BUFFALO

Transit Supportive Development

Case Study

Summer 2009

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Executive Summary

In the fall of 2007, Buffalo was selected to be one of the New York State Metropolitan Planning Organizations' four *Transit Supportive Development* case studies. The case studies, each from a different corner of New York State, present varying challenges and opportunities that focus on centering future development around new and existing transit service.

The Buffalo case study addressed the question of how to best link two campuses of the University at Buffalo to each other, as well as to surrounding neighborhoods and downtown Buffalo. The university expects to grow by over 40% in the coming decades, and predicts that some 8,000 daily bus riders can be expected in the corridor between the South Campus, where the existing Metro light rail terminates, and the North Campus.

Preliminary analysis included data and on-the-ground research into current local ridership characteristics and travel demand as well as a stakeholder workshop, in which photo-simulations of various transit modes were presented for discussion.

The Metro currently runs at-surface in downtown Buffalo and in a tunnel in outlying areas. Several studies have looked at extending the line further north.

The primary analysis revolved around what specific mode of transit would be most effective at accomplishing the goals laid out by the client, the University at Buffalo. The two modes under consideration were:

1. **Light Rail Transit (LRT)**
   Several LRT alternatives were considered, from a line running in a deep tunnel to a surface line, along several alignments. Though travel time and reduction of transfers varied among the various alternatives, the benefits of LRT in this case included lower environmental impacts, lower long-term operating costs, and greater potential to spur Transit-Supportive Development along the corridor.

2. **Bus Rapid Transit (BRT)**
   Often considered a cheaper alternative to LRT, Bus Rapid Transit provides many of the benefits of rail at lower initial capital and construction cost.

Also presented in this report are photo simulations of various types of neighborhood streets in the study area with examples of LRT and BRT running along them. These were shown to stakeholders at a workshop held in February of 2009.

After in-depth discussion of existing conditions, future travel demand projections, and analysis of potential modes, this report makes several recommendations as to the benefits and drawbacks of each porential mode.

PART I: Existing Conditions

Overview

Existing Transit Service

Today, the Niagara Frontier Transit Authority (NFTA) operates a light rail line, known locally as the Metro, between downtown Buffalo and the South Campus of the University at Buffalo (UB). It makes 14 stops, including one at the Downtown Campus, which is expected to be the subject of expansion in the next dozen years. Currently, those traveling between the North and South campuses, including students, faculty and other university employees, make heavy use of the UB Stampede, a bus service operated under contract to the University. For travel between the North Campus and the Downtown Campus, a combination of UB Stampede and the Metro or a UB shuttle can be used.

NFTA also operates an extensive bus system. Nine routes converge on the Metro station at the South Campus, located at the northern edge of the Buffalo city limits. Two of these routes extend out in the general direction of the University, with one stopping on the North Campus.

Planning for Future Transit Service

Many studies have been done, most centering on the idea of extending the Metro line to the north through the Town of Amherst all the way to the North Campus of the University located there. To date, the absence of funding and community opposition to the extension have prevented action. The University's ambitious plans for expansion have given new impetus to finding a transit expansion plan that can provide large travel benefits, meet the needs of the University and be sensitive to residents' concerns. Whatever decision is to be made about the transit technology between the two campuses will have to be consistent with the plans to expand and redesign the North Campus. The location of the line and, especially, any station or stations, would have to be compatible with the plans of the North Campus now under study.

This report explores the travel benefits of alternative transit expansion concepts, their advantages and disadvantages and the implications of the enormous growth projected for the University, especially for the Downtown Campus.

In addition to the markets associated with the three University campuses, the extension would have the potential to serve other markets in the larger metropolitan region. This would include trips to and from neighborhood locations along the light rail line, not only to and from the Downtown area, but to areas near the other stations along the line. It would also include trips that might originate from communities farther north, which would benefit because the line would be extended closer to the points of origin. These trips are accounted for in this analysis only if they were intercepted by the survey done at University Metro station. This intercept survey is discussed in the next section of this report.

Transit-Supportive Development at the University at Buffalo

The University at Buffalo's Comprehensive Physical Plan embraces the concept of Transit-Supportive Development (TSD) as a way to achieve a sustainable build out of the university that minimizes traffic and related environmental impacts and reduces the need for costly and unsightly parking lots and structures. In addition to reinforcing academic programs in campus centers, the plan targets areas well-served by public transit for residential and commercial mixed-use development.

