



MEMORANDUM

TO:	29 Road / I-70 Interchange Study Technical Advisory Committee
FROM:	Paul Brown and Melanie Bishop, FHU
DATE:	January 31, 2024
SUBJECT:	Westbound I-70 Freeway Operation Review (FHU Project Number 121072-01)

The 29 Road / I-70 project is evaluating a proposed new interchange along I-70 between the existing Horizon Drive interchange (Exit 31) and the existing Clifton interchange (Exit 37). Traffic analyses for the interstate assuming the new interchange show poor AM peak period levels of service (LOS E or LOS F) in four 15-minute periods along westbound I-70 in the long-range planning horizon (year 2045). Per Federal Highway Administration (FHWA) and Colorado Department of Transportation (CDOT) requirements, mitigation is anticipated to return the freeway to acceptable operations. However, analyses of the opening day condition (year 2030) show acceptable levels of service (LOS D or better). The project team evaluated when the poor levels of service are forecasted to occur (at some point between year 2030 and year 2045) and define the freeway volumes that result in this failure. This will allow for a discussion with the wider project team (including the Technical Advisory Committee) about possible mitigation phasing plans.

Analysis Framework (Year 2030 and Year 2045 Operations)

The project team evaluated two scenarios required by the CDOT 1601 and FHWA Interstate Access Request (IAR) process – opening day (year 2030) and the long-range planning horizon (year 2045). These results will be presented in the SLS to meet CDOT and FHWA requirements.

Year 2045 Operations – Long Range Planning Horizon

The long-range planning horizon operations are presented on **Figure 1** and **Figure 2**. As the graphics show, LOS F operations are forecasted westbound for one 15-minute period between the proposed 29 Road interchange and Horizon Drive. Further, LOS E operations are forecasted for three subsequent time periods in this same area, resulting in an hour of unacceptable operations. These results reflect existing geometric conditions on the freeway except for the addition of the 29 Road interchange ramps to and from I-70.

The year 2045 no-action operational results for this area showed acceptable operations (LOS D or better), indicating that mitigations may be needed if the proposed interchange is constructed. The project team is evaluating an I-70 auxiliary lane as a potential mitigation measure. However, it comes at a significant project cost. Early conceptual estimates indicate that the auxiliary lane could cost about \$5.3 million (in 2023 dollars). An additional mitigation measure being considered is the widening of the Horizon Drive westbound off-ramp to provide a 2-lane exit. This improvement could be completed as part of the auxiliary lane project.

Year 2030 Operations – Opening Day

The project is using year 2030 as the opening day analysis year. The year 2030 operations are presented on **Figure 3** and **Figure 4**. As the graphics show, LOS C or better operations are forecasted, and no mitigation would be required.

Interim Year Analysis

To better understand when the acceptable (LOS C) operations on opening day transition to unacceptable (LOS E/F) operations in the long-range planning horizon, interim year analyses were completed for year 2035 and year 2040.

Year 2035 Operations

Forecasted traffic operations in the first interim year (2035) are presented on **Figure 5** and **Figure 6**. As the figures show, LOS D operations are forecasted westbound for one 15-minute period between the proposed 29 Road interchange and Horizon Drive. This is still acceptable (LOS D or better) and only occurs for one 15-minute period. Although the level

of service worsening from LOS C to LOS D may be a concern, the short duration and the fact that it meets the acceptable operation threshold should not warrant mitigations in this interim year.

Year 2040 Operations

Forecasted traffic operations in the second interim year (2040) are presented on **Figure 7** and **Figure 8**. As the figures show, LOS E operations are forecasted westbound for one 15-minute period between the proposed 29 Road interchange and Horizon Drive. This is considered unacceptable (LOS E or worse) but only occurs for one 15-minute period. The remaining seven 15-minute periods are acceptable (LOS D or better). Although it may be considered a concern, the short duration of LOS E operations should not warrant mitigations in this interim year.

Interim Year Conclusion

Although operations degrade over time based on increased volumes, these results indicate that only one 15-minute period would fall below the acceptable threshold in 2040. This implies that mitigations required in the long-range planning horizon would not be necessary until year 2040 or later.

Volume Threshold Analysis

Travel demand forecasts for future years are just that – forecasts. They are prepared using the best available information, including planned improvements and anticipated growth in households and employment. This process is executed in the Grand Valley using the Mesa County Regional Travel Model (MCRTM), and the project team used this model to develop project-specific forecasts.

However, it is acknowledged that modeled traffic volumes are still forecasts, and they can be affected by unforeseen events. In the Grand Valley, the economic downturn of 2008–2009 was not captured in then-current traffic forecasts, and the effects of the COVID-19 pandemic were not captured in travel demand models across the state.

