.

Brief Overview of Study Results

<u>Changes to Standards Have Offsetting Impacts on Future Development Patterns and Need for Transportation Improvements</u>

In general, the study found that the 2004 amendments to the concurrency ordinance would have mixed results regarding future development and the need for transportation facility improvements in King County. The County uses two different level of service

(LOS) standards [Transportation Adequacy Measure (TAM) and travel time standards]. Each standard is based on a separate method of measuring congestion. The 2004 changes to the standards and methods of calculating congestion make it difficult to quantify a single impact. Following is a discussion of the impact of the two changes:

- The TAM standard was lowered from LOS D to LOS E in the urban area of King County (but remains at LOS B in the rural area). At LOS B, traffic flow is stable, but operating speeds are beginning to be restricted by other traffic. At LOS E, traffic flow is unstable and speeds are reduced, but can vary widely from point to point. There is little independence of speed selection and maneuverability at LOS E. The lower TAM standard allows more congestion on the transportation network, which means that more development would be permitted countywide, particularly in the urban area.
- The new travel time method for calculating level of service for the monitored corridors acts as a more stringent measurement of congestion than the "critical link" method it replaced. Therefore, the introduction of this new method would allow less development in those areas of the county where traffic utilizes segments of the monitored corridors that are not meeting the standard.
- The 2004 changes to the level of service standards and methods, in general, reduced the unmet need for capacity-related transportation improvements, because more congestion is accepted in the transportation network. However, the implementation of the travel time method of measuring congestion for the monitored corridors, while maintaining the LOS B standard, increases the need for transportation facility improvements on these corridors. This is particularly true for the monitored corridors in the rural area.

Changes to Concurrency Modeling Practices Had a Greater Impact Than Policy Changes to the Level of Service Standard and Method of Calculating Level of Service

The study found that changes to concurrency modeling practices implemented in 2004 by the concurrency program staff of the Road Services Division had greater impacts than the changes to the concurrency standard and level of service calculation method adopted by the Council.[1] The concurrency modeling practices adopted by the staff in 2004 substantially reduced the amount of traffic congestion measured by the model, thus allowing for more development countywide.

[1] A comparison of the concurrency modeling practices between the 2003 model and the 2004 model is shown in Appendix A. The notable differences in the modeling practices that influenced the concurrency analysis results in 2004 appear to be the traffic assignment technique (item #8) and the degree to which the trips from each zone are determined to be impacted (item #9).

Changes to Modeling Practices Were Not Sufficiently Documented or Communicated to Council, and Could Not Be Replicated For This Study

The 2004 changes to modeling practices were not fully documented or communicated to the Council, and could not be replicated by Concurrency Program staff for this study. The lack of documentation of modeling practices and the inability to replicate those changes raises questions about the adequacy of management controls over concurrency modeling.

Some Modeling Practices Are Not Consistent With Standard Transportation Planning and Engineering Practices

For example:

- Modeling software used does not have the capability of accurately measuring the intersection capacity of the road network.
- The Transportation Adequacy Measure is not an effective measure of traffic congestion, because it provides only an abstract average score for impacted segments of the road network and cannot easily be used to identify congested areas within the network.
- The method used to assign traffic to the network does not reflect actual driver behavior.
- The use of an arbitrary number of trips to determine which road links in the network are affected by new development does not reflect actual impacts of the trips from the concurrency zone.
- The calculation of level of service for concurrency determinations includes traffic congestion on the facilities owned by other jurisdictions, including cities, neighboring counties, and state highways. This study raises a policy question concerning whether development should be denied in the unincorporated area based on traffic congestion on facilities owned by other jurisdictions. Moreover, including state highways in the model is contrary to the requirements of the GMA, which directs jurisdictions to exclude state facilities from concurrency requirements.

The Concurrency Management Program is Overly Complex

The study found that King County's concurrency program is overly complex. For example, there are two separate computer programs used for the concurrency program, two separate level of service standards using two separate measures of traffic congestion, and separate concurrency testing processes for residential and commercial development. Further, the accepted level of service under the two standards varies between the urban and rural areas.

Conclusion and Recommendations

Questions regarding the current modeling techniques, lack of quality control, and the level of complexity of the concurrency program raise concerns about the program's reliability and impact on achieving the goals of the GMA. This report makes eleven recommendations for improving modeling practices, reducing the complexity, and improving the quality control of the concurrency program.

Background

Role of Concurrency Within Long-Range Transportation Planning

The 1990 Growth Management Act (GMA) requires all jurisdictions in heavily populated and high growth areas of the state, including King County, to project transportation facility and service needs for at least 10 years in the Transportation Element of their Comprehensive Plan. The identified facility needs are based on adopted standards for level of service. The level of service standards are included in the Transportation Element for the purpose of judging the performance of the transportation system. Performance is assessed by comparing actual and projected traffic congestion to the adopted standards.

The GMA further mandates the Transportation Element to include specific actions and requirements for bringing into compliance any facilities or services that are not operating within the adopted standards for level of service. Additionally, it requires that transportation system expansion needs be projected for at least 10 years, based on the traffic forecasts for the adopted land use plan and the adopted standards for level of service.

The GMA requires jurisdictions to develop a financing plan to meet identified transportation needs. If probable funding falls short of meeting identified needs, the jurisdiction is required to discuss in the Comprehensive Plan how funding will be raised or land use assumptions reassessed in order "to ensure that level of service standards will be met." Therefore, the GMA requires jurisdictions to achieve a balance among land use growth, level of service standards, and capital improvement funding levels.

Concurrency Requirement

After adoption of the Transportation Element, each jurisdiction is required to adopt an ordinance to implement a concurrency program. The GMA instructs the jurisdiction:

> "to adopt and enforce ordinances which prohibit development approval if the development causes the level of service on a locally owned transportation facility to decline below the standards adopted in the transportation element of the comprehensive plan, *unless transportation improvements or strategies to accommodate the impacts of development are made concurrent with the development.* These strategies may include increased public transportation service, ride sharing programs, demand management, and other transportation systems management strategies. For the purposes of this subsection (6) "concurrent with the development" shall mean that improvements or strategies are in place at the time of development, or that a financial commitment is in place to complete the improvements or strategies within six years." (RCW 36.70A.070 (6) (b))

Therefore, the concurrency requirement of the GMA provides local jurisdictions with a tool for maintaining the balance among growth, funding, and service levels, in that it requires jurisdictions to deny development if it would result in service levels falling below standards. The balance may also be maintained by adjusting funding, land use policies, or level of service standards.

King County adopted its initial concurrency ordinance in 1995. Changes have been made to the program over time. For example, in 2001, the Council adopted a new approach for testing concurrency for proposed residential developments, using a pre-drawn map. The concurrency map determines in advance those areas of the county which can accept additional residential development. This means that developers of residential properties can look at the map to identify areas within King County where residential developments can be approved, rather than submit each proposal for individual concurrency testing. **Figure 1** shows the 2003 concurrency status map and **Figure 2** shows the 2004 concurrency status map, illustrating the impact of the changes made to the concurrency program in 2004. The 2004 map was used for determining concurrency status for residential development when this study was initiated in 2005.

Figure 1. Residential Concurrency Status Map for 2003

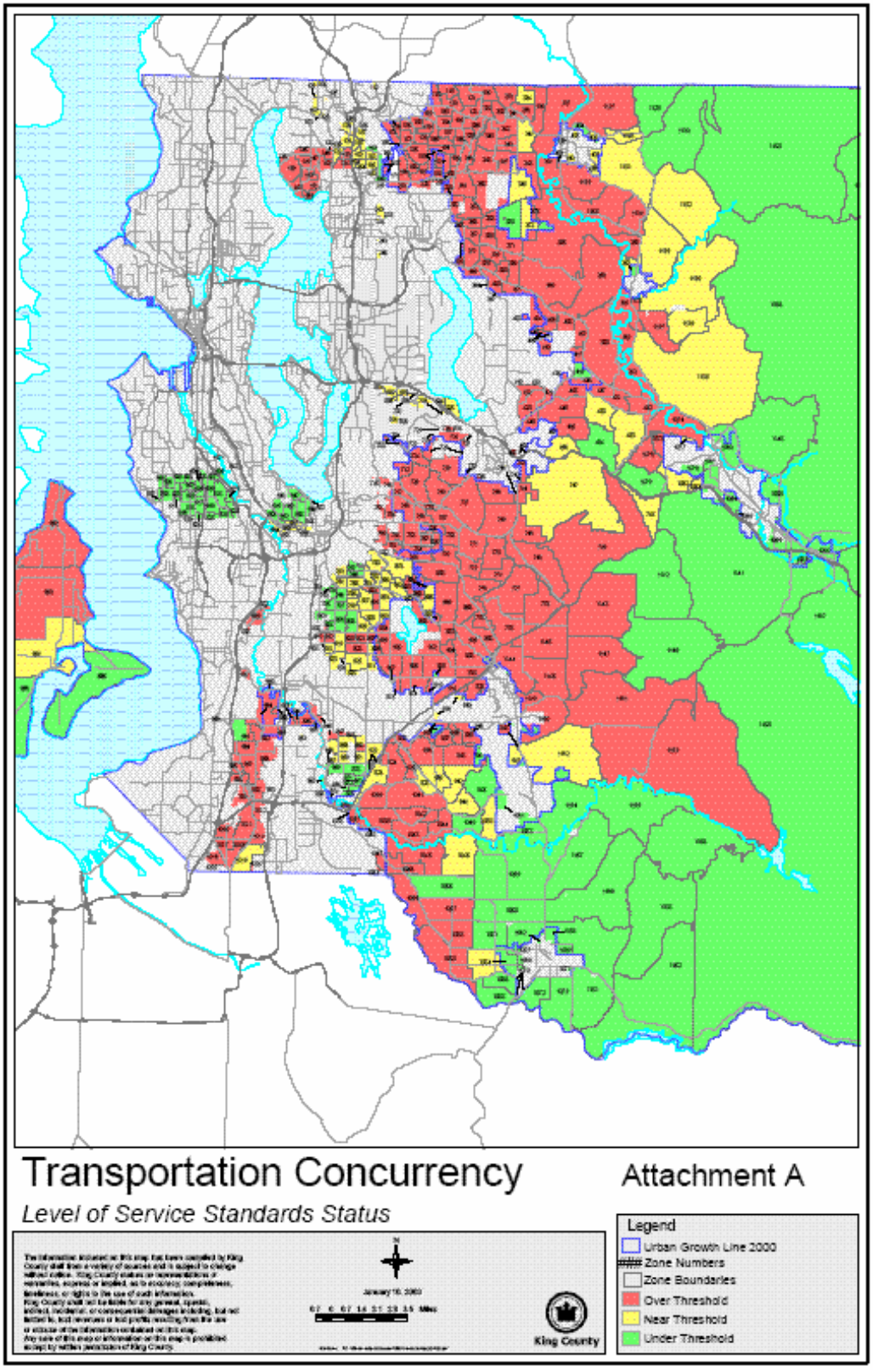
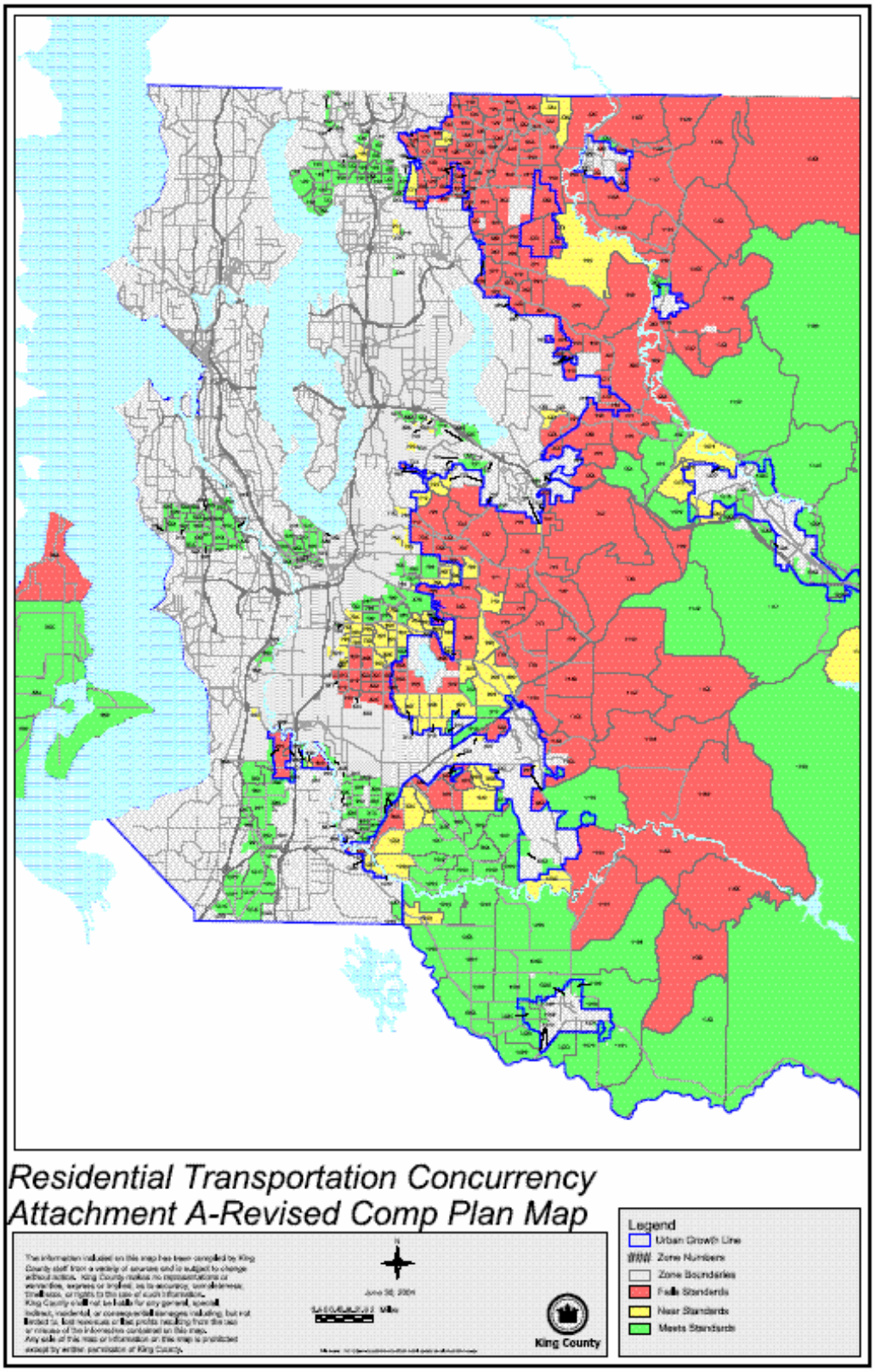


Figure 2. Residential Concurrency Status Map for 2004



The Council adopted changes to the concurrency program in 2004. These changes are described below.

