Lake Junaluska
Assembly Public Works

Lake Junaluska Assembly
Traffic and Parking Report
Summer 2008

Assembly Public Works Department
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Executive Summary:

The purpose of this analysis is to assess the flow of traffic and parking around the area of the Central Campus, with special attention to the flow around Stuart Auditorium and in reflection of the Campus Master Design Group. This study documents existing parking spaces and evaluates the flow of traffic during the peak of Lake Junaluska's busiest season.

Introduction

This report was initiated out of traffic and parking concerns of the Stuart Center and Campus Master Design Group. The purpose of this study is to document existing parking and to evaluate the flow and volume of vehicular and pedestrian traffic in the central campus during our heaviest conference season.

The traffic study was conducted by Howard C. Tew, PE, with Public Works, in consultation with Mitchell "Buddy" Young, LJA Director of Public Works. Extensive interviews were conducted with Gene McAbee, LJA Chief of Security; Fred Galloway, Trolley Driver; and others. Many of the interviews were conducted with persons who are not familiar with the vision presented to the Design Group. However, their observations seem valid and are included without concern for influence on the vision.

Methodology

A study of vehicular and pedestrian traffic was conducted to evaluate the volume and flow of traffic along North Lakeshore Drive in the vicinity of the Terrace Hotel and Stuart Auditorium on June 5, 2008 and June 10, 2008. All traffic passing the Terrace Hotel on Thursday, June 5, 2008 was monitored from 8:57am to 3:18pm. On Tuesday, June 10, 2008 traffic was monitored from 8:45 to 12:09. These dates were chosen due to anticipated high traffic volume that would result from activities related to major conferences scheduled on these dates. The annual Western North Carolina Conference was in session June 4-8, 2008. Major worship and business sessions convened in and adjacent to Stuart Auditorium on June 5, 2008. The Holston Annual Conference met in this same area June 8-11, 2008. It is estimated that 2800 persons attended at the WNC Conference and 2100 attended the Holston Conference (Ken Howle, June 2008)
A computer program was developed by Mr. Tew to automate the traffic count and to log the specific time of each vehicle and pedestrian observation and any event which resulted in unusual delays. The traffic count was conducted from the third floor balcony of the Terrace Hotel which affords a wide view of all vehicular and pedestrian traffic approaching the area. All traffic observations were recorded in real time using a laptop computer. Real time clock time (Eastern Standard Day-Light Savings Time) was recorded with each observation.

All pedestrian traffic was recorded which actually crossed the center line of North Lakeshore drive between the cross-walk in front of the LJA Administration Building and the cross-walk at the west end of the Harrell Center in front of the Terrace Hotel. Persons walking along the sidewalk or in the street parallel with the street were not counted if they did not cross the center line. The number of such persons during peak pedestrian traffic was significant. A limited number of pedestrians crossing between the Terrace and the Harrell Center may have been missed due to obstruction of the view of the street by the large tree in front of the Terrace Hotel. The pedestrians not observed due to the obstruction were not using the crosswalk and are considered statistically insignificant.

Vehicular traffic was recorded which crossed the speed bump between the Terrace Hotel and the Harrell Center from either direction. No distinction was recorded to reflect direction of traffic. Westbound traffic which turned on to Chapel Drive just prior to the speed hump was also counted. This vehicular traffic turning left onto Chapel Drive was counted since it contributes significantly to congestion in this area during high traffic periods.

Of particular interest was the cycle time of the LJA shuttle trolleys. Only one trolley operated for the full period of the traffic study. There are two active trolleys. One trolley broke down by mid-morning on June 5, 2008 and did not appear in service on June 10, 2008. The green top trolley was active on both study days and was the only trolley tracked in the study. Passenger vans were employed while the trolley was out of commission but could not be counted accurately. Therefore only the green top trolley is recorded as a shuttle vehicle to establish cycle times. Each time the trolley passed the Terrace Hotel a record was made of the time.

These times were analyzed to determine the cycle time of the trolley. The trolley begins its cycle at the Lambuth Inn, travels down North Lakeshore Drive stopping at the Terrace Hotel and several other points along the way, finally arriving at the Welcome Center at the main gate at Highway 19. It then returns to the Lambuth Inn along the same route, again making stops along the way. This completes one full trolley cycle. In this study the trolley cycles were evaluated based on the stops in front of the Terrace Hotel. Mr. Tew spent half of busy day riding with Fred Galloway on the trolley.

