CHAPTER 3

3.0 SELECTION OF CONCEPTUAL US 1 ALTERNATIVES

The Study Team reviewed the project area's existing land uses, previous planning efforts, transportation characteristics, environmental features and anticipated 2040 traffic volumes in order to prepare concepts that were refined into four conceptual project alternatives including:

- A No-Build (Rural Highway/High Speed Arterial) Alternative;
- A Superstreet Alternative;
- A Freeway Alternative; and
- A Freeway with Local Street Enhancements Alternative.

The design specifications of these alternatives are discussed in greater detail in the sections below. After their selection, the four alternatives were then compared for their:

- Ability to improve US 1 traffic operations and safety;
- Compatibility with state, county and long range plans for US 1;
- Opportunity to improve bicycle and pedestrian travel in the project area;
- Ability to balance future US 1 access changes with urban development needs;
- Impacts on the human and natural environment; and
- Costs.

Through the comparison above concerns, it became evident that two of the four alternatives - the Superstreet Alternative and the Freeway with Local Street Enhancements Alternative - are the best match for the short and long term transportation goals of US 1 in the project study area.

The Superstreet Alternative was shown to be the best alternative for the interim period between 2012 and 2040, and the Freeway with Local Street Enhancements Alternative was shown to be the best alternative after 2040. The analysis of the alternatives also indicated that the Superstreet Alternative has a design that easily facilitates a later conversion of US 1 to a freeway. The freeway design is shown as the ultimate goal for US 1 in the state, county and township plans.

Upon selection of the conceptual US 1 alternatives, more detailed analysis is presented in Chapter 4.

3.1 Identification of Conceptual US 1 Alternatives

In order to determine the types of improvements that would be necessary to assure that US 1 would sufficiently serve future transportation needs, the Study Team reviewed the project area's existing land uses, previous planning efforts, transportation characteristics and environmental features. The Study Team also considered future year 2040 traffic volumes. With this knowledge, the following four conceptual alternatives were identified and analyzed:

- **No-Build (Rural Highway/High Speed Arterial) Alternative:** This conceptual alternative is considered the No-Build. In this alternative, no improvements will be implemented. The only exception would be the addition of new traffic signals, potentially at both existing local roads and at proposed development access points to US 1.

  US 1 south of NC 56 will continue to be a high speed arterial that will include traffic signals at the US 1 intersections with Bert Winston Road, Cheatham Street/ Pocomoke Road, US 1A (South Main Street), and potentially additional roads on US 1. North of NC 56 and particularly north of US 1A (North Main Street), the volumes on US 1 will be lower so the demand for future signals would be less. Nevertheless, a single large development or other increases in traffic demand could warrant a signal in the north, thereby introducing delays.

- **Superstreet Alternative:** In this conceptual alternative US 1 will be a superstreet, a type of roadway design that does not allow for left turns from side streets or driveways. Traffic from side streets would only be able to make right turns onto US 1 and then take U-turns at median breaks. The benefits associated with superstreet design include greater mainline capacity, safety and green-signal time because of the elimination of traffic conflicts associated with left turns.

- **Freeway Alternative:** In this conceptual alternative, US 1 will be a freeway with access only at interchanges. This design will eliminate side street and driveway conflicts and would offer the highest capacity and safety. Additionally, NCDOT has identified US 1 as a future freeway in its *North Carolina Strategic Highway Corridors Vision Plan*.

- **Freeway with Local Street Enhancements Alternative:** In this conceptual alternative, US 1 will have the same freeway design as the Freeway Alternative, but local streets will be enhanced to become frontage and backage roads to facilitate better travel and provide access within the local community for non-freeway users.

Note that for all four conceptual alternatives (including the No-Build) it is assumed that the SEHSR will be constructed including proposed local streets and connections to US 1.

3.2 Comparison of Conceptual US 1 Alternatives

The four conceptual alternatives presented above were compared utilizing multiple criteria including:

- US 1 traffic operations and safety;
- Compatibility with US 1 long range plans;
- Provisions for bicyclists and pedestrians;
- Balancing access needs and development potential with traffic operations;
- Impacts to the natural and human environments; and
- Preliminary Costs.

Because this comparison occurred within the earlier stages of the project, some detailed data did not exist at the time. In these instances, impacts were inferred from available data.

3.2.1 US 1 Traffic Operations and Safety

3.2.1.1 *Average Daily Traffic Capacity Analysis*

The preliminary version of the *Triangle Regional Model* Version 5 (TRM-V5) was used to predict future US 1 traffic volumes to evaluate long term capacity on US 1. Although the Study Team recognizes that TRM-V5 is not yet official, it was utilized at the request of the MPO because it includes more detail about the local roadway network in the study area. It also includes the latest population and employment projections for 2040. It is important to note that the volumes in the TRM-V5 model are slightly lower than those in the 2035 TRM-V4 model. This is due primarily to a reduction in overall land use intensities anticipated to be in place by 2040.

As shown in Table 3-1, traffic projections for US 1 will be greater south of NC 56 and lower north of NC 56. Between the southern project limits and the future NC 56 Bypass, daily volumes are expected to exceed 40,000 vpd by 2040. Between the future NC 56 Bypass and existing NC 56, the US 1 volumes are

expected to exceed 30,000 vpd in 2040. North of NC 56, US 1 will carry less than 30,000 vpd in 2040.

