Appendix E: Example Model Development Flow Chart

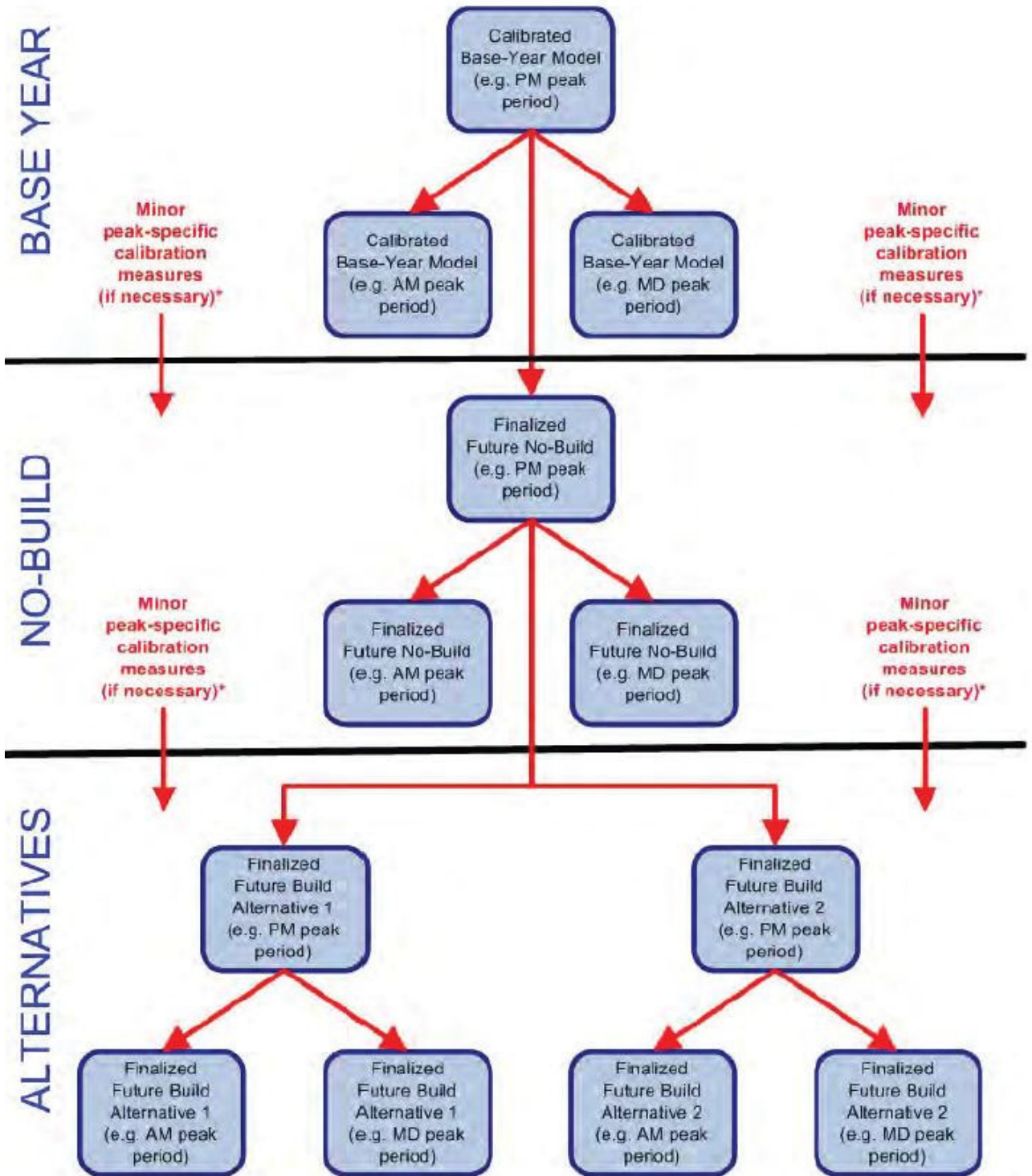# Examples of a Model Development Flow Chart

The purpose of a model development flow chart is to create a simple diagram of the model development process. The most important component of this diagram is the points at which a version of the network is copied to create multiple scenarios with the same geometry, such as different peak periods. The goal of this exercise is to emphasize the linear nature of the development process, control the number of forks in the development path, and minimize the number of network changes that must be repeated in multiple files.