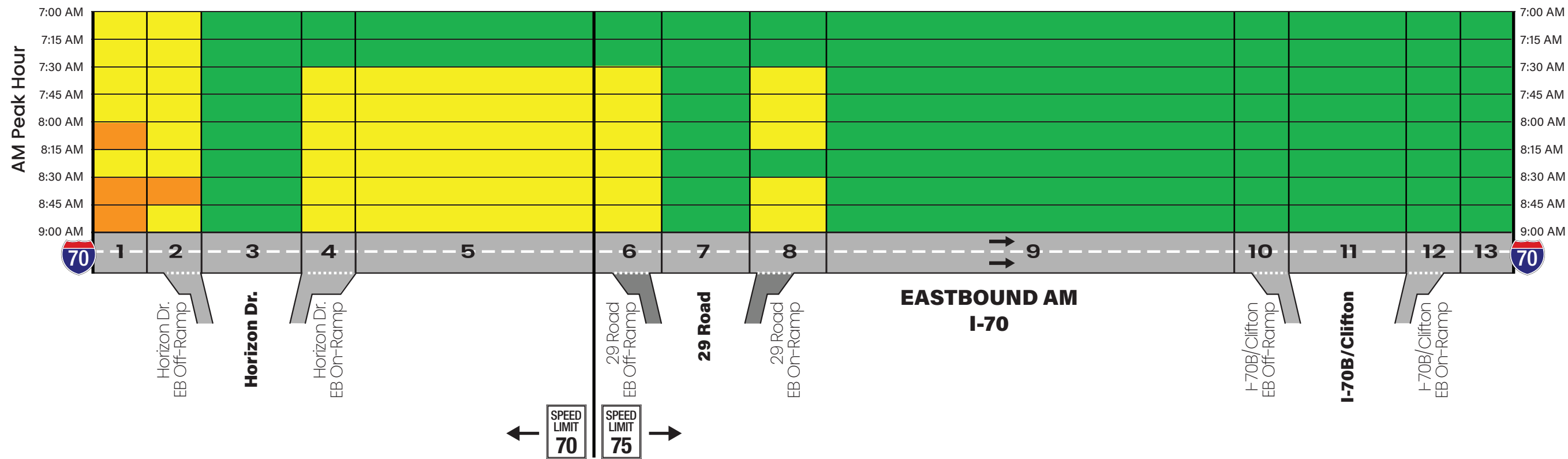
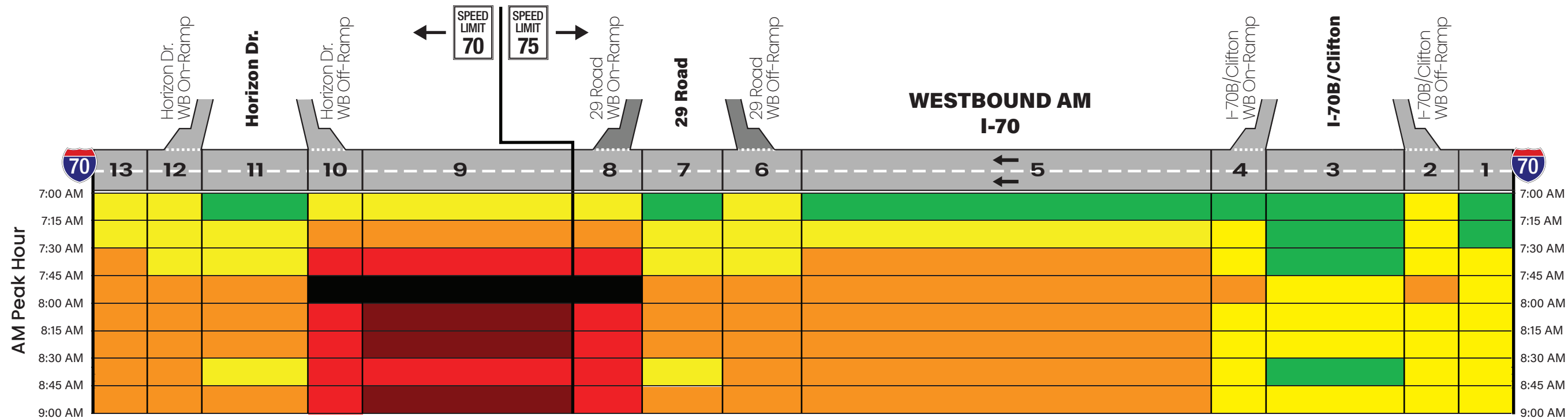
Analysis Approach