On North Campus, the bulk of the proposed development is concentrated in and around the academic core and along the Ellicott Way transit/bike/walk corridor (see rendering below). On South Campus, the plan points to the underdeveloped commercial properties across from Main Circle as promising locations for TSD directly opposite the campus. As shown in a plan rendering, perhaps the most likely development would be a building with retail uses on the ground floor and apartments on the floors above. Shoppers and residents of the complex would benefit from proximity to the NFTA Metro Rail University Station and bus loop, as well as community destinations in the University Heights neighborhood and on South Campus. The development of an academic health center at the Buffalo Niagara Medical Campus in downtown Buffalo, an area well-served by public transit, is a large-scale action that is highly supportive of transit. The UB plan also envisions the development of student and faculty housing in close proximity to the campus on sites that have ready access to transit, particularly those close to MetroRail stations.

Potential TSD at UB North Campus

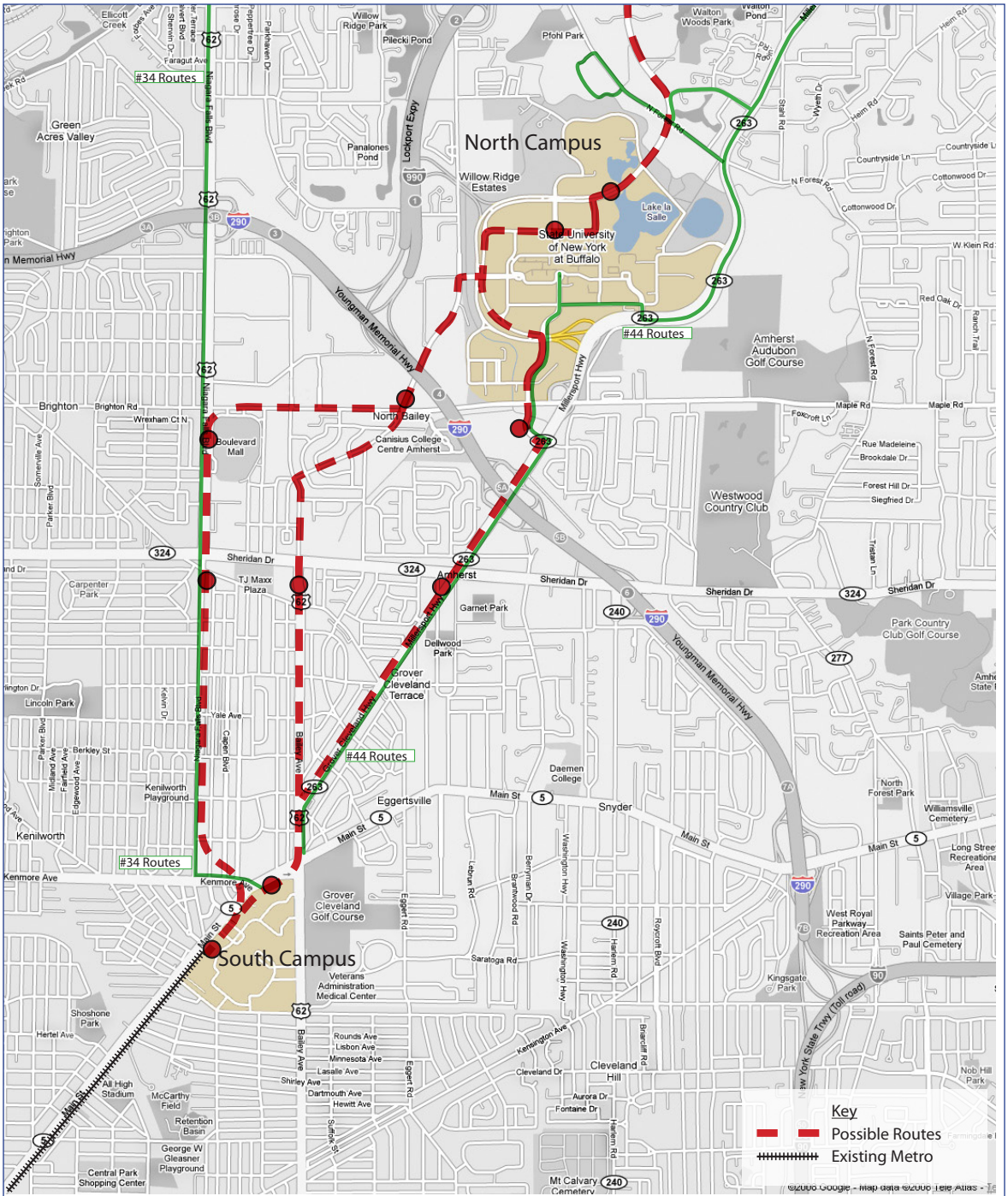

Figure 1: Inter-Campus Corridor

PART II: Travel Benefits

What are the travel benefits of new service?

The potential beneficiaries of new transit services between the South and North campuses of the University at Buffalo fall into a number of categories:

- **those who would use the new service to travel between the North Campus and points south of Metro's University station on the South Campus, potentially eliminating a transfer at that station, including not only travel associated with the University but to and from other locations to the north.**
- **those would travel between points north of the South Campus (including the North Campus) and the South Campus.**

The new services contemplated in the corridor between the two campuses fall into two categories – either as continuations of the Metro light rail line from the South Campus to the North Campus, avoiding a transfer for those traveling from points south of the South Campus to points north, or as separate services beginning at the South Campus Metro station. Within these two categories is travel associated with the University and travel not related to University activities.