Depending on the type of project, this could mean starting each stage in the modeling process (base, no-build, alternatives) by focusing on one peak period and getting it fully calibrated and functional before creating the other peak periods. This method would be used for those networks that have very few differences between peaks and the calibration measures required for one peak would apply to all of them. For example, as shown in Figure 1, one peak period should be fully calibrated and functional before the model is copied to create the other peak period scenarios. This ensures that the network geometry in each model is exactly the same. Furthermore, all scenarios in each stage should be completed before moving onto the next, which is depicted as the horizontal lines in the diagram. This should be the best approach for most projects. On the other hand, there could be other projects where each peak period is so different from the others that the calibration measures would not be common to all of them. The goal is to minimize the number of changes that have to be repeated in multiple files, so in the case the work flow depicted in Figure 2 would be more appropriate.

Creating forks in the development process too soon can have severe consequences. It can be tempting to meet an aggressive project schedule by developing alternative models in parallel to the base conditions. By fully calibrating one peak period of the base year model first, these changes to the network will only need to be done once. This also applies to future alternatives. Calibration measures in the base year will need to be carried forward in all subsequent models. Having to repeat network changes multiple times can significantly increase the level of effort required to complete the project. In addition, this premature forking of the model results in diverging models that do not truly represent a comparison of alternatives. It is very difficult to code link/connector changes (e.g. adding a dedicated turn lane) to the network exactly the same twice. Very minute differences that are not visually detectable can have an effect on the results generated by the simulation. The modeler should delay creating copies of a model for additional peak periods as long as possible to maintain consistency.
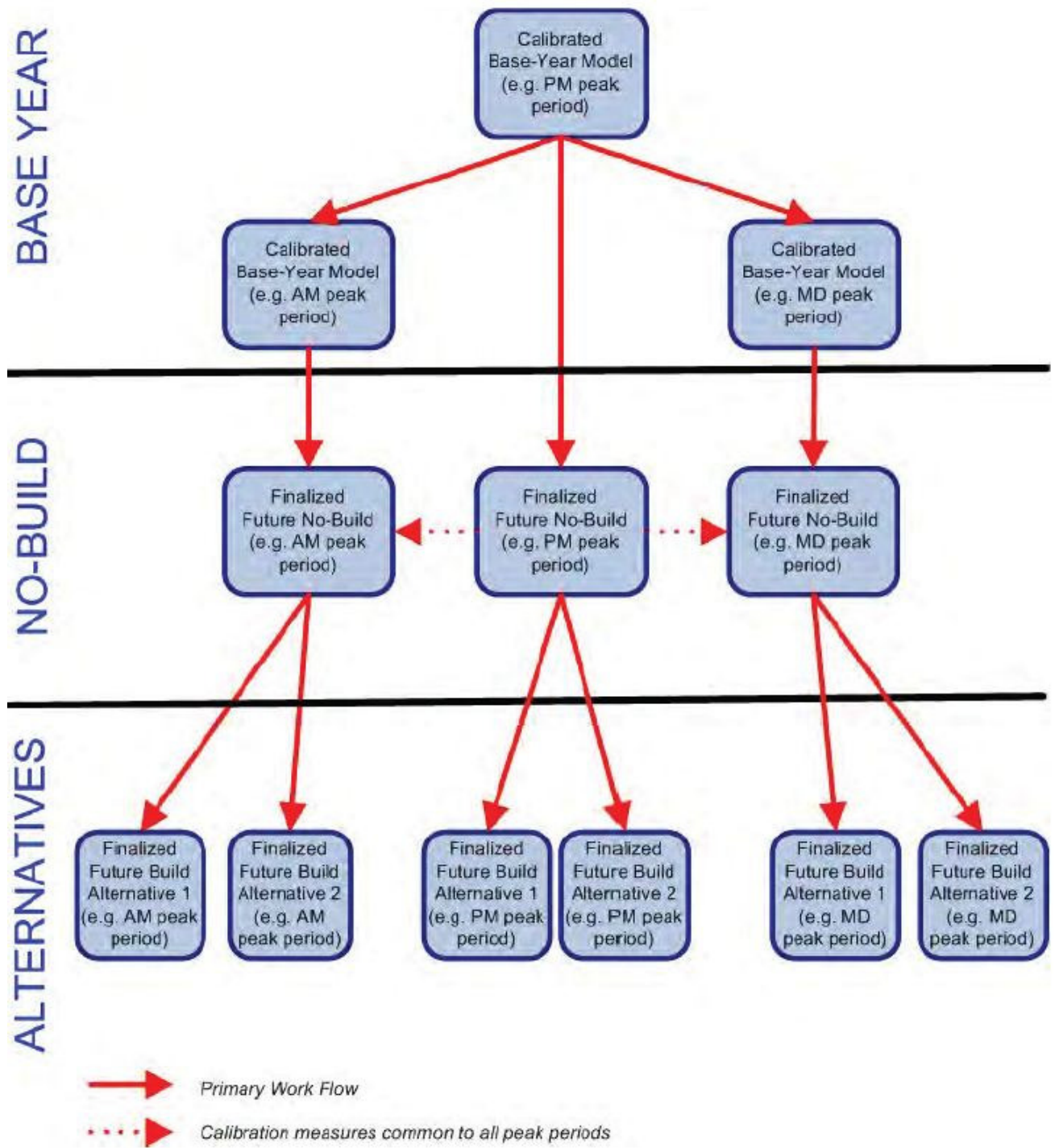
This simple exercise of preparing the model development flow chart during the scoping process gives both the modeler and WSDOT staff a clear picture of the critical path for the project and facilitates the creation of realistic and prudent schedule to complete the project on-time and on-budget. Two examples are provided below.

