Traffic Feasibility Study
For
Two-Way Traffic Flow on
Main Street and Mill Street

Prepared for:

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Introduction and Background

With this study, JMTE understands that the Town of Sylva desires to address two issues. First, the Town of Sylva wants to understand how two-way streets improve the downtown business environment and create a safe and comfortable pedestrian environment. This report presents case summaries from a variety of communities that have documented the advantages and disadvantages of converting couplets (as pairs of one-way streets are called) to two-way traffic operation.

Second, the Town of Sylva wants to quantify the engineering feasibility and the benefits and costs of converting the Main Street and Mill Street couplet. Currently, Main Street and Mill Street have one-way traffic patterns and are designated as US 23 Business. (Main Street is US 23 Business North and Mill Street is US 23 Business South.) The options reviewed will include converting Main Street and Mill Street to two-way streets.

Part I: Case Summaries – Two-Way Streets and the Business and Pedestrian Environment

Why Did Downtowns Go From Two-Way to One-Way?

How we went from two-way to one-way streets in our downtowns begins with the booming post-WW II economy. Americans bought cars—lots of them. This newfound access to automobiles allowed us to move farther away from the town center and as a result, our traditional land use and development patterns changed radically. Once we were out in the suburbs, we needed to get to work in our new car; and we needed to do it quickly. In the 1950s and 60s, it was common practice for transportation engineers and planners to modify existing road systems and construct new roads to accommodate emerging travel patterns, handle additional capacity, and relieve congestion. In downtowns, we saw two-way streets become one-way and we narrowed sidewalks to make room for additional parking and driving lanes.

In his book, *Walkable City – How Downtown Can Save America, One Step at a Time*[i], author Jeff Speck describes the widespread conversion of downtown streets from two-way to one-way that occurred primarily in the 1950's and 1960's as an "epidemic." This was a time of job migration and a shift from shopping and land development in downtowns to the suburbs. Cities and towns converted two-way streets to one-way couplets to compete with the faster speeds available in suburbia, and for other reasons such as civil defense evacuation concerns. This was also the pre-interstate highway era where many commuters traveled exclusively on surface streets, rather than mostly on interstate and other freeways like today. This created multilane streets (introducing the "multiple threat" at pedestrian crossings) that could separate turning movements from through traffic, accommodate synchronized traffic signals, and quickly move traffic through downtown. The net result was, according to Speck, so effective that "there was no longer any reason to live downtown" due to the speeding traffic. "What had once been a great urban asset – the public realm – (became) little more than a collection of surface freeways. Thoroughfares that once held cars, pedestrians, businesses, and street trees became toxic to all but the first."

Return to Two-Way – Good Idea or Not?

Urban planners, downtown developers, retail merchants, and even engineers now wonder if one-way traffic patterns, coupled with suburban-style development patterns, have contributed to decreased downtown economic viability. Stakeholders in large and small cities are investigating the value of one-way street patterns compared to two-way patterns. Do the gains of a two-way network (e.g. slowing traffic, increasing business visibility, improving pedestrian safety) outweigh the lost advantages of one-way networks (e.g. progressive flowing traffic from synchronized traffic signals, fewer intersection conflicts)? Will towns experience greater economic vitality if they convert their streets to two-way?

Research easily uncovers why towns are motivated to convert to two-ways streets. Despite reducing the efficiency of moving through traffic, most results are considered beneficial. Reasons include:

Economic Vitality	Traffic Flow	Driver Behavior	Complete Streets	Downtown Vibe
• Increased business access • Increased business visibility • Increased sales	• Calmer traffic • Reduced travel distances • Reduced traffic miles traveled (due to decrease in circling) • Increased congestion • Two-way signal pro-gression moves less traffic than one-way	• Alleviate driver confusion • Reduce out-of-direction travel (can drive straight to destination without circling) • Predictable grid pattern • Less need for wayfinding signs	• Friendlier to bikes and pedestrians • Easier to implement a complete street	• Parking configuration • "scenes" of activity (congestion) • Eliminate "dead blocks"

<Table 1>

While uncovering the motivating reasons for a one-way to two-way conversion is relatively easy, it is more difficult to identify documented long-term outcomes of these conversions, particularly for smaller towns like Sylva. What follows are case summaries that include documented one-way to two-way conversion outcomes as well as some outcome highlights that were not part of an academic and/or larger research process. Additionally, we could not find a city or town with road and geographic constraints similar to Sylva's.

Case Summaries

King Street, Charleston, South Carolina: For her master thesis[ii], Megan Baco, researched and documented the long-term effects of Charleston, SC's King Street's one-way to two-way conversion. King Street was one of Charleston's early business corridors. In 1956, the City of Charleston converted a section of Upper King Street from two-way to one-way traffic to change the function of the road from a business corridor to an arterial road with greater capacity. In 1994, the City of Charleston reconverted Upper King Street to a two-way street. Based on conclusions from Baco's study, the 1994 conversion contributed to enhanced property values. Additionally, the study states, "Beyond, an increase in property values, the one-way to two-way conversion of Upper King Street, generated a new interest in the commercial properties along the street, increased pedestrian activity of the area because of increased safety and general attractiveness, and has acted as catalyst in the further preservation of the storefronts lining Charleston's most recognizable street."

Hyannis, Massachusetts: The book, *Resilient Downtowns: A New Approach to Revitalizing Small and Medium City Downtowns*[iii], summarizes a 2000 study completed by Vollmer and Associates for the Hyannis Main Street Business Improvement District (HMSBID) in Cape Cod, Massachusetts. Vollmer studied, "twenty-two cities that converted their streets from one-way to two-way streets and found that as a result of the change in traffic flow, the number of businesses located in the downtown increased. Furthermore, there was an increase in pedestrian friendliness and an improvement in overall 'livability' and 'sense of community.'" Megan Baco's study also references the Vollmer/Hyannis study. She explains that Hyannis, "dissatisfied with relying on previous conversion case studies that focused on traffic flow, the HMSBID commissioned a study to evaluate business development and downtown livability. Of the 22 cities identified as having converted their main downtown streets from one-way to two-way, the majority reported positive results in terms of business development. One community reported mixed results but no municipality reported a negative impact." Baco goes on to note that, "many of the conversions were part of a greater revitalization program that included myriad streetscape improvements."

Louisville, Kentucky: Professional Engineer Mike Spack wrote an article titled, "Top Seven Benefits of Converting One-Way Couplets to Two-Way Streets"[iv] on his website, *Mike On Traffic*. Spack summarized Dr. John Gilderbloom's review of three years of data collected after the City of Louisville, Kentucky converted two one-way streets to two-way operation. The results documented by Dr. Gilderbloom[v] and summarized by Spack include:

Top Seven Benefits of Converting One-Way Couplets to Two-Way Streets

1. Reducing Crime
2. Reducing Collisions
3. Increasing Property Values
4. Increasing Business Revenue/Taxes
5. Increasing Bicycling Traffic
6. Increasing Pedestrian Traffic
7. Increasing Vehicle Circulation

Vancouver, Washington: Alan Ehrenhalt, senior editor at *Governing* magazine, wrote in December 2009 about Vancouver, Washington's Main Street in his article, "The Return of the Two-Way Street."[vi] After millions of dollars of investment in revitalization yielded little improvement, the city converted its older section of Main Street from one-way to two-way, two-lane. Within weeks businesses were celebrating more store traffic and the chairman of the Downtown Association said, "Why did it take us so long to figure this out." Another chairman of the Downtown Association said a year later, "One-way streets should not be allowed in prime downtown retail areas. We've proven that."

Mr. Ehrenhalt lays out the argument for and against two-way central business district streets as follows (boldface his):

> "Meanwhile, local governments were slowly learning that the old two-way streets, whatever the occasional frustration, had real advantages in fostering urban life. Traffic moved at a more modest pace, and there was usually a row of cars parked by the curb to serve as a buffer between pedestrians and moving vehicles. If you have trouble perceiving the difference, try asking yourself this question: How many successful sidewalk cafés have you ever encountered on a four-lane, one-way street with cars rushing by at 50 miles per hour? My guess is, very few indeed.
>
> So over the past 10 years, dozens of cities have reconfigured one-way streets into two-way streets as a means of bringing their downtowns to life. The political leadership and the local business community usually join forces in favor of doing this. There are always arguments against it. Some of them are worth stopping to consider.
>
> **Among the critics are traffic engineers and academics who were taught some fixed principles of transportation in school decades ago and have never bothered to reconsider them. Joseph Dumas, a professor at the University of Tennessee, argued a few years ago that "the primary purpose of roads is to move traffic efficiently and safely, not to encourage or discourage business or rebuild parts of town . . . . Streets are tools for traffic engineering."**
>
> If you agree that streets serve no other purpose than to move automobiles, you are unlikely to see much problem with making them one-way. On the other hand, if you think that streets possess the capacity to enhance the quality of urban life, you will probably consider the Dumas Doctrine to be nonsense. That is the way more and more cities are coming to feel.
>
> There are other arguments. It's sometimes said that more accidents occur on two-way streets than one-way streets. The research that supports this claim is decades old, and to my knowledge, has not been replicated. Even if you accept this argument, though, you might want to consider that, at slower speeds, the accidents on two-way streets are much more likely to be fender-benders at left-turn intersections, not harrowing high-speed crashes involving cars and pedestrians.

> Finally, there are complaints from fire departments that it takes them longer to reach the scene of trouble when they have to thread their way around oncoming traffic, rather than taking a straight shot down a one-way speedway. I can't refute this, and in any case, I don't like arguing with fire departments. But I have to wonder how many people have died in burning buildings in recent years because a fire truck wasn't allowed to use a one-way street.
>
> I wouldn't argue that two-way streets are any sort of panacea for urban revival, Vancouver's experience notwithstanding. And I understand that they are not always practical. Some streets simply are too narrow to have traffic moving in both directions; others have to be designated one-way because their purpose is to feed traffic onto expressways.
>
> What I would say is this: When it comes to designing or retrofitting streets, the burden of proof shouldn't fall on those who want to use them the old-fashioned way. It should be on those who think the speedway ideology of the 1950s serves much of a purpose half a century later."

