

## LONG TERM CAPACITY DESIGN ALTERNATIVES

If 2035 regional model traffic demands become realized, US 550 would operate well over capacity under a “No-Build” scenario. The following section will discuss several design options to improve 2035 capacity and operation. These design alternatives will be further discussed within the Phase 1A Report.

### Freeway Section

A two lane freeway in both directions could be constructed to accommodate projected 2035 demands from NM 313 to Camino Don Tomas and from NM 528 to Paseo del Volcan. Projected 2035 through movements indicate that four lanes would be required from Camino Don Tomas to NM 528. However, this would require that interchanges be limited to the existing I-25 single point urban interchange and possibly a new interchange at NM 528. The only other option would be to locate an interchange at NM 313, which is quite close to the I-25 SPUI or at Camino Don Tomas, which although ideally spaced at one mile between NM 528 and I-25, Camino Don Tomas does not have the north-south connectivity of NM 313 or NM 528. The downside of this option is that frontage roads would be required to be provided local access to the various residential and commercial



properties in the area, requiring a significant amount of ROW acquisition, in some cases, condemning much of the commercial property requiring the access. Additionally, a freeway section currently does not correspond to the type of future community development the Town of Bernalillo, Santa Ana Pueblo, and the City of Rio Rancho desires. A freeway would especially fracture the Town of Bernalillo, which is currently trying to maintain its small town and historical quality of life.

### Eight Lane Section

Projected 2035 demands, if realized, dictate that US 550 incorporate four through lanes in each direction from NM 313 to Paseo del Volcan. This option would provide acceptable levels of operation at many of the study intersections except at Jemez Dam, Sheriff’s Posse Road, and Camino Don Tomas. However, the intersections of Paseo del Volcan and NM 528 are both projected to have extremely heavy demands north to east (AM peak) and west to south (PM peak) which would require NB triple right-turns at both intersections, a WB triple left at Paseo del Volcan, and a free flow movement for the WB left-turns at NM 528. This option would likely require extensive ROW acquisition. Additionally, the bridge would have to be widened.

### Six Lane Section

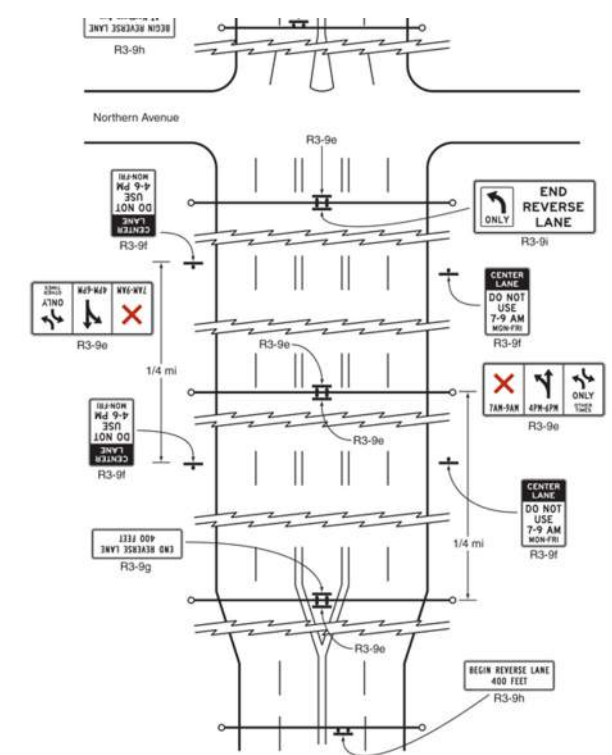
As mentioned in the Operations Analysis section, through demands on US 550 are very near requiring three through lanes in each direction today from US 313 to NM 528. Two through lanes in each direction can remain between Sprint Boulevard and Paseo del Volcan. It is anticipated that a six lane section could accommodate demands as late as 2027 to 2030 with the latter more likely if back access roads are constructed. This is based on the calculation of approximately a 3.5% average annual growth calculated between 2013 counts and 2035 projections. It should be noted that the anticipated life of a six lane section does not take into account potential reductions in demand resulting in greater transit utilization, alternative river crossing options, benefits from adaptive signal control, and implemented traffic demand management strategies like flex shifts or telecommuting for employment centers. Bridge widening would also be required for this option if bicycle lanes were to be accommodated. It may be possible that if bicycle lanes are not accommodated and through lanes are narrowed to 11 feet, widening of the bridge could possibly be avoided. This will be further investigated in the Phase 1A Report.