- The standard for the level of service using the Transportation Adequacy Measure (TAM) as a measure of congestion was reduced in the urban area from LOS D to LOS E (i.e. more congestion is allowed) for those portions of the urban area that were not previously at LOS E.
- The method to calculate level of service for the monitored corridors based on the ratios of traffic volume to roadway capacity at "critical links" of these corridors was replaced with a measurement of level of service using travel time.

Concurrency Testing Process

In order to be approved, a proposed new development must obtain a concurrency certificate, which requires a test of whether that development proposal meets concurrency requirements. The concurrency testing process involves modeling of the estimated traffic generated by proposed new developments into the road network, and comparing the amount of traffic congestion following the new development with the Council-adopted level of service standards (amount of congestion accepted). If traffic congestion falls within the adopted standard after traffic from a proposed development is modeled in the road network, the proposed development receives a concurrency certificate. If traffic congestion exceeds standards, the proposed development is denied a concurrency certificate and may not proceed.

In King County, concurrency testing involves (1) two separate concurrency testing methodologies for residential and commercial developments; (2) two different LOS standards based on two separate measures of congestion, and (3) two separate standards for the urban and rural areas.

1. Concurrency Testing Methodologies

The methodologies for residential and commercial development are described below:

- Within its concurrency model, the Road Services Division has identified 667 geographic "concurrency zones" in the unincorporated area. The residential concurrency testing process involves modeling of additional trips generated by projected residential growth within each concurrency zone. To determine the links in the network that are impacted by the growth from each zone, a fixed number of trips in each of the concurrency zones are assigned to the network. Depending on whether the trips from each concurrency zone result in the impacted road network links falling below the level of service standards, the concurrency zone is colored green, red, or yellow on a map. Residential development is allowed in green zones, but not allowed in red zones. Yellow zones are defined as those within 10 percent of the standards. For a proposed residential development in a yellow zone, concurrency staff must estimate the level of development that can be supported within the remaining available capacity.

- The concurrency testing process for proposed commercial (non-residential) developments is entirely different. Instead of a map-based approach, the traffic generated by each proposed commercial development is individually modeled, and then the impact of that traffic on the road network is compared to the level of service standards.

2. Level of Service Calculation Methods

The two separate methods of measuring congestion (LOS) are described below:

- The level of service based on the TAM for each concurrency zone is computed based on the volume/capacity ratio (weighted for vehicle miles traveled) for all arterial roadways affected by vehicle trips from that zone.
- Level of service using the travel time measure (for the monitored corridors) is measured as travel time in defined segments of the monitored corridors. **Figure 3** shows the location of the monitored corridors.

3. Level of Service Standards

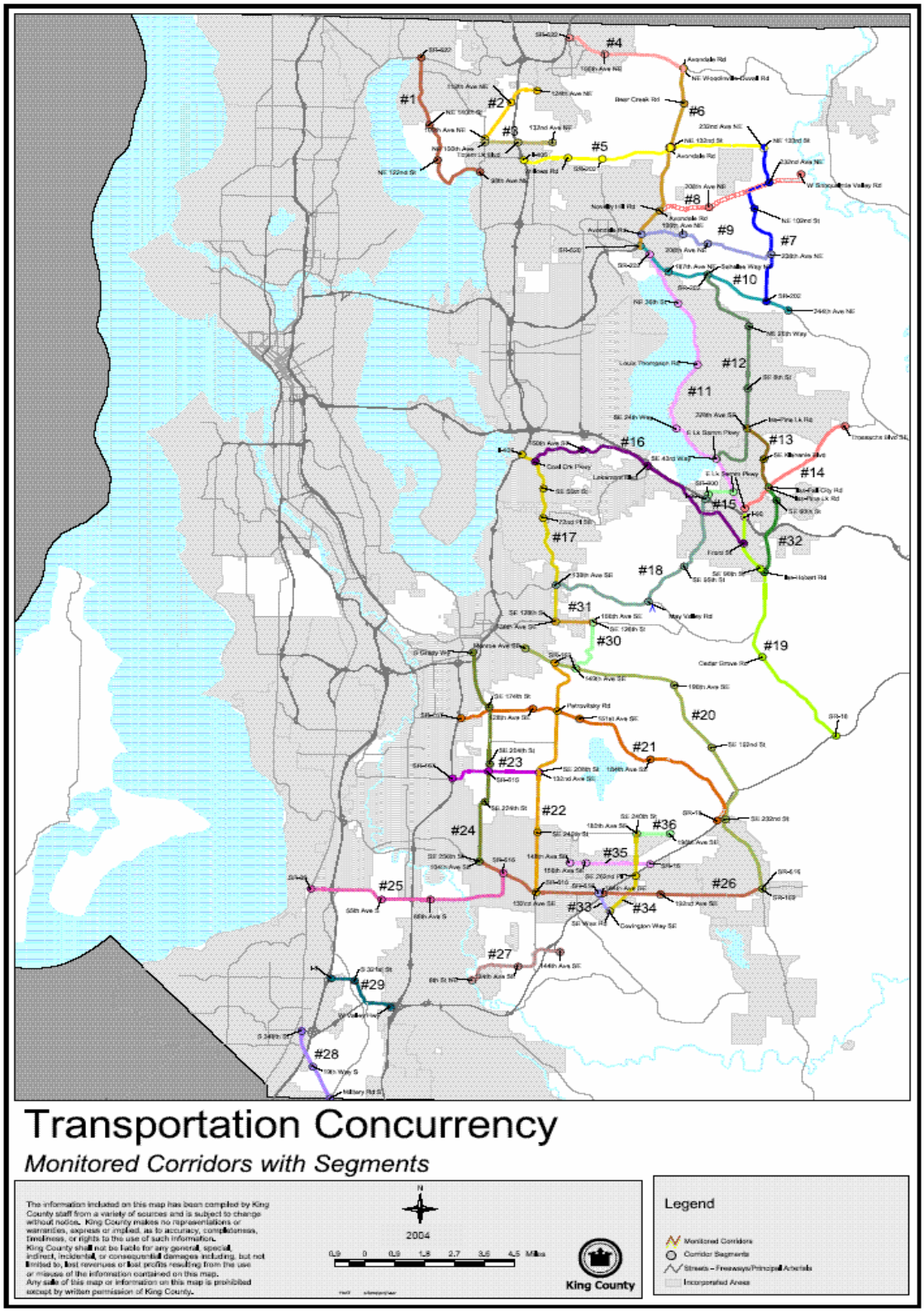
The Council adopted standards are applied to both the transportation adequacy measure and the travel time measure. The level at which the standard is set (amount of congestion accepted) varies between the urban and rural area:

- In the urban area, the adopted level of service is LOS E (significant amount of congestion accepted).
- In the rural area, the adopted level of service is LOS B (little congestion accepted).

Additionally, short subdivisions (9 units or less) in the urban area are exempted from concurrency requirements, whereas short subdivisions in the rural area (4 units or less) remain subject to the higher rural standard of LOS B (little congestion).

Because the concurrency testing process is so complex, it is described in six separate flow charts (**Figures 6 through 11**), which are provided in **Appendix B**.

Figure 3. Monitored Corridors with Segments



Summary of Key Findings and Recommendations

General Findings Relating to Modeling Practices

- The two methodologies (TAM and travel time) used by the concurrency program for calculating levels of service are very complex and involve many *technical assumptions* in the concurrency models. These assumptions and modeling procedures have not been well documented for the general public or decision makers. (Mirai prepared six flow charts to explain the level of service calculation procedures, which are shown in **Appendix B**. It was not possible to make one simple chart because of the complexity.)

- Mirai found that the 2004 TAM scores significantly changed from the 2003 TAM scores due to the changes to the modeling practices applied to the 2004 concurrency model.[2] Those changes were not fully explained to the Council before the 2004 ordinance was adopted.

- A significant number of concurrency zones on the concurrency status map changed from red to green between 2003 and 2004. Concurrency program staff could not explain the reason for this change, although it appears that the changes to modeling practices, rather than improvements to facilities, led to the changes to concurrency status.

- The fact that concurrency program staff cannot document how the changes to the modeling practices affected concurrency results is an indication of a significant problem with quality control. While Road Services Division staff sought to explain how the changes in the modeling practices between 2003 and 2004 affected results, they were unable to replicate the 2004 changes to the 2003 concurrency map. Further, these efforts uncovered a modeling error that was made in the 2004 concurrency model. The inability to replicate 2004 changes, and the error identified raise concerns about quality control over modeling practices.

- The complexity of the system has created an environment where verifying the accuracy of the modeling output has become very difficult if not impossible.

[2] Appendix A shows a comparison of the key modeling practices between the 2003 model and 2004 model. The changes in the TAM scores for the concurrency zones from 2003 to 2004, summarized at the Planning Area level, are shown in Table 1 and Table 2. The reasons for concurrency status changes from 2003 to 2004 are summarized in Table 3 and Table 4. In 2004, staff introduced two significant changes to the modeling practices: the use of an "all-or-nothing" assignment technique and a new definition of trip impacts from a zone in the network. The all-or-nothing assignment technique is described on Page 15. The TAM score in 2004 was calculated for each zone based on the network links not having trips equal to 0.99 from the zone where TAM scores in 2003 included at the links in the network having up to 0.0001 trips from each zone. (This was a mistake that was discovered in this study. The original intent was not to include the links having trips less than 0.99.)

Answers to Specific Questions Mirai Was Asked to Address

For this study, Mirai was asked to address five questions. The questions, Mirai's findings, and recommendations are described below:

1. ***Does King County's base transportation model used for transportation planning employ best practices for transportation modeling?***

Answer: The concurrency model is constructed upon King County's long-range travel demand forecasting model (the base model). It includes many changes made to the base model. The current base model constructed in 2000 was based on the Puget Sound Regional Council's regional demand forecasting model and was updated significantly in 2003. The base model was developed with application software called EMME/2. The base model is not a single model. Rather, it is a series of models tied together: a trip generation model, a trip distribution model, a mode split model, and a trip assignment model. Land use data is the input, and the output is forecast traffic volumes on all links in the roadway network.

The base model appears to be generally sound, but it has been six years since this model was fully updated. The Puget Sound Regional Council has completed its regional model update. Since the King County's base model was constructed with the Regional Council's model as the base, the County's model should also be updated. While some updates were made by King County staff in 2003, further updates are warranted. For example, the trip generation and trip distribution models in the regional model have been updated based on the 2000 census data. The regional land use data, including those in Snohomish and Pierce Counties, are updated to 2004. These updates have not been calibrated in the model.

Recommendation 1: Update the base year model to reflect current King County land use with the new Puget Sound Regional Council's land use data and network data; calibrate the base model against the base year traffic counts on key corridors.
Recommendation 2: Review the updated Regional Council's model and adopt the key features of the regional model that are useful for King County's transportation planning and concurrency management activities.

2. ***Is the concurrency model (that is a refined version of the base planning transportation model for the purpose of concurrency analyses) documented and consistent with best practices?***

Answer: There are numerous, serious problems with the concurrency modeling methods and practices. These problems include:

- **Quality control and documentation of concurrency modeling is poor.**

Road Services Division staff introduced technical changes to concurrency modeling practices in 2004. The technical changes had the effect of substantially reducing the amount of traffic congestion measured by the model, resulting in more than 100 zones in the residential concurrency status map changing from red to green. The Road Services Division has been unable to replicate the changes that were made, and in attempting to do so, discovered an error in the 2004 concurrency model. Therefore, the accuracy of the 2004 concurrency model is questionable. Further, the fact that the modeling changes in 2004 cannot be replicated raises significant issues concerning the quality control over modeling practices, including the lack of documentation of the technical assumptions used in the concurrency models.

- **The concurrency model is overly complex**

  - There are two separate computer models used in the concurrency program, two methods of measuring congestion, two separate level of service standards, and two concurrency testing processes. Yet another process is involved when residential developments are proposed in "yellow zones" (described above). All of these contribute to a very complex model and testing process.

  - King County is applying a level of service testing procedure for residential development (map-based approach) that is distinctively different from the procedures for non-residential development (separate concurrency modeling for each proposed development). It appears that the current practice allows for more non-residential developments and fewer small residential developments, because the residential levels of service have been calculated with the assumption that all concurrency zones uniformly generate 201 afternoon peak hour trips. This assumption ignores conditions such as availability of vacant lands, existing development potential, or any market conditions that might influence the amount of development in that zone. This number has been used over the last several years to determine which arterial roadway segments could be affected by traffic from the zone, and would significantly influence the calculation of the levels of service for each zone for residential development.

- **The concurrency program uses modeling techniques that are not consistent with standard industry practices and/or do not reflect reality**

  - The Transportation Adequacy Measure (TAM) is a poor measure of congestion and is not consistent with standard transportation planning and engineering practice. TAM is an abstract index based on average volume to capacity ratio for all of the network links affected by each concurrency zone. Mirai believes that it is very difficult to show where traffic congestion exists using the TAM score. Consequently, it would be more difficult to know how to invest resources most cost-effectively to reduce congestion on those portions of the road network which are not meeting level of service standards.