Vehicular traffic was recorded and distinguished in four broad categories:

a) Passenger Vehicles – Cars, passenger pickup trucks, mini-vans, motorcycles and bicycles moving in line with vehicular traffic
b) Utility Vehicles – LJA service vehicles, LJA security vehicles, private service vehicles, delivery vehicles, and any vehicle which was obviously on the Assembly grounds for the purpose of delivering goods or providing services to Assembly residents, staff, or guests.
c) Buses and Vans – Church buses or full size church vans, LJA shuttle vans including the white top Trolley
d) Green Top Trolley

Events which caused a significant delay of vehicular or pedestrian traffic were also recorded. These events included such events as a vehicle stopped in the flow of traffic asking a security officer for directions, a passenger vehicle stopped to drop off or pickup pedestrians, a delivery vehicle parked in a manner which obstructed traffic, a vehicle backing out of a parking space, and a vehicle waiting to take the parking space of another vehicle which was about to leave a parking space. Other delay events that were not observed but would have been recorded had they occurred would include traffic or pedestrian accidents, security officer's activities to detain a motorist due to a traffic violation, and other similar events. Each delay event was recorded as a separate record including the time of the delay event and a brief text description of the nature of the event.

The number of available parking spaces has been indexed and is available in Appendix A.

Organization of Recorded Observations

Data files generated by the recording computer program were written to hard disk in sequential files that included separate records for each observed traffic entity or event. These files were generated in a comma delimited text file format which is accessible by Microsoft Excel spreadsheet. Data were converted to Microsoft Excel2007 format and organized to facilitate graphical presentation using charting features of Excel2007. The original text files were not altered in order to maintain integrity of data for future review and analysis.

Observed pedestrian and vehicular traffic were grouped into 15-minute intervals to facilitate evaluation of traffic volume trends. Charts and tables used for presentation are generally based on traffic volume rates for 15-minute periods. Other time intervals can easily be evaluated using the original data.

The data recorded for both days of the study have been charted in various formats using Microsoft Excel2007 spreadsheet charting features. These charts visually illustrate the rates of traffic in 15-minute time periods starting at 8:45am. The June 5th study actually began after 8:45 at 8:57am. As a result, the values for the 15-minute period between 8:45 and 9:00 represent only about three minutes of traffic. The same applies to the period between 3:15 and 3:30pm. The traffic count was terminated at 3:18pm. The value shown between 3:15 and 3:30pm is not meaningful since it only reflects three minutes of traffic. On June 10th the study began at 8:45am and terminated at 12:09pm. The charts prepared for June 10th illustrate traffic rates through 12:15pm, but the 12:00-12:15pm period only represents nine minutes of traffic observation. All other time periods reflect accurate traffic counts with continuous recording of traffic throughout the study period on both days.

The charts developed to illustrate the observed traffic data generally are plotted with the time of day on the x-axis (horizontally). The time of day shown on the horizontal axis represents the ending time of the displayed time period. Thus a column on a chart with the axis at the base of the column labeled as 12:15pm represents the traffic counted for the period between 12:00 noon and 12:15pm. Bar charts will generally have the time of day plotted and labeled on the vertical axis.

Analysis

The variation between the levels of traffic on the two study days provides an interesting comparison of hourly flow of pedestrian and vehicular traffic on North Lakeshore Drive. June 5th was a very high traffic conference day while June 10th turned out to be a moderate to high traffic conference day. Both pedestrian and vehicular traffic levels are related to the timing of conference activities on the LJA campus.