### Dynamic Lanes

#### Reversible Lanes

With limited available ROW, the use of reversible or dynamic lanes could be implemented to achieve either the “Three-Lane Section” or “Four Lane Section” options. The reversible lane concept essential maintains an extra lane that would change direction based on the dominant direction of travel at a certain time of day. In the case of US 550, the extra lane would accommodate eastbound traffic in the AM commuter peak and westbound traffic demands in the PM commuter peak. Reversible lanes generally require frequent (every quarter mile) overhead lane utilization indications. Overhead lane utilization signage can further be augmented by what is called a “zipper”, which is a vehicle that can shift concrete barrier walls one lane over in preparation for the switch in lane direction as peak demands change. The other major challenge to reversible lanes is left-turns. Generally, it is recommended that left-turn movements be eliminated within the reversible lane segment as shifting left-turn lanes can prove to be too

Figure 8. Reversible Lane Indications (MUTCD Excerpt)



confusing for drivers and difficult to accommodate appropriate and safe intersection geometry. As mentioned, it is projected that there will be heavy left-turn demands at the Paseo del Volcan and NM 528 intersections. Therefore a reversible section could be limited to NM 313 to NM 528. However, the elimination of left-turn movements at the intersections likely would not find support among adjacent business owners as many businesses take access off of intersections such as Camino Don Tomas and Jemez Road. Alternative access could possibly be provided through the use of back access roads, which will be discussed in the Access Management section of this report. Reversible lanes could also be incorporated into the freeway option previously discussed thus reducing the number of freeway lanes needed to accommodate 2035 traffic demands.

*HOV and Hot Lanes*

High Occupancy Vehicle (HOV) lanes are facilities designated for use by vehicles with a specified number of passengers, which include personal and transit vehicles. HOV lanes are recommended on corridors with high congestion to encourage transit use and carpooling to reduce the number of vehicles on the facility, and thus providing additional capacity. HOV lanes are intended to benefit those drivers and passengers to in effect by-pass congestion

**Figure 9. Typical Hot Lane Signage**



HOT lanes is short for High Occupancy Toll lanes, which are lanes that allow drivers to pay a toll to use the lane provided they have a specified number of passengers within their vehicle. Transit vehicles would also qualify for use of HOT lanes. HOT lanes are recommended on corridors with high congestion to encourage drivers to use transit as their primary mode of transportation or to create carpools. The tolls collected can then be used to maintain the infrastructure needed to enforce and operate the HOT lanes. Generally, HOT lanes are only used on freeway facilities and not signalized arterials. US 550 would have to become a more limited access freeway facility for this option to become viable.

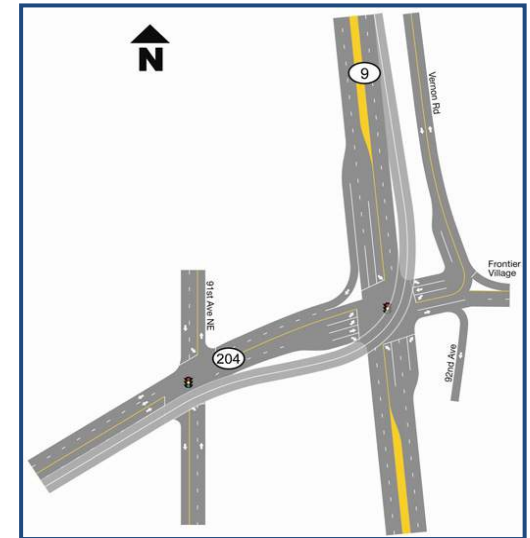
**Priority Movement Enhancements**

*Flyover*

As mentioned, it is anticipated that there will be extremely heavy turn demands between the east and south legs of both Paseo del Volcan and NM 528. Turn demands at NM 528 are such that even a triple left-turn will not operate at an acceptable level of service. Therefore, this movement would operate best under a free-flow scenario, which would entail a fly-over, loop ramp or jug handle. A fly over would include a grade separated structure that would start on the east leg, traverse above the signalized intersection, and return to grade on the south leg. This option would not only include the expense of a significant bridge structure, but would also require limited access for adjacent approaches on the east and south legs. There would likely require a significant ROW acquisition as well.