This analysis first discusses the benefits that would accrue to those who, as a consequence of having an extension of the light rail line, would no longer have to transfer at the University station. Second, this analysis discusses those who would see an improved service from the extension even should they not be traveling to points to the south on the Metro.

It must be emphasized that this analysis is based on limited data and a series of assumptions that, while reasonable, are no substitute for a fuller analysis using the origin-destination surveys done by the Greater Buffalo-Niagara Regional Transportation Council, supplemented by surveys done by the University at Buffalo. The intent of this analysis is to serve as a guide to focus decision-making about transit alternatives in the corridor and to offer the University and other key stakeholders a way of examining these alternatives rationally.

Morning 7:30 to 10:30

Origin \ Destination	Campus	Stampede	Kiss & Ride	UB Parking	Metro	NFTA Bus	Neighborhd	Park & Ride	Totals	Reverse (PM)
Campus		297	0	NA	20	5	2	1	325	462
Stampede	228		0	0	31	6	3	0	268	373
Kiss & Ride	0	0		0	41	3	0	0	44	64
UB Parking	NA	3	0		56	3	0	0	62	72
Metro	123	49	10	15		246	31	39	513	604
NFTA Bus	30	13	0	0	374		0	0	417	813
Neighborhd	13	5	0	0	59	8		0	85	80
Park & Ride	10	1	0	0	211	22	0		244	126
Totals	404	368	10	15	792	293	36	40	1958	2594

Afternoon 3:00 to 6:00

Origin \ Destination	Campus	Stampede	Kiss & Ride	UB Parking	Metro	NFTA Bus	Neighborhd	Park & Ride	Totals	Reverse (AM)
Campus		316	0	NA	38	52	9	2	417	404
Stampede	387		0	25	53	72	11	0	548	368
Kiss & Ride	0	0		0	28	2	0	0	30	10
UB Parking	NA	1	0		35	3	0	0	39	15
Metro	54	48	64	47		667	60	108	1048	792
NFTA Bus	6	5	0	0	409		0	16	436	293
Neighborhd	3	3	0	0	20	5		0	31	36
Park & Ride	12	0	0	0	21	12	0		45	40
Totals	462	373	64	72	604	813	80	126	2594	1958

Source: Counts undertaken by UB interns in late October and November, 2008, on Wednesdays and Thursdays, all in the area surrounding the University Metro Station

Goodyear Hall:
In addition to the above, the Stampede buses have the following ridership statistics at Goodyear Hall in the northern part of the South Campus:
AM Peak Period: Passengers getting off: 633 (all arriving from North Campus)
Passengers getting on: 193 (going to the North Campus)
PM Peak Period: Passengers getting off: 516 (all arriving from North Campus)
Passengers getting on: 304 (going to the North Campus)