- The method that is used to assign traffic to the network does not reflect actual driver behavior and is not consistent with standard planning practice. The Road Services Division staff changed the traffic assignment technique from the "equilibrium" assignment to "all-or-nothing" assignment without informing the Council. The "all-or-nothing" traffic assignment technique assumes that drivers choose travel routes between the origin and the destination based on free-flow conditions during the peak hour, regardless of traffic congestion. It assumes that drivers' behaviors would not change due to traffic congestion. The model under this assignment allocates trips in the network calculating the shortest travel time when traffic is flowing freely. The technique resulted in the model assuming higher levels of traffic congestion on the major freeways and arterials than would be actually present.

- The software used for concurrency modeling does not have the capability to adequately measure roadway capacity. The Road Services Division uses model software called EMME/2. The EMME/2-based model does not consider intersection operations (signal timing and traffic control) when calculating travel demand. Instead, it relies on roadway capacity (vehicles per lane) as a primary network attribute to obtain traffic volumes. Because of the limitations of the EMME/2-based model, it is difficult to calculate roadway capacity that includes intersection improvements.

- Mirai believes that the method used to measure traffic congestion problems in the transportation system would influence ways to find the solution to the problems. A limitation of the EMME/2 is that capacity that may be gained through traffic operational improvements such as adding left turn pockets and signal phasing changes at intersections, cannot be adequately modeled. Therefore, using the EMME/2 model, the solution to a traffic congestion problem at a particular location might be to widen the roadway. However, a more cost-effective strategy might be to improve traffic operations at intersections, such as improving signal phasing. Such improvements cannot be modeled with a roadway link-based model such as EMME/2.

- The use of a pre-determined amount of trips for concurrency testing for residential developments from each concurrency zone is arbitrary and does not reflect actual traffic patterns.

  Proposed residential developments are tested against a pre-drawn concurrency status map. The pre-drawn map assumes a specific number of trips (201 trips) would be assigned from each zone in the network to determine which links would be affected. The affected links are summed and averaged to obtain a TAM score, and monitored corridor travel times. The number of trips selected to assign from all zones is fixed, arbitrary, and does not reflect actual traffic patterns. Further,

the fact that the concurrency testing process is different for proposed residential and commercial developments raises questions about the equity of the system.

The Road Service Division was not able to explain why a decision was made to use the constant, 201 trips from each concurrency zone. There is a technique, called a "selected zone" analysis, which uses the actual trips generated by each zone to determine the affected links.

- Some of the data used by the model are incomplete or dated**.** For example, land use growth in surrounding counties, and road improvements committed by other jurisdictions are not reflected in the model. Mirai found that the growth in Snohomish and Pierce Counties, and the state facility improvements the state legislature approved for the Nickel Funding Package, might not have been adequately included in the 2004 model.

- Many segments of the network affected trip distributions and the monitored corridors extend into incorporated areas of the county and state highways**.** Except for those trips going onto the freeways and HOV lanes, the calculation of congestion using both the TAM and travel time methods include traffic congestion that occurs inside the incorporated cities and the state owned facilities. A policy question can be raised as to whether it is appropriate to limit development in the unincorporated area based on facility needs in incorporated areas. Further, including traffic congestion on state highways in the concurrency model is contrary to the requirements of the GMA, which directs jurisdictions to exclude state facilities from concurrency requirements.

Recommendation 3: The concurrency model should be revised and simplified by:

- Using a single standard of congestion
- Eliminating the use of the TAM as a measure of congestion
- Using a single process for testing concurrency for all types of developments
- Eliminating the use of a separate approach for concurrency testing when congestion is in the "yellow zones."

Recommendation 4: Quality control over and documentation of concurrency modeling should be improved by:

- Requiring concurrency management staff to prepare an annual report that explains the technical assumptions, land use changes, network changes, and other parameters that are used to update the concurrency model.
- Establishing an independent expert panel and require them to review the annual report before it is submitted to the King County Council.

Recommendation 5: The concurrency model should reflect land use growth in neighboring counties, and all improvements for which there is a financial commitment by another jurisdiction.

Recommendation 6: Review the policy that directs staff to evaluate the section of the monitored corridors where they are located outside unincorporated King County and decide whether it would be appropriate to keep those segments as parts of the monitored corridors. If the TAM continues to be used as one of the level of service methodologies, decide whether the TAM score should be calculated with the network links located outside the unincorporated King County.

Recommendation 7: Exclude trips using state highways from the concurrency model.

3. ***What are the impacts of the County's changes to level of service standards and methodology for calculating level of service on:***
    - ***Location of new developments that have received a concurrency certificate in the unincorporated urban areas,***
    - ***Traffic volumes-to-capacity ratios, and***
    - ***Travel time in the 36 monitored corridors?***

Answer: In general, the changes to the County's level of service standards and methodology allow for more development countywide. However, the answer to this question requires examination of how the following three factors affect future development:

- Standards for level of service were lowered in the Urban Area;
- Technical modeling changes substantially lowered the amount of congestion measured countywide; and
- The new method for measuring level of service, based on travel time in the monitored corridors, is more stringent than the previous method, meaning more traffic congestion is measured by the travel time method, although the level of service standard has not been changed.

These factors have counteracted each other somewhat. The technical modeling changes introduced by staff are the most influential factor in that they significantly reduced the amount of congestion measured, therefore allowing more development countywide. The lowering of the level of service standard in the urban area also allows for more development in the urban area. The new travel time method for calculating level of service in the monitored corridors measures more congestion than the previous method; thus more road segments within the monitored corridors do not meet the level of service standard. The following provides more detailed technical analysis.

To illustrate the impact of the changes to the level of service standards and methodologies used for the 2004 residential concurrency maps on future development, four summary tables, shown as **Tables 1 though 4**, have been prepared. (The tables begin on Page 23.) **Tables 1 and 2** show how many zones within each Planning Area did not meet the TAM standards and monitored corridor's critical link/travel time standards for the years 2003 and 2004, separated between the rural and urban areas. **Tables 3 and 4**

show the reasons for the change in concurrency status among the zones that changed color from 2003 to 2004. Based on these tables, Mirai found that:

- Overall, the 2004 concurrency program would allow more development. Among a countywide total of 667 concurrency zones in 2003, there were a total of 384 zones classified as the "red" zones that were closed for residential developments. The total numbers of "red" zones were reduced to 251 zones in 2004.

- There were significant reductions in the TAM scores throughout King County. The overall average of the TAM score in the urban area of King County was **0.80** in 2003, and **0.73** in 2004 (Table 2). The TAM score in the rural area was decreased even more as shown in Table 1. (The lowered TAM score was achieved despite the use of the unrealistic "all-or-nothing" traffic assignment technique (discussed above), which artificially increases the amount of traffic congestion measured by the model (i.e., results in higher TAM scores). If the more realistic equilibrium assignment technique was used, the TAM score would have been much lower in 2004.

- The decrease in the amount of congestion measured in 2004 (i.e. lower TAM scores) is not because of added capital facilities or reduced vehicle travel demand; rather, it is mostly due to technical changes in modeling practices. (**Appendix A** describes the changes in modeling practices between 2003 and 2004.)

- Due to the combined factors of the reduction in the amount of congestion measured and the changes to level of service standards within the Urban Growth Area, no urban concurrency zones exceeded the level of service standard based on the TAM in 2004, whereas 112 zones exceeded the TAM level of service standard in 2003.

- On the other hand, less residential development will be approved under the level of service standards based on travel time for the monitored corridors because the amount of congestion measured using the travel time approach is greater than the amount of congestion using the previous approach measuring volume to capacity at critical links.

- Due to the stricter travel time standard, there are more segments of the monitored corridors that fail to meet standards. Therefore, the amount of improvements needed to meet adopted standards would be greater under the new standard than under the previous standard.

Recommendation 8: Assess the extent to which the implementation of the travel time standard has increased the unmet need of capacity-related road improvements for the monitored corridors.

4. How has the unmet transportation need of capacity-related projects, as identified in the Transportation Needs Report (TNR), changed due to changes in level of service standards?

Answer: In general, the changes to the concurrency ordinance and modeling practices in 2004 would have the effect of reducing the unmet transportation facility needs in King County. This is due to the lowering of the level of service standard within the Urban Growth Area and to technical changes in modeling practices by the Road Services Division in 2004, which reduced the amount of congestion measured by the model significantly.

However, the new travel time methodology implemented in 2004 for the monitored corridors is a more stringent test than the previous critical link methodology. Therefore, due to the stricter travel time methodology, the 2004 ordinance would have the effect of increasing the unmet need of capacity-related projects in the monitored corridors. This is particularly true in the rural area, where the level of service under the travel time standard is set at a much higher level (**LOS B**) than in the urban area (**LOS E**). The intent of the higher standard in the rural area is apparently to direct growth to the urban area, where the lower standard allows for more development. However, setting a very high standard in the rural area could have the unintended consequence of promoting capacity-related improvements in the rural area, because the higher standard in the rural area results in the county not meeting the standard for many links in the monitored corridors.

Additionally, as mentioned earlier, short subdivisions in the Urban Growth Area are exempted from concurrency requirements whereas short subdivisions in the Rural Area remain subject to the high rural standard of LOS B (little congestion). Because of the high standard and lack of an exemption for small subdivisions in the rural area, even small subdivisions that would otherwise comply with zoning requirements cannot receive a concurrency certificate in the Rural Area if located in a red zone. In addition, due to the high standard (LOS B) in the Rural Area, much of the Rural Area is located in red zones. Because LOS B is a very high standard and because small developments are not exempted from the standard as they are in the Urban Growth Area, small subdivisions are not allowed in a red zone even if little actual traffic congestion exists. This is another complex policy issue with potential unintended impacts that the Council may want to consider.

Recommendation 9: Examine the implications of the LOS B standard to the unmet need for capacity-related improvements in the rural area segments of the monitored corridors.

5. When will the new level of service standards be exceeded in the monitored corridors based on current modeling practices and CIP financial plans?

Answer: Through speed surveys in 2004, staff identified existing levels of service based on average vehicle speed in all segments in each of 36 monitored corridors. Many of the

monitored corridors do not meet or satisfy the level of service standards today. The tables in **Appendix C** show the levels of service based on the travel speed surveys on each segment. The following 11 monitored corridors are not meeting the travel time level of service standard of "E" in the Urban Growth Area and "B" in the Rural Area:

- **Avondale Road** – Northbound between NE Woodinville-Duvall Road and Bear Creek Road (current LOS is E, standard is LOS B)
- **NE Woodinville-Duvall Road** - Eastbound and Westbound between 156th Avenue and Avondale Road (current LOS is D and C respectively, standard is LOS B for both directions)
- **NE 124th/128th/133rd Street** – Eastbound and Westbound between I-405 and Willows Road (current LOS is F for both directions, standard is LOS E): Eastbound between Willows Road and SR-202 (current LOS is C, standard is LOS B), Eastbound and Westbound between SE 202 and Avondale Road (current LOS is C for both directions, standard is LOS B): Eastbound between Avondale Road and 236th Ave NE (current LOS is C, standard is LOS B)
- **Novelty Hill Road** – Eastbound and Westbound between Avondale Road and 208th Ave NE (current LOS is F for both directions, standard is LOS B): Eastbound and Westbound between 232nd Ave NE and W. Snoqualmie Valley Road (current LOS is E and D respectively, standard is LOS B)
- **SR 202** – Eastbound between SR 520 and 187th Ave NE (current LOS is F, standard is LOS E): Eastbound between 187th Ave NE and Sahalee Way NE (current LOS is E, standard is LOS B): Eastbound and Westbound between Sahalee Way NE and 244th Ave NE (current LOS is C and E respectively, standard is LOS B)
- **Issaquah Fall City/ Duthie Hill** – Eastbound between Issaquah-Pine Lake Road and Issaquah-Fall City Road (current LOS is C, standard is LOS B)
- **Sahalee Way/ 228th NE and SE 43rd Way** – Southbound between SR 202 and NE 25th Way (current LOS is D, standard is LOS B)
- **SR 900** – Northbound between 176th Ave SE and 138th Ave SE (current LOS is F, standard is LOS E)
- **Front Street/ Issaquah-Hobart Road** – Northbound and Southbound between SE 96th Street and Cedar Road (current LOS is E and F respectively, standard is LOS B for both directions)
- **SE 208th Street/ SE 212th Street –** Eastbound between SE 167 and SE 515 (current LOS is F, standard is LOS E)
- **SE 56th Street –** Westbound between SE 900 and East Lake Sammamish Parkway (current LOS is F, the standard is LOS E)

In addition to these 11 monitored corridors, the following six corridors will operate at or below the travel time standard in the near future:

- **Coal Creek Parkway** (current LOS is E with 13.1 miles per hour; the standard is LOS E with 13.0 miles per hour.)

- **SR 169 (**current LOS is B with 34.9 miles per hour; the standard is LOS B with 34 miles per hour)
- **Carr Road SE/ Petrovitsky Road** (current LOS is E with 16.4 miles per hour; the standard is LOS E with13.0 miles per hour)
- **SE 56th Street** (current LOS is E with 13.8 miles per hour; the standard is LOS E with 13.0 miles per hour)
- **Issaquah Pine Lake Road** (current LOS is E with 15.1 miles per hour; the standard is LOS E with 13.0 miles per hour)
- **149th St SE/ 156th Ave SE** (current LOS is E with 11.2 miles per hour; the standard is LOS E with 11 miles per hour)

These 17 corridors listed above are operating at LOS "F" or the bottom range of "E," if they are located in the Urban Growth Area, and LOS "C" or lower if they are located in the Rural Area. The remaining 19 corridors are located in the Urban Growth Area and operating at LOS D or higher.

It appears that the remaining monitored corridors can accept more traffic before they reach the travel time standard. There is no simple answer for the question of when the traffic growth will exceed the level of service standards. Those corridors might not exceed the standard for many years, depending on future growth patterns. Unless King County conducts more comprehensive sub-area transportation planning studies, it would be difficult to determine when future growth will cause travel time to exceed the standards in the monitored corridors that have not yet reached the standards.

Recommendation 10: Conduct transportation corridor studies to identify what capital or operational improvements are needed on the segments in the monitored corridors that are not meeting the travel time standards.
Recommendation 11: Review amount of the improvements needed in the monitored corridors and adjust the travel time standards and/or land use projections, if the identified improvements are not feasible.