The column charts showing combined pedestrian and vehicular traffic illustrate the ebb and flow of the traffic relative to the convening and adjournment of conference activities. Both

pedestrian and vehicular traffic increases dramatically in the 30 minutes prior to the convening of specific conference activities. These surges are evident in the column chart illustration of the June 5th traffic. At 9:30am an open session of laity convened at Stuart Auditorium. From 9:15 to 9:30 the traffic spike shows activity related to assembly for this session. Traffic fell off at the opening of this session but surged again pursuant to the convening of the Worship Celebration and Holy Communion at 10:30. This surge of traffic persisted for approximately 45 minutes before gradually declining after the beginning of the 10:30 meeting. Traffic is seen to reach a low point about 11:30. Beginning at 11:45 pedestrian traffic again surged and was at its highest from 12:00 noon to 12:15pm as conference sessions were adjourned for lunch. Vehicular traffic lagged pedestrian traffic as attendees made their way to their vehicles to exit for lunch and was at its highest level of the day between 12:00 and 12:15. By 12:45pm traffic had declined and remained at a moderately high rate throughout the afternoon. Just prior to the 2:00pm convening of the Conference for Organization and Plenary Business Session both pedestrian and vehicular traffic surged again, but not to the levels of the traffic at the noon hour.

Interestingly, the highest one-minute vehicular traffic count of the day occurred at 1:50pm just prior to the beginning of this afternoon session. Twenty vehicles crossed in front of the Terrace Hotel during this one minute period of corresponding high pedestrian traffic. This level of vehicular traffic may represent the maximum possible flow of vehicles through this area with pedestrian traffic. If this rate could be sustained it would be equivalent to 300 vehicles in 15 minutes and 1200 vehicles per hour. Such sustained rates are unlikely during periods of high pedestrian traffic. The next highest one-minute rate was 15 vehicles. A sustained maximum rate of 120 vehicles per 15 minutes is realistic given that pedestrian surges will almost always coincide with traffic surges.

The highest recorded vehicular and pedestrian traffic occurred between 12:00 and 12:15pm on June 5th. This occurred at the time when conference attendees were breaking for lunch after the morning session. The pedestrian traffic was far higher during this period than at any other 15-minute period. There were 369 pedestrians who crossed North Lakeshore Drive during this period; 140 pedestrians more than at any other 15-minute time period. In the one-minute period between 12:01 and 12:02pm fifty pedestrians were observed crossing the street. Pedestrian surges are not as detrimental to traffic flow as vehicular surges because crossing officers can “bundle” more effectively.

The volume of service vehicles including trucks and vans, shuttles and trolleys is commonly referred to as “truck” traffic. The 3-D Area chart illustrates the relative volume of the five categories of traffic recorded. Analysis of the data shows that 8.44 percent of the vehicular traffic on June 5th was “truck” traffic. On June 10th over 13 percent of the vehicular traffic was “truck” traffic. These values appear logical. It would be reasonable to expect that service traffic on the Assembly grounds during the summer season would be fairly static and below the normal highway average. While the volume of service traffic would be expected to increase somewhat during high volume conference days, the great volume of guest traffic would be so high that the service traffic portion would be a lower percentage. For the two conference days studied, the hourly volume of service vehicles was almost identical, with the lower traffic

conference day on June 10th actually having one hourly period where service traffic was higher than for the same hour during the high traffic conference day on June 5th. What is even more interesting is that while during the highest 15-minute peak traffic period of the day, the percentage of service vehicles on June 10th (6.5%) is only half the percentage recorded on June 5th (13%), yet the percentage of service vehicles at their highest rate of the day is 20% and 25% respectively for June 5th and June 10th.

Traffic Observations

Trolley cycle times are illustrated in bar and column charts for each day of the study. During periods of low traffic and little traffic congestion the trolley is able to cycle in as little as 15 minutes from the Lambuth Inn to the Welcome Center and then back to the Lambuth.

However, in heavy vehicular and pedestrian traffic, the cycle time can exceed 30 minutes. Therefore, when only one trolley is operating, persons can find themselves waiting for as much as 30 minutes before being able to board the trolley. And even after the wait, on heavy traffic conference days, the trolley may not have room for all those who wish to ride. A second trolley helps to reduce this cycle time significantly and accommodate more riders. However, during heavy traffic periods it is not uncommon for trolleys to find themselves going in the same direction and only a short distance apart. At least one instance of this was observed during the June 5th study. Both trolleys were operable and at one point they were one behind the other in traffic headed in the same direction. There are limited places available along North Lakeshore Drive where a trolley can turn around. Such locations should be identified and trolley drivers instructed to turn the trailing trolley around and go in the opposite direction from the other trolley before this situation arises. The World Methodist Museum is near the center of the Trolley route between the Lambuth Inn and the Welcome center. When two trolleys are operating they are most efficient when they pass each other in front of the museum going in opposite directions. If a trolley driver finds himself gaining on the other trolley, he should pull over or spend more time at a non-congested stop in order to put more space between the trolleys. (Fred Galloway, June 2008)