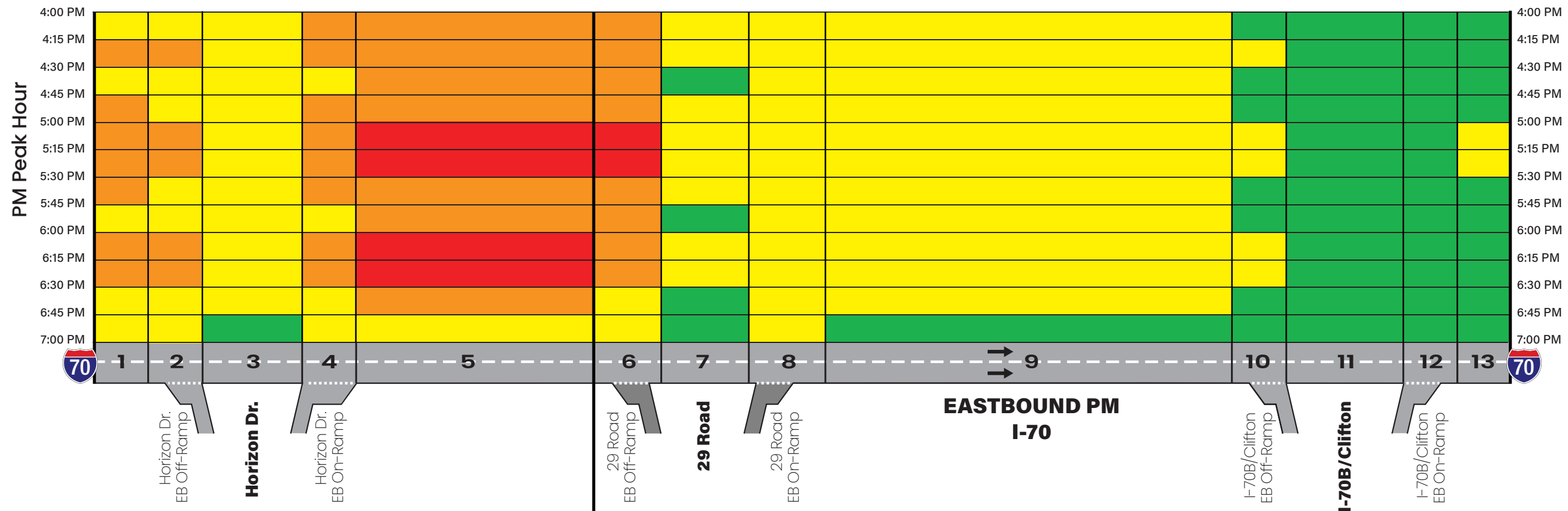
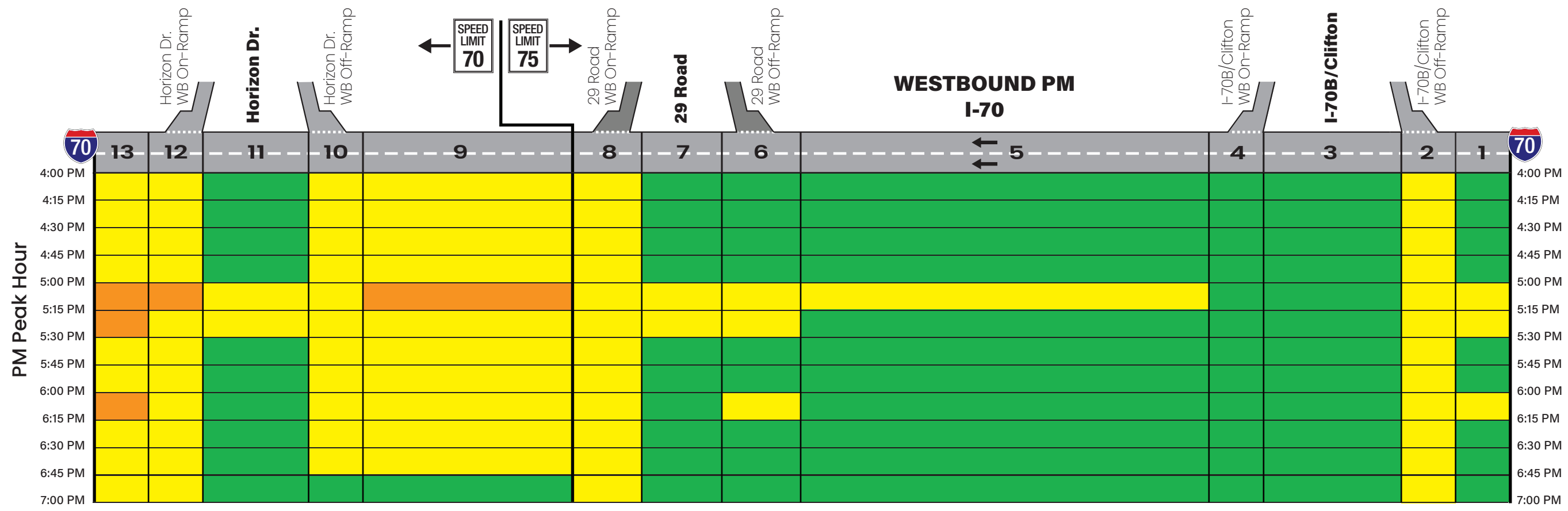
Given the nature of the volume forecasting process, the project team completed an analysis to determine the volume threshold at which traffic operations are expected to degrade to unacceptable levels (LOS E). Agencies can use these values to plan for improvement irrespective of the year in which the volumes occur. The analysis consisted of incremental software runs that reduced the year 2045 mainline I-70 demand by 100 vehicles per hour until an acceptable LOS was achieved between 29 Road and Horizon Drive. The process also reflected the fact that the single lane Horizon Drive exit ramp (diverge) is over capacity in year 2045. Hence, each mainline freeway analysis iteration was completed with both the existing ramp configuration and a theoretical 2-lane exit ramp configuration until acceptable freeway operations were observed. Once this value was recorded, a further iterative process was applied to the ramp to determine the volume at which an acceptable LOS was achieved for the ramp diverge.