Final Comments

The GMA requires local jurisdictions to ensure that transportation facilities sufficient to accommodate growth are in place concurrent with that growth. A concurrency program provides a tool for jurisdictions to achieve the balance among land use growth, capital funding, and level of service required by the GMA.

King County's transportation concurrency program is overly complex, uses modeling practices that Mirai questions, treats different types of development differently, and lacks sufficient quality control. These problems raise concerns about the accuracy and equity of the program. Further, the methods used by the program to model the transportation network and measure traffic congestion do not adequately measure roadway capacity or

traffic congestion. This makes it difficult to identify the most cost-effective solutions for bringing facilities into compliance with standards, as required by the GMA.

The improvements recommended by this study will simplify the system, improve its quality and equity, and improve the program's ability to promote the balance between land use growth, capital funding, and level of service envisioned by the GMA.

Table 1. Comparison of Levels of Service Results for the Rural Areas Between 2003 and 2004

	2003						2004					
Planning Area	**No of zones**	**Average TAM Score**	**TAM Exceeding Standard**	**TAM 10 % of Standard**	**Corridor LOS Exceed Standards (V/C)**	**No of Red zones**	**No of zones**	**Average TAM Score**	**TAM Exceeding Standard**	**TAM 10 % of Standard**	**Corridor LOS Exceed Standards (Travel Time)**	**No of Red zones**
Bear Creek	42	0.81	40	2	3	40	42	0.76	37	4	11	37
East Sammamish	24	0.78	20	3	4	20	24	0.7	11	5	16	19
Eastside Cities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Enumclaw	22	0.61	8	2	0	8	22	0.52	0	0	1	1
Federal Way	4	0.88	4	0	0	4	4	0.85	4	0	0	4
Green River Valley	10	0.84	10	0	0	10	10	0.72	5	4	0	5
Highline	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Soos Creek	37	0.78	35	2	4	35	37	0.69	18	13	7	22
Newcastle	22	0.86	22	0	7	22	22	0.73	16	6	1	17
Northshore	31	0.83	30	0	2	30	31	0.79	29	2	13	29
Snoqualmie	43	0.64	15	15	1	15	43	0.59	6	10	20	22
Tahoma/ Raven Heights	69	0.7	45	11	9	46	69	0.65	30	18	25	41
Vashon	5	0.66	2	1	0	2	5	0.53	1	0	0	1
Total	**309**	**0.76**	**231**	**36**	**30**	**232**	**309**	**0.68**	**157**	**62**	**94**	**198**

Table 2. Comparison of Levels of Service Results for the Urban Areas Between 2003 and 2004

	2003					2004					
Planning Area	**No of zones**	**Average TAM Score**	**TAM Exceeding Standard**	**TAM 10 % of Standard**	**Corridor LOS Exceed Standards (V/C)**	**No of Red zones**	**No of zones**	**Average TAM Score**	**TAM Exceeding Standard**	**TAM 10 % of Standard**	**Corridor LOS Exceed Standards (Travel Time)**	**No of Red zones**
Bear Creek	6	0.81	2	2	0	2	6	0.81	0	1	4	4
East Sammamish	17	0.82	15	1	3	15	17	0.78	0	2	12	12
Eastside Cities	7	0.93	1	5	0	1	7	0.84	0	1	1	1
Enumclaw	10	0.58	0	0	0	0	10	0.53	0	0	0	0
Federal Way	24	0.84	21	2	2	21	22	0.77	0	1	0	0
Green River Valley	25	0.78	8	8	0	8	22	0.74	0	1	0	0
Highline	44	0.83	1	7	0	1	44	0.69	0	0	0	0
Soos Creek	89	0.88	14	43	10	24	74	0.75	0	0	17	17
Newcastle	32	0.9	20	11	5	21	28	0.78	0	0	0	0
Northshore	54	0.9	28	22	9	30	51	0.82	0	2	5	5
Snoqualmie	16	0.62	0	5	0	0	16	0.55	0	0	6	6
Tahoma/ Raven Heights	34	0.7	6	4	4	9	28	0.69	0	0	8	8
Vashon	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	**358**	**0.80**	**116**	**110**	**33**	**132**	**325**	**0.73**	**0**	**8**	**53**	**53**

Table 3. Reasons for Concurrency Status Changes for the Rural Zones from 2003 to 2004

Planning Area	Total No of zones in Rural Areas (2004)	No of zones with same status	No of zones with status changed	Decreased TAM score within Rural Area	Increased TAM score within Rural Area	New TAM standard in Rural Area	New Monitored Corridors standard in Rural Area
Bear Creek	42	37	5	4	1	0	0
East Sammamish	24	20	4	3	0	0	1
Eastside Cities	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Enumclaw	22	11	11	10	0	0	1
Federal Way	4	4	0	0	0	0	0
Green River Valley	10	5	5	5	0	0	0
Highline	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Soos Creek	37	21	16	15	1	0	0
Newcastle	22	18	4	4	0	0	0
Northshore	31	29	2	2	0	0	0
Snoqualmie	43	22	21	10	0	0	11
Tahoma/Raven Heights	69	39	30	20	4	0	6
Vashon	5	5	0	0	0	0	0
Rural Area Total	**309**	**211**	**98**	**73**	**6**	**0**	**19**

Table 4. Reasons for Concurrency Status Changes for the Urban Zones from 2003 to 2004

Planning Area	Total No of zones in Urban Areas (2004)	No of zones with same status	No of zones with status changed	Decreased TAM score within Urban Area	Increased TAM score within Urban Area	New TAM standard in Urban Area	New Monitored Corridors standard in Urban Area
Bear Creek	6	0	6	2	0	0	4
East Sammamish	17	11	6	0	0	5	1
Eastside Cities	7	3	4	4	0	0	0
Enumclaw	10	10	0	0	0	0	0
Federal Way	22	1	21	15	0	6	0
Green River Valley	22	9	13	10	0	3	0
Highline	44	36	8	8	0	0	0
Soos Creek	74	35	39	18	0	0	21
Newcastle	29	0	29	21	0	8	0
Northshore	51	10	41	31	0	7	3
Snoqualmie	16	10	6	0	0	0	6
Tahoma/Raven Heights	28	11	17	6	0	0	11
Vashon	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Urban Area Total	**326**	**136**	**190**	**115**	**0**	**29**	**46**

Appendix A
Comparison of Concurrency Modeling Practices Between 2003 Model and 2004 Model

R2003a Model		R2004c Model	
1.	1300 zones	1.	1300 zones
2.	1998 base year model	2.	2000 base year model to 2003 synthetic base year model
3.	1998 land use plus pipeline growth	3.	2000 land use plus pipeline growth
4.	Trip tables: only free-flow loop with (4 step travel demand model process).	4.	Trip tables: free-flow,18hr. Off-peak, and 3hr AM & PM peaks loops with (4 step travel demand model process).
5.	Traffic count base year 1998 PM peak hour.	5.	Traffic count base year 2003 PM peak hour.
6.	Total trips in PM Peak Hr. trip table = 885,552	6.	Total trips in PM Peak Hr. trip table = 910,760
7.	Model road network with 0.5 or 0.2 additional lanes for turn pockets or dual turn lanes on monitored corridors and CIP/TIP projects.	7.	Model road network with only 0.2 additional lanes for all corridors with turn pockets or dual turn lanes; 0.5 lanes dropped.
8.	30 iteration assignment	8.	Zero iteration all or nothing assignment
9.	All zone distribution link trips are used in TAM score. Factional trips equaling 0.00001 are calculated in the TAM score.	9.	Zone link trips less than or equal too 0.99 are not used in TAM score calculation.
10.	Zone TAM scores based on zone distribution for links with a zone trip and weighted by VMT and aggregated to a weighted zone score.	10.	Zone TAM scores based on zone distribution for links with a zone trip and weighted by VMT and aggregated to a weighted zone score.
11.	Corridor segment weighted V/C, LOS Standard range 1.0 to $\geq$ 1.1	11.	Travel times by corridor segments determined by Free-Flow LOS standard by function class and speeds.
12.	Zone compliance for monitored corridor test is based on 30% of peak directional trips; determined with 201 dummy trips. Compliance threshold less than = 38.6 trips PM peak hour trips on a monitor corridor.	12.	Zone compliance for monitored corridor test is based on 30% of peak directional trips; determined with 201 dummy trips. Compliance threshold less than = 38.6 trips PM peak hour trips on a monitor corridor.
13.	Zone processing time 1 hour per zone. 562 zones with two CPU approx. 14 days to process all zones.	13.	Zone processing time 12 minutes per zone. 562 zones with two CPU approx. 2.4 days to process all zones.

Source: King County Road Services Division

Appendix B
Level of Service Calculation Procedures - Flow Charts

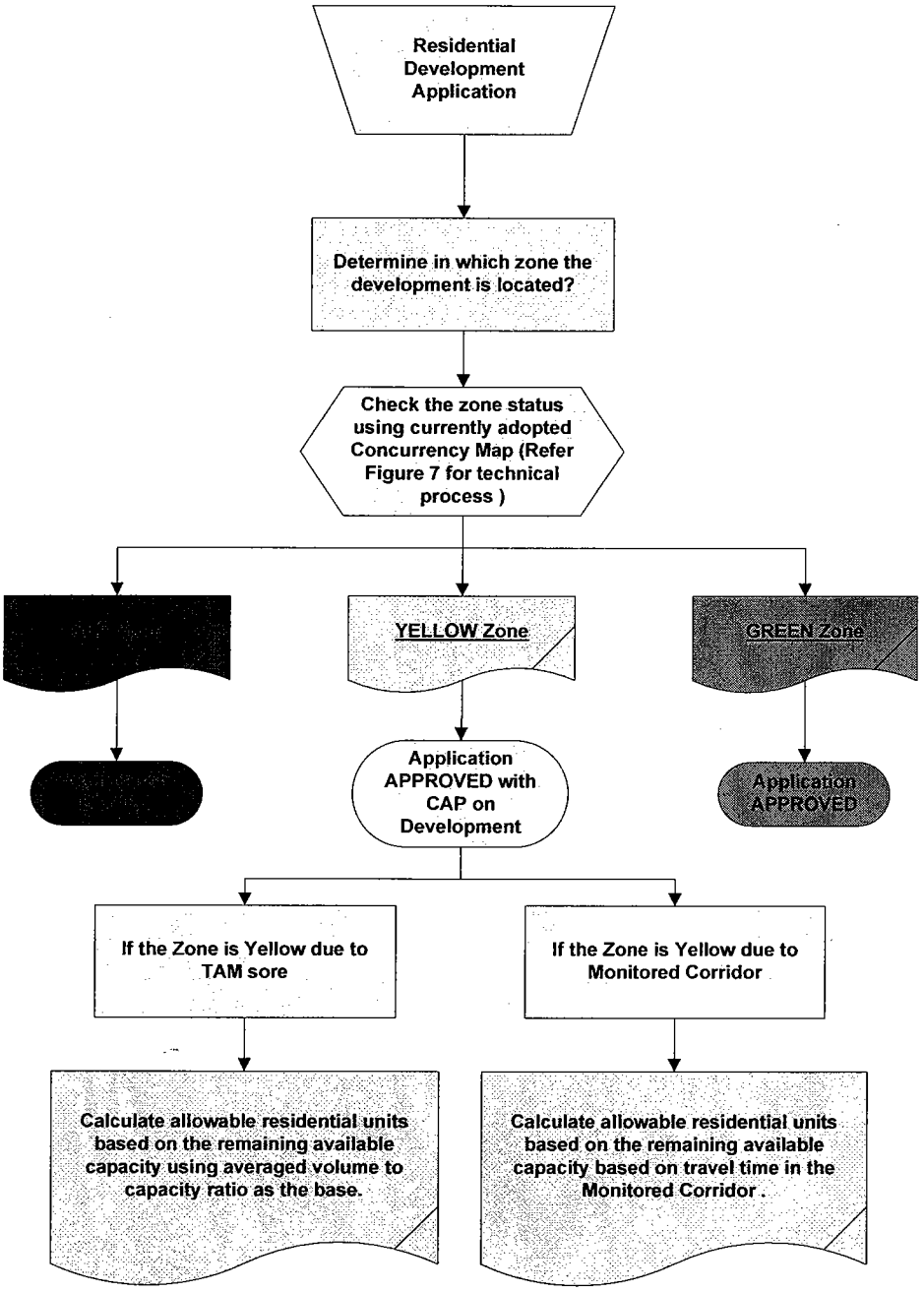


Figure 6. Residential Development Application process	
Mirai Associates	12/21/2005