Table 3-1. 2040 Volumes and Capacity Analysis

US 1 Segment		2040 Daily Traffic Volume	Alternative				
			No Build		Superstreet	Freeway	Freeway with Local Street Enhancements
From	To		North of NC 56	South of NC 56			
Vance County line	North project limit	22,800	B	--	A	B	B
North project limit	US 1A (near Mann St.)	26,100	B	--	A	B	B
US 1A (North Main Street)/ Mann St.)	NC 56	25,800	B	--	A	B	B
NC 56	US 1A (S. Main Street)	31,600	--	C	A	C	C
US 1A (South Main Street)	US 1A (Park Ave.)	40,600	--	F	C	C	C
US 1A (Park Ave.)	Youngsville	43,400	--	F	D	D	D

Note: -- indicates that data for the cell shown is not applicable.

The four alternatives were evaluated for traffic operations using the 2040 daily traffic volumes. Specific design assumptions in this evaluation include:

- **No-Build:** The rural highway segment of US 1 north of NC 56 would be a four lane highway without signals. The high speed arterial segment of US 1 south of NC 56 would have conventional signals.
- **Superstreet Alternative:** US 1 would be a four lane superstreet with two-phase signals.
- **Freeway Alternative:** US 1 would be a four lane freeway.
- **Freeway with Local Street Enhancements Alternative:** US 1 would be a four lane freeway with local streets providing access to development.

The daily level of service (LOS) thresholds used in this analysis are found in Table 2-6. As indicated in Table 3-1, traffic volumes in the south section are projected to be almost 50 percent

higher than those anticipated in north section. Key findings from this analysis include the following points:

- **Improvements needed in southernmost project segment prior to 2040:** In the project section between US 1A S. Main Street and US 1A (Park Avenue), the existing roadway has traffic signals and is an arterial roadway. However under the No Build Alternative, LOS F is anticipated by 2040.
- **Capacity is not the primary concern in the northernmost project section:** In this section, traffic volumes are lower and capacity is not the primary criteria in determining the future typical section. However, future traffic signals will need to be introduced at additional intersections, and the inclusion thereof would result in delays on US 1.
- **The Superstreet Alternative would improve operations and safety, but would not meet ultimate freeway goal:** Although traffic signals will still be required, they would operate more efficiently than on a traditional arterial roadway, and the Superstreet Alternative will allow for LOS D or better operations throughout the entire corridor as well as improve safety. However, the Superstreet Alternative does not meet the ultimate goal of having US 1 as a freeway.
- **The Superstreet, Freeway, and Freeway with Local Street Enhancements Alternatives perform well into 2040:** With four lanes, any of these alternatives provide suitable capacity for the entire corridor through 2040.

An earlier analysis had been conducted for the project using the TRM-V4 model which utilizes 2035 daily traffic volumes. Using the TRM-V4 model, future traffic volumes were generally 5,000-8,000 vehicles per day (VPD) greater on the southernmost segment of US 1 between the southern project limit and NC 56. To accommodate these higher volumes, a six-lane section would have been more suitable in this segment of US 1.

While the TRM-V4 model has been superseded by TRM-V5 model, which has adjusted lower daily volumes, the higher daily volumes of the V4 model could be used to infer what could occur after the 2040 timeframe. Hence, it appears beneficial to take into account the possibility for a six-lane section in the southernmost segment of US 1 in the longer term beyond 2040. The current recommendations are not to provide right of way for six-lanes, but to require setbacks of up to 30 additional feet to minimize future impacts if six-lane widening were to occur south of NC 56. It is recommended, however, that overpass structures over US 1 be designed to allow for a 6-lane median divided section with paved shoulders.

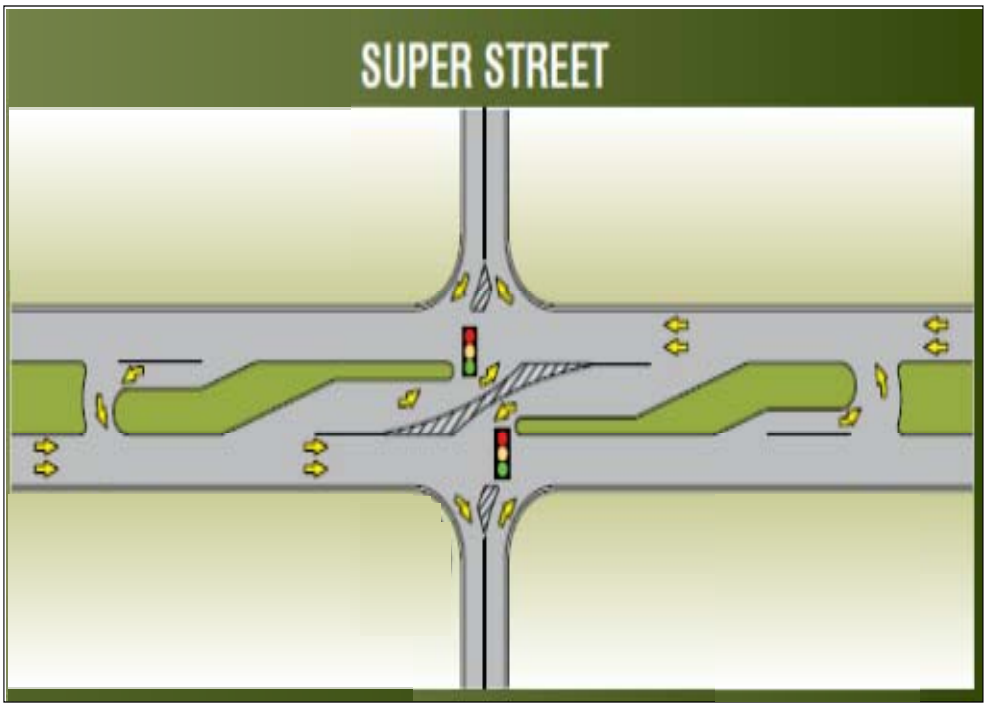
3.2.2 Intersection Capacity Analysis

In addition to the average daily traffic capacity analysis discussed above, a more detailed intersection analysis was conducted using Synchro software. The intersection analysis was conducted using three intersection types:

- A non-signalized intersection (if not currently signalized);
- A traditional signalized intersection; and
- A "superstreet" intersection.