Pedestrians crossing the street at crosswalks or otherwise in this congested area created vehicle traffic delays especially in times when major conferences or meetings are about to convene or at the adjournment of such meetings. A tabulation of all observed delay events on June 5, 2008 is attached.

Delivery vehicles stopping on the street making deliveries to the Harrell Center and the Terrace Hotel can create significant traffic delays. At one time during the conferences there were three Federal Express trucks parked near the Harrell crosswalk along with one PET dairy products truck, and a Staples truck. In addition, there were trolleys and shuttles that needed to stop there, cars backing out of spaces and entering spaces, and pedestrians crossing and walking in the road. (Gene McAbee, June 2008)

Passenger vehicles, church buses, shuttle buses, and Trolleys stopping in the street in the flow of traffic to drop off or pick up passengers create major delay events. Many cases were observed where passenger vehicles stopped in the street in front of the Terrace, the driver got out to cross the street to attend a function, and a passenger got out and walked around the vehicle to assume the driver's position. Some of these instances appeared to be LJA staff dropped off by a spouse.

The parking spaces in front of the Harrell Center cause many problems for traffic. Delays are caused by cars trying to get in the spaces that have to back into traffic sometimes several times to get into the space. Problems are caused by cars backing out of the spaces because drivers cannot see on-coming traffic until they are well into the travel lane. Problems are caused by other cars waiting for parking spaces when a car is seen backing out. These spaces need to be removed or redesigned. This is a lesser problem all along the parking beside the Rose Walk, but still a problem that has resulted in accidents in the past and many close calls. (Gene McAbee, June 2008)

There is no sidewalk from the Administration Building to the Terrace Hotel. Pedestrians coming from Stuart sometimes cross at the Chapel Drive intersection and then walk in traffic behind cars backing out of the spaces on the north side of Lakeshore Drive. While there has been an attempt to install wheel stops to maintain a walking area between the stone wall and the front bumper of the cars parked there, the cars tend to pull up so far that they block the area with their front bumpers. (Gene McAbee, June 2008)

Our parking issue is not one of lack of space, but one of lack of convenient space. During the WNC Methodist Conference there very few cars involved in the conference parked at the Welcome Center or on the field at the gym and there was room for well over 200 hundred cars there. But, getting people not to drive to Stuart and to stop and use the shuttle service is difficult if not impossible without actually closing the road to all traffic. Everyone seems to have a reason that they MUST drive in. When they do get to Stuart after the Chapel parking lot is full, they tend to park in unauthorized areas, blocking private driveways and streets, and blocking other cars in. (Gene McAbee, June 2008)

While the direction of vehicular traffic on North Lakeshore Drive was not recorded, it was noted that from early morning to mid-morning almost 90 percent of traffic was moving in the eastbound lane coming from the main west entrance toward Stuart Auditorium. The requirement for guests to register at the Welcome Center probably contributes to this disproportionate volume of eastbound traffic prior to conference meetings. After mid-morning there was not an observed difference in vehicular traffic moving east or west. As conference attendees left the area, eastbound traffic may actually have exceeded the volume of westbound traffic for sections of North Lakeshore Drive east of the Terrace Hotel. This may be due to a number of factors including the availability of shopping and dining to the east and the difficulty of exiting the Chapel Drive parking lot and turning left across traffic onto North Lakeshore Drive. Most drivers will probably find it easier to make a right turn onto North Lakeshore Drive and cross the dam rather than turn left against traffic and encounter the

congestion in the central campus area. Drivers more familiar with the Assembly grounds may choose to cross the dam and then turn right to exit along South Lakeshore Drive or Access Road. For those who cross the dam and turn left on Access Road, entrance onto NC-HWY-209 may pose a problem. The current NCDOT proposal to improve traffic flow along the NC-HWY-209 corridor may ease this congestion. Lake Junaluska Assembly officials should be actively involved with NCDOT in the planning of improvements to access from NC-HWY-209 to insure that exit conditions from Access Road are optimized for LJA guests choosing to exit to the east.