Speck admits that what worked for Vancouver (2010 population: 162,000) may or may not be as effective for smaller towns or larger cities. He cites some major city streets for which he acknowledges they need to move a lot of vehicles. Still, he claims that making them two-way would make them more walkable. Speck closes his chapter on one-way and two-way streets by saying, "If your downtown lacks vitality and it's got one-ways, it's probably time for a change."[vii]

Savannah, Georgia: Also included in Jeff Speck's *Walkable City* book is an example from Savannah, Georgia, where the City created several couplets in the Oglethorpe section of downtown in 1969. The City of Savannah commissioned architect Christian Sottile to study one of the one-way streets, East Broad Street. Sottile found that two-thirds of the tax-paying addresses no longer existed a few years after the two-way to one-way conversion. After a new elementary school was built on East Broad Street, the street was converted back to a two-way street, and tax-paying addresses increased by fifty-percent.[viii]

Lafayette, Indiana: In 2010, the City of Fargo, North Dakota, completed an Economic Impact Analysis[ix] to "quantify the direct economic and employment impacts of the three street reconfiguration alternatives." In this analysis, Fargo benchmarked its planned projects against projects in Des Moines, Iowa; Fort Collins, Colorado; Lafayette, Indiana; and Austin, Texas. Of these, Lafayette, Indiana, is most similar to Sylva. Like Sylva, Lafayette is, "considered the heart of the community with a wide range of retail shops, boutique shops, a bed and breakfast inn, restaurants, professional service providers, public services and community festivities. There are no chain retail stores in Downtown Lafayette. Lafayette is home to Purdue University. Main Street is less than one mile in length and is characterized mostly by specialty shops and offices." The City of Lafayette converted Main Street from one-way to two-way in 1994. According to the summary, Lafayette's Main Street Director stated that, "The conversion of Main Street from 4th to 11th Streets was a very big plus to retail," and the Chamber Director stated that "Main Street has better specialty shopping than elsewhere in the region." In summary, Lafayette's conversion project, "was motivated by a need to enhance safety, automobile circulation and create sites for redevelopment to occur," but, "Downtown Lafayette has enjoyed continued redevelopment and attracted specialty retailers along the Main Street since the two-way conversion was completed."

Conversion Drawbacks: As discussed above, well-documented conversion outcomes are difficult to come by. The outcomes that are documented and available tend to be positive; we were unable to identify a study that included a fully negative evaluation. However, it is worth noting that, particularly from a traffic-engineering standpoint, there are drawbacks of returning to two-way operations.

In a fact sheet developed for a conversion study in ***Napa,*** **California**[x], the consulting engineers noted the following one-way to two-way conversions:

- Generally increase traffic congestion at intersections.
- May require left turn lanes at intersections, which may eliminate on-street parking adjacent to the intersection.
- Two-way streets increase the number of conflict points at intersections, and may increase certain types of crashes (i.e., broadside).
- Reduces opportunity to increase traffic capacity if ever needed.
- Narrower two-way streets may be difficult for large vehicles and fire apparatus to negotiate and may require longer red zones and loss of parking at some intersections.
- With only one lane each direction, traffic control may be required during emergencies.
- Two way streets that eliminate turning movements at some intersections will divert turning vehicles to other intersections.

In an article[xi] by Chiu, Zhou, and Hernandez in the Journal of Urban Planning and Development, the authors offer the following insight developed from their ***El Paso, Texas*** research,

> "The case study presented highlights the possible drawbacks and benefits of the traffic flow conversion and finds that two-way configurations do not necessarily bring forth desirable traffic performance. Among all proposed configurations, many of them do not necessarily outperform the existing one-way configuration. However, it is also shown that if carefully analyzed and designed, opportunities exist in order to make a two-way configuration a desirable option. Adequate capacities for both directions of the converted streets are needed and parking may need to be prohibited either permanently or during peak hours if capacity is not sufficient, although doing so requires a careful review of parking and public opinion issues."

We know that downtown revitalization is challenging. Creating vibrant and viable downtowns requires planning and a mix of approaches; a one-way to two-way conversion is just one tool available to communities. Gleaning what we have learned from the case studies, a road conversion, alone, does not create revitalization success. Successful communities implement a variety of revitalization strategies. Additionally, those with successful conversion projects equally address multi-modal engineering, business, and streetscaping concerns. Chiu, Zhou, and Hernandez offer a nice summary of the discussion when they say, "The debate on how two-way streets impact downtown revitalization may continue, but one thing to be certain of is that without a rigorous traffic impact study approach, the planners and downtown communities may always have to hold their breath on what may actually happen after the conversion." What follows is Sylva's rigorous traffic impact study approach.

Part II: Engineering Feasibility, Benefits and Costs

Operational Traffic Patterns Considered

The consultant team met with the Steering Committee on December 2, 2014, to review the objectives of this project. The team presented several options for traffic operational patterns that might meet the goals of the Town and business community. To keep this study within the defined scope, the Steering Committee was asked to identify patterns that seemed more likely to meet the desired outcomes, and eliminate any that looked unpromising.

The operational patterns were as follows:

Option 1 – This is the option that the Town first asked the team to evaluate. It creates a two-way, two-lane Main Street and makes Mill Street one-way, primarily one-lane, westbound. Part of the unused left lane could be used for auxiliary left turn lanes, diagonal parking, and/or extended sidewalks.

Option 1A – This option is very similar to Option 1. The only difference is that Option 1A makes Mill Street two-way between Keener Street and Grindstaff Cove Road (SR 1513). This option was suggested by the consultant because it is anticipated that the left turn movement from eastbound Main Street to Grindstaff Cove Road would be well served with a left turn lane, for which there is no room on Main Street to provide without the removal of existing on-street parking and pedestrian curb extensions.

Option 2 – Option 2 would make both Main Street and Mill Street two-way, two-lane streets. It is very likely that both ends of the former couplet would require new traffic signals with this option.

Option 3 – At the time of the stakeholders meeting, traffic control had been in place on Mill Street that closed the left lane of Mill Street, resulting from an earlier fire that created a temporary need for debris removal and cleanup. Also, Sylva enacted traffic control on Main Street requiring left turns from the left lanes approaching Landis Street and Spring Street and disallowing through movements from the left lane. Option 3 would be to make these changes permanent and employ more solid infrastructure to reinforce the one-lane use. This is not a great change from current operations as the couplet is so short that the second lanes do not provide much additional capacity, acting more as auxiliary left turn lanes than through lanes.

Option 4 – This option was labeled a "diverging couplet" as it creates a cross-over of through traffic similar to the new "diverging diamond" interchange concept. It would retain a couplet operation but would use Main Street for westbound traffic and Mill Street for eastbound traffic. It was suggested as an option that allowed Main Street traffic to drive towards the historic courthouse. Traffic signals would be needed at each end of the couplet so that traffic could be crossed over and re-crossed at the other end of town.

The consultant presented reasons for and against each option and answered Steering Committee questions about the options. It was decided to eliminate Option 1A, Option 2, and Option 4. It was the consensus of the group that these options were overly complicated and thus would be hard for motorists to understand. They were also likely to be the most expensive options due to the requirements of new traffic signals. Option 3 will be modeled in addition to the forecasted baseline (background or no-build) scenario. Also, if the left turn demand from eastbound Main Street to northbound Schulman Street creates unacceptable delay or queuing, the effect of restricting left turns on Main Street until the intersection with Mill Street will be analyzed. Diagrams of the operational traffic patterns considered are contained in Appendix A.

Five Factors to Consider

For at least the past twenty years, ideas promoting urban vitality have been discussed by planners and to a lesser degree, transportation engineers. Three members of the engineering, planning and design firm *Glatting Jackson Kercher Anglin Lopez Rinehart, Inc.* published a paper in 1998 for NACTO (the National Association of City Transportation Officials, formed in 1996) titled "**Downtown Streets** *Are We Strangling Ourselves on One-Way Networks?*[xii] The paper, by G. Wade Walker, Walter M. Kulash, and Brian T. McHugh, describes five factors to consider when deciding to convert a one-way street to two-way. 1. A lane of one-way traffic is known to have a greater capacity than a lane of two-way traffic. A lane of two-way traffic will have a lower capacity by 10 to 20%.

As a corridor route approaches capacity, some traffic will divert to lesser used routes within the corridor. This can have the benefit of increasing the visibility and economic vitality of properties on the route attracting additional traffic.

2. One-way streets create "out of direction" travel, which occurs when a desired destination is not on the street that is moving in the direction of the motorist. This recirculating traffic must make additional turns to reach the desired destination, increasing traffic exposure to motorist and the total VMT of traffic moving in the corridor. The increase in travel distance is usually from 20 to 50% more in a one-way system and the increase in turning movements from 20 to 60% more than in a two-way system.

3. Although travel speeds are faster in a one-way system for through traffic, faster speeds create a less safe pedestrian environment. Motorists with a downtown destination care more about accessibility than speed.

4. Consider the safety of the pedestrian environment. Pedestrians deal with 16 “conflict sequences” in one-way networks while only dealing with two conflict sequences in two-way networks. The pedestrian/vehicle conflict sequence takes into account how many different ways the pedestrian may encounter a vehicle when both are sharing the same space. These are sequences that occur at intersections that only refer to situations where the pedestrian has the right-of-way. It is based upon the kind of turning movement that the vehicle is making, the direction in which the vehicle path intersects with the pedestrians, and the location of the vehicle with respect to the pedestrian’s field of view at the beginning of the vehicle movement. Though in theory the pedestrian is protected by right-of-way rules, in practice the pedestrian needs to ascertain that traffic is yielding appropriately. Having to be aware of 16 possible combinations of vehicular conflict is inherently more dangerous than being aware of two.

“It is also important to remember that a one-way street system always has a greater magnitude of vehicle turning movements compared to a two-way system. Any turning movement, regardless of street configuration as one- or two-way, creates exactly the same potential for vehicle/pedestrian conflict, namely, one legally turning vehicle crossing the path of one legally crossing pedestrian. Thus, aside from the complexity of conflict sequences, there are simply more (typically 30–40%) vehicle/pedestrian conflicts within a one-way street network than in a comparable two-way system.”[xiv]

5. The fifth factor covered in the Walker article is the Eclipsing of Storefront Exposure. One-way streets don’t allow drivers to see the reverse near side of the intersection they are crossing, whereas two-way streets provide such a view in both directions. This effect can actually be measured; shorter block lengths would increase the percent of stores with eclipsed fronts while longer blocks would decrease that percentage.

The Walker method allow interested parties to include both traditional traffic engineering measures and emerging concerns of livability in an evaluation of whether to convert a street to two-way operation. The Walker article points out that just changing a street to two-way operation is no guarantee of immediate economic benefits, but that it is usually a component of a greater vision or urban design plan for the downtown.

Walker’s report also cites the case of Vine Street in Cincinnati, where 40% of businesses on that corridor closed after the street was converted from two-way to one-way.[xv]

This engineering feasibility study, while mentioning and describing all five factors, only attempts to quantify the motor vehicle delay, which is the measure of the streets’ level of service. This is the measure that the state Department of Transportation will be the most interested in as it relates to seeking approval to enact the proposed changes on US 23 Business.