A superstreet intersection allows only right turns, therefore motorist wishing to turn left from a superstreet intersection would be directed to turn right, and then make a U-turn approximately 1,000 feet beyond the main intersection. This is shown in Figure 3-1. A Typical Superstreet Intersection. Traffic signals can be applied at either the main intersection or at the U-turn locations on each side of the main intersection. Superstreet traffic signals operate independently in each direction of flow and, as a result, have significantly more green time for the mainline traffic.

Figure 3-1. A Typical Superstreet Intersection



The intersection analysis was conducted to identify specific time periods when traffic flow would be anticipated to reach congested conditions. The analysis was divided into 10 year

increments from 2012 through 2040. Traffic growth was estimated to continue at a constant rate until 2050, in order to estimate long-term requirements

It should be noted that an intersection analysis is based on the peak hour traffic volumes and examines capacity in greater detail than a daily traffic review. Therefore, specific findings between the ADT capacity analysis in Table 3-1 and the intersection analysis in Table 3-2 may not reflect the same level of service. In addition, level of service is measured differently for an intersection and a roadway section.

Table 3-2. Intersection Capacity Analysis

US 1 Intersection	Intersection Type	Level of Service				
		2012	2020	2030	2040	2050
Cheatham St.	Signalized	A	B	C	C	**E**
	Superstreet	A	A	B	B	C
US 1A (South Main St.)	Non-signalized (WB left)	E	**F**	**F**	**F**	**F**
	Signalized	A	A	B	C	D
	Superstreet	A	A	A	C	D
Bert Winston Rd.	Signalized	A	B	C	D	**F**
	Superstreet	A	A	B	C	**E**

A review of Table 3-2 indicates:

- **Non-Signalized Intersections:** US 1A (South Main Street) will require intersection improvements in the form of traditional signals or superstreet design by 2020.
- **Signalized Intersections:** Conventional arterial signals are expected to provide LOS D through 2040. LOS C is typically preferred on rural facilities, particularly on regionally important highways.
- **Superstreet Intersections:** Superstreet type improvements would provide LOS C or better traffic operations through 2040.
- **Cheatham Street and Bert Winston Road Intersections by 2050:** With the exception of the Cheatham Street intersection as a superstreet intersection in 2050, all other signalized or superstreet versions of the Cheatham Street and Bert Winston Road intersections would function at LOS F or below in 2050, thereby indicating that the long-term solution for these intersections, and potentially others that were not modeled, would include grade separations and interchanges along US 1.

3.2.2.1 *Traffic Safety Comparison*

The alternatives were compared for safety. The key differentiator in the level of safety of a roadway is the level of access control. The existing US 1 has limited to no access control. A superstreet version of US 1 will have partial access control, and a freeway version will have full access control. Review of NCDOT average crash rates for roadways with no access control, partial access control and full access control revealed the rates shown in Table 3-3. These rates may be used to infer the conditions of US 1 with the various access control scenarios.

Table 3-3. NCDOT Average Crash Rates for Rural Divided US Highways (2008-2010)

Roadway Type	Access Control Level	Crash Rates per Type		
		Injury	Fatality	Total
Rural highway or arterial	None	36.24	1.05	**109.29**
Superstreet	Partial	26.65	0.72	**84.06**
Freeway	Full	18.83	0.56	**74.19**

Note: All crash rates are shown in crashes per 100 million vehicle miles. It is important to note that although a superstreet is a partially access controlled facility, the majority of four-lane divided US highways with partial access control are not superstreets. Therefore, additional information is needed to verify the improved safety with a superstreet.

Improved safety is one of the primary reasons that NCDOT encourages superstreets because this method reduces the risk of crashes and specifically the risk of severe crashes such as side-collisions or T-bone type accidents that occur on more conventional arterials. As a result, the likelihood of severe and fatal incidents at a superstreet intersection are significantly reduced because the design eliminates two movements (side street through movements and left turns) that are statistically considered higher risk for serious injury.

A comparison of the number of conflict points between a traditional and superstreet intersection further demonstrates the reduced potential for crashes. As shown in Figure 3-2, a conventional intersection has 32 potential conflict points.

Figure 3-3 shows a four-leg superstreet intersection with only 14 potential conflict points. Due to the simplification of traffic flow and the reduction of potential conflicts with turning vehicles, pedestrians also benefit from superstreet intersection design.