Traffic Control

During major events, LJA security officers attempt to cover the two crosswalks in front of the LJA Administration Building and in front of the Terrace Hotel. They assist with the flow of traffic and to protect pedestrians crossing the street, walking beside the travel lanes instead of on the sidewalks. They assist pedestrians exiting vehicles including the trolleys and shuttles. Officers also manage and coordinate the parking of delivery vehicles for unloading at those two crosswalks. (Gene McAbee, June 2008)

Recommendations

Traffic flow on North Lakeshore Drive is generally at a leisurely pace. Motorist move slowly but steadily encountering speed humps, joggers and pedestrians. They do not anticipate moving at high speed through this area. When conference activities bring large numbers of guests both vehicular and pedestrian numbers increase dramatically. Vehicular traffic slows accordingly and the least delay backs traffic up to a standstill. As greater numbers of conferences bringing greater numbers of guests are scheduled in the future the traffic problem will become a more frequent issue. It is during these high traffic periods that a plan needs to be in place to reduce the number of delay events that cause traffic to come to a standstill. The following recommendations are offered for consideration as a means of reducing delay events and the subsequent congestion of traffic on North Lakeshore Drive:

1. Develop a plan to intercept and divert service vehicles and delivery vehicles from congested areas during high traffic periods. Inform LJA staff to avoid North Lakeshore drive during peak periods on conference days. Arrangements should be considered which would provide for all delivery vehicles making stops at the Terrace Hotel to use the delivery ramp to access the side and rear entrances rather than stop in front of the Terrace and use the front entrance. Delivery vehicles servicing the Harrell Center should be instructed to use the small parking area to the west and adjacent to the Harrell Center when possible. On heavy traffic conference days Harrell Center Staff might be asked to leave this parking area available for service vehicles only.

2. LJA administration staff who normally park in the central campus area should be encouraged to park at the Welcome Center and ride the trolley or shuttle to their work station during heavy traffic conference days in order to open up additional parking and

reduce traffic volume in the central campus area. Trolley and shuttle vehicles should be scheduled to accommodate the early morning arrival of the LJA staff on these days such that it is convenient and practical for them to use. Parking spaces made available in this manner might be used for additional close-in parking for elderly or handicapped guests. Incentives to encourage LJA staff to take advantage of the trolley and shuttle service might be considered. Coupons for free or reduced rates for lunch at one or more of the LJA food services or book store, access to reserved close-in parking on non-conference days, and similar incentives might be offered as "frequent shuttle rider" bonuses.

3. Relocate administrative offices. In some options of the vision presented to the Design Group, administrative offices are rebuilt. An option to relocate the Administrative Offices out of the central campus might be considered.

4. Provide shuttle loading areas where shuttle vans and trolleys can pull over out of the flow of traffic for loading and unloading. The trolley is important to help reduce the need for additional vehicles in the area, but the trolley also causes traffic delays because it must stop in the travel lane to pick up passengers all along the route on North Lakeshore Drive. There should be places wherever possible for the trolley to pull out of traffic to allow cars to pass instead of being stuck behind the trolley all the way down North Lakeshore Drive. There is always a long line of cars behind the trolley no matter which way it is going during conferences and major events. (Fred Galloway, Gene McAbee, June 2008)

5. Provide separate entry and exit doors for trolley passengers. Passengers would enter from the front door and exit at the back door. In this manner passengers can both enter and exit the trolley at the same time, thus reducing the time the trolley has to stop at a loading point. (Fred Galloway, June 2008)

6. There is not enough handicapped parking for major conferences. Provisions need to be made for transportation of special needs persons from their motel or vehicle to their meeting place. (Gene McAbee, June 2008)

7. Remove or redesign the parking spaces in front of the Harrell Center to reduce the congestion of vehicles getting into and out of these spaces. These spaces could be eliminated only on anticipated high pedestrian traffic days and used for shuttle bus and trolley pull-over areas. (Gene McAbee, June 2008)