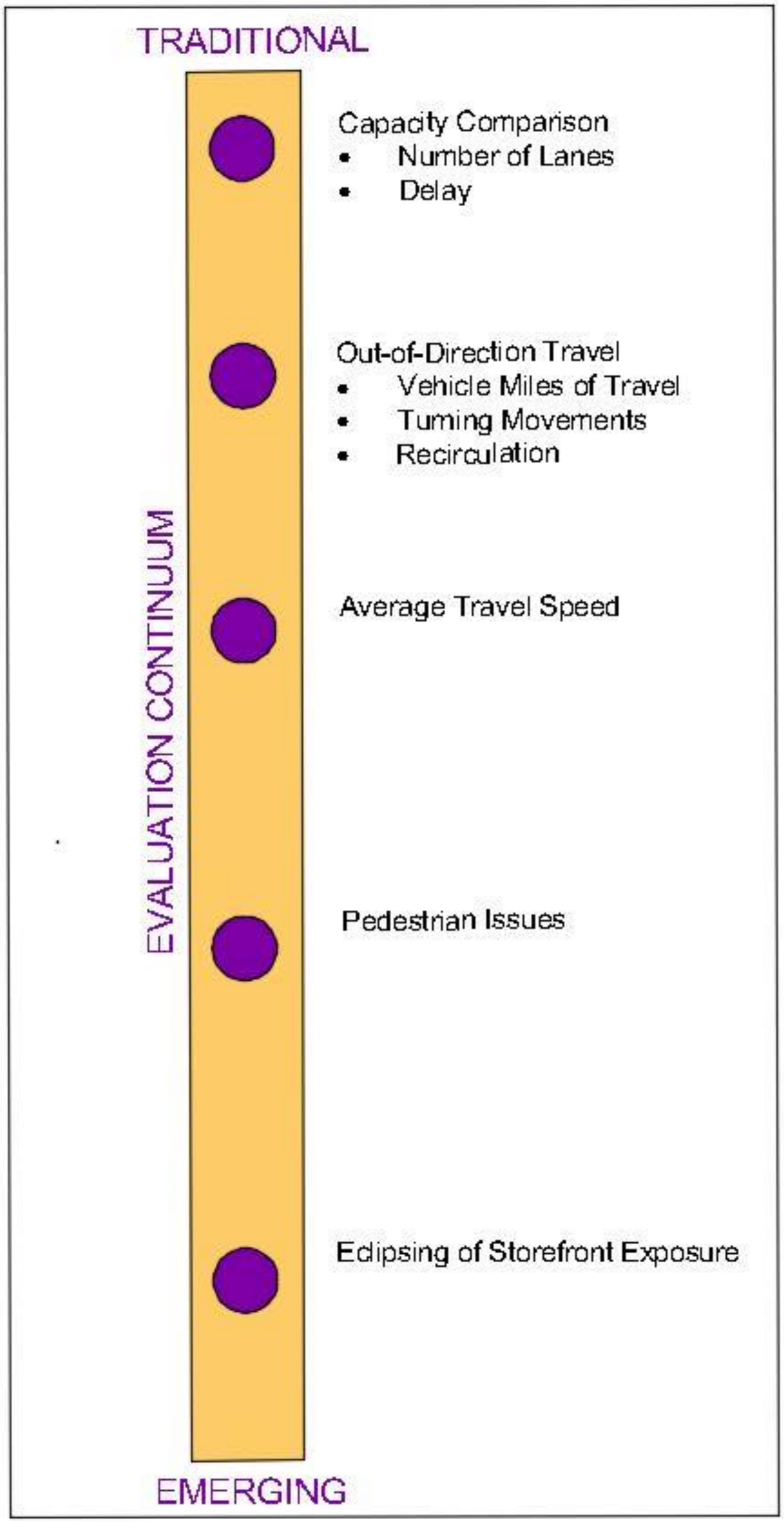


Figure 1 – “Five Factors to Consider” for changing a one-way street to a two-way street. [xiii]

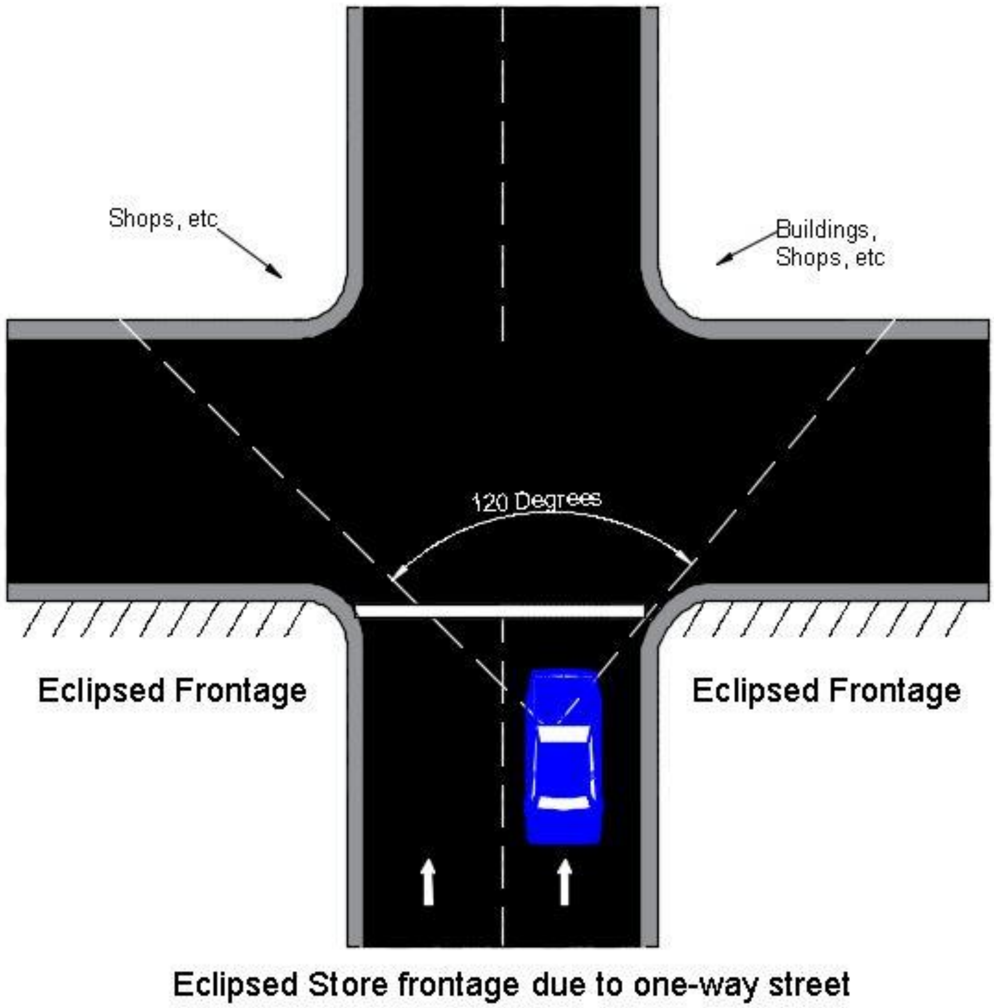


Figure 2

Image concept by: Walker, et al.[xiv]

Opportunities to Enact Change

Fifteen years into the twenty-first century is a hopeful time for those wanting to advance livability, new urbanism, multi-modalism, walkability and a resurgence of the public downtown realm. Though the effort remains to be tested, the North Carolina Department of Transportation adopted its Complete Streets policy in 2009 and issued the companion design guidelines in 2012. The SPOT* process gives local governments, through their Planning Organizations and Division Engineers, opportunity to assign points to desired projects. Although Statewide projects are 100% ranked by numerical score, Regional projects are 30% and Local projects are 50% determined by locally assigned points.

> *SPOT – Strategic Prioritization Office of Transportation. This unit of the NCDOT is charged with managing the ranking system used to numerically evaluate candidate transportation projects for inclusion in the construction program, called STIP – State Transportation Improvement Program. Once a project is included in the STIP, funds are earmarked over the years of development and construction to build the project.

The 2010 Comprehensive Transportation Plan (CTP) for Jackson County identifies the downtown portion of Main Street and Mill Street as "needs improvement," (see Figure 3) although there is no specific identification of improvements needed in the report. Planning to update the CTP began in 2014, and Town officials and downtown leaders can use this opportunity to further refine and develop the project problem definition for a more inclusive "Complete Streets project for downtown.

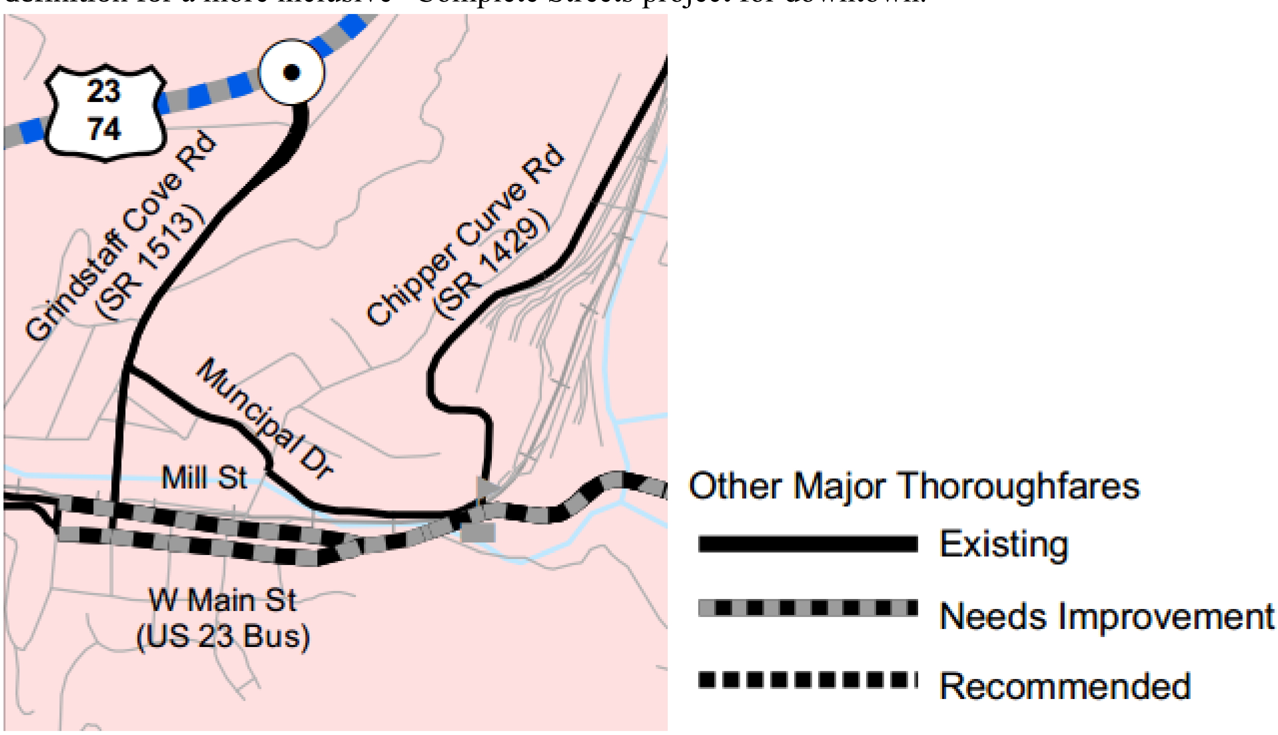


Figure 3 – Project Area showing "Needs Improvement" on Main Street and Mill Street. *Images from the 2010 Comprehensive Transportation Plan for Jackson County*

The Complete Streets Planning and Design Guidelines contain a lot of information and give many typical examples of design elements; even so, certain design elements can be changed based on the specific design needs of the potential users of the transportation project. The following outtake from the Complete Streets Planning and Design Guidelines is just one example of what might be chosen as a template for new projects on Main Street and Mill Street in downtown Sylva.