**Figure 10. Example of a Flyover at Signalized Intersection**

Source: WashDOT

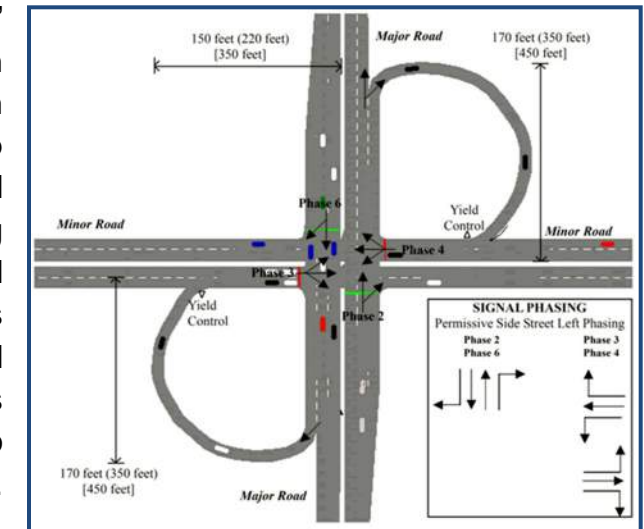


*Jug Handle*

Another option would be to shift left-turn traffic to the westbound right lanes by constructing a “loop ramp” in the northwest quadrant of the NM 528 intersection and a grade separated bridge structure for either US 550 or NM 528. This design option would also require significant ROW acquisition, especially in the northwest quadrant where the loop ramp would be constructed. Additionally there would be significant costs associated with the bridge structure for either US 550 and NM 528. An additional option could be the use of a “jug handle”. A “jug handle” intersection is an at-grade intersection where a left-turn movement has been shifted to the outside right through lanes and then shepherded through an at grade loop access. An example is shown in **Figure 11** as provided by the FHWA Techbrief on three New Jersey jug handles. As shown, the left-turn movement would actually enter the signalized intersection twice: Once as a westbound through and twice as a southbound through lane. However, if a jug handle option was constructed the NM 528 intersection is anticipated to still operate at a LOS F under 2035 demands.

**Figure 11. Jug handle Example**

Source: FHWA





Therefore, a jug handle would not be a viable option and a flyover type operation would operate at a more acceptable LOS.

#### Continuous Flow Intersection

Finally, this over-capacity movement could possibly be handled by incorporating a continuous movement geometry, as indicated in **Figure 12**. As shown, the westbound left-turn movement would cross the eastbound movements through a two phase signal just upstream of the US 550/NM 528 intersection. The left-turn movement would then be channelized to the right of the eastbound through lanes at the US 550/NM 528 signalized intersection and thus allow all eastbound left-turn movement to operate simultaneously with both westbound left and through movements. This approach could allow the signal to operate below capacity. Challenges to this concept includes ROW acquisition to accommodate a larger intersection footprint, the potential restriction of right-turn on red for north/south approaches unless right-turn channelization is used, and complexity of the signal operation as there would be three closely spaced signals to accommodate the left-turn crossover movements.

**Figure 12. Continuous Flow Intersection**  
Source (FHWA)



#### Back Access Roads

The incorporation of back access collector or frontage roads will not only provide better access management but would reduce traffic demands needing to use US 550 by as much as 20-25% based on the additional capacity of one lane of traffic in each direction. This reduction in demand on US 550 could provide as much as an additional five years of capacity to the Six-Lane Option discussed previously in this section, and would also remove significant amounts of mid-block turning demands which can inhibit progression and increase crash risks. Access management concepts and recommendations are discussed in detail in the next section.

#### Transit Improvements

The implementation of Bus Rapid Transit (BRT) should be considered in the coming years for the US 550 bridge crossing to and from the Rail Runner Transit Hub. To alleviate river crossing demands, a new park and ride facility could be located on the west side of the Rio Grande River.

This park and ride could impact modal choice on the US 550 thus potentially freeing up additional capacity. Therefore, potential locations for such a park and ride facility should be studied to determine the most serviceable and practical location. Additional capacity savings could also be realized by looking into providing a reversible BRT lane. Further discussion of potential transit improvements are discussed in the Transit section of this report.

#### Adaptive Signal System

An adaptive signal system could be deployed, which can provide up to 5% capacity improvements throughout a typical day. An adaptive system continuously recalculates the required offset, green splits and cycle length based on real time platoon data and traffic demand. Implementation of this type of traffic control would require additional detection both upstream and downstream from the signal locations, and usually includes a traffic management program that works with many existing controller types. The advantages for an adaptive system are the following:

- The system will continuously distribute green time to “real time” demands.
- The system can provide a consistent reliable travel time for corridor demands no matter what the time of day.
- The adaptive nature can customize peak hour plans by day of the week, whereas a static plan defines a plan to last from a predetermined time frame.

The main drawback to the system can be the initial cost and the continued maintenance of a larger amount of detection as the adaptive system depends on this data. If these additional detectors are not working, the adaptive system fails.

An adaptive system is a good option in conjunction with other strategies when a corridor cannot be widened or when the procurement of additional ROW is cost prohibitive. In order to get the most out of an adaptive signal system, other strategies such as transit enhancements, access management, traffic demand management, and pedestrian/bicycle improvements should also be pursued.

#### Alternative Bridge Crossings

Alternative bridge crossing have been looked at in the past. However a new bridge crossing would require many shareholders to agree on a location and so far no viable candidates have been put forth and seems unlikely that any will be progressed within the next couple of decades. Providing alternative Rio Grande Bridge crossings are beyond the scope of this project. However, the opportunity for new river crossings north or south of the US 550 corridor should continue to be pursued, especially as development continues in the area.

### Traffic Demand Management

Additionally efforts can be made in traffic demand control from a planning perspective by encouraging the following local employment, and business development practices:

- Carpooling or car sharing programs
- Implementation of flexible company work hours
- Encouragement of telecommuting and tele-meeting practices
- Incorporation of parking fees
- Development of work center destinations on the west side of the river to balance river crossing demands