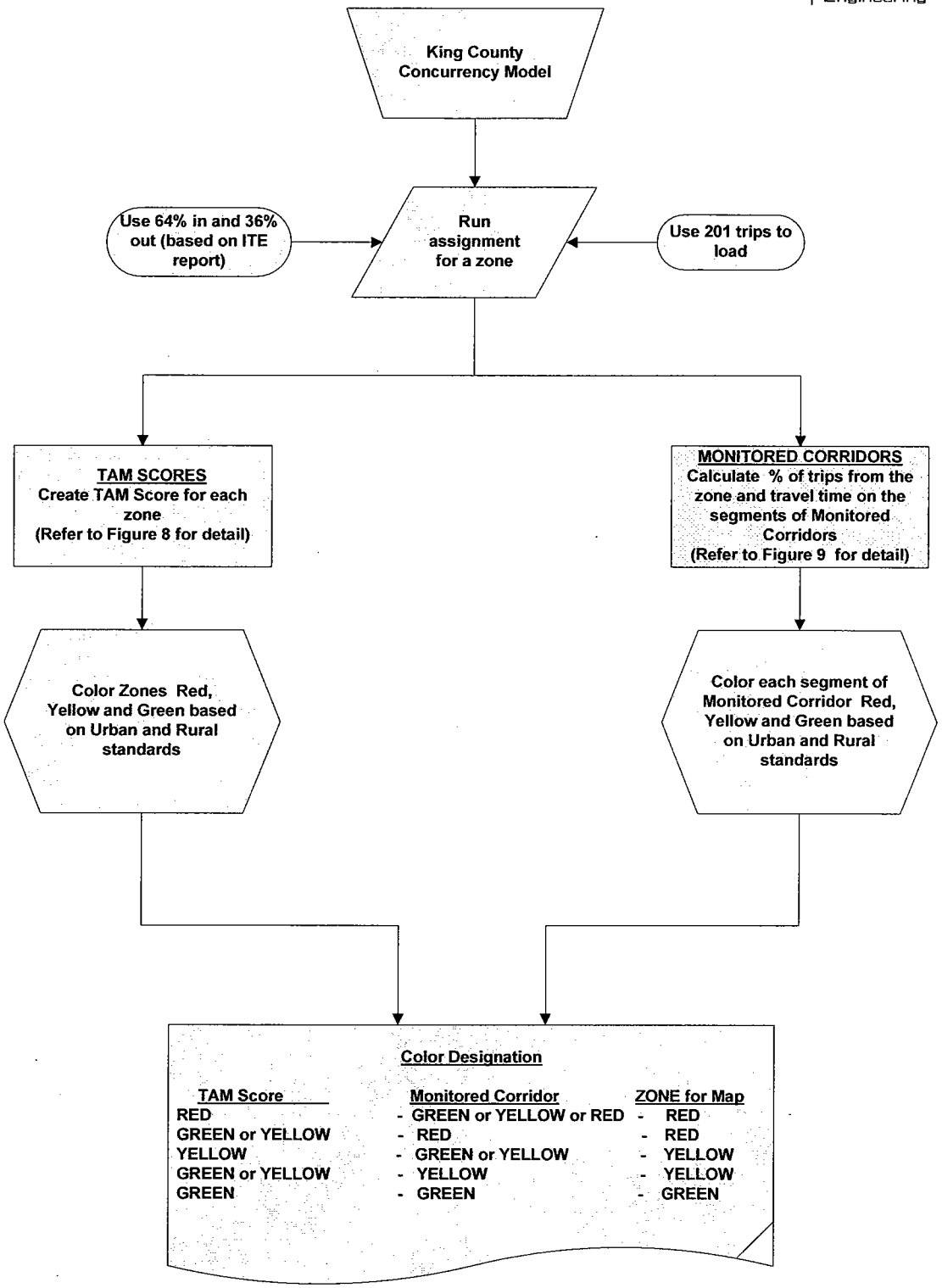


Figure 7. Concurrency Map Creation

Mirai Associates	12/21/2005

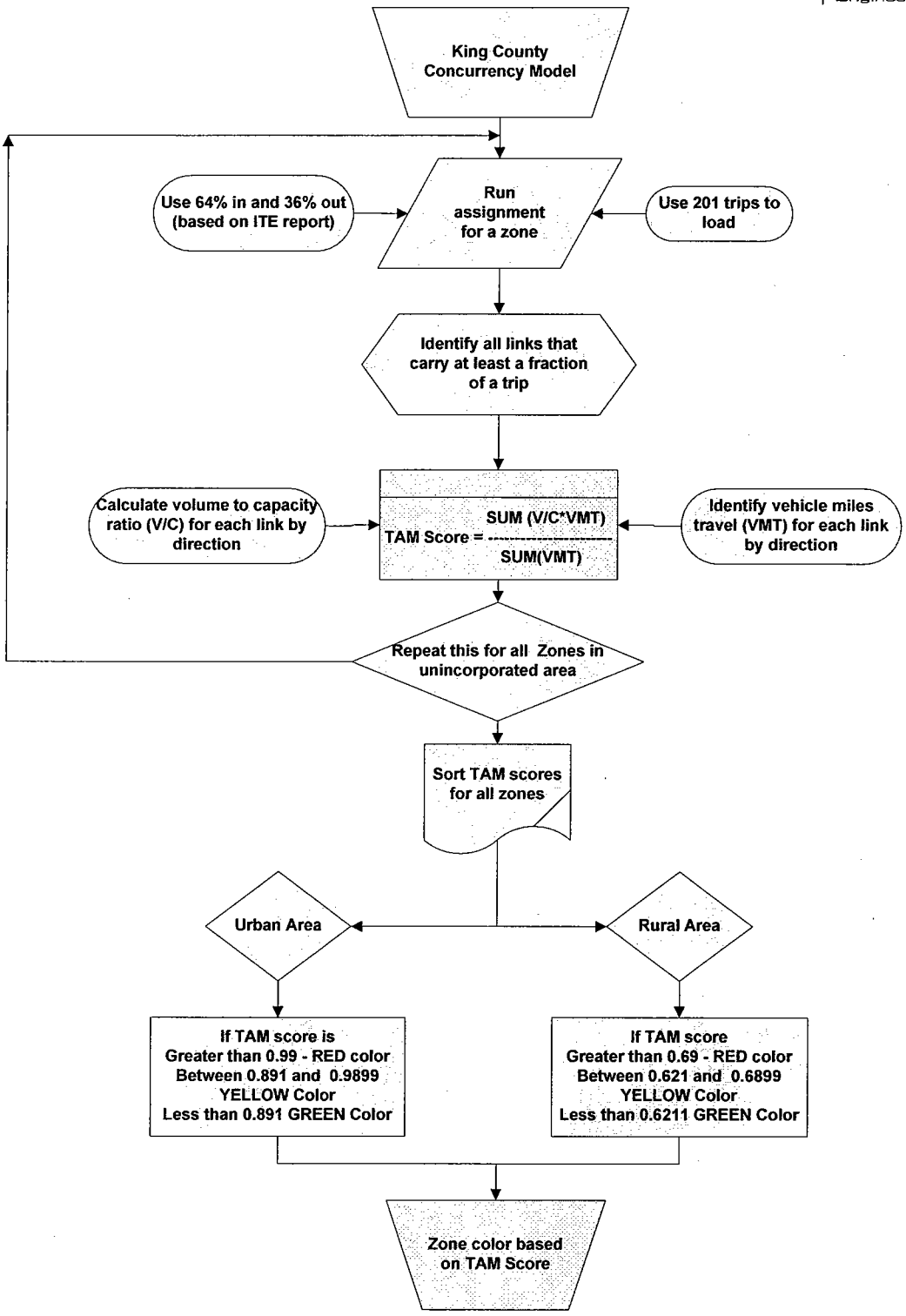


Figure 8. Zone Color Determination Based on TAM Scores

Mirai Associates	12/21/2005

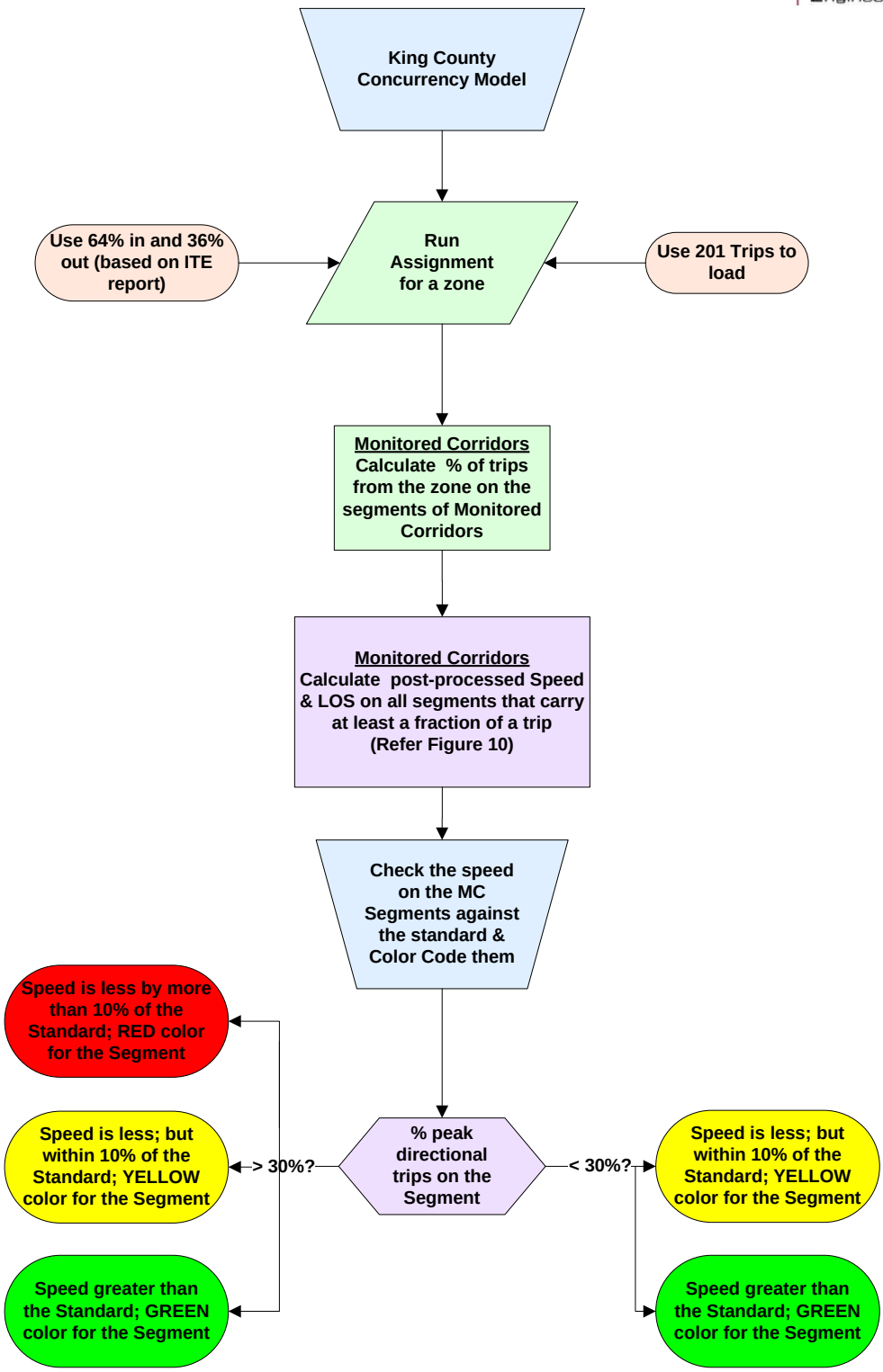


Figure 9. Monitored Corridor Segment Color Determination

Mirai Associates	12/21/2005

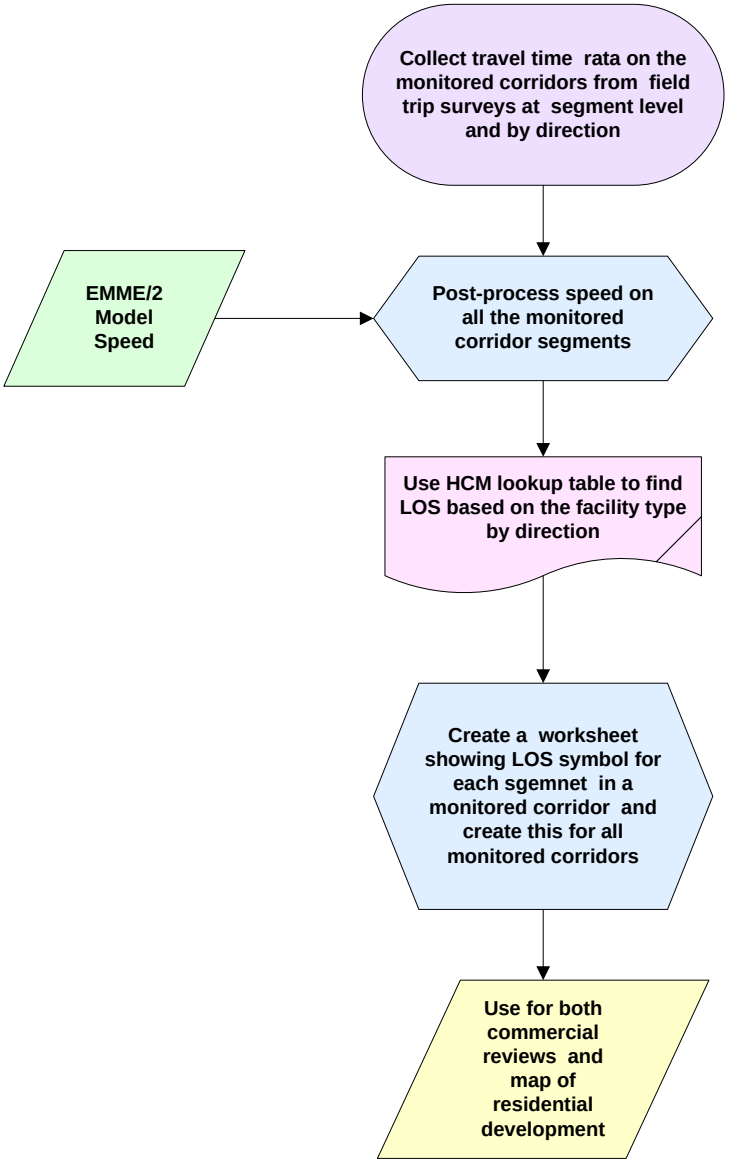


Figure 10. Calculation of Speed on Monitored Corridors' Segments

Mirai Associates	12/21/2005

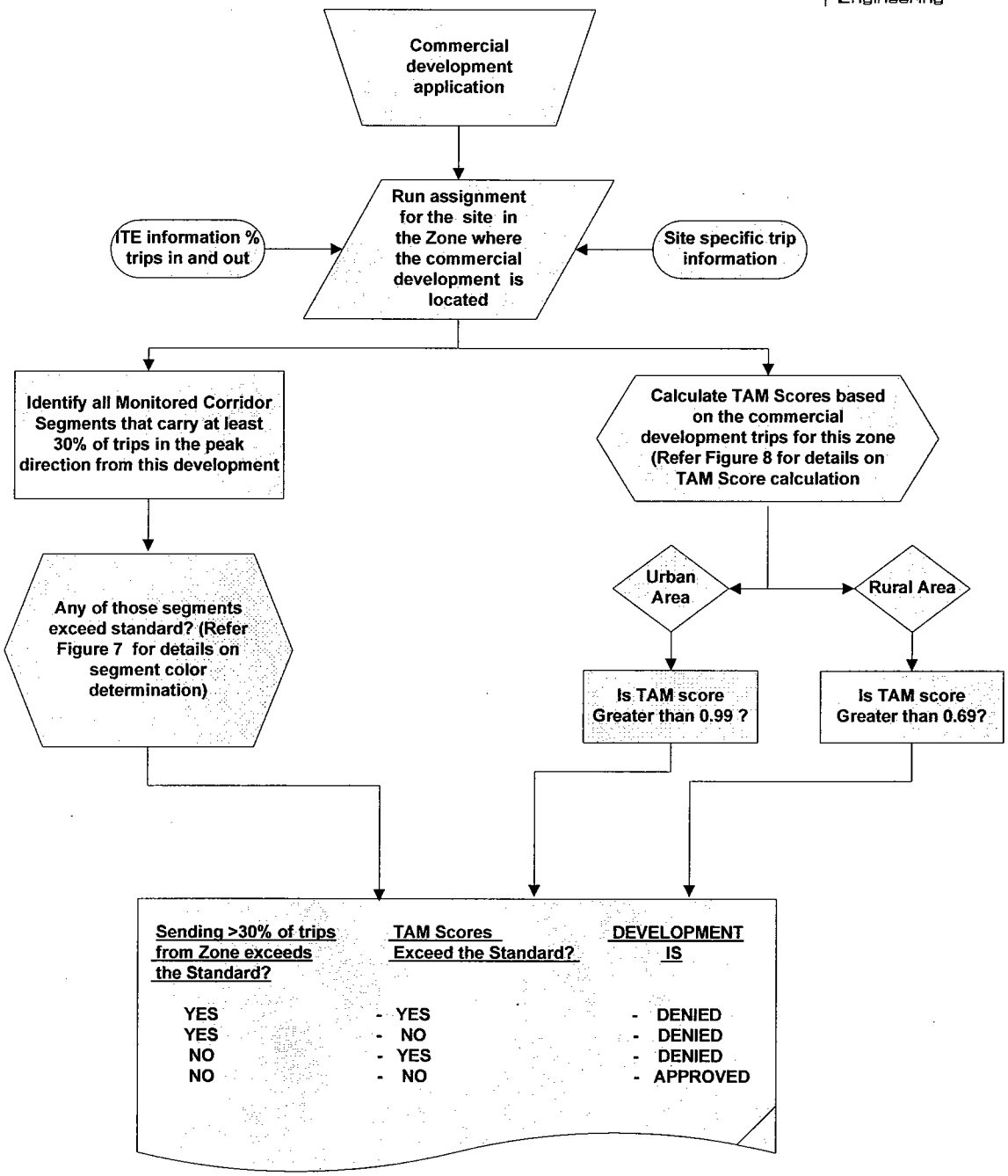


Figure 11. Commercial Development Process

Mirai Associates | 12/21/2005

Appendix C
Monitored Corridor Observed Speeds, Model Speeds and Corresponding Levels of Service for the Monitored Corridors

Avondale Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
NE Woodinville-Duvall Rd. To Bear Creek Rd. (1.48 mi)	Rur.	40	Principal	SB	32.4	B	33.3	B	YELLOW
	Rur.	40	Principal	NB	15.0	E	14.4	E	RED
Bear Creek Rd. to NE 132nd St. (2.05 mi)	Rur.	40	Principal	SB	36.5	A	36.2	A	
	Rur.	40	Principal	NB	35.0	A	26.5	B	YELLOW
NE 132nd St. to Novelty Hill Rd.(1.56 mi)	Rur.	40	Principal	SB	33.5	B	33.1	B	YELLOW
	Rur.	40	Principal	NB	29.4	B	38.2	A	
Novelty Hill Rd. to SR-520 (1.14 mi)	Urb.	40	Principal	SB	31.1	D	23.2	C	
	Urb.	40	Principal	NB	16.5	D	22.7	C	
NE Woodinville-Duvall Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
SR-522 to 156th Ave NE (1.36 mi)	Urb.	35	Principal	WB	25.0	C	23.6	C	
	Urb.	35	Principal	EB	23.3	C	24.1	C	
156th Avenue NE to Avondale Rd. (2.46 mi)	Rur.	40	Principal	EB	22.0	D	21.1	D	RED
	Rur.	40	Principal	WB	27.4	C	26.2	C	RED
NE 124th/128th/133nd St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
I-405 to Willows Rd. (1.34 mi)	Urb.	35	Principal	EB	14.7	F	10.7	F	RED
	Urb.	35	Principal	WB	****	F	11.7	F	RED
Willows Rd. to SR-202 (1.02 mi)	Rur.	45	Principal	WB	****	A	38.4	A	
	Rur.	45	Principal	EB	17.4	C	23.1	C	RED
SR-202 to Avondale Rd. (2.2 mi)	Rur.	35	Principal	EB	33.2	C	23.1	C	RED
	Rur.	35	Principal	WB	****	D	21.5	D	RED
Avondale Rd. to 236th Ave NE	Rur.	35	Minor	EB	****	C	15.1	C	RED
	Rur.	35	Minor	WB	****	B	29.3	B	YELLOW

Novelty Hill Rd.	Area	Posted Speed (MPH)	Road Class	Direction	Observed Speed	LOS	Congested Model Speed	LOS	Residential Map
Avondale Rd. to 208th Ave NE (1.54 mi)	Rur.	40	Principal	WB	12.0	F	12.1	F	RED
	Rur.	40	Principal	EB	28.0	D	24.3	F	RED
208th Ave. NE to 232nd Ave NE (1.54 mi)	Urb.	40	Principal	EB	39.0	A	15.8	E	YELLOW
	Urb.	40	Principal	WB	42.0	A	27.8	C	
232nd Ave NE to W. Snoqualime Valley Rd. (1.24 mi)	Rur.	40	Principal	EB	20.0	E	19.1	E	RED
	Rur.	40	Principal	WB	35.0	D	15.4	D	RED
SR-202	Area	Posted Speed (MPH)	Road Class	Direction	Observed Speed	LOS	Congested Model Speed	LOS	Residential Map
SR-520 to 187th Ave NE (1.22 mi)	Urb.	45	State Route	EB	17.4	E	15.2	F	RED
	Urb.	45	State Route	WB	32.2	E	31.3	C	
187th Ave NE to Sahalee Way NE (1.19 mi)	Rur.	45	State Route	EB	17.2	F	16.3	E	RED
	Rur.	45	State Route	WB	36.5	C	43.3	A	
Sahalee Way NE to 244th Ave NE (2.73 mi)	Rur.	45	State Route	WB	43.7	B	30.7	C	RED
	Rur.	45	State Route	EB	45.6	C	20.3	E	RED
East Lake Sammamish Pkwy.	Area	Posted Speed (MPH)	Road Class	Direction	Observed Speed	LOS	Congested Model Speed	LOS	Residential Map
SR-202 to NE 36th St. (1.19 mi)	Urb.	35	Minor	SB	34.9	B	31.8	B	
	Urb.	35	Minor	NB	17.5	A	36.1	A	
NE 36th St. to Louis Thompson Rd. (2.21 mi)	Urb.	35	Minor	NB	31.0	A	37.7	A	
	Urb.	35	Minor	SB	37.5	D	24.5	D	
Louis Thompson Rd. to SE 24th Way (2.49 mi)	Urb.	35	Minor	SB	39.0	A	30.7	A	
	Urb.	35	Minor	NB	39.7	A	32.6	A	
SE 24th Way to SE 43rd Way (2.24 mi)	Urb	35	Minor	SB	35.1	A	41.5	A	
	Urb.	35	Minor	NB	38.1	A	39	A	

Issaquah Fall City / Duthie Hill	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
East Lake Sammamish Parkway SE to Issaq.-Pine Lk. Rd. (1.14 mi)	Urb.	35	Principal	EB	26.9	D	20.1	D	
	Urb.	35	Principal	WB	25.8	B	26.9	B	