If a project to convert Main and/or Mill Streets to two-way traffic was desired prior to a full Complete Streets STIP project, it could be done by restriping, reconfiguring traffic signals and changing signs. A cost estimate to enact the Option 1 change is given in Appendix B.

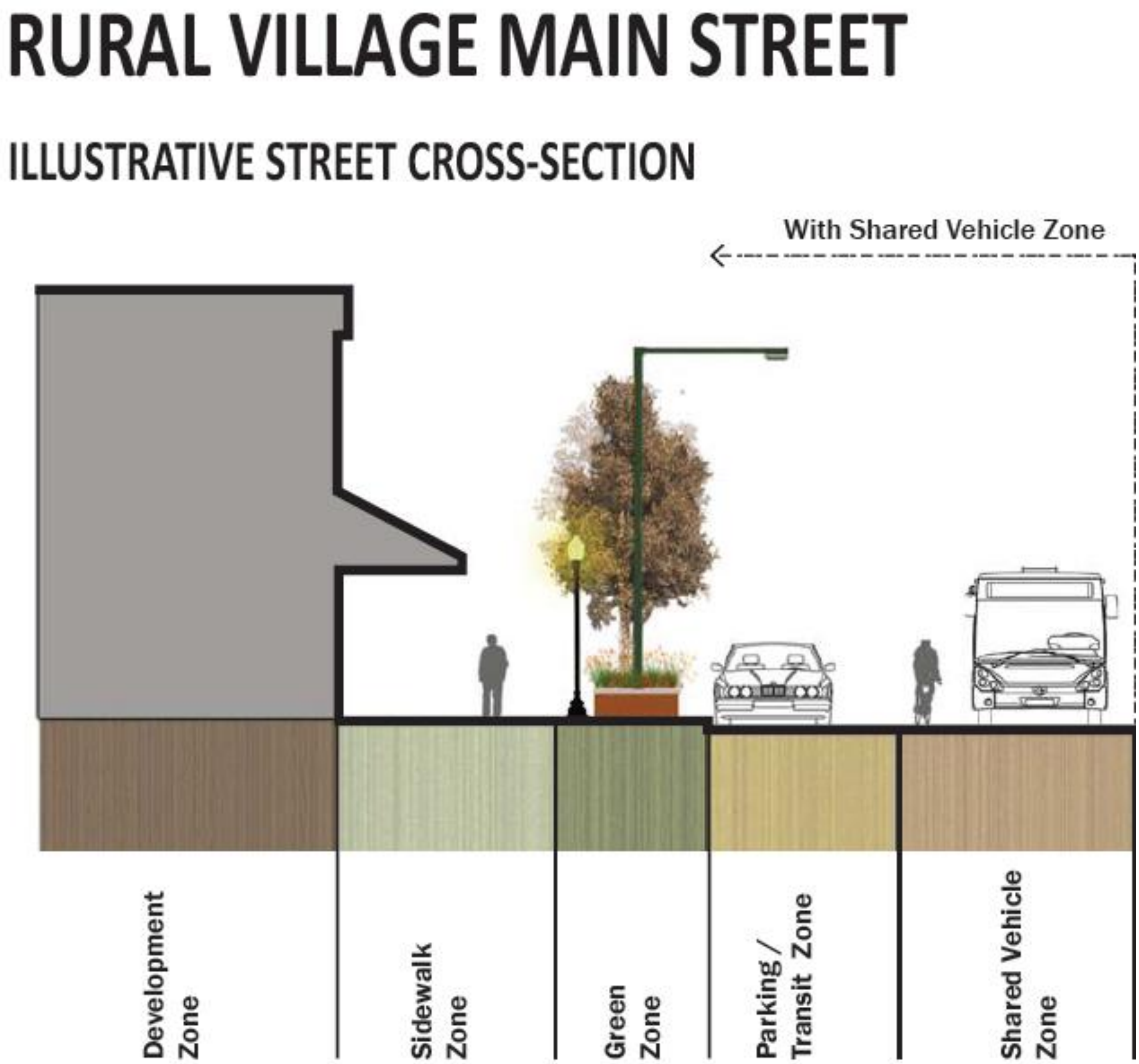


Figure 4 – Rural Village Main Street Illustrative Street Cross-Section from NCDOT's *Complete Streets Planning and Design Guidelines*

STREET COMPONENT DIMENSIONAL GUIDELINES

	Sidewalk Zone *(feet)*	Green Zone *(feet)*	Parking /Transit Zone *(feet)*	Motor Vehicle/ Shared Vehicle Zone *(lane width- feet)*	Bicycle Zone *(feet)*
Rural Village	10' - 12'	6' - 8'	8' - 10'	10' - 13'	4' - 6' lanes (see note 4)
Rural Developed	8' - 10'	6' - 8'	8' - 10'	10' - 13'	4' - 6' lanes (see note 4)

NOTES

1. Sidewalk zone should typically extend to the front of the building. Sidewalks are the most important element on a main street, because pedestrians are the priority. Therefore, the sidewalk width should typically be at least 10' unobstructed.
2. Green zone may include hardscaping, landscaping, street trees, lighting, and related pedestrian /bike /transit amenities. Hardscaping (with street trees in appropriately-designed planters) is typical, for access to on-street parking and transit.
3. Parking is expected on main streets. Parking zone dimensions vary depending upon the type of parking provided. Angle parking is allowed, preferably reverse angle parking. Angle parking will require a wider dimension than shown.
4. Shared lanes are the preferred treatment, due to the low speeds. In this case, travel lanes should be 13' wide to allow for maneuvering and opening car doors. Shared lane markings can be used on streets < 35 mph. If a bicycle lane is provided, it should be 6' wide, and the motor vehicle lane should be narrowed to 10'.

Figure 4 continued. Image and Notes from *"The North Carolina Complete Streets Planning and Design Guidelines,"* July 2012

TWO-WAY CONVERSION STUDY

Main Street and Mill Street currently comprise a short (less than 0.40 mile each) couplet of two-lane roads with both lanes moving traffic in one direction. However, both roads begin and end the couplet with only one lane of traffic, and because of the short distance to the dropping of the second lane, the streets don't truly have a two-lane capacity. Local officials and the NCDOT have recently (in the last few months) made the left lane on Main Street a mandatory left-turn-only lane at the second and third signalized intersections on Main Street. Because these roads comprise a couplet, there is a higher demand for left turns from one street to the other to reach destinations on the other street or to return to the desired direction of travel. These second lanes primarily help capacity by providing exclusive lanes for left turning movements.

Main Street and Mill Street together comprise segments of route US 23 Business, with Main Street carrying northbound US 23 Business and Mill Street designated as US 23 Business South. Because it is required by the North Carolina Department of Transportation (NCDOT) to consider converting the roads from one-way to two-way operation, this report performs a traditional analysis of measuring the effect of implementing a conversion to two-way operation on motor vehicle Level of Service (LOS), capacity, and queuing on these segments of US 23 Business.

This report summarizes the effects of making roadway changes that would be needed to implement two-way traffic operation on Main Street and roughly estimates the capital costs of implementing those changes (see Appendix B). Note that this estimate only includes items necessary to enact the traffic change; it does not include pedestrian or other multimodal features, nor does it provide any consistent "streetscape" style features. The report also summarizes the results of a capacity analysis performed for the traffic signal system that controls the five (5) signalized intersections in the study area. This study shows conceptual changes in parking or loading zones to take advantage of created space and to make loading zones more accessible.

PARAMETERS AND STUDY AREA

Peak hour turning movement traffic counts were taken at three intersections in the study area. These intersections are:

Main Street at Schulman Street
Mill Street at Schulman Street / Grindstaff Cove Road
Mill Street at Spring Street / Allen Street

Tube counters were used to capture traffic from both northbound Landis Street and southbound Walnut Street and both directions of Spring Street approaching Main Street. These counts were used combined with upstream traffic flow to project turning movement counts at the other two intersections on Main Street. Queue length, level of service, and intersection delay will be analyzed to quantify the traffic impacts on the roadway network from the proposed two-way conversion. The study area is this couplet located in Downtown Sylva on Main Street between Keener Street and Mill Street, on Mill Street between Main Street and Keener Street, and on Keener Street (an existing two-way street that reconnects the couplet) between Main Street and Mill Street, a cumulative roadway distance of 0.75 mile. A satellite image is shown (*Figure 5)* along with a street map *(Figure 6)* and a map depicting the traffic count locations *(Figure 7).* A 2% heavy vehicle factor was used in the analysis.

Figure 5 – Satellite view of study area in Downtown Sylva

The scope of the two-way conversion study is to quantify the existing traffic conditions in this network and forecast what conditions can be expected if Main Street is converted to two-way operation. The study area includes the entire couplet section, beginning and ending at intersections that have existing two-way operation. The following signalized intersections comprise the entire time-based coordinated signal system that encompasses and controls the complete couplet area of operation:

- Mill Street at Grindstaff Cove Road / Schulman Street (has railroad preemption)
- Mill Street at Allen Street / Spring Street (has railroad preemption)
- Main Street at Schulman Street
- Main Street at Landis Street / Walnut Street
- Main Street at Spring Street