Figure 3-2. Conventional Intersection Potential Conflict Points

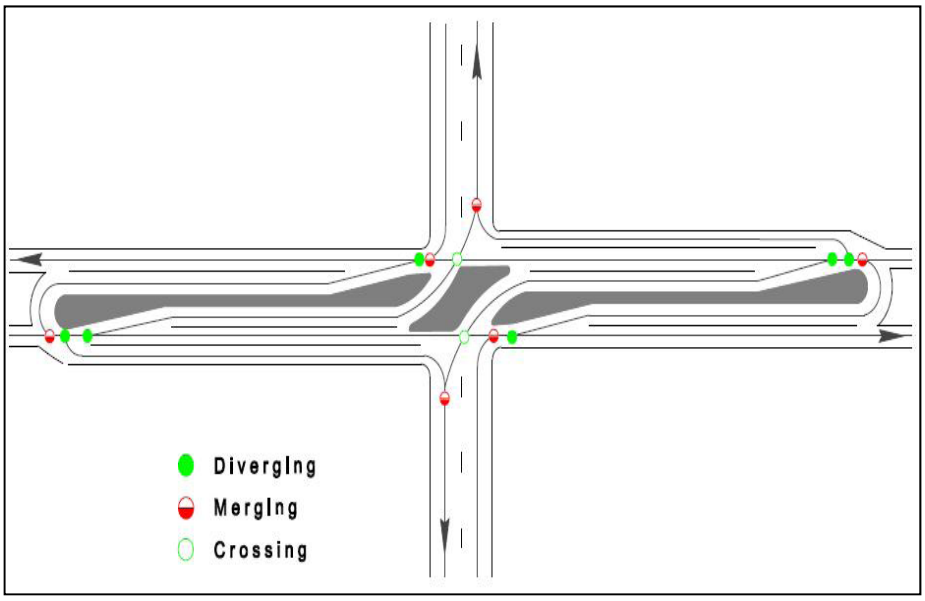
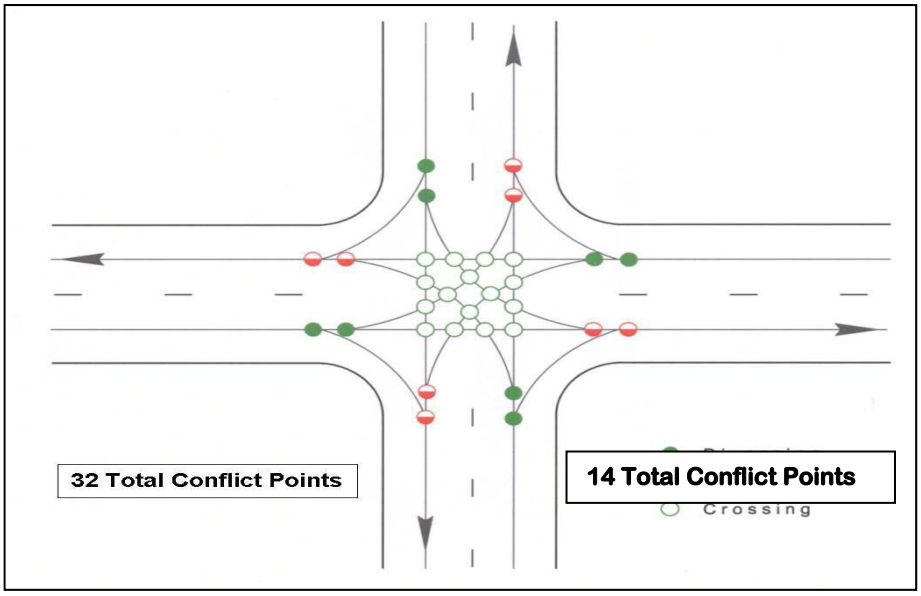


Figure 3-3. Superstreet Intersection Potential Conflict Points



3.3 Compatibility with US 1 Long Range Plans

The Study Team reviewed existing MPO and local plans for Franklinton and Franklin County and the *North Carolina Strategic Highway Corridor Plan* (NCSHCP), discussed in Section 4.1.

3.3.1 Franklin County Comprehensive Transportation Plan

A key resource in this review was the *Franklin County Comprehensive Transportation Plan* (CTP) Highway Map, which is shown in Figure 1-3. In the CTP, Franklin County identified the following desires for US 1:

- US 1 would be a freeway on the existing alignment.
- Future interchanges would be constructed at the new Bert Winston Road, the proposed NC 56 Bypass, and existing NC 56. It was noted that the CTP showed spacing of approximately one mile between interchanges, likely preventing the inclusion of additional interchanges on US 1 south of NC 56.
- A future NC 56 Bypass would be constructed on the south side of Franklinton. The facility was recommended as an Expressway.
- A future realignment of Bert Winston Road and new interchange with US 1