Issaq.-Pine Lk. Rd. to Issaq.-Fall City Rd. (2.05 mi)	Rur.	35	Principal	EB	39.5	C	21.3	C	RED
	Rur.	35	Principal	WB	29.1	B	32.9	B	YELLOW
Issaq.-Fall City Rd. to Trossach Blvd. SE (1.63 mi)	Rur.	35	Principal	WB	42.5	A	41.4	A	
	Rur.	35	Principal	EB	43.1	A	43.2	A	
Sahalee /228th NE & SE 43 Way	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
SR-202 to NE 25th Way (2.73 mi)	Rur.	35	Principal	SB	39.1	D	14.8	D	RED
	Rur.	35	Principal	NB	33.9	A	44.6	A	
NE 25th Way to SE 8th Ave (1.97 mi)	Urb.	35	Principal	NB	30.6	B	31.2	B	
	Urb.	35	Principal	SB	25.8	C	23.1	D	
SE 8th Ave. to Issaq.-Pine Lk. Rd. (1.13 mi)	Urb.	35	Principal	SB	30.6	D	22.2	C	
	Urb.	35	Principal	NB	32.6	D	22.1	C	
Issaq.-Pine Lk. Rd. to E. Lk. Samm. Pkwy. (1.94 mi)	Urb.	35	Principal	SB	32.9	B	28.8	B	
	Urb.	35	Principal	NB	34.7	C	26.2	C	
E. Lk. Samm. Pkwy to SE 56th St. (1.82 mi)	Urb.	35	Principal	NB	31.6	C	22.2	C	
	Urb.	35	Principal	SB	20.5	B	29.8	B	
SR-900	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
I-90 Interchange to SE 95th St. (2.21 mi)	Urb.	40	State Route	SB	36.0	B	32.6	B	
	Urb.	40	State Route	NB	37.0	B	30.7	B	
SE 95th St. to 176th Ave SE (1.96 mi)	Rur.	40	State Route	NB	43.0	B	39.1	B	YELLOW
	Rur.	40	State Route	SB	42.0	A	45	A	
176th Ave SE to 138th Ave SE (3.0 mi)	Urb.	40	State Route	NB	12.0	F	15.4	F	RED
	Urb.	40	State Route	SB	26.0	C	31.9	C	

Newport Way / W. Sunset Way	Area	Posted Speed (MPH)	Road Class	Direction	Observed Speed	LOS	Congested Model Speed	LOS	Residential Map
Coal Creek Pkwy to 150th Ave SE (1.71 mi)	Urb.	35	Minor	WB	22.0	D	17.1	D	
	Urb.	35	Minor	EB	24.0	C	21.9	C	
150th Ave SE to Lakemont Blvd. (2.09 mi)	Urb.	35	Minor	EB	28.0	C	18.5	C	
	Urb.	35	Minor	WB	28.0	B	28.7	B	
Lakemont Blvd. SE to SR - 900 (2.48 mi)	Urb.	35	Minor	WB	19.0	B	29.6	B	
	Urb.	35	Minor	EB	24.0	C	21.2	C	
Coal Creek Parkway	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
I-405 to SE 56th St. (1.73 mi)	Urb.	35	Principal	NB	27.0	B	30.9	B	
	Urb.	35	Principal	SB	30.0	D	13.1	E	YELLOW
SE 56th St. to 72nd Pl. SE (1.98 mi)	Urb.	35	Principal	SB	18.0	D	15.3	E	YELLOW
	Urb.	35	Principal	NB	39.0	A	25.6	C	
72nd Pl SE to SE 128th St. (2.33 mi)	Urb.	35	Minor	NB	35.0	A	37.1	A	
	Urb.	35	Minor	SB	28.0	C	21.7	C	
Front St / Issaquah-Hobart Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	**Residential Map**
I-90 to SE 96th St. (1.93 mi)	Urb.	25/35	Principal	SB	13.0	D	18.4	D	
	Urb.	25/35	Principal	NB	16.5	D	18.1	D	
SE 96th St. to Cedar Grove Rd. (3.12 mi)	Rur.	40	Principal	NB	43.5	C	18.4	E	RED
	Rur.	40	Principal	SB	36.9	B	11.4	F	RED
Front St / Issaquah-Hobart Rd. (3.42 mi)	Rur.	45	Principal	NB	42.0	A	39.8	A	
	Rur.	45	Principal	SB	43.9	A	38.1	A	

SR-169	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
Monroe Ave SE to 149th Ave SE (1.91 mi)	Urb.	45	Principal	WB	40.2	A	46.9	A	
	Urb.	45	Principal	EB	33.1	C	27.7	C	
149th Ave SE to 198th Ave SE (3.02 mi)	Rur.	50	State Route	WB	46.7	A	44.8	A	
	Rur.	50	State Route	EB	52.6	A	52	A	
196th Ave SE to SE 192nd St. (3.22 mi)	Rur.	50	State Route	WB	46.7	A	47.6	A	
	Rur.	50	State Route	EB	38.9	B	41	B	*YELLOW*
SE 192nd St. to SE 232nd St. (2.05 mi)	Rur.	50	State Route	WB	46.7	A	45.5	B	
	Rur.	50	State Route	EB	38.9	C	34.9	B	*YELLOW*
SE 232nd St. to Sr-516 (2.4 mi)	Urb.	35	State Route	WB	36.8	B	35.8	B	
	Urb.	35	State Route	EB	21.8	E	19.3	E	*YELLOW*
140th Ave. SE / 132 Ave. SE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-169 to Petrovitsky Rd. (1.91 mi)	Urb.	35	Principal	NB	29.4	C	28	C	
	Urb.	35	Principal	SB	25.6	D	20.4	D	
140th Ave. SE / 132 Ave. SE to Petrovitsky Rd. to 208th Ave SE 2.36 mi)	Urb.	35	Principal	NB	33.4	B	29.2	B	
	Urb.	35	Principal	SB	26.1	C	37.1	A	
208th Ave SE to 240th Ave SE (2.0 mi)	Urb.	35	Minor	SB	33.7	B	32.7	B	
	Urb.	35	Minor	NB	28.2	B	31.7	A	
240th Ave SE to SR-516 (2.0 mi)	Urb.	35	Minor	SB	25.7	C	26.9	B	
	Urb.	35	Minor	NB	31.1	C	27.1	B	