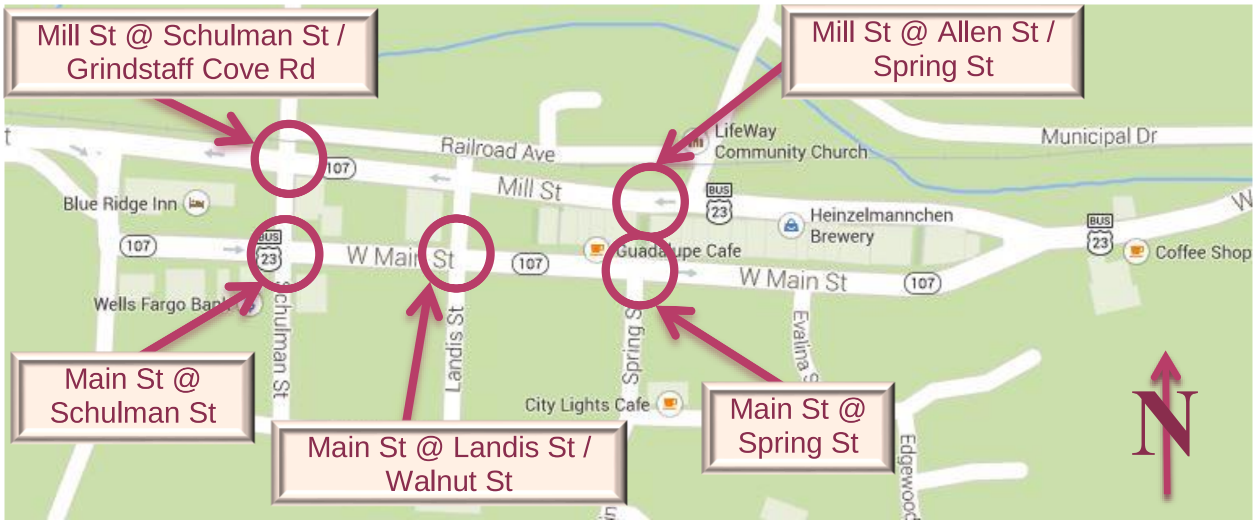
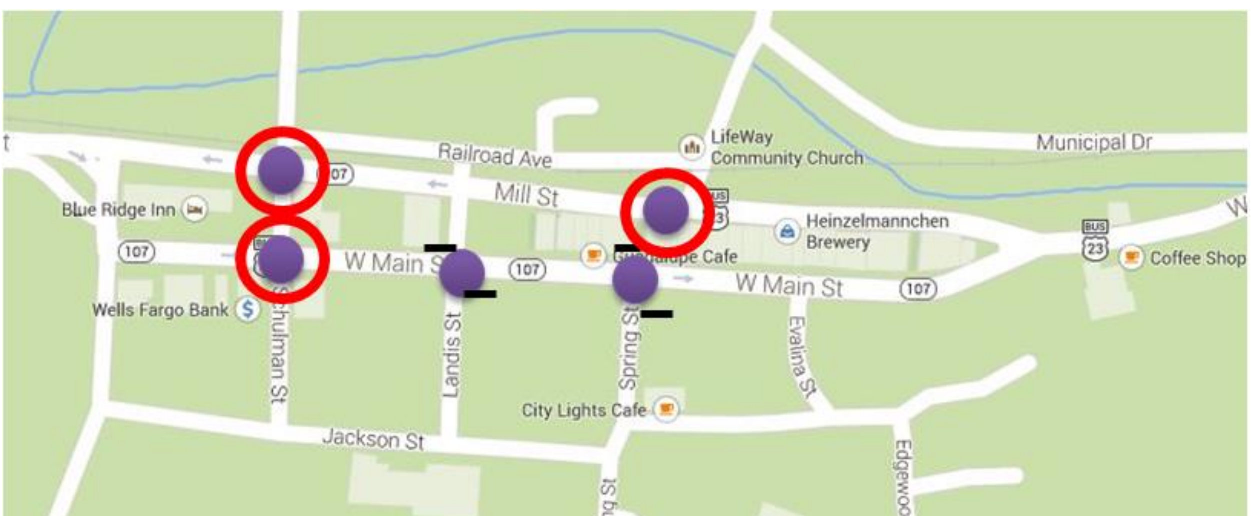


Figure 6 – Street map view of study area in Downtown Sylva identifying signalized intersections.



Traffic signal locations Peak Hour Turning Movement Count locations

Tube count locations

Figure 7 – Location of traffic counts taken for the conversion study

Peak period weekday (7:00 AM – 9:00 AM, 11:00 AM – 2:00 PM, and 3:00 PM – 6:00 PM) turning movement counts were conducted at the three above intersections circled in red in order to obtain existing (baseline) traffic volumes and conditions. AM, Midday (MD), and PM peak periods for each intersection were analyzed for the existing one-way couplet operation, a forecasted one-way couplet operation in two years, and a proposed parallel two-way, two-lane Main Street operation to begin in two years. A future two-way, two-lane operation with left turn restrictions was also modeled. Two percent annual traffic growth was assumed, although historical AADT changes range from -3.0% to +5.6% annually (See Appendix C).

SURROUNDING LAND USES

Sylva is nestled between Kings Mountain and Scotts Creek, two geographic features which have constrained grid-style downtown development. The Main Street – Mill Street couplet serves the original Downtown Central Business District (CBD) of Sylva and is thought to have been a couplet since the 1950's. No major transportation projects are known to have occurred in the vicinity for at least thirty years, although a streetscape project in the 1990's added pedestrian features such as pedestrian signals and sidewalk curb extensions. Downtown offers professional services such as insurance, real estate, banking and legal services; unique craft retail and tourist-oriented businesses; churches; auction and consignment stores; two craft breweries, and non-chain restaurants. County services were relocated from the historic courthouse to new auto-oriented facilities on Grindstaff Cove Road, and the library moved from Main Street to a much larger new facility connected to and behind the historic courthouse. The Town Police Department is now located on Main Street, with the town's public works and town offices on Allen Street, near downtown. There is no longer a public school within walking distance of downtown, and the Post Office moved from downtown to a shopping center on Grindstaff Cove Road not accessible by walking. Still, Sylva's downtown is known for increasing vibrancy recently, credited to new and varied offerings in retail, food, and beverage choices.

SURROUNDING ROADWAYS

Sylva is well served by high design speed highways that bypass downtown. Still, traffic counts on Main Street and Mill Street are higher than can be accounted for by just the trip attractions in downtown, indicating that a considerable amount of through traffic uses downtown. The Sylva Bypass is a freeway carrying route US 74 around the north side of Sylva, serving Sylva with two interchanges, one of which is with Grindstaff Cove Road, connecting Downtown to the Bypass three-quarters of a mile away. US 74 becomes an expressway east and west of the freeway but continues to provide high speed operation without traffic signals eastward all the way to Interstate 40 and westward for over twenty miles to near the Nantahala Gorge. US 74 is identified by the NCDOT as a Strategic Highway Corridor (freeway) connecting Asheville, North Carolina, to Chattanooga, Tennessee.

US 23 arrives from the south running concurrent with route US 441 towards Sylva. It is an undivided five-lane and divided four-lane facility, with a steep grade of seven percent traveling over Cowee Mountain from Franklin and Atlanta, Georgia. US 23-441 is a 60 mile per hour facility except for the Cowee Mountain crossing and the intersection with US 23 Business in Dillsboro. At Dillsboro US 23 North turns eastward and runs concurrent with US 74 East towards Asheville. US 441 North turns westward and runs concurrent with US 74 West for seven miles before splitting north towards Cherokee, the Great Smoky Mountains National Park, and Tennessee. US 23-441 from US 74 to Georgia is a Strategic Highway Corridor (expressway) designated as the Asheville, North Carolina to Atlanta, Georgia, corridor.

The regional route NC 107 is fully contained in Jackson County, connecting Sylva to Cullowhee, Western Carolina University, Cashiers in the southern end of the county and traveling on to South Carolina. It has boulevard Strategic Highway Corridor designation to Cullowhee and then a thoroughfare vision on to South Carolina. About two miles of NC 107 is within Sylva and is an extension of Main Street, with near continuous sidewalk on the west side and increasing sections of sidewalk on the east side, required as properties redevelop.

NC 116 connects US 23-441 south of Dillsboro to NC 107 at the southern end of Sylva, passing through the Town of Webster. Both NC 107 and NC 116 are important local and regional transportation facilities.

Figure 8 – Surrounding roadways serving Sylva, North Carolina

IMPACTED ROADWAYS

The proposed study area includes intersections and roadway segments on Main Street and Mill Street along with their intersections with Savannah Drive, Keener Street, Schulman Street, Landis Street, Walnut Street, Spring Street, Allen Street and Grindstaff Cove Road. Three of the four blocks have a consistent spacing between intersections of about 350 feet before the last block extends to nearly 800 feet at the intersection of Main Street with Mill Street.

Figure 9 – Existing one-way and two-way streets identified

The US 23 Business couplet in Sylva is carried by Main Street and Mill Street. Although both streets have two lanes, the left lane of both streets serves primarily as a left turn auxiliary lane and for beginning and ending parking maneuvers. Main Street has continuous sidewalks but Mill Street lacks sidewalks on most of its north side and has gaps in the sidewalk on the south side. There are no marked bicycle facilities, but the speed limit of 20 miles per hour and the travel speeds are generally conducive to shared lane operations.

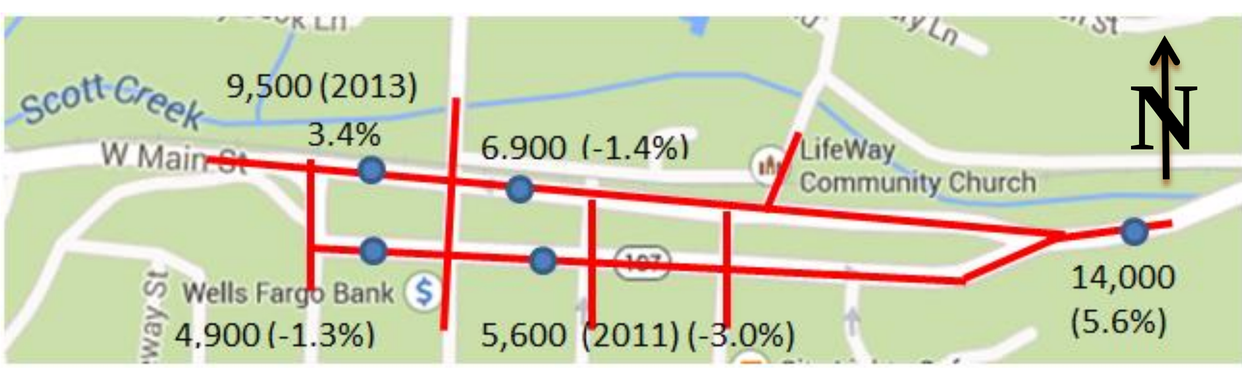


Figure 10 – Historical AADT Traffic Volumes (See Appendix C)

NCDOT traffic counts on Main and Mill Streets are shown in Figure 10. Counts are from 2012 unless another year is shown. Also shown is the change in AADT since 2002 or oldest year since 2002 that data is provided. With a range from -3 percent to over 5.5 percent, there is uncertainty in what will happen to traffic growth here in the future. Many demographers forecast decreasing traffic volumes nationally as younger generations postpone driving for a variety of reasons. The attraction of urban lifestyles, postponing moving out of parents' homes, marriage and starting families may all contribute to decreased driving. However, the most recent traffic counts, which capture a period of improving economy and low gasoline prices, show an increase from recent years. For the purposes of this study, an annual growth in volume of two percent is assumed.

EXISTING TRAFFIC

The AM, MD, and PM peak hour volumes at each intersection were selected by visual observation from the turning movement counts. The complete traffic turning movement counts can be found in Appendix D.