Based on this process, widening the Horizon Drive exit ramp (only) would not address identified year 2045 operational shortfalls on I-70. Further, constructing the additional ramp lane will not change the volume threshold for implementation of the auxiliary lane. Hence, combining the ramp widening with the auxiliary lane implementation is the most reasonable construction approach from a traffic perspective.

Threshold Volume Conclusion

Based on this process, the westbound I-70 mainline between 29 Road and Horizon Drive can operate acceptably (LOS D or better) at a demand of approximately 3,500 vehicles per hour. However, the westbound Horizon Drive diverge will not operate acceptably as a single lane with the 2045 forecast volume regardless of the mainline I-70 volume. Hence, it is recommended that the Horizon Drive diverge be improved when the exit ramp demand reaches 1,850 vehicles per hour.



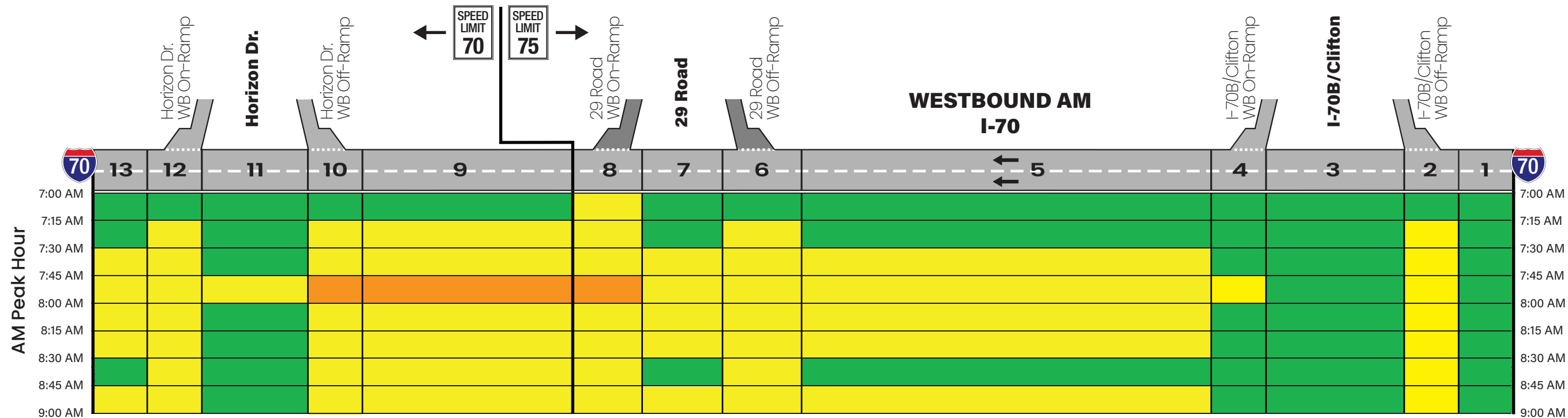


LEGEND

- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

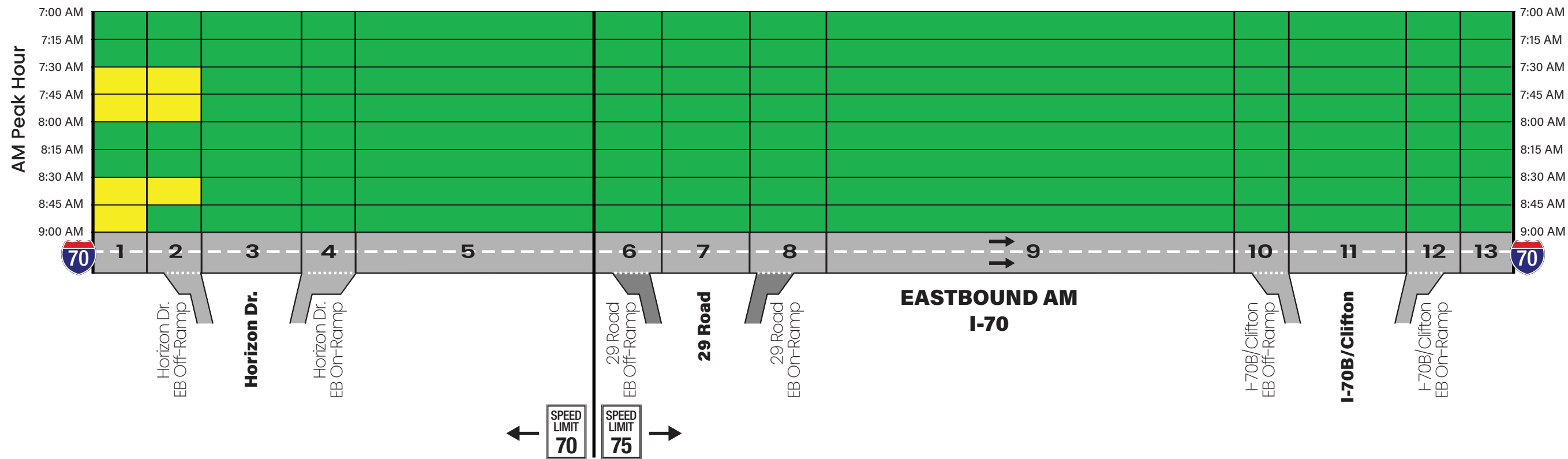


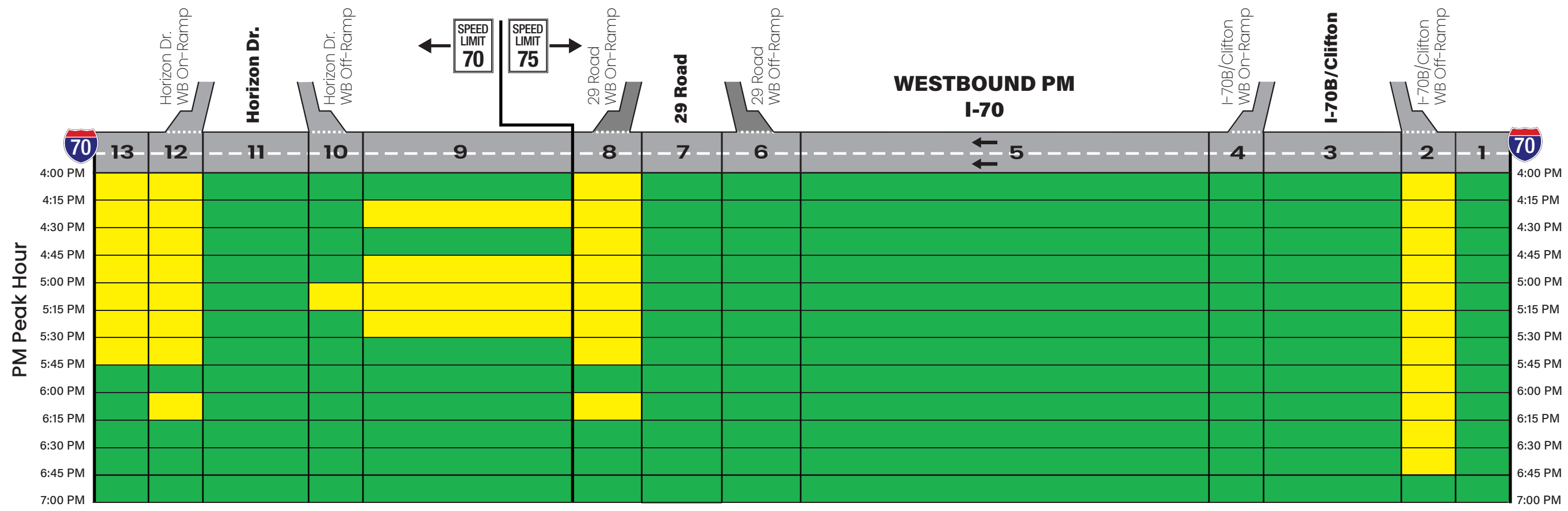
FIGURE 2
 2045 Build PM Peak Period Freeway Operations
 I-70 and 29 Road Interchange - Freeway Phasing Analysis 121072-01 1/30/24



LEGEND

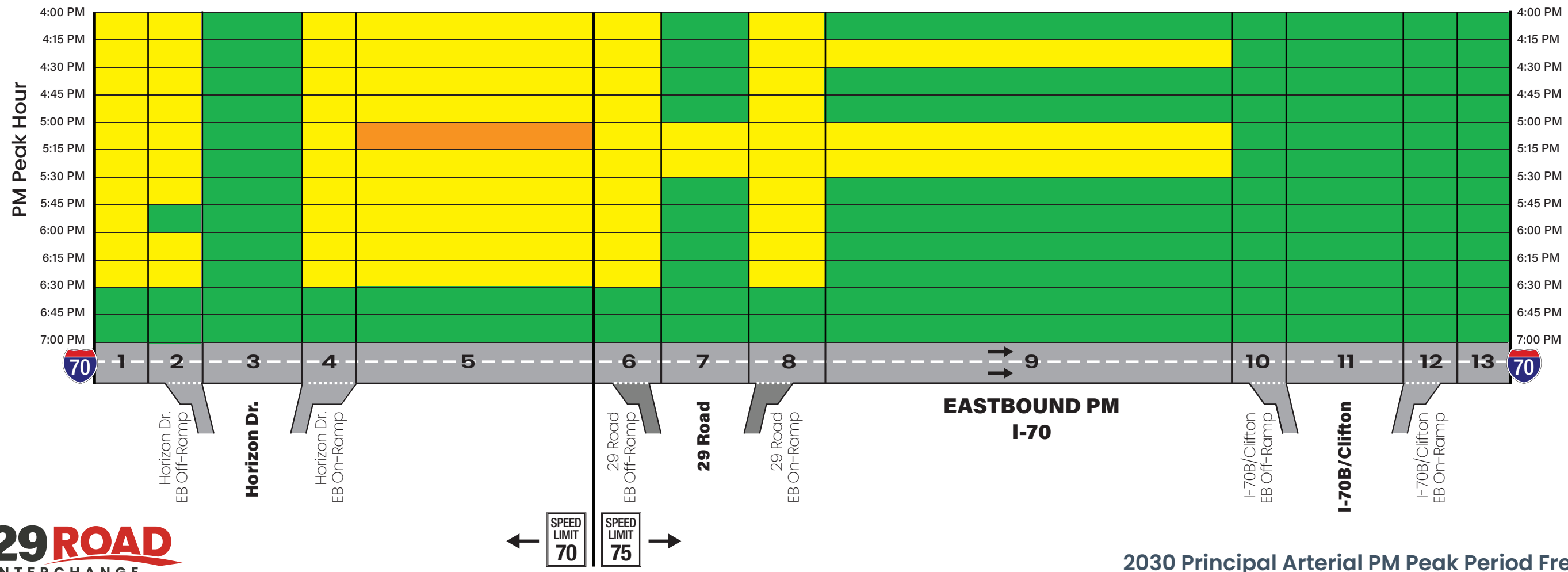
- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F