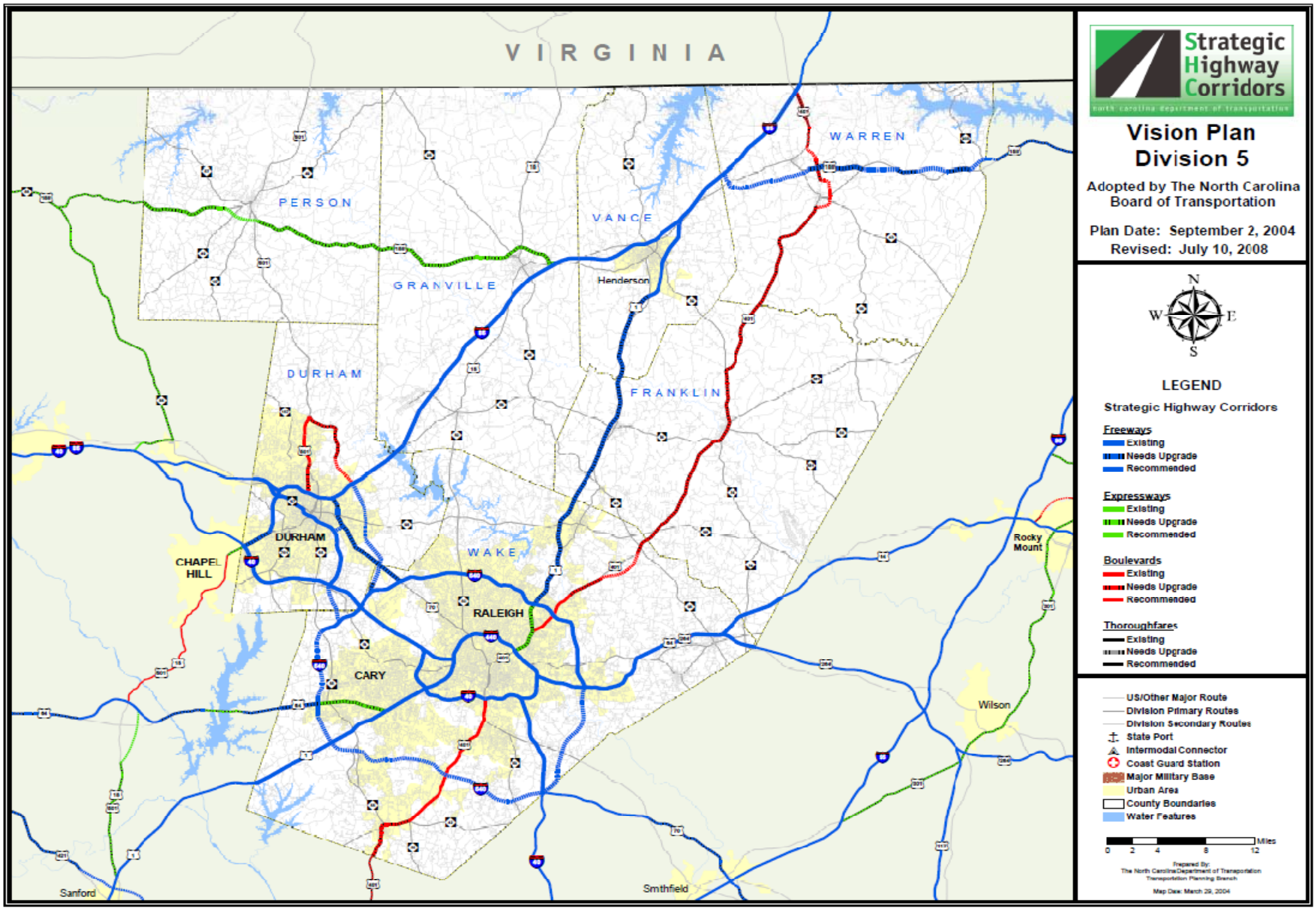
3.3.2 North Carolina Strategic Highway Corridors Vision Plan

The North Carolina Strategic Highway Corridors Vision Plan (Strategic Corridors Plan) calls for a freeway that would link I-85 near Henderson to I-540 in Raleigh. This vision is also discussed in the Phase I US 1 Corridor Study. The Strategic Corridors Plan envisions a six-lane freeway just north of the NC 96 interchange in Youngsville (the northern limit of the Phase I study area and the southern limit for this Phase II study). To note, CAMPO's Long Range Transportation Plan (LRTP) also calls for a future freeway. The map showing NCDOT's long range vision of a freeway from the Strategic Corridors Plan is shown on Figure 3-4.

3.3.3 Franklin County Zoning

The Study Team reviewed future land use and zoning to understand the desired future land use patterns manifested in existing policy. This review allows for increased understanding of the potential relationships between the future land uses and the types of roadways considered in each alternative.

Figure 3-4. North Carolina Strategic Highway Corridors Vision Plan Map



Franklin County's zoning map calls for a combination of industrial and highway oriented development along US 1 (see Chapter 2 for greater detail and figures). These types of development can only occur if access is provided to them from US 1 directly, or from a system of local frontage or backage roads along US 1.

3.3.4 Overall Compatibility with US 1 Long Range Transportation & Land Use Plans

Each of the four conceptual alternatives were compared for compatibility with the two transportation plans and future land use plans. The analysis indicates:

- **No-Build Alternative:** The No-Build Alternative does not meet the needs of the existing transportation and land use plans. The US 1 arterial section is effectively a boulevard. This design is well below the freeway design called for in regional transportation plans. In addition, the existing arterial has relatively unlimited access to adjacent parcels with the exception of the median restrictions. As congestion and development increases, it becomes increasingly likely that future access permits may be rejected by NCDOT and that development would decide to find other locations with longer term access solutions.
- **Superstreet Alternative:** The superstreet solution will not meet the long term vision of regional transportation plans for a freeway. However, it can be consistent with a phased approach to upgrade from the superstreet design to a freeway design. In terms of land use planning, the superstreet provides better and safer access than an arterial, but ultimately would require a longer range solution. As volumes increase on US 1 past 2040, congestion and capacity issues would occur on US 1. This would ultimately require six-lane widening.
- **Freeway Alternative:** This alternative meets the CTP and NCSHCP goals for US 1 as a freeway. However, it does not provide the required access needed to meet the long term development plans for the area. The Freeway Alternative will not provide a long range access solution and will likely discourage development on the corridor.
- **Freeway with Local Street Improvements Alternative:** This alternative meets the CTP and NCSHCP goals for US 1 as a freeway and will provide access that is compatible with future development plans. It is the only solution that meets the long term vision for both transportation and land use in the study area.