Carr Rd. SE / Petrovitsky Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-167 to 128th Ave SE (2.32 mi)	Urb.	35	Principal	EB	19.9	E	16.4	E	*YELLOW*
	Urb.	35	Principal	WB	25.6	C	25.2	C	
128th Ave SE to 151st Ave SE (1.93 mi)	Urb.	35	Principal	EB	21.5	D	25.1	D	
	Urb.	35	Principal	WB	32.8	C	34	B	
151st Ave SE to 184th Ave SE (1.52 mi)	Urb.	35	Principal	EB	28.8	A	35.9	A	
	Urb.	35	Principal	WB	39.2	A	43.7	A	
184th Ave SE to SR-18 (4.53 mi)	Rur.	40	Principal	EB	49.1	A	43.8	A	
	Rur.	40	Principal	WB	48.8	A	40.7	B	
SE 208 St. / SE 212 St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-167 to Sr-515 (1.23 mi)	Urb.	40	Principal	EB	13.0	F	11.8	F	*RED*
	Urb.	40	Principal	WB	32.0	B	29.5	B	
SR-515 to 132nd Ave SE (1.51 mi)	Urb.	40	Principal	WB	21.0	D	20.6	D	
	Urb.	40	Principal	EB	29.0	C	26.6	C	
SR-516 / SE 256th St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
104th Ave SE to 132nd Ave SE (1.98 mi)	Urb.	35	Principal	WB	****	B	33.1	B	
	Urb.	35	Principal	EB	21.5	D	20.5	D	
132nd Ave SE to 164th Ave SE (1.87 mi)	Urb.	45	Principal	EB	28.8	C	26.5	C	
	Urb.	45	Principal	WB	****	A	36.3	A	
164th Ave SE to 192nd to Ave SE (1.89 mi)	Urb.	45	Principal	WB	****	A	36.2	A	
	Urb.	45	Principal	EB	32.9	C	22.3	C	
192nd Ave SE to SR-169 (3.08 mi)	Urb.	45	Principal	WB	****	A	44.3	A	
	Urb.	45	Principal	EB	26.1	C	27.4	C	

S. 272nd St / S. 277 St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-99 to 55th Ave S.	Urb.	35	Principal	EB	21.0	C	19.2	D	
	Urb.	35	Principal	WB	****	C	22.1	C	
55th Ave S. to 86th Ave S. (1.65 mi)	Urb.	35	Principal	WB	****	C	24	C	
	Urb.	35	Principal	EB	22.0	D	19	D	
86th Ave S. to SR-516 (2.7 mi)	Urb.	50	Principal	WB	****	B	40.4	B	
	Urb.	50	Principal	EB	27.0	C	31.3	C	
236th Ave. NE/238th Ave. NE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
NE 133nd St./232nd Ave NE to approx. NE 102nd St.(2.69 mi)	Urb.	35	Principal	SB	****	B	30.7	B	
	Urb.	35	Principal	NB	****	B	28.9	B	
NE 102nd St. to SR-202 (2.54 mi)	Rur.	35	Principal	SB	****	C	25.8	C	
	Rur.	35	Principal	NB	****	C	27.8	C	
SR-161	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
S. 348 St. to 19TH Way S. (1.28 mi)	Urb.	35	Principal	SB	24.6	C	25.1	C	
	Urb.	35	Principal	NB	****	A	35.1	A	
19th Way S. to Military Rd S. (1.13 mi)	Urb.	35	Principal	NB	24.7	A	35.3	A	
	Urb.	35	Principal	SB	****	D	23.7	C	
Juanita-Woodinville / NE 160 St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
100 Ave. NE to 112th Ave NE (1.04 mi)	Urb.	35	Minor	WB	23.0	D	14.5	D	
	Urb.	35	Minor	EB	28.4	C	18.3	C	
112th Ave NE to 124th Ave NE (1.42 mi)	Urb.	35	Minor	WB	14.8	C	21.4	C	
	Urb.	35	Minor	EB	18.8	B	24.6	B	

68th Ave. NE/Juanita Dr. NE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-522 to NE 140th St. (1.88 mi)	Urb.	35	Minor	SB	24.3	C	19.6	C	
	Urb.	35	Minor	NB	21.0	C	19.1	C	
NE 140th St. to NE 122nd St. (1.67 mi)	Urb.	35	Minor	NB	31.9	B	18.6	B	
	Urb.	35	Minor	SB	29.6	A	30.3	A	
NE 122nd St. to 98th Ave NE (2.0 mi)	Urb.	35	Minor	NB	15.5	D	14.1	D	
	Urb.	35	Minor	SB	15.9	B	23.9	B	
NE 132nd St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
NE 100 Ave. to Totem Lk Blvd. (0.92 mi)	Urb.	35	Minor	WB	15.3	D	13.2	D	
	Urb.	35	Minor	EB	16.8	D	15.3	D	
Totem Lk. Blvd to 132nd Ave NE (1.11 mi)	Urb.	35	Minor	WB	13.1	D	13.6	D	
	Urb.	35	Minor	EB	19.6	D	15.7	D	
SE 56th St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-900 to E. LK. Samm. Pkwy. (0.71 mi)	Urb.	35	Principal	EB	13.4	E	13.8	E	*YELLOW*
	Urb.	35	Principal	WB	16.0	F	12.9	F	*RED*
SR-515	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
S. Grady Way to SE 174th St. (1.99 mi)	Urb.	35	Principal	NS	****	B	27.3	C	
	Urb.	35	Principal	SB	29.6	D	19.9	D	
SE 174th St. to SE 204th St. (1.84 mi)	Urb.	45	Principal	SB	22.8	D	19.4	D	
	Urb.	45	Principal	NB	****	A	35.7	A	
SE 204th St. to SE 224th St. (1.49 mi)	Urb.	45	Principal	SB	26.5	C	21.1	C	
	Urb.	45	Principal	NB	****	B	34.8	B	
SE 224th St. to SE 256th St. (1.87 mi)	Urb.	45	Principal	NB	****	B	34.8	B	
	Urb.	45	Principal	SB	20.8	D	21.2	D	

Lea Hill Rd./SE 312th /SE 304th	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
8th St. NE to 124th Ave SE (1.81 mi)	Urb.	35	Minor	WB	****	C	23.3	C	
	Urb.	35	Minor	EB	22.3	C	18.9	C	
124th Ave SE to 144th Ave SE (1.34 mi)	Urb.	35	Minor	EB	41.8	A	42.1	A	
	Urb.	35	Minor	WB	****	A	30.6	A	
Covington Way SE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SE Wax Road to SR-516 (0.75 mi)	Urb.	35	Minor	EB	21.0	C	23.1	C	
	Urb.	35	Minor	WB	14.8	D	16.2	D	
SPAR Rd / Issaq. By-Pass	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
Front St./Issaq.- Hobart Rd. S. to SE 60th St.	Urb.	45	Principal	NB	****	B	31.5	B	
	Urb.	45	Principal	SB	****	A	43.9	A	
SE 60th St. to Issaq.-Fall City Rd. (1.65 mi)	Urb.	45	Principal	SB	****	A	40.2	A	
	1.65	mi.		NB	****	A	40.2	A	
Issaquah Pine Lake Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
228th Ave. SE to SE Klahaine Blvd. (1.38 mi)	Urb.	35	Principal	NB	23.2	D	21.7	D	
	Urb.	35	Principal	SB	33.3	B	32.9	B	
SE Klahanie Blvd. To Issaq. Fall City Rd. (0.97 mi)	Urb.	35	Principal	NB	32.7	E	15.1	E	*YELLOW*
	Urb.	35	Principal	SB	22.2	D	17.7	D	
NE Union Hill Rd.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
Avondale Way NE to 196th Ave NE (1.14mi)	Urb.	35	Minor	EB	15.0	D	15.1	D	
	Urb.	35	Minor	WB	17.4	D	16.9	D	
196th Ave NE to 208th Ave NE (1.42 mi)	Rur.	35	Minor	WB	32.7	A	30.7	A	
	Rur.	35	Minor	EB	28.6	A	42.2	A	
208th Ave NE to 238th Ave NE (1.76 mi)	Rur.	35	Collector	WB	36.4	A	33.9	A	
	Rur.	35	Collector	EB	38.7	A	35	A	

SE 128th St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
138th Ave. SE to 156th Ave SE (1.13 mi)	Urb.	35	Principal	WB	****	B	32.9	B	
	Urb.	35	Principal	EB	26.7	C	22.9	C	
149th/SE/156th Ave SE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
SR-169 to SE 128th St. (1.95 mi)	Urb.	35	Minor	SB	23.7	D	11.2	E	*YELLOW*
	Urb.	35	Minor	NB	27.4	C	22.3	C	
Peasley Canyon/ S. 320th St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
I-5 ramps to S 321st ST. (0.94 mi)	Urb.	40	Principal	EB	30.1	D	19.9	D	
	Urb.	40	Principal	WB	****	C	28.6	B	
S. 321st St. to W. Valley Hwy (1.39 mi)	Urb.	40	Principal	EB	22.9	C	28.1	C	
	Urb.	40	Principal	WB	****	D	18.8	D	
SE Wax Road/180th Ave. SE	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
Covington Way SE to SE 262nd PL (1.31 mi)	Urb.	35	Minor	SB	22.2	B	24.4	B	
	Urb.	35	Minor	NB	24.6	C	23.7	C	
SE 262nd Pl. to SE 240th St. (1.53 mi)	Urb.	35	Minor	SB	28.0	C	24.8	C	
	Urb.	35	Minor	NB	24.7	B	25.5	B	
SE 256th St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
West of City Limits to 156th Ave SE (1.46 mi)	Urb.	35	Minor	WB	***	A	37.3	A	
	Urb.	35	Minor	EB	40.7	C	24	C	
156th Ave SE to SR-18 (0.96 mi)	Urb.	35	Minor	WB	****	A	37.3	A	
	Urb.	35	Minor	EB	33.4	C	20.3	C	
SE 240 St.	**Area**	**Posted Speed (MPH)**	**Road Class**	**Direction**	**Observed Speed**	**LOS**	**Congested Model Speed**	**LOS**	***Residential Map***
180th Ave. SE to 196TH Ave SE (0.97 mi)	Urb.	35	Principal	EB	33.0	B	32.2	B	
	Urb.	35	Principal	WB	****	B	34.7	B	

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Appendix D
Executive Response

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JUL - 6 2006
KING COUNTY AUDITOR

July 6, 2006

Cheryle A. Broom
King County Auditor
Room 1033
COURTHOUSE

Dear Ms. Broom:

Thank you for the opportunity to review the draft final "Report on King County Concurrency Modeling Review" dated June 2006, prepared for the King County Auditor's Office, King County Council by Mirai Transportation Planning and Engineering. Staff in the Department of Transportation (DOT) has had an opportunity to review the report and have discussed their comments on the report findings and recommendations with me. While the DOT staff concurs with a number of the factual statements, findings, and recommendations in the report, they have identified some important areas of disagreement with the report conclusions.

I am including some background information on concurrency and long-range transportation planning requirements in the Washington State Growth Management Act ("GMA"), additional information about the 2004 concurrency update, and clarifications regarding DOT planning procedures and processes to assist you and the County Council in your review.

GMA – Long-range Transportation Planning and Transportation Concurrency

The GMA outlines certain mandatory elements that must be included in a jurisdiction's adopted comprehensive plan. The Transportation Element, a GMA requirement identifies a number of sub-elements that include long-range transportation planning and short-range concurrency assessment of transportation adequacy at the development level.

Long-range transportation planning under the GMA requires that land use, level of service (LOS) standards, and financing information be prepared for and applied to a long-term planning horizon based on population projections for the same time period.

In King County, the identification and prioritization of long-range transportation road facility needs (currently a horizon year of 2022) is accomplished through the Transportation Needs Report (TNR). The TNR is the long-range plan that serves as the basis for development of the six-year Roads Capital Improvement Program (CIP). The TNR is adopted and amended as part of the county's regular updates of the King County Comprehensive Plan. The CIP is the implementation of the plan.

The purpose of transportation concurrency is to make a short-range determination of the adequacy of transportation facilities to accommodate traffic from proposed development using adopted level of service standards. The concurrency process compares traffic demand from existing and "pipeline" development to the traffic capacity provided by existing capital facilities plus facilities "committed" for construction within the adopted Roads six year CIP.

It is our understanding that the GMA does not require that the county's transportation concurrency program include a process for identifying and estimating the cost of roadway and other improvements needed to meet level of service standards necessary for each of the 667 concurrency zones in unincorporated King County to "pass" concurrency (to be coded green on the concurrency map). Use of the concurrency program in such a way would in fact be inconsistent with the GMA requirement for a long-range comprehensive plan approach for coordinating land use, LOS standards and capital facilities. These three elements are to be evaluated and balanced through the GMA's long-range transportation planning process (discussed above) and not through transportation concurrency.

Both the county's comprehensive plan and the county's transportation concurrency program have been certified by the Puget Sound Regional Council (PSRC) as meeting the requirements of GMA.

2004 Changes to King County's Transportation Concurrency

In 2004, the County Council adopted a travel time methodology for all of the county's monitored corridors, replacing the old measure which was based on volume-to-capacity ratio (V/C). From 1995 until 2002, the county's concurrency test included a "monitored corridor" assessment, which required that an entire concurrency zone be coded "red" (failing to meet the level of service standard) even if the volume/capacity problem existed only on a single short link of a road corridor system. In 2003, the county implemented a partial solution to this problem by considering longer segments along a roadway corridor when making V/C concurrency determinations on monitored corridors. This was an interim step toward the travel time methodology for monitored corridors that was adopted in 2004. Travel time was determined to be a more reasonable and realistic assessment of actual traffic conditions for purposes of concurrency than the original monitored corridor methodology. The travel time methodology is a more accurate measurement of traffic congestion that is able to reflect increased operational efficiencies of a roadway due to Intelligent Traffic System (ITS) and other operational improvements along corridors.