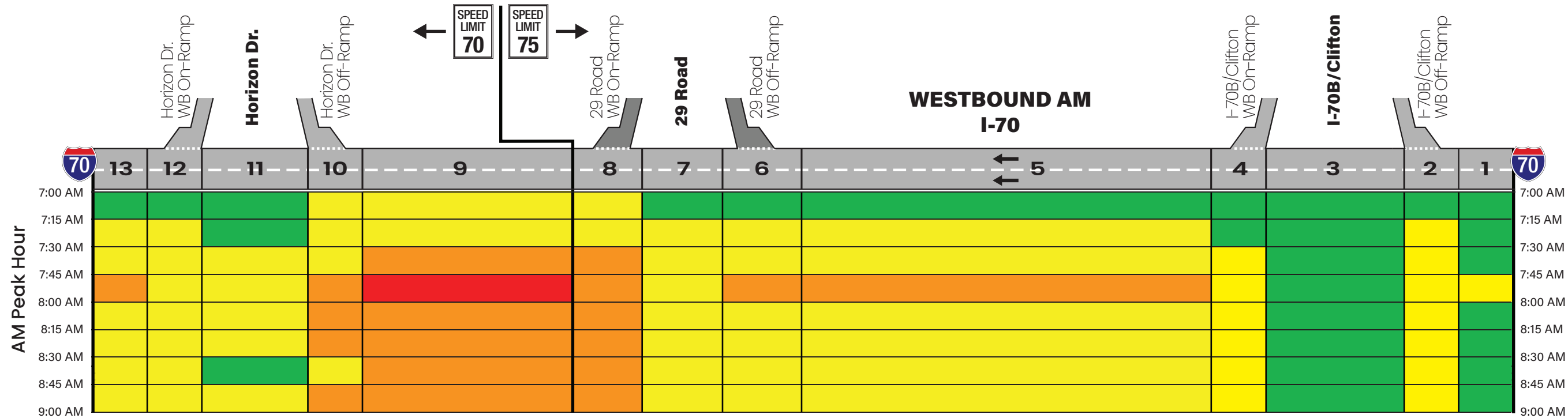




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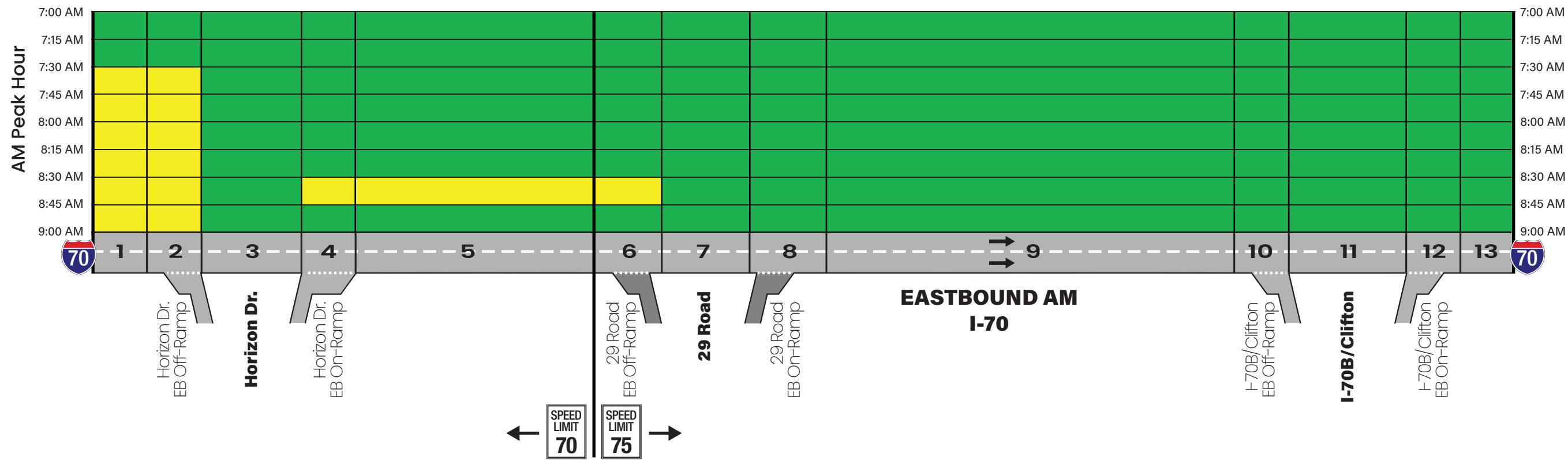
- LOS A (Green)
- LOS B (Yellow)
- LOS C (Orange)
- LOS D (Red)
- LOS E (Dark Red)
- LOS F (Black)