BFJ, December 8, 2008

Table 1: Movements by Origin and Destination - Counts at University Station

The Survey

Riders who benefit by eliminating a transfer

To get an estimate of the number of beneficiaries from the elimination of transfers, a field survey was conducted to count those who currently use the Metro station. Counts of movements at this station were done on Wednesdays and Thursdays in late October and early November 2008 at the University Metro Station. These counts were conducted during two peak periods – 7:30am to 10:30am in the morning and 3:00pm to 6:00pm in the evening. Individuals were tracked to determine how they arrived or left the station area and where they were going in the vicinity. The results are reproduced here as Table 1.

In the morning peak period slightly less than 2,000 individuals were counted and in the evening peak period about 2,600 individuals were counted. In the morning peak period individuals who travel between the Metro at the South Campus and the UB Stampede who would directly benefit from an extension of Metro to the North Campus consist of those traveling both southbound and northbound. In the morning peak period the southbound travelers totaled 31 and northbound totaled 49. In the evening time period northbound totaled 48 and southbound totaled 53.

A second group who might potentially benefit are those who now drive and park at the Metro station (park-and-ride: 211) or who are dropped off there (kiss-and-ride: 41). The comparable numbers in the evening peak are 108 and 64, respectively. A percentage of these individuals might shift to a Metro extension if there were added stops near their point of origin. Even more would shift if a park-and-ride were closer to their origins. This might be provided as a new station near the I-90 / I-290 interchange.

The third group who might potentially benefit from the extension includes those now using NFTA buses to travel to or from the University Metro station. There are 374 individuals who travel by NFTA buses to the Metro station transfer to Metro and 246 who make that trip in the reverse in this morning period. In the evening peak period 667 individuals transfer from the Metro to the NFTA buses and 449 transfer from NFTA buses to the Metro. However, many of these individuals use buses that do not operate along the corridor that the Metro extension might take. There are nine routes that feed the Metro station, but only two -- #34 and #44 – extend to points north. The #34 operates largely along Niagara Falls Boulevard with branch services to the east closer to North Bailey Avenue, where some passengers might use a well placed stop on the Metro extension. The #44 operates along Millesport Highway and directly serves the North Campus. It can be assumed that most, perhaps two-thirds of those who were counted as transferring from NFTA bus at the Metro station came from these two routes. Given the routing of these two services it is estimated that about half of the #44 riders (those now boarding at the North Campus) and one-third of the #34 riders (those boarding near a new stop near Bailey Avenue and Maple Avenue), would be candidates for the Metro extension. This calculates to about 33 percent of the NFTA transferees who would benefit.

Figure 1 on page 6 shows the most relevant features of the corridor between the two campuses.

To get a more complete picture of the number of individuals who would benefit from the extension of Metro service, the six hours of counts were expanded to average weekday estimates using the daily boardings and alightings at the University station with data supplied by the NFTA. For an average weekday for the 12 months from April 1, 2007 to March 31, 2008 a total of 2,169 people boarded at the Metro station and 2,632 exited the station. The field survey accounted for 66 percent of those entering and 59 percent of those leaving, and the six hour counts were expanded accordingly.

For each category defined by mode of arrival or departure at the University station – UB Stampede, Park-and-Riders, Kiss-and-Riders, NFTA bus riders and neighborhood walk-ons – an estimate was made of the share that would benefit from the extension. These results are presented in Table 2. The total two way trips that would benefit are estimated at about 700 on an average weekday. It must be remembered that this estimate is based on the current patterns of use by University-related travelers. The ramifications of this growth on the choice among transit alternatives will be discussed in greater detail later in this report.