3.4 Provisions for Bicyclists and Pedestrians

A key component of this study is to expand and improve the existing bicycle and pedestrian facilities within the study area. It is anticipated that over time, demand will increase for these modes. As part of future construction projects, it is also anticipated that a "complete streets" philosophy will be applied as part of improvements or new streets in the area.

Under existing conditions, there is very little pedestrian and bicycle demand to cross US 1 or travel along it. There are no bicycle or pedestrian facilities or special accommodations along or across US 1. Over time, if development would occur as anticipated on the west and east sides of US 1, the demand for bicycle or pedestrian facilities would likely increase.

Each alternative was considered in terms of its provision for safe bicycle and pedestrian operations.

- **No-Build Alternative:** The existing US 1 is an arterial roadway that provides relatively few pedestrian and bicycle accommodations. Under the No Build Alternative, new pedestrian and bicycle improvements are not expected and crossing of US 1 will become less safe with increased traffic congestion.
- **Superstreet Alternative:** The superstreet design will be an improvement over the existing arterial. The phasing of the signal system, as well as the center median splitter will provide a refuge for pedestrians. However, US 1 in this section of Franklin County, will still be a high speed rural facility so pedestrian movements would not be encouraged.
- **Freeway Alternative:** A freeway is consistent with the CTP and NCSHCP goals. While freeways legally prohibit bicyclists and pedestrians along their length, they provide overpasses that can be designed to serve bicyclists and pedestrians crossing US 1. This would be a significant improvement over existing conditions, particularly in the Central section of US 1 where businesses are located on both sides of the roadway.
- **Freeway with Local Street Improvements Alternative:** This alternative would provide an ideal scenario for the development of a bicycle and pedestrian system for Franklinton and the study area. While the freeway will provide the safest and fastest means for US 1 vehicle through traffic, local streets will be planned to provide bicycle and pedestrian accommodations. In addition, the local streets will create a network allowing travel north and south parallel to US 1 as well as east to west over US 1 at overpasses.

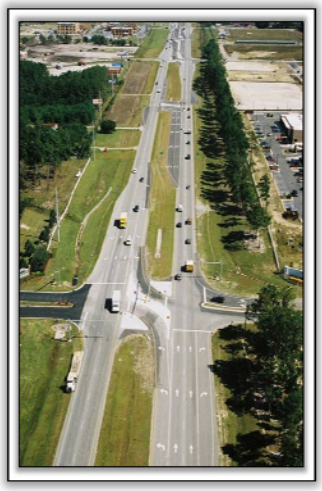
3.5 Balancing Access Needs and Development Potential with Traffic Operations

Key stakeholder concerns expressed at steering committee meetings included the following:

- Whether existing land uses with US 1 access would maintain access even if US 1 were to be converted to a freeway.
- Future investors/developers for land along US 1 would be assured access to their sites in the short- and long-term.
- Future direct access to US 1 from driveways should not be permitted, but access to US 1 should occur by using local streets with connections to US 1 at specific locations.
- The addition of new traffic signals along US 1 should be prevented.

The intent of managing the access of new developments is to improve the short to medium-term capacity of US 1, as well as to improve safety by eliminating multiple access points. The goal of providing access to serve development is in direct conflict with the goal to reduce access points to maximize capacity and improve safety. A review of how well the alternatives would balance access needs with mobility needs is provided below:

- **No-Build Alternative:** As traffic increases on a rural highway, volumes gradually increase until the point where traffic signals are required to allow safe and efficient access at major intersections. In the southernmost project areas, traffic signals have already been introduced at Bert Winston Road and Cheatham Street. As volumes increase on US 1 and new developments occur, more signals would be needed. These needs will likely appear earliest at the US 1A intersections and ultimately at other intersections. This type of progression can serve local access well, but diminishes the capacity of the roadway and introduces safety issues that would be associated with higher speed traffic slowing or stopping at intersections.
- **Superstreet Alternative:** The Superstreet Alternative is an at-grade alternative that balances access provision, capacity and safety. Through the utilization of dual leftovers, traffic can turn left or U-turn at locations spaced typically 1,000 to 1,500 feet from the nearest intersection. The allowance of a left turn from the main roadway preserves access. This movement is the most efficient and safest left turn at a standard intersection since the turning vehicle has a clear view of approaching traffic. Left turns from the local roadway are forced to take a right followed by a U-turn. In general, this approach allows for access into businesses and would not restrict development.



From a traffic capacity perspective, the restricted movements at the superstreet intersections allow for higher volumes than a conventional four-leg signal. In the proposed configuration, signal timing is programmed separately for each direction of mainline traffic.

In addition, the signals operate with only two phases substantially reducing the amount of yellow and red time between phases. Note, however, that a superstreet does not have the capacity of a freeway. As a result, although a superstreet can be very effective at balancing access requirements with highway operational needs, once the overall capacity of the roadway is exceeded, a freeway may be required. Thus with a freeway, all access would be eliminated, except at interchanges.

- **Freeway Alternative:** The Freeway Alternative will be designed exclusively to provide high speed travel, reduced congestion and increase safety. The key element to achieving these goals is eliminating all access points, thus the freeway alternative would provide adequate mainline capacity, but at the expense of local access. With a freeway, all access would be eliminated except at interchanges.
- **Freeway with Local Street Improvements Alternative:** Recognizing that the Freeway Alternative will not afford suitable access to existing and future land uses along US 1, an option of a US 1 as freeway combined with an enhanced local road network was considered. Although direct access to US 1 will be eliminated, the effect on access and development would be reduced by allowing access via local street enhancements.