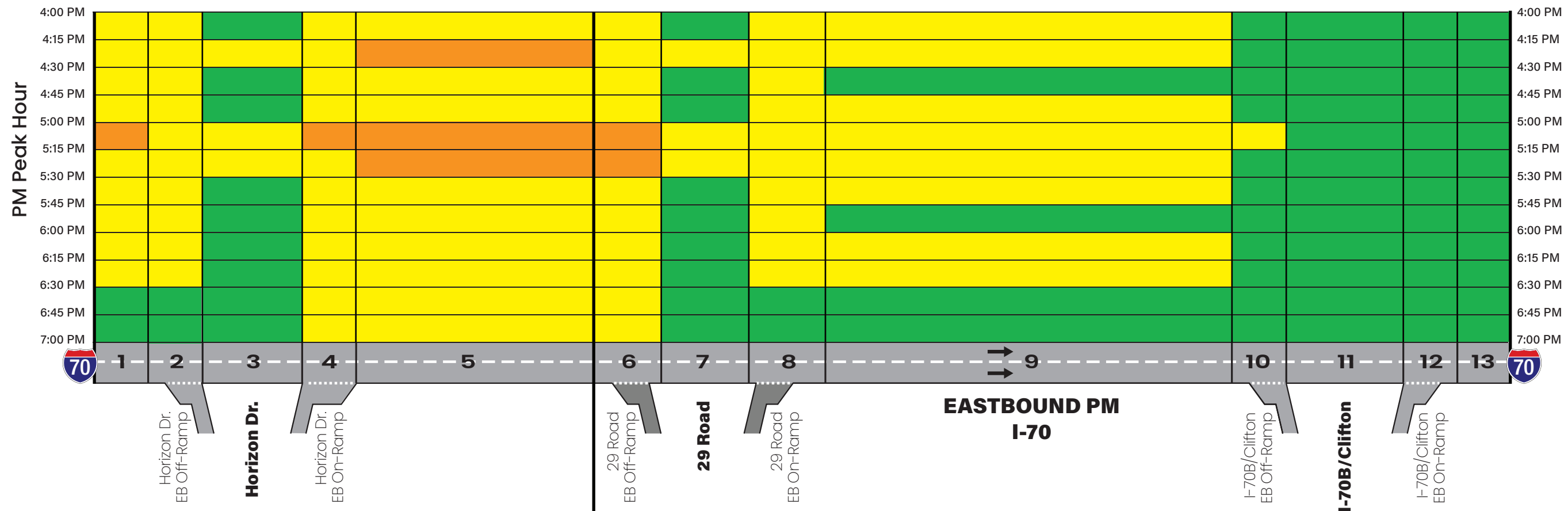
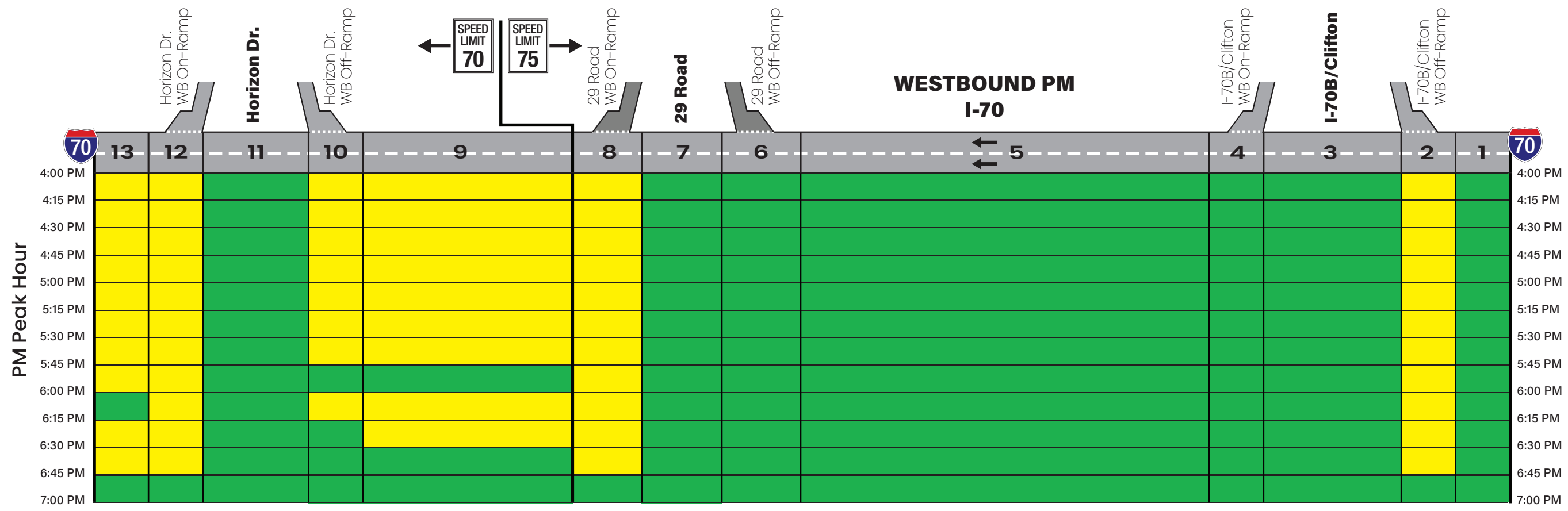