BACKGROUND TRAFFIC

Background traffic is defined as the traffic that would be at the studied intersections at the time of anticipated project completion, with or without the proposed changes. Background traffic is comprised of existing traffic and any increase or decrease in volumes which might occur from general growth trends in the surrounding area or from nearby specific developments. For the purposes of analysis, it was assumed that the conversion from couplet to two-way street operation would not occur for two years. An annual traffic growth rate of 2% was used to forecast what traffic volumes might be like in two years because two percent is a generally accepted default value by the NCDOT, barring any known new developments or highway projects occurring in the projection time period. The local DOT Division recommended one percent, and as previously discussed, the historical AADT traffic volumes show a wide range of both increasing and decreasing traffic volumes. For this simulation, the "background" traffic is that traffic which is anticipated to exist in two years. The same volumes are modeled for both the existing couplet operation and the proposed two-way, two-lane, Main Street options.

METHOD OF ANALYSIS

The studied intersections were analyzed using Synchro / SimTraffic. Synchro / SimTraffic is a specialized software package that allows the user to model intersections and roadway networks to determine levels of service (LOS), based on the thresholds specified in the Highway Capacity Manual (HCM) published by the Transportation Research Board. Synchro also provides analysis of capacity, vehicle delay, volume to capacity ratio (V/C), queue lengths, traffic signal timing, and vehicle flow rate. For the purpose of this report, queue length, delay and LOS are the only aspects being analyzed. A reduction factor for parking is used in all analyses where parking exists or is proposed to exist next to a through travel lane.

The HCM defines capacity as “the maximum hourly rate at which persons or vehicles can reasonably be expected to traverse a point during a given time period under prevailing roadway, traffic, and control conditions”. LOS is a term used to represent different driving conditions, primarily with respect to traffic congestion. It is defined as a “qualitative measure describing operational and perceptional conditions within a traffic stream”. LOS “A” represents free flow traffic conditions with no congestion. LOS “F” represents severely impacted traffic flow due to vehicle congestion. LOS is generally determined by the total “Control Delay” experienced by drivers. Control delay is vehicle delay that is ultimately caused by the traffic control device. This includes deceleration delay, queue move-up time delay, stopped delay, and acceleration delay.

HIGHWAY CAPACITY MANUAL
LEVEL OF SERVICE AND DELAY

UN-SIGNALIZED INTERSECTION		**SIGNALIZED INTERSECTION**	
LEVEL OF SERVICE	**AVERAGE CONTROL DELAY PER VEHICLE (Seconds)**	**LEVEL OF SERVICE**	**AVERAGE CONTROL DELAY PER VEHICLE (Seconds)**
A	**0-10**	**A**	**0-10**
B	**10-15**	**B**	**10-20**
C	**15-25**	**C**	**20-35**
D	**25-35**	**D**	**35-55**
E	**35-50**	**E**	**55-80**
F	**> 50**	**F**	**> 80**

<Table 2>

Usually, at a signalized intersection LOS “D” is considered the lowest acceptable LOS. However, it is not unusual for a side street or private driveway at an un-signalized intersection to experience LOS “F” during a peak hour. The analysis for un-signalized intersections can project very high delays on the side street, thus it is recommended to use LOS measurements as a comparative tool rather than a design tool.

The 95th Percentile Queue is defined to be the vehicle queue (back-up) that has only a 5% probability of being exceeded during the analysis period. At un-signalized intersections, p0 is the probability of a queue free state.

According to *NCDOT’s Congestion Management Capacity Analysis Guidelines*, “The SimTraffic Maximum Queue or Synchro 95th Percentile Queue, whichever is higher, should be used in determining recommended storage lane lengths.” The analysis result tables below show a highlighted breakdown of which output queues were used for the basis of the recommendations.

ANALYSIS OF EXISTING CONDITIONS – (COUPLET PATTERN)

In order to estimate the existing queue length, LOS, and delay at the study intersections, the existing traffic volumes from the AM, MD, & PM peak hours were analyzed using the existing couplet configuration and traffic control conditions. *(Tables 3 – 7)* The Sim Traffic Reports for Capacity Analysis for the existing couplet conditions can be found in *Appendix E.* The existing traffic signal plans of record (POR) can be found in *Appendix F*. The existing traffic signal coordination and scheduling plans for the studied intersections can be found in *Appendix G*. The capacity analysis model for the "Existing Couplet" included an operation reduction factor for on-street parking adjacent to a travel lane.

MAIN STREET (US 23 BUS. NORTH) @ SCHULMAN STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	**AM PEAK HOUR**		**MD PEAK HOUR**		**PM PEAK HOUR**	
	SimTraffic **Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic*** **Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic*** **Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	96	A 7.5	286	B 19.4	272	C 20.8
Southbound	117	C 25.1	116	B 15.0	92	B 14.4

<Table 3>

MAIN STREET (US 23 BUS. NORTH) @ LANDIS STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	**AM PEAK HOUR**		**MD PEAK HOUR**		**PM PEAK HOUR**	
	SimTraffic **Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic*** **Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic*** **Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	152	A 7.8	70	A 2.8	75	A 3.4
Northbound	27	B 12.9	71	C 31.0	113	C 30.5
Southbound	54	C 30.6	72	D 52.8	92	D 54.4

<Table 4>

MAIN STREET (US 23 BUS. NORTH) @ SPRING STREET.
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	51	A 2.7	183	A 4.6	230	A 5.1
Northbound	74	A 9.9	96	C 27.6	52	B 17.6
Southbound	51	B 14.1	93	D 36.6	76	C 33.3

<Table 5>

MILL STREET (US 23 BUS. SOUTH) @ SPRING & ALLEN STREETS
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	111	B 10.2	175	B 10.2	155	B 10.3
Northbound	31	B 15.7	54	E 63.7	53	E 71.1
Southbound	44	C 25.9	65	C 23.2	68	C 30.0

<Table 6>

MILL STREET (US 23 BUS. SOUTH) @ SCHULMAN STREET & GRINDSTAFF COVE ROAD
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	31	A 2.4	126	A 4.6	102	A 4.9
Northbound	74	D 36.2	140	E 61.3	142	E 59.3
Southbound	186	B 17.4	206	C 24.1	246	C 26.6

<Table 7>

Analysis of Background Conditions – (Couplet Pattern)

In order to estimate the background queue length, LOS, and delay at the study intersections, the background traffic volumes from the AM, MD, & PM peak hours were analyzed using the existing couplet configuration and traffic control conditions. *(Tables 8 – 12)* The capacity analysis (Synchro & SimTraffic Reports) for the background couplet conditions can be found in *Appendix E*. The existing traffic signal plans of record (POR) for the studied intersections can be found in *Appendix F*. The existing traffic signal coordination and scheduling plans for the studied intersections can be found in *Appendix G*. The capacity analysis model for the "Background – Couplet Pattern" included an operation reduction factor for on-street parking adjacent to a travel lane.

MAIN STREET (US 23 BUS. NORTH) @ SCHULMAN STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

Approach	**AM Peak Hour**		**MD Peak Hour**		**PM Peak Hour**	
	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	116	A 7.6	243	B 18.7	292	B 19.2
Southbound	133	C 25.2	182	B 19.6	140	B 16.3

<Table 8>

MAIN STREET (US 23 BUS. NORTH) @ LANDIS STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

Approach	**AM Peak Hour**		**MD Peak Hour**		**PM Peak Hour**	
	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	179	A 8.4	136	A 3.4	88	A 3.4
Northbound	25	A 3.2	49	C 24.6	49	C 27.2
Southbound	29	C 34.3	90	D 53.9	92	D 51.0

<Table 9>

MAIN STREET (US 23 BUS. NORTH) @ SPRING STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	30	A 2.8	225	A 5.3	223	A 4.7
Northbound	30	A 6.2	74	C 25.6	74	B 14.0
Southbound	53	B 14.0	72	C 31.2	93	C 34.6

<Table 10>

MILL STREET (US 23 BUS. SOUTH) @ SPRING & ALLEN STREETS
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	95	A 9.3	203	A 9.9	021	B 10.5
Northbound	31	B 14.6	76	E 74.0	74	E 63.4
Southbound	22	B 12.6	108	C 22.6	68	B 11.3

<Table 11>

MILL STREET (US 23 BUS. SOUTH) @ SCHULMAN STREET & GRINDSTAFF COVE ROAD
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	50	A 2.2	175	A 5.3	134	A 5.8
Northbound	98	C 35.0	138	E 58.4	77	E 57.7
Southbound	139	B 16.8	251	C 28.1	300	C 29.3

<Table 12>

ANALYSIS OF PROPOSED CONDITIONS – (OPTION 3) ONE LANE COUPLET

In order to estimate the existing queue length, LOS, and delay at the study intersections in the Option 3 operational pattern, which uses the existing couplet configuration but more permanently adopts the closed-lane features present in late 2014 when debris removal from a fire was taking place, a growth factor of 2% was applied to the existing traffic volumes for two years' time. The AM, MD, & PM peak hours were analyzed using the proposed 1-lane configuration with auxiliary lanes as they currently exist, but with some additional parking spaces on Mill Street *(Tables 13 – 17).* The capacity analysis (Synchro & SimTraffic Reports) for the proposed 1-lane conditions can be found in *Appendix E.* The capacity analysis model for the "1-lane couplet" (Option 3) included an operation reduction factor for on-street parking adjacent to a travel lane.

MAIN STREET (US 23 BUS. NORTH) @ SCHULMAN STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	**AM PEAK HOUR**		**MD PEAK HOUR**		**PM PEAK HOUR**	
	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	118	A 7.8	243	B 18.7	293	C 20.4
Southbound	132	C 25.3	182	B 19.6	139	B 16.0

<Table 13>

MAIN STREET (US 23 BUS. NORTH) @ LANDIS STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	**AM PEAK HOUR**		**MD PEAK HOUR**		**PM PEAK HOUR**	
	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**	***SimTraffic* Max Queue (Feet)**	**LOS and Delay (sec)**
Eastbound	157	A 8.2	136	A 3.4	73	A 2.8
Northbound	25	A 4.7	49	C 24.6	49	C 26.3
Southbound	30	C 34.4	90	D 53.9	92	D 46.4

<Table 14>

MAIN STREET (US 23 BUS. NORTH) @ SPRING STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	30	A 3.0	225	A 5.3	223	A 4.7
Northbound	30	A 6.3	74	C 25.6	74	B 13.4
Southbound	53	B 13.1	72	C 31.2	72	C 24.6

<Table 15>

MILL STREET (US 23 BUS. SOUTH) @ SPRING & ALLEN STREETS
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	138	B 11.0	203	A 9.9	372	B 14.3
Northbound	30	B 12.5	76	E 74.0	72	E 64.8
Southbound	31	B 14.3	108	C 22.6	76	B 13.0

<Table 16>

MILL STREET (US 23 BUS. SOUTH) @ SCHULMAN STREET & GRINDSTAFF COVE ROAD
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	31	A 2.5	175	A 5.3	289	A 7.4
Northbound	97	D 35.4	138	E 58.4	93	E 57.8
Southbound	136	B 16.5	251	C 28.1	293	C 30.1

<Table 17>

ANALYSIS OF PROPOSED CONDITIONS – (OPTION 1) TWO-WAY MAIN ST.