Market Segment	Time	Count	Assumed Daily	Percent Share to Metro Extension	Total Riding Metro Extension Under Current Conditons
Stampeders					
Stampede to Metro	Am Peak	31			
Stampede to Metro	Pm Peak	53			
			127		
Metro to Stampede	Am Peak	49			
Metro to Stampede	Pm Peak	48			
			164		
Two-Way			145	100	145
Park and Riders					
Park and Ride to Metro	Am Peak	211			
Park and Ride to Metro	Pm Peak	21			
			350		
Metro to Park and Ride	Am Peak	39			
Metro to Park and Ride	Pm Peak	108			
			248		
Two-Way			299	33	99
Kiss and Riders					
Kiss and Ride to Metro	Am Peak	41			
Kiss and Ride to Metro	Pm Peak	28			
			104		
Metro to Kiss and Ride	Am Peak	10			
Metro to Kiss and Ride	Pm Peak	64			
			125		
Two-Way			115	33	38
NFTA Bus Users					
NFTA Bus to Metro	Am Peak	374			
NFTA Bus to Metro	Pm Peak	409			
			1,183		
Metro to NFTA Bus	Am Peak	246			
Metro to NFTA Bus	Pm Peak	667			
			1,539		
Two-Way			1,361	33	449
Neighborhood Walk-ons					
Neighborhood to Metro	Am Peak	59			
Neighborhood to Metro	Pm Peak	20			
			119		
Metro to Neighorhood	Am Peak	31			
Metro to Neighorhood	Pm Peak	60			
			153		
Two-Way			136	0	0
Grand Total					731

Table 2: Travelers Who Would Avoid Transfer at University Station with Extension of Metro

Benefits for those not transferring to Metro

Table 1 indicated that among the 4,552 people counted, 1,595 were not transferring to or from the Metro. Some of these riders could be affected by changes in the transit system in the Metro station area. But this will only be the case for those who find the new service more convenient or faster. Of these 1,595, the vast majority, 1,228 are traveling on the UB Stampede between the North and South campuses, and another 148 use the Stampede buses but connect to them at the Metro station area using another mode to reach or leave the area, either NFTA buses, the park and ride on the South Campus, or walking to or from the station area from the neighborhood. Thus, 1376 (1,228 plus 149) would all gain whatever benefit the new service would provide over the existing Stampede service.

The remaining 219 travelers using either NFTA buses or parking at the Metro station or walking to or from the station would only benefit to the extent that the new service would offer faster or more convenient service to warrant them shifting from their current mode of access to the South Campus area. Of these, the 93 who use NFTA to/from South Campus would almost certainly not come from the routes other than #34 or #44, since that would involve a circuitous route, traveling to or from the South Campus in one direction only to use the Stampede service in the other. Among the remaining 126 are 25 parkers and 25 that walk in from the neighborhood, and 74 who use one mode to enter the areas and another to leave it. A small percentage of those parking might use the new service if stops were located closer to their trip origins.

These estimates are expanded from the six hours of counts to the daily total and factored to show a total of 2,210 daily travelers who might benefit from a new service in the corridor, given current travel patterns, as shown in Table 3.

In addition, as the footnote in Table 1 indicates, there are about 800 trips in each peak period boarding or alighting from UB Stampede buses in the vicinity of Goodyear Hall. Expansion of these volumes based on the daily factors developed for the Metro station yields about 1,200 trips in each direction per weekday, or 2,400 daily. These travelers would only benefit if a station for the new service was located conveniently.

To summarize, it is estimated that approximately 700 trips per day would benefit by avoiding a transfer at the University Metro station and another 2,200 trips could benefit by having a service that replaced the current Stampede service. Another 2,400 would benefit if the new service stopped near Goodyear Hall. The extent of these benefits will depend more specifically on the service offered. The possibilities are discussed next.

Market Segment	Count	Assumed Daily	Percent Share to Metro Extension	Total Benefitting from New Service
South Campus / Stampede	1,228	1,965	100	1,965
Other Modes / Stampede	148	237	100	237
NFTA Bus / South Campus	93	149	0	0
Park and Ride / South Campus	25	40	20	8
Neighborhood / South Campus	27	43	0	0
Two Other Modes via Metro Station Area	74	118	0	0
TOTAL	1,595	2,552		2,210

Table 3: Travelers who are not using Metro Stations today who would benefit from new service

PART III: Transit Alternatives

Light Rail and Bus Rapid Transit

In this section, the characteristics of possible alternatives for transit service are discussed. These include light rail (LRT) and improved bus services, known as Bus Rapid Transit (BRT).