DOT Concurrency Improvements

Two major goals of the GMA are to encourage development in urban areas where adequate public facilities and services exist and to reduce sprawl. King County and the region are successfully directing growth into the urban area consistent with these goals. Concurrency procedures and practices should be consistent with these goals. We acknowledge that some of the concurrency practices are technically complex but they are generally sound and consistent with requirements of GMA.

Ensuring that all county programs and projects meet standards for high quality is of great importance to my office. The DOT and I recognize that there is room for improvement in the transportation concurrency program as revised by the County Council in 2004. We concur with many of the suggestions made in the report aimed at maintaining and improving the quality of the county's transportation concurrency determinations. We will continue to work with the County Council to ensure that the county's transportation concurrency process meets the policies and requirements of the King County Comprehensive Plan and the GMA.

Attached is a summary of my responses to the report recommendations in the table format you requested in your June 22, 2005 memorandum.

Thank you for the opportunity to review and provide a response to the report. If you have questions regarding these responses, please do not hesitate to contact me or Harold Taniguchi, Director, Department of Transportation, at 206-684-1481.

Sincerely,

Ron Sims
King County Executive

Attachment

cc: Kurt Triplett, Chief of Staff, Office of the King County Executive
Dave Lawson, Internal Audit Manager, Executive Audit Services, Office of Management and Budget
Harold Taniguchi, Director, Department of Transportation (DOT)
Linda Dougherty, Division Director, Roads Services Division (RSD), DOT
Jennifer Lindwall, CIP and Planning Section Manager, RSD, DOT

Recommendation	Agency Position	Schedule for Implementation	Comments
Recommendation #1: Update the base year model to reflect current King County land use with the new Puget Sound Regional Council's land use data and network data; calibrate the base model against the base year traffic counts on key corridors.	concur	To the extent feasible, DOT updates its base model consistent with the PSRC model update schedule. PSRC is currently updating its base 2000 model to a "refreshed" year 2000 base. DOT is scheduling its base 2000 model update to track PSRC's model update. PSRC is planning a 2006 base year update to be available in 2008.	King County's 2004 concurrency update was developed on the King County 2003 base model which was extrapolated from the King County 2000 base model. The King County 2000 base model was developed from the PSRC base model and was fully calibrated.
Recommendation #2: Review the updated Regional Council's model and adopt the key features of the regional model that are useful for DOT's transportation planning and concurrency management activities.	concur	Consistent with PSRC's model update schedule.	Review of the Regional Council's model and adoption of key features of the regional model are standard parts of the King County base model update.
Recommendation #3: The concurrency model should be revised and simplified by: • Using a single standard of congestion • Eliminating the use of the TAM as a measure of congestion • Using a single process for testing concurrency for all types of development • Eliminating the use of a separate approach for concurrency testing when congestion is in the "yellow zones."	Partially concur		• Do not concur with using a single standard of congestion. Separate standards of congestion for urban and rural areas are consistent with growth management goals. • Do not concur with eliminating the TAM measure. While the calculations that produce TAM scores are somewhat complex, the TAM standard is a useful and easily recognized indication of congestion for a geographic area instead of just a road corridor. • There is no evidence that the difference in concurrency testing processes for residential and non-residential development results in disparity in concurrency test results. The existing process for testing for concurrency for all types of development is based on the same underlying concurrency

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			model. The concurrency map is an adopted policy decision to provide predictability to residential developers. The potential for development of a map-based approach for non-residential development could be examined. • Concur with elimination of yellow zones.
Recommendation #4: Quality control over and documentation of concurrency modeling should be improved by: • Requiring concurrency management staff to prepare an annual report that explains the technical assumptions, land use changes, network changes, and other parameters that are used to update the concurrency model. • Establishing an independent expert panel and require them to review the annual report before it is submitted to the King County Council.	Partially concur	New documentation procedures are under development and will be implemented with the next concurrency update.	• More detailed documentation will be developed with each model update. Production of technical memoranda and reports documenting technical assumptions, land use changes, network changes, and other model update parameters should occur at the time of each model update or implementation of new processes or procedures. This may or may not be annually. • More stringent in-house review procedures and methodologies are being established to assure a higher standard of quality control. DOT will consider establishing a technical review panel.
Recommendation #5: The concurrency model should reflect land use growth in neighboring counties, and all improvements for which there is a financial commitment by another jurisdiction.	concur	DOT is establishing additional quality control procedures that will ensure future updates will include all relevant data.	
Recommendation #6: Review the policy that directs staff to evaluate the section of the monitored corridors where they are located outside unincorporated King County and decide	concur	Review of monitored corridors will be done in the context of the next model update.	Congestion levels on monitored corridors are calculated for TAM scores whether or not the monitored corridors are in unincorporated King County or some other jurisdiction. The TAM standard is a useful and easily recognized indication of congestion for a geographic area instead of just a single unincorporated segment of a

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whether it would be appropriate to keep those segments as parts of the monitored corridors. If the TAM continues to be used as one of the level of service methodologies, decide whether the TAM score should be calculated with the network links located outside the unincorporated King County.			longer arterial corridor. However, the travel time test is based only on the portions of monitored corridors that are within unincorporated King County or are within a jurisdiction that has entered into a reciprocal concurrency interlocal agreement with King County.
Recommendation #7: Exclude trips using state highways from the concurrency model.	concur	New quality control procedures will identify designated highways of statewide significance (HSS).	It is assumed this recommendation is referring only to designated highways of statewide significance (HSS). Excluding HSS from concurrency requirements is consistent with state law.
Recommendation #8: Assess the extent to which the implementation of the travel time standard has increased the unmet need of capacity-related road improvements for the monitored corridors.	Do not concur		Corridor congestion identified through the concurrency process is included in the evaluation of long term capital project needs as part of the standard TNR development and update process.
Recommendation #9: Examine the implications of the LOS B standard to the unmet need for capacity-related improvements in the rural area segments of the monitored corridors.	Do not concur		Corridor congestion identified through the concurrency process is included in the evaluation of long term capital project needs as part of the standard TNR development and update process. DOT is unwilling to examine the implications of LOS B standard in the rural area because this would be contrary to growth management policy decisions regarding land use and transportation in rural areas of King County. The LOS B standard for rural areas has been in place since the inception of concurrency in 1995. Continued use of the LOS B standard in 2004 for Rural Areas has not changed the capital project needs in the CIP or TNR.
Recommendation #10: Conduct transportation	Partially concur	Corridor studies are conducted for CIP	The TNR process is used to identify problems and needs. It is the standard

corridor studies to identify what capital or operational improvements are needed on the segments in the monitored corridors that are not meeting the travel time standards.		projects to evaluate operational and safety needs before implementation.	practice to assess operational and capital components of each CIP project before implementation to ensure needs are fully addressed at the location.
Recommendation #11: Review amount of the improvements needed in the monitored corridors and adjust the travel time standards and/or land use projections, if the identified improvements are not feasible.	Do not concur .	Established processes for developing and updating the Comprehensive Plan, TNR, and CIP are already consistent with the requirements of Growth Management Act.	Consistent with the Growth Management Act, DOT assesses potential funding sources and reviews land use assumptions to program projects needed to meet level of service standards.

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Appendix E
Auditor's Comments to Executive Response

We are providing the auditor's comments in tabular format so the reader can easily identify the recommendation, agency position on the recommendation, agency comments, and auditor's comments. We commented if the agency did not concur or partially concurred with the recommendation. We combined our comments with respect to the agencies non-concurrence with recommendations 8-11 into a single comment, as the basis for non-concurrence with each of these recommendations is similar.

Recommendation	Agency Position	Agency Comments	Auditor's Comments
Recommendation #1: Update the base year model to reflect current King County land use with the new Puget Sound Regional Council's land use data and network data; calibrate the base model against the base year traffic counts on key corridors.	concur	King County's 2004 concurrency update was developed on the King County 2003 base model which was extrapolated from the King County 2000 base model. The King County 2000 base model was developed from the PSRC base model and was fully calibrated.	
Recommendation #2: Review the updated Regional Council's model and adopt the key features of the regional model that are useful for DOT's transportation planning and concurrency management activities.	concur	Review of the Regional Council's model and adoption of key features of the regional model are standard parts of the King County base model update.	
Recommendation #3: The concurrency model should be revised and simplified by: • Using a single standard of congestion • Eliminating the use of the TAM as a measure of congestion • Using a single process for testing concurrency for all types of development • Eliminating the use of a separate approach for concurrency testing when congestion is in the "yellow zones."	Partially concur	• Do not concur with using a single standard of congestion. Separate standards of congestion for urban and rural areas are consistent with growth management goals. • Do not concur with eliminating the TAM measure. While the calculations that produce TAM scores are somewhat complex, the TAM standard is a useful and easily recognized indication of congestion for a geographic area instead of just a road corridor. • There is no evidence that the difference in concurrency testing processes for residential and non-residential development results in disparity in concurrency test	The intent of the recommendation is to use a single measure of congestion, not a single level of service standard. Transportation Adequacy Measure (TAM) is a poor measure of congestion because it is an abstract average, and provides no information on the specific facilities causing congestion. It is also not consistent with industry standards for measuring congestion. Commercial developments can be approved in red zones where residential

Recommendation	Agency Position	Agency Comments	Auditor's Comments
		results. The existing process for testing for concurrency for all types of development is based on the same underlying concurrency model. The concurrency map is an adopted policy decision to provide predictability to residential developers. The potential for development of a map-based approach for non-residential development could be examined. • Concur with elimination of yellow zones.	developments are prohibited. Thus, not only is there a difference in the concurrency process, but a difference in results whenever a commercial development is approved in a red zone.
Recommendation #4: Quality control over and documentation of concurrency modeling should be improved by: • Requiring concurrency management staff to prepare an annual report that explains the technical assumptions, land use changes, network changes, and other parameters that are used to update the concurrency model. • Establishing an independent expert panel and require them to review the annual report before it is submitted to the King County Council.	Partially concur	• More detailed documentation will be developed with each model update. Production of technical memoranda and reports documenting technical assumptions, land use changes, network changes, and other model update parameters should occur at the time of each model update or implementation of new processes or procedures. This may or may not be annually. • More stringent in-house review procedures and methodologies are being established to assure a higher standard of quality control. DOT will consider establishing a technical review panel.	The seriousness of the problems with quality control over modeling practices strongly suggests that annual documentation of changes and assumptions, and an independent review of this documentation, is prudent.
Recommendation #5: The concurrency model should reflect land use growth in neighboring counties, and all improvements for which there is a financial commitment by another jurisdiction.	concur		
Recommendation #6: Review the policy that directs staff to evaluate the section of the monitored corridors where	concur	Congestion levels on monitored corridors are calculated for TAM scores whether or not the monitored corridors are in	

Recommendation	Agency Position	Agency Comments	Auditor's Comments
they are located outside unincorporated King County and decide whether it would be appropriate to keep those segments as parts of the monitored corridors. If the TAM continues to be used as one of the level of service methodologies, decide whether the TAM score should be calculated with the network links located outside the unincorporated King County.		unincorporated King County or some other jurisdiction. The TAM standard is a useful and easily recognized indication of congestion for a geographic area instead of just a single unincorporated segment of a longer arterial corridor. However, the travel time test is based only on the portions of monitored corridors that are within unincorporated King County or are within a jurisdiction that has entered into a reciprocal concurrency interlocal agreement with King County.	
Recommendation #7: Exclude trips using state highways from the concurrency model.	concur	It is assumed this recommendation is referring only to designated highways of statewide significance (HSS). Excluding HSS from concurrency requirements is consistent with state law.	
Recommendation #8: Assess the extent to which the implementation of the travel time standard has increased the unmet need of capacity-related road improvements for the monitored corridors.	Do not concur	Corridor congestion identified through the concurrency process is included in the evaluation of long term capital project needs as part of the standard TNR development and update process.	The Executive Response suggests that the long-range needs identification process resulting in the Transportation Needs Report (TNR) accomplishes the requirements of the Growth Management Act that local jurisdictions take actions when facilities don't meet adopted standards. We see little linkage between the TNR process and the Growth Management Act requirement to bring facilities into compliance with adopted standards. The TNR process is not specifically oriented toward bringing facilities into compliance with standards. The TNR is a list of facility needs, regardless of whether the need is related to capacity
Recommendation #9: Examine the implications of the LOS B standard to the unmet need for capacity-related improvements in the rural area segments of the monitored corridors.	Do not concur	Corridor congestion identified through the concurrency process is included in the evaluation of long term capital project needs as part of the standard TNR development and update process. DOT is unwilling to examine the implications of LOS B standard in the rural area because this would be contrary to growth management policy decisions regarding land use and transportation in rural areas of King County. The LOS B standard for rural areas has been in place since the inception of concurrency in 1995. Continued use of the LOS	

Recommendation	Agency Position	Agency Comments	Auditor's Comments
		B standard in 2004 for Rural Areas has not changed the capital project needs in the CIP or TNR.	or safety or other priorities. There is no discussion in the TNR concerning how the improvements identified in the report will affect compliance with level of service standards. There is not adequate funding for all projects on the TNR; therefore no assurance that the capacity-related projects on the list will get built. Also, because the TAM, which is used to measure level of service, is an abstract measure of average congestion in a geographic region, it is impossible to determine whether capacity-related improvements proposed in the TNR are the most cost effective means of bringing facilities into compliance with standards.
Recommendation #10: Conduct transportation corridor studies to identify what capital or operational improvements are needed on the segments in the monitored corridors that are not meeting the travel time standards.	Partially concur	The TNR process is used to identify problems and needs. It is the standard practice to assess operational and capital components of each CIP project before implementation to ensure needs are fully addressed at the location.	
Recommendation #11: Review amount of the improvements needed in the monitored corridors and adjust the travel time standards and/or land use projections, if the identified improvements are not feasible.	Do not concur .	Consistent with the Growth Management Act, DOT assesses potential funding sources and reviews land use assumptions to program projects needed to meet level of service standards.	