Model Development Tree (Example 1)

BASE YEAR

Minor peak-specific calibration measures (if necessary)*

Calibrated Base-Year Model (e.g. PM peak period)

Calibrated Base-Year Model (e.g. AM peak period)

Calibrated Base-Year Model (e.g. MD peak period)

Minor peak-specific calibration measures (if necessary)*

NO-BUILD

Minor peak-specific calibration measures (if necessary)*

Finalized Future No-Build (e.g. PM peak period)

Finalized Future No-Build (e.g. AM peak period)

Finalized Future No-Build (e.g. MD peak period)

Minor peak-specific calibration measures (if necessary)*

ALTERNATIVES

Finalized Future Build Alternative 1 (e.g. PM peak period)

Finalized Future Build Alternative 2 (e.g. PM peak period)

Finalized Future Build Alternative 1 (e.g. AM peak period)

Finalized Future Build Alternative 1 (e.g. MD peak period)

Finalized Future Build Alternative 2 (e.g. AM peak period)

Finalized Future Build Alternative 2 (e.g. MD peak period)

*The vast majority of calibration measures should apply to all peak periods. In order to maintain the highest level of consistency between models, these changes should be made only once in each modeling stage (base, no-build, alternatives) before copies are made to create the other peak periods. Peak-specific network changes should be minimal and will typically require less effort to recreate in each phase than the network calibration measures.

Model Development Tree (Example 2)

Figure showing hierarchical model development tree with three horizontal bands labeled BASE YEAR, NO-BUILD, and ALTERNATIVES.

BASE YEAR:
- Calibrated Base-Year Model (e.g. PM peak period)
- Calibrated Base-Year Model (e.g. AM peak period)
- Calibrated Base-Year Model (e.g. MD peak period)

NO-BUILD:
- Finalized Future No-Build (e.g. AM peak period)
- Finalized Future No-Build (e.g. PM peak period)
- Finalized Future No-Build (e.g. MD peak period)

ALTERNATIVES:
- Finalized Future Build Alternative 1 (e.g. AM peak period)
- Finalized Future Build Alternative 2 (e.g. AM peak period)
- Finalized Future Build Alternative 1 (e.g. PM peak period)
- Finalized Future Build Alternative 2 (e.g. PM peak period)
- Finalized Future Build Alternative 1 (e.g. MD peak period)
- Finalized Future Build Alternative 2 (e.g. MD peak period)

Legend:
→ Primary Work Flow
⋯▶ Calibration measures common to all peak periods

Appendix G: Ramp Meter Signal Timing Example

Available in PDF format on the Traffic Analysis Website
http://www.wsdot.wa.gov/Design/Traffic/Analysis/

Appendix H: Signal Timing Checklist

Available in PDF format on the Traffic Analysis Website
http://www.wsdot.wa.gov/Design/Traffic/Analysis/

Appendix I: Example Confidence and Calibration Report

Available in PDF format on the Traffic Analysis Website
http://www.wsdot.wa.gov/Design/Traffic/Analysis/