8. The requirement for guests lodging at LJA facilities to register at the main west entrance Welcome Center probably results in a greater proportion of inbound traffic on North Lakeshore Drive to be moving in the eastbound lane. The need for first time guests to register at the Welcome Center and to become oriented to the Assembly Grounds before getting tied up in conference traffic is recognized. First time guests who come in at the east entrance can easily get confused and may contribute significantly to traffic congestion in the central campus area. However, for frequent visitors who are more

familiar with the LJA grounds, the east entrance may be a more convenient approach. The use of the east entrance by such veteran guests may help reduce vehicular traffic significantly in the eastbound lane of North Lakeshore Drive during heavy traffic conference days. The traffic congestion implications of requiring everyone to register at the Welcome Center for our largest conferences should be evaluated and alternate methods of registration considered for high traffic days.

9. Because of the use of computerized mapping directions and GPS by so many members of the public, we are getting more vehicles coming off US 74 at the Wal-Mart exit looking for Lake Junaluska Assembly instead of exiting onto US 19. These drivers enter their destination as "Lake Junaluska" and the directions take them to the area of the Lake Junaluska Post Office. Since LJA lodging reservations must be registered at the Welcome Center it is best for all conference traffic, especially first time guests, to enter the west entrance. It would help if NCDOT would consider installing an additional sign at Exit 104 (the Wal-Mart exit) that directs drivers to Exit 103 for "Junaluska Assembly". (Gene McAbee, June 2008)

10. Lake Junaluska Assembly officials should be actively involved with NCDOT in the planning of proposed improvements to NC-HWY-209 at the east entrance to the Assembly grounds. Improvements for LJA traffic entry and exit conditions to NC-HWY-209 should be included as an integral part of the NCDOT proposal.

11. Consider a multi-level parking deck in the area just below and adjacent to North Lakeshore drive just to the northeast of Stuart Auditorium. A two level parking deck could easily receive traffic moving east on Chapel Drive and traffic moving west on North Lakeshore Drive at the same time without obstructing the view of the Lake from residences. Allowing traffic from North Lakeshore to the upper level and traffic from Chapel into the lower level would remove the need for costly and space consuming ramps associated with most parking facilities. This would remove westbound traffic from the central campus congestion area by providing an alternative exit from convenient parking. An area of approximately 20,000 square feet of undeveloped area exists at this site. A two level parking deck at this site could accommodate as many as 80 additional parking spaces; three levels could accommodate 120 spaces. Such covered parking spaces could be used effectively as additional handicapped parking due to their proximity to Stuart Auditorium. (See attached aerial photography illustration).

12. Consider the construction of a new one-way entrance into the Chapel Drive parking lot from North Lakeshore Drive to the northeast of Stuart Auditorium. This one-way entrance could serve as an entrance to the Chapel Drive parking lot by westbound traffic and could be reversed to provide for easy exit from the Chapel Drive parking lot at the close of major conferences and events. This entrance could be achieved easily in the area discussed in paragraph 10 if the consideration is rejected or possibly included with that plan. (See attached aerial photography illustration).

Appendix A – Parking Space Inventory

The following tables inventory the parking spaces available at Lake Junaluska, both those explicitly under the jurisdiction and control of the Lake Junaluska, and those on Lake Junaluska Grounds.

Location	Paved Spaces	Handicapped Spaces	Unpaved Spaces
Lambuth	157	5	--
Cross	8	--	--
IGC/Sunset	24	--	--
Chapel Lot	181	--	--
Chapel Drive	47	4	12
Harrell Center	13	14	--
Admin/Terrace	77	3	200
Rosewalk	114	1	--
Terrace Upper	46	2	--
Pool/Kern	50	3	--
Jones	53	3	6
Shackford Hall	18	2	--
Apartments	45	--	--
Lakeside Lodge	18	--	--
Welcome Center	70	5	
Weldon Gym	--	--	200
Total	921	42	418

Other	Paved Spaces	Handicapped Spaces	Unpaved Spaces
Lakeview	54		
Golf Course	59		
World Methodist Council	15		
Foundation for Evangelism	16	1	
District Office	14	2	
Tri Vista	104		
Lakemont	43		
South Lakeshore			25
Total	305	3	25
Complete Total	1156	40	443