In order to estimate the existing queue length, LOS, and delay at the study intersections in the Option 1 operational pattern, which has two-way, two-lane traffic on Main Street and a single lane one-way westbound on Mill Street, we applied an annual growth factor of 2% for two years to the existing traffic volumes. The AM, MD, & PM peak hours were analyzed using proposed two-way, two-lane configuration and traffic control conditions. *(Tables 18 – 22)* The capacity analysis (Synchro & SimTraffic Reports) for the proposed two-way, two-lane condition can be found in *Appendix E.* The capacity analysis model for the "two-way, two-lane operation" included an operation reduction factor for on-street parking adjacent to a travel lane.

MAIN STREET (US 23 BUS. NORTH) @ SCHULMAN STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	181	A 9.0	312	C 33.0	308	C 32.8
Westbound	76	B 12.7	302	B 19.6	201	B 18.9
Northbound	31	B 10.7	31	C 21.6	53	B 16.5
Southbound	140	D 37.3	183	C 33.6	187	C 32.9

<Table 18>

MAIN STREET (US 23 BUS. NORTH) @ LANDIS STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	208	A 7.6	282	A 8.8	313	B 12.5
Westbound	71	A 7.7	140	A 5.8	160	A 9.2
Northbound	30	B 13.7	52	C 21.4	97	C 22.4
Southbound	52	C 32.9	74	D 38.9	69	D 42.6

<Table 19>

MAIN STREET (US 23 BUS. NORTH) @ SPRING STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	51	A 2.7	246	A 6.5	248	A 8.3
Westbound	53	A 8.8	199	B 12.0	115	A 9.8
Northbound	30	B 10.2	54	B 15.9	52	B 19.3
Southbound	31	C 20.4	31	B 15.0	31	B 18.2

<Table 20>

MILL STREET (US 23 BUS. SOUTH) @ SPRING & ALLEN STREETS
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	176	B 10.2	198	A 9.1	264	B 11.5
Northbound	31	B 18.3	53	E 62.8	74	D 54.4
Southbound	22	A 6.8	43	C 25.5	41	B 16.3

<Table 21>

MILL STREET (US 23 BUS. SOUTH) @ SCHULMAN STREET & GRINDSTAFF COVE ROAD
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	91	A 3.5	289	B 16.5	292	B 18.9
Northbound	74	B 15.9	76	B 14.9	53	B 12.5
Southbound	96	B 15.3	311	E 75.6	270	C 32.9

<Table 22>

Town of Sylva
Two Way Main Street
~Conceptual Design~

Buildings	
Driveways	
Green Space	
Sidewalks	
Truck Apron	
Railroad	

J.M. TEAGUE Traffic Engineering

J.M. Teague Engineering, PLLC
525 N.Main St Waynesville, NC
Office: 828-456-8383
Fax: 828-456-8797

SCALE: NOT TO SCALE

Figure 11 - Option 1:
Two-Way Main Street

PLAN DATE: 2-26-2015	REVIEWED BY: Reuben Moore, PE
PREPARED BY: C.B.Hladick, CADD	REVIEWED BY:

REVISIONS	INIT.	DATE

ANALYSIS OF PROPOSED CONDITIONS – (OPTION 1) TWO-WAY MAIN ST. WITH NO LEFT TURNS ALLOWED EASTBOUND ON MAIN STREET UNTIL THE MILL STREET INTERSECTION

In expectation of possible unacceptable congestion at the intersection of Main Street and Schulman Street an analysis of Option 1 with no left turns allowed until the intersection of Main Street with Mill Street was performed. In order to estimate the queue length, LOS, and delay at the study intersections in the Option 1 operational pattern, which has two-way, two-lane traffic on Main Street and a single lane one-way westbound on Mill Street, we applied an annual growth factor of 2% for two years to the existing traffic volumes. The AM, MD, & PM peak hours were analyzed using proposed two-way, two-lane configuration and traffic control conditions. For this option, those conditions include "No Left Turn" from Main Street at Schulman, Landis, and Spring Streets. *(Tables 23 – 27)* The capacity analysis (Synchro & SimTraffic Reports) for the proposed two-way, two-lane condition can be found in *Appendix E.* The capacity analysis model for the "two-way, two-lane operation" included an operation reduction factor for on-street parking adjacent to a travel lane.

MAIN STREET (US 23 BUS. NORTH) @ SCHULMAN STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	138	A 8.5	313	D 39.7	307	C 32.7
Westbound	111	B 11.3	296	B 19.9	197	C 20.6
Northbound	31	B 15.6	31	B 12.8	31	A 1.1
Southbound	138	D 37.9	184	C 32.3	181	C 32.4

<Table 23>

MAIN STREET (US 23 BUS. NORTH) @ LANDIS STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	181	A 9.2	313	B 14.9	314	B 15.3
Westbound	94	A 9.3	175	B 11.5	178	A 7.7
Northbound	30	B 12.3	74	C 28.4	52	C 27.3
Southbound	52	C 32.3	70	D 51.5	94	D 50.8

<Table 24>

MAIN STREET (US 23 BUS. NORTH) @ SPRING STREET
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Eastbound	51	A 2.9	157	A 7.0	306	A 9.9
Westbound	65	A 5.4	227	A 9.5	203	B 12.5
Northbound	49	A 8.5	52	C 20.7	96	C 23.7
Southbound	31	C 23.3	52	C 22.5	30	B 12.4

<Table 25>

MILL STREET (US 23 BUS. SOUTH) @ SPRING & ALLEN STREETS
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	220	B 11.5	202	A 8.2	287	A 9.7
Northbound	51	B 14.8	72	E 72.9	53	E 73.4
Southbound	22	B 12.8	22	C 22.7	65	B 14.7

<Table 26>

MILL STREET (US 23 BUS. SOUTH) @ SCHULMAN STREET & GRINDSTAFF COVE ROAD
ANALYSIS OF AM/MD/PM PEAK HOUR TRAFFIC CONDITIONS

APPROACH	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
	SimTraffic Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)	*SimTraffic* Max Queue (Feet)	LOS and Delay (sec)
Westbound	116	A 4.0	298	B 19.3	304	B 12.6
Northbound	96	B 15.9	96	C 28.3	96	C 21.3
Southbound	121	B 13.5	330	F 133.9	290	C 18.3

<Table 27>

	BACKGROUND TRAFFIC (NO BUILD OPTION)						OPTION 1 - TWO-WAY TRAFFIC ON MAIN STREET						OPTION 1 - TWO-WAY TRAFFIC ON MAIN STREET WITH NO LEFT TURNS ALLOWED UNTIL INTERSECTION WITH MILL STREET						OPTION 3 - ONE-LANE, ONE-WAY (COUPLET) OPERATION ON BOTH MAIN AND MILL STREETS					
	AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR		AM PEAK HOUR		MD PEAK HOUR		PM PEAK HOUR	
APPROACHES	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)	*Sim Traffic* Max Queue (Feet)	LOS and Delay (sec)
Main St @ Shulman Street																								
Main St Eastbound	116	A 7.6	243	B 18.7	292	B 19.2	181	A 9.0	704	C 33.0	720	C 32.8	138	A 8.5	894	D 39.7	744	C 32.7	118	A 7.8	243	B 18.7	293	C 20.4
Main St Westbound	N/A	N/A	N/A	N/A	N/A	N/A	76	B 12.7	302	B 19.6	201	B 18.9	111	B 11.3	296	B 19.9	197	C 20.6	N/A	N/A	N/A	N/A	N/A	N/A
Shulman St Northbound	N/A	N/A	N/A	N/A	N/A	N/A	31	B 10.7	31	C 21.6	53	B 16.5	31	B 15.6	31	B 12.8	31	A 1.1	N/A	N/A	N/A	N/A	N/A	N/A
Shulman St Southbound	133	C 25.2	182	B 19.6	140	B 16.3	140	D 37.3	183	C 33.6	187	C 32.9	138	D 37.9	184	C 32.3	181	C 32.4	132	C 25.3	182	B 19.6	139	B 16.0
Main St @ Landis & Walnut Sts																								
Main St Eastbound	179	A 8.4	136	A 3.4	88	A 3.4	208	A 7.6	282	A 8.8	313	B 12.5	181	A 9.2	313	B 14.9	314	B 15.3	157	A 8.2	136	A 3.4	73	A 2.8
Main St Westbound	N/A	N/A	N/A	N/A	N/A	N/A	71	A 7.7	140	A 5.8	160	A 9.2	94	A 9.3	175	B 11.5	178	A 7.7	N/A	N/A	N/A	N/A	N/A	N/A
Landis St Northbound	25	A 3.2	49	C 24.6	49	C 27.2	30	B 13.7	52	C 21.4	97	C 22.4	30	B 12.3	74	C 28.4	52	C 27.3	25	A 4.7	49	C 24.6	49	C 26.3
Walnut St Southbound	29	C 34.3	90	D 53.9	92	D 51.0	52	C 32.9	74	D 38.9	69	D 42.6	52	C 32.3	70	D 51.5	94	D 50.8	30	C 34.4	90	D 53.9	92	D 46.4
Main St @ Spring St																								
Main St Eastbound	30	A 2.8	225	A 5.3	223	A 4.7	51	A 2.7	246	A 6.5	248	A 8.3	51	A 2.9	157	A 7.0	306	A 9.9	30	A 3.0	225	A 5.3	223	A 4.7
Main St Westbound	N/A	N/A	N/A	N/A	N/A	N/A	53	A 8.8	199	B 12.0	115	A 9.8	65	A 5.4	227	A 9.5	203	B 12.5	N/A	N/A	N/A	N/A	N/A	N/A
Spring St Northbound	30	A 6.2	74	C 25.6	74	B 14.0	30	B 10.2	54	B 15.9	52	B 19.3	49	A 8.5	52	C 20.7	96	C 23.7	30	A 6.3	74	C 25.6	74	B 13.4
Spring St Southbound	53	B 14.0	72	C 31.2	93	C 34.6	31	C 20.4	31	B 15.0	31	B 18.2	31	C 23.3	52	C 22.5	30	B 12.4	53	B 13.1	72	C 31.2	72	C 24.6
Mill St @ Spring & Allen Sts																								
Mill St Eastbound	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mill St Westbound	95	A 9.3	203	A 9.9	210	B 10.5	176	B 10.2	198	A 9.1	264	B 11.5	220	B 11.5	202	A 8.2	287	A 9.7	138	B 11.0	203	A 9.9	372	B 14.3
Spring St Northbound	31	B 14.6	76	E 74.0	74	E 63.4	31	B 18.3	53	E 62.8	74	D 54.4	51	B 14.8	72	E 72.9	53	E 73.4	30	B 12.5	76	E 74.0	72	E 64.8
Allen St Southbound	22	B 12.6	108	C 22.6	68	B 11.3	22	A 6.8	43	C 25.5	41	B 16.3	22	B 12.8	22	C 22.7	65	B 14.7	31	B 14.3	108	C 22.6	76	B 13.0
Mill St @ Shulman St & Grindstaff Cove Rd																								
Mill St Eastbound	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Mill St Westbound	50	A 2.2	175	A 5.3	134	A 5.8	91	A 3.5	289	B 16.5	292	B 18.9	116	A 4.0	298	B 19.3	304	B 12.6	31	A 2.5	175	A 5.3	289	A 7.4
Shulman St Northbound	98	C 35.0	138	E 58.4	77	E 57.7	74	B 15.9	76	B 14.9	53	B 12.5	96	B 15.9	96	C 28.3	96	C 21.3	97	D 35.4	138	E 58.4	93	E 57.8
Grindstaff Cove Road Southbound	139	B 16.8	251	C 28.1	300	C 29.3	96	B 15.3	311	E 75.6	270	C 32.9	121	B 13.5	330	F 133.9	290	C 18.3	136	B 16.5	251	C 28.1	293	C 30.1