LEGEND

- LOS A
- LOS B
- LOS C
- LOS D
- LOS E
- LOS F





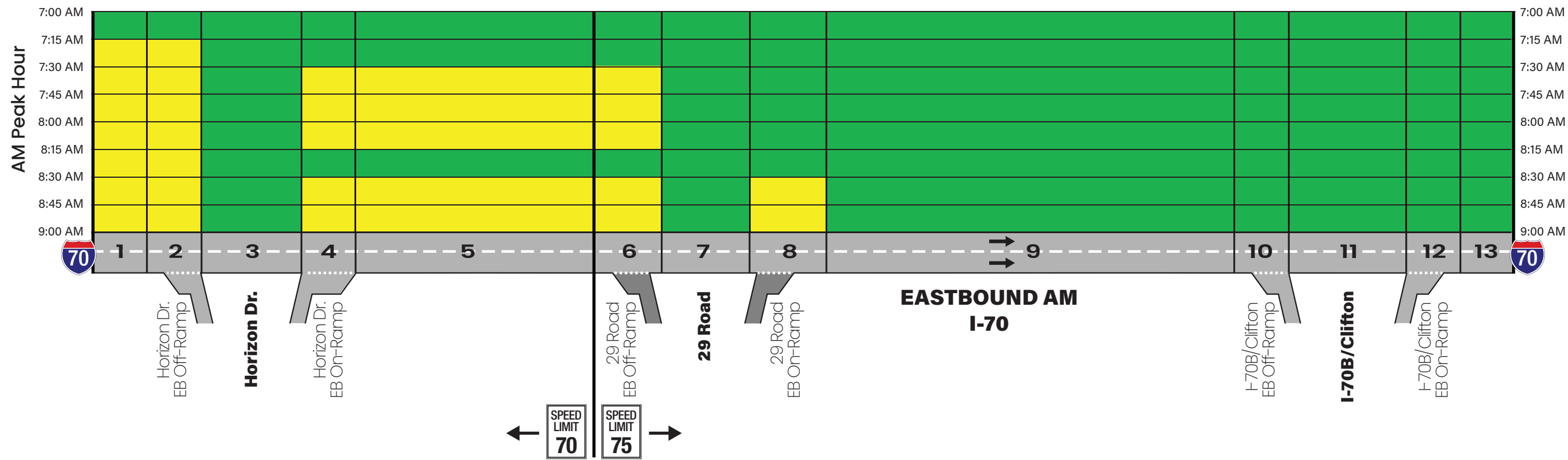
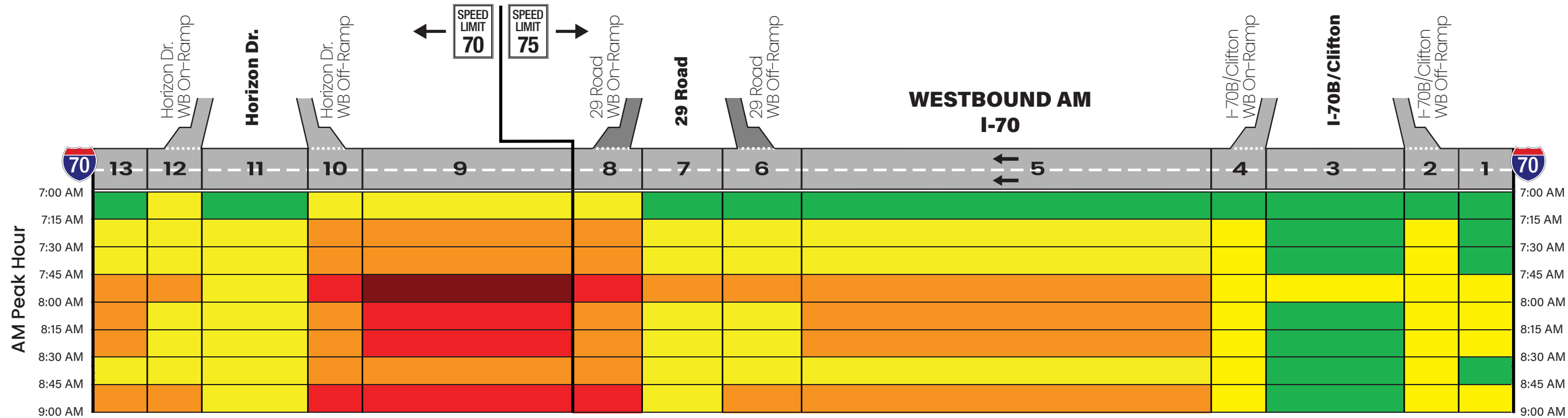


FIGURE 7
 2040 Principal Arterial AM Peak Period Freeway Operations
I-70 and 29 Road Interchange - Freeway Phasing Analysis 121072-01 1/30/24