3.6 Impacts to Natural & Human Environment

At this conceptual level of analysis, it is not possible to identify specific impacts. However, it is possible to perform a GIS-level evaluation of the likely impacts of each alternative. The potential environmental impacts are similar for most of the alternatives.

- **No-Build Alternative:** Under the No-Build Alternative, traffic congestion will increase substantially on US 1. In addition, traffic signals would likely be warranted at more locations further reducing mobility on US 1. Effects of the No-Build approach would be higher congestion and delays with extended peak periods for traffic. From a non-highway standpoint, impacts of the No-Build would include a reduced quality of life and potential air quality degradation.

- **Superstreet Alternative:** Because the Superstreet Alternative will include access changes at existing intersections, side roads and driveways, the type of direct impacts discussed above would occur. These would occur to a minor degree at "bulb-outs" at U-turn locations. If the US 1 superstreet remains four lanes beyond 2040, congestion would occur at higher volume intersections. Ultimately, delays would increase resulting in similar impacts (although to a lesser degree) as the No-Build approach. If a superstreet were maintained for the long term, it is likely that it would need to be expanded to six lanes past 2040. A widening to six-lanes would result in multiple impacts to both the human and natural environment along US 1.
- **Freeway Alternative:** The Freeway Alternative will be similar to existing conditions along US 1, although the existing grass shoulder would likely need to be converted to a paved shoulder. This could likely be accommodated within the existing right of way in most locations. Given this, only minor environmental impacts of the type above will likely occur. However, with US 1 as a freeway, interchanges would need to be provided. Three interchanges are proposed in the CTP, and more may be considered. Although interchange footprints vary, they are each likely to be approximately 35-40 acres. Thus the greatest level of environmental impact is associated with interchange locations.
- **Freeway with Local Street Improvements Alternative:** This alternative would have all of the potential impacts associated with the above Freeway Alternative including interchange impacts. In addition, the improvements to local streets would have a higher potential for greater impacts to the natural environment. Natural environment impacts would include multiple stream and wetland crossings to provide continuous local street connections between interchanges.

3.7 Preliminary Cost Comparison

At this preliminary stage of the alternative comparison analysis, cost estimates were not possible. Therefore, a subjective comparison was developed based on the characteristics of each alternative concept.

- **No-Build Alternative:** The No-Build Alternative will likely have minimal costs as long as a four lane section remains. Widening to six lanes will likely result in moderate costs, although the additional right of way required could be high.
- **Superstreet Alternative:** The cost of implementing a superstreet will be moderate. The construction costs will be focused at reconfiguring each intersection. If it is roughly assumed that there are 20 crossovers, an overall cost would be $10 million ($500,000 per

crossover). Even if this cost were doubled, it would be roughly similar to a single interchange concept.

- **Freeway Alternative:** The Freeway Alternative will be more expensive. Assuming 4 interchanges are provided, the construction costs of all four interchanges alone could be in the range of $50 to $70 million dollars (excluding other project costs). In addition, the interchanges will require approximately 35-40 acres of land for each location. (Note: More detailed cost estimates are identified in Chapter 5 for the final alternative.)
- **Freeway with Local Street Improvements Alternative:** This alternative will be the most expensive. It involves costs associated with the US 1 improvements as well as the interchanges. In addition, the local street network for the 9-mile section under study could require 10 -18 miles with local streets on each side of US 1.

3.8 Comparison Summary of Conceptual Alternatives

Based upon the comparisons presented in Sections 3.2 through 3.7, a comparison of how well each alternative met the requirements of each criterion is summarized in Table 3-4. A color coded system was utilized to rate each of the alternatives. In this color coded system: green is a positive assessment; yellow is generally positive although there are constraints; orange is generally negative; and red represents a scenario that is negative.

In addition to the color overview, a numerical comparison was prepared. In general, the number of green shaded measures received 4 points, yellow received 3 points, orange 2 points, and red only 1 point. As a result, an alternative concept with a high number rating will likely be preferable to an alternative concept with a lower score. A brief synopsis of the findings for each alternative includes:

- **No-Build Alternative:** The No-Build Alternative generally provided mediocre results. The alternative will yield higher traffic delays and likely higher crash rates than the other alternatives. The need for six lanes south of NC 56 introduces impacts and costs, albeit less than some other alternatives. Three categories had a poor rating with this alternative:
    - Traffic operations south of NC 56 where widening to six lanes will be required to avoid LOS F,
    - Bicycle and pedestrian provisions, and
    - Compatibility with both the transportation and local land use plans.

  This approach scored a total of 18 points, the lowest of all alternatives.

- **Superstreet Alternative:** The Superstreet Alternative rated highly in this analysis. In terms of traffic operations, safety, and compatibility with regional plans, it ranked generally positive although it did not precisely meet the plan for an ultimate freeway. Impacts were minimal since the majority of improvements are limited to the intersections on US 1, primarily within the median area. The highest ranked criteria, however, was cost since it will likely be less expensive than widening US 1 to six lanes (as required with an arterial) and involves no interchange construction (as required with both freeway alternatives).