CONCLUSIONS AND RECOMMENDATIONS

The first thing to note is that in the case summaries we found and reviewed, not one noted conversion results that were all negative. The negative results mentioned primarily had to do with the efficiency of motor vehicle flow, and even with these, the noted changes in efficiency had some positive effects. Some of the positive efficiency effects noted in the summaries include reduced travel distances and miles traveled, the elimination of out-of-direction travel (unless turning restrictions are added), less confusing navigation, and a lessened need for wayfinding signs. Additionally, traffic is "calmer," meaning it is slower and there is increased congestion. Depending on who one asks, some may consider these last two items as positive for the business and pedestrian environment of downtown or negative to the hurried traveler. To the degree to which a congested street leads to a congested sidewalk would be immensely popular for the business community.

Traffic engineering analysis allows us to make predictions about future traffic volumes and what traffic operations would be like if certain conditions change. Table 28 summarizes the average seconds of delay per vehicle and the projected maximum queue of stopped vehicles for four scenarios. These scenarios are the background scenario, the two-way on Main Street scenario, the two-way on Main Street with no left turns allowed until Mill Street, and the one-lane, one-way couplet scenario.

The background scenario shows what is expected to happen with an assumed growth in traffic and with no changes in traffic control. This scenario is sometimes called the "do nothing" scenario – it represents conditions that can be expected in the absence of any changes. Looking at the morning (AM), midday (MD), and late afternoon (PM) peak hour maximum queue lengths, level of service and average delay per vehicle, we see that the longest predicted queue on US 23 Business occurs in the PM, at the Main Street and Shulman Street intersection, with a queue length about the distance from the traffic signal to the fountain at the base of the courthouse steps. This is a condition we already observe, so the prediction is in line with observed experience. We also see that the average delay per vehicle is just less than 20 seconds per vehicle, barely considered a "B" level of service.

The length of this queue in both two-way Main Street traffic scenarios is quite long in both the midday and PM, exceeding 700 and approaching 900 feet in length. The average delay per vehicle increases by fifty to nearly one hundred percent, approaching 40 seconds per vehicle. Using prediction modeling, restricting left turns at Schulman Street actually increases the queue and average delay. We attribute this to the effect of moving the previously allowed left turns into the volume of through traffic which creates more delay for that movement.

Comparing the "no build" scenario to the two-way Main Street scenario without turning restrictions (Option 1), we see that the model predicts that delay would increase by about three quarters, and that queue lengths would become longer by nearly two-and-a-half times. A queue of this distance would back up from the traffic signal at Shulman Street to about the Economy Inn. These would likely be considered extreme impacts by the North Carolina Department of Transportation, the entity that would have to approve these changes.

If the Town wanted to pursue the conversion of Main Street to two-way traffic, there are some favorable arguments. The greatest is the anticipated increase in business activity and complete street flavor it would bring to downtown. One problem with capacity analysis is that it does not take into account human behavioral changes that will occur when the driving environment changes. A characteristic of traffic flow is that it flows like water – seeking the path of least resistance. That applies to through vehicle trips; it would not change the trip paths of motorists with an origin or destination in the study area. If delay became a consistent problem for through motorists, they would begin to select alternate routes until a new equilibrium was reached.

Before implementing a two-way Main Street, the effects on neighboring streets should be considered. Through traffic would likely begin to use Municipal Drive to a greater extent, and even the narrow residential street Dillsboro Road (SR 1380), which is not well suited for high traffic volumes. For through traffic between Dillsboro and Cullowhee, US 23-74 could become a more attractive route.

The official recommendation from the consultant is as follows: Two key issues should be addressed to determine if a two-way Main Street should be pursued at this time. First is an assessment of downtown's current business climate. Are businesses closing due to a lack of shoppers, or are new businesses drawn to Main Street and Mill Street, with openings on the rise? This could be measured by tracking sales tax receipts, new business licenses, or counting parking turnover.

The second key issue is whether Main Street's current form is dysfunctional to business activity. Does traffic generally move at the 20 miles per hour speed limit, or is speeding observed consistently and perceived as a threat by shoppers? Can a visitor safely walk from available parking to the storefront?

If business is booming and the street is calm, the two-way Main Street is probably not worth pushing for given the negative impacts to traffic flow. However, if downtown could be considered distressed and current traffic operations threaten the life and limb of shoppers, the Town should still push hard for a two-way street conversion.

We see three courses of action for the Town to consider. The first is to push hard for a two-way Main Street as soon as possible, assuming that business is in a poor state and Main Street is a race track. The second would be to pursue a strategic plan for a two-way Main Street, assuming that business is not bad but you think it could be greatly improved. The third is to consider Option 3, the queue and delay results of which are in the final set of columns in Table 28.

Appendix B has a bare bones, no frills cost estimate for implementing Option 1. That estimate is only $75,000, but assumes that the existing traffic signal pole and mast arms will support the addition of two additional signal displays each. If new poles and arms would be needed, the cost would increase by $150,000. This information would come into play if the first course of action above is chosen.

Given the transportation efforts afoot in Jackson County at the time of this report, it is a perfect time for the Town of Sylva to consider a strategic course of action for a two-way Main Street, if this is the Town's chosen course of action. Jackson County, in concert with the Southwestern Commission's Rural Planning Organization and the NCDOT's Statewide Planning Branch, began an update of the Comprehensive Transportation Plan (CTP) last year. As part of the CTP, a traffic model will be developed that can show how increases and decreases in capacity will affect traffic flow on other roads in the model area. Further, a problem statement for the conversion project that would more fully address the multimodal needs of Main and Mill Streets could be developed and recommended for inclusion in the State Transportation Improvement Program (STIP).

Option 3 creates the approximate traffic pattern that existed when the left lane of Mill Street was closed due to last year's fire. Diagonal parking became possible due to the closed traffic lane, and the single lane of traffic served to calm traffic speeds. While the NCDOT may have strong reservations about Option 1, it should have little to no reservations about Option 3 as it has nearly the same queuing and delay numbers that are going to exist anyway in the "do nothing" scenario.

OTHER RECOMMENDATIONS

SCHULMAN STREET

Schulman Street south of Main Street currently operates as a one-way, southbound street. The consultant advises the Town to revisit the reasons this street is configured as a one-way, and review if the reasons are still appropriate if a new option is implemented on Main Street.

REAR ENTRY PARKING

All diagonal parking represented in these plans is shown as front entry parking, but the consultant strongly encourages the Town to consider making diagonal parking rear entry. It would be easier to implement such a parking change in conjunction with a traffic operational change so that the community can learn all changes at once.

Figure 12 -Pictures of Rear-Entry Parking

There are three major reasons that rear-entry parking is superior to front-entry parking:

1. Rear-entry parking allows vehicles to be loaded and unloaded with trunks facing the sidewalk rather than the traffic in the street.
2. The open vehicle doors with rear-entry parking direct occupants towards the sidewalk rather than the street.
3. Drivers leaving a parking space that has been parked using rear-entry have a much better view of oncoming traffic. This is especially important for the safety of bicycle traffic.

Figure 13 -Example of an information sign used to demonstrate the rear-entry parking technique.

TRAFFIC SIGNAL ON MILL STREET AT ALLEN STREET & SPRING STREET

The pedestrian environment improves with frequent street crossing opportunities. For this reason, long traffic signal cycle lengths are not appropriate in high pedestrian areas. The traffic signal system in downtown Sylva currently operates on two different cycle lengths, 70 seconds and 110 seconds. The longer cycle runs during the busiest time of the day, from 10:00 a.m. to 6:30 p.m., seven days a week. All of the signals in the system are two-phase except for the signal at Mill, Spring and Allen Streets, which is a three-phase signal. The more phases a signal has, the longer the cycle length.

Previous objections to removing this traffic signal included concerns about how fast Mill Street traffic might travel, and about access to and from the police department. If Mill Street becomes one lane, the slowest moving vehicle will control the speed. The police department has moved from Allen Street to Main Street. Also, the left turn movement from Mill Street to Spring Street should become greatly reduced if Option 1 is implemented, because westbound traffic would be able to travel on Main Street directly.

Removing this traffic signal would allow the remaining two-phase signals to be programmed for a 60-second cycle, providing more frequent opportunities for pedestrians to cross Main Street. The consultant recommends consideration of removing this traffic signal if Mill Street becomes one-lane. The Urban Street Design Guide, published by NACTO, recommends cycle lengths in the 60 to 90 second range both to offer pedestrians more frequent crossing opportunities and to not overly delay minor street traffic.

NEW TRUCK ROUTE RECOMMENDED

Option 1, the two-way traffic on Main Street scenario, has westbound traffic on Main Street in addition to having westbound traffic on Mill Street. The westbound traffic on Main Street would make a free-flowing right turn onto Keener Street in this scenario. Tractor Trailer trucks making this right turn would likely encroach across the centerline to shy away from the corner of the Blue Ridge Inn and the sidewalk on that corner. For this reason, we recommend that Main Street have an ordinance enacted making Mill Street westbound the "Truck Route" so that signs reading "No Thru Trucks" could be placed to apply to Main Street. This action only becomes necessary if any westbound traffic is allowed to use Main Street.

References:

The North Carolina Complete Streets Planning and Design Guidelines, NCDOT (July 2012)

Jackson County, NC, Comprehensive Transportation Plan (2010), a joint effort of Jackson County, the Southwestern Rural Planning Organization, and NCDOT.

NCDOT's Congestion Management Capacity Analysis Guidelines

Urban Street Design Guide by NACTO (National Association of City Transportation Officials) (2013)

Endnotes:

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http://nacto.org/docs/usdg/are-we-strangling-ourselves-on-one-way-networks_walker.pdf
[xiii] Walker, ibid
[xiv] Walker, ibid.
[xiv] Walker, ibid.