  The superstreet scored 29 points, the second highest of the alternative concepts. It should be noted, however, that this analysis focused on the 2040 planning horizon. It is likely that the superstreet will require either widening to 6 lanes or improvement to a freeway by 2050 (primarily on those sections south of NC 56) to accommodate projected volumes.

- **Freeway Alternative:** The Freeway Alternative overall did not rate highly. While it exceeded all traffic requirements and conforms to the freeway vision in the long range regional plans, it was viewed negatively by local planners in terms of not providing adequate access to attract planned development. In addition, it will require right of way related to both the interchange locations combined with right of way for development that will lose access directly to US 1.

  This alternative scored 22 points, better than the arterial concept, but lower than the two top ranked alternatives.

- **Freeway with Local Street Improvements Alternative:** As with the Freeway Alternative, this alternative ranks highly in all traffic categories and conforms to the regional plan. Compared with the freeway only alternative, the primary difference is that the local street system provides good access to development and develops a network of bicycle and pedestrian facilities. The primary drawbacks are environmental impacts due to the impact new local streets can have on specific environmental features. In addition, this alternative is likely the most expensive since it is a combination of US 1 improvements, interchange alternatives, and the local streets.

  Nevertheless, the combined freeway and local street solution scores the highest of all alternative concepts with a total of 30 points.

Based on the matrix comparison evaluated in Table 3-4, and the scoring of the alternatives therein, two alternatives were recommended for more detailed analysis:

1. **Superstreet Alternative:** The Superstreet Alternative was highly rated. Although it does not meet the ultimate freeway vision, it is substantially less expensive and also provides a potential interim solution.
2. **Freeway with Local Street Improvements Alternative:** This alternative ranked highest and meets all goals of the forecast study. It involves numerous local street projects beyond improvements to US 1 itself resulting in increased impacts as well as higher costs. It may be possible, however, to offset some or most of the local street costs by requiring construction or funding as part of private development.

Table 3-4. Comparison of Conceptual Alternatives

Alternative	Score	US 1 Traffic Operations – South of NC 56	US 1 Traffic Operations – North of NC 56	US 1 Traffic Safety	Compatibility with Regional Plans	Provisions for Bicyclists and Pedestrians	Providing Local Access for Land Use	Natural Environment Impacts	Human Environment Impacts	Cost
No Build Alternative (Existing Arterial/ Rural Highway)	**18 points**	LOS F south of NC 96 by 2040 (would require 6 lanes)	Rural Highway will likely be converted to arterial with some signals	Increasing crash rates likely with additional access points	No – Meets Boulevard standard (2 steps below freeway). Development access congested.	None - US 1 remains a barrier to bicyclists and pedestrians. Signal operations would worsen with pedestrian phases.	Likely that developments will continue to directly access US 1	Moderate – Initial improvements would be focused on US 1. Widening to 6 lanes would be required which would increase impacts.	Moderate – Widening of US 1 would impact building located adjacent to the existing US 1.	Moderate costs would be associated with widening to 6 lanes.
Superstreet Alternative	**29 points**	Increased capacity allows for LOS D operations to 2040. LOS E and F likely to occur by 2050 (would require 6 lanes)	Adequate capacity. Two phase signals increase green time for US 1 through traffic although stops are still required for US 1 through traffic.	Leftovers and superstreet channelization reduce conflicting movements improving safety.	Partial – Meets Expressway standard (1 step below freeway), but serves planned development. May be acceptable as an interim solution.	Minimal – US 1 improvements allow for improved safety for pedestrians crossing at intersections due to the unique signal phasing.	Development could continue to access US 1 directly, but left turn movements from side street development would be eliminated	Minimal – Improvements focused on US 1	Minimal – Improvements focused on US 1	Low Costs for conversion to Superstreet and leftover intersections.
Freeway Alternative	**22 points**	Four lane freeway has excess capacity through 2050 and likely longer.	Good operations through 2040.	Safest type of roadway since intersections and access points eliminated.	Partial Yes - Freeway called for in plans, but restricts development access and potential.	Moderate – Provides overpasses at US 1 that would be designed to serve bicycle and pedestrian traffic.	Conversion to freeway would likely require closure of businesses and residences reliant on US 1 for access	Moderate – Improvements focused at US 1 and interchanges.	Very high – Improvements focused at US 1 and interchanges. In addition, controlled access freeway would likely require multiple building impacts	Very high costs related to construction, and very high ROW costs associated with lost access.
Freeway with Enhanced Local Street Network Alternative	**30 points**	Four lane freeway has excess capacity through 2050 and likely longer. In addition, local street network will likely divert 1000-4000 vpd from US 1.	Good operations through 2040. Slightly US 1 trips diverted to local street network.	Safest type of roadway since intersections and access points eliminated.	Yes - Freeway called for in plans. Local street network serves existing & future development.	High – In addition to US 1 overpasses, local streets would be developed with Complete Streets principles. Would provide network for bicyclists & pedestrians	The provision of local streets provide alternate access for existing businesses and provide plan for future business. Conversion to freeway would reduce number of building impacts.	High - Improvements include US 1, interchanges, and local streets. Local streets likely impact some streams and wetlands.	Moderate – Although improvements include US 1 and interchanges, local streets would generally be placed in consideration of maintaining access and minimizing building impacts	Very high costs related to US 1 upgrade and interchanges. Medium costs associated with Local Streets (although this could include requirements that developers assist in financing local access).

Legend:

Green = Positive (4 Points)

Yellow = Generally positive with some negatives (3 Points)

Orange = Generally negative, but does function (2 Points)

Red = Negative (1 Point)