Light Rail

Light rail systems typically have close station spacing, vehicles operating in one to three car trains depending on the capacity required, with an operator who typically collects fares on board or with a pre-boarding payment system. Station platforms are often at a low level necessitating a climb to board trains. Light rail systems can operate at grade on streets, at grade on separate rights-of-way, elevated or in tunnels, or in combinations of these. The current Buffalo Metro service is classified as a light rail line, although it has some of the features of heavy rail, including high level platforms and off board fare collection. Its alignment operates both underground and at grade, with the underground portion in the northern portion of the line, including the northern terminus at the University station.

The features that differentiate the possible extensions of the Metro to the North Campus are their routing, elevations and stations. The line can be extended as a deep tunnel, with construction avoiding disruption at the surface, except where station entrances are located. It can operate closer to the surface, requiring more disruptive cut and cover methods. Or it can be built at grade running on street rights-of-way. Because light rail lines can negotiate relatively steep grades, they can be constructed to climb from one level to another over a short distance, making it possible to operate part of the line at or above grade, and other parts below grade. For example the existing terminus of the Metro line can be extended and elevated to the surface and operate on the street. It is also possible to use separate light rail equipment, such as a streetcar or tramway that might be more compatible visually and not connect it to the existing Metro.

Bus Rapid Transit

BRT is another option. This mode can be advantageous if it is given the more positive features of rail, such as off-vehicle fare collection and separate or preferential rights-of-way to speed the service, including preferential treatment at traffic signals, and fewer stops, all designed to speed service. BRT can also have the flexibility to have branches where buses operate conventionally to reduce walking distance to bus stops, and then operate as an express service with more limited stops on the BRT portion of the system.

In Table 4 these options are compared side by side, using the results of the analysis discussed earlier as input, where appropriate. For comparison purposes the existing service, labeled UB Base, is shown. Detailed derivations of the travel times in Table 4 are presented in Table 5.

As can be seen from Table 4, for trips between the North and South campuses the alternatives provide only small travel time advantages. In fact, the deep underground light rail extension would take longer, a result of the extra time for reaching the underground, although this might be mitigated somewhat if the station at the North Campus rose to a higher level, reducing the time passengers will take between the surface and the station. The table also shows "equivalent time" doubling the time waiting, walking and transferring, consistent with travel demand planning practice. Using this measure, the underground light rail alternatives fare poorly. All the alternatives to the current situation are likely to be more reliable than the existing service. The light rail alternatives are likely to be operated at a lesser frequency since longer trains with higher capacity are substituted for buses.

The comparisons show a substantially different change for trips between the North Campus and the Downtown Campus. Here the travel benefits of those alternatives not requiring a change of vehicles at the University station show up clearly. These alternatives take seven to ten minutes less, and when using the equivalent time measure, including a five minute delay for transferring, the travel time advantage stretches to close to fifteen minutes with the LRT on the surface connected to the existing Metro saving the most time. The light rail alternatives tend to be the most reliable.

The travel benefits to the neighborhoods through which any of these alternatives pass tend to be modest, except for trips using the extension of the existing Metro, where any of the alternatives not requiring a transfer improve the transit service in these neighborhoods. As can be expected, those alternatives that are operated underground offer more weather protection.

The operating costs are likely to be lower for those alternatives that offer higher travel speeds, since they are more productive on a cost per hour basis. This favors the light rail alternatives. How the costs are divided up between the NFTA and the UB would have to be the subject of negotiations between the two entities, making it impossible to know at this time which entity gains more from lower operating costs of the various alternatives.

Capital construction costs for the underground alternatives are likely to be high. The surface light rail connected to the underground Metro station will likely be considerably less, but still more than the exclusively surface light rail or BRT alternatives, since it would in-

	UB Base	BRT	LRT on Surface	Light Rail Extension Cut and Cover Construction	Light Rail Extension Deep Underground	LRT on Surface and Underground Connection to Metro Rail
Travel Benefits for UB North Campus / South Campus						
Travel time (minutes)	23.5	21.5	21.6	22.5	24.5	21.6
Convenience (climbing and transferring)	High	High	High	Some climb	Climb	High
Service frequency	5	5	8	8	8	8
Reliability	Subject to delay	High	High	High	High	High
Equivalent time (minutes)	32	30	31.6	34.5	38.5	31.6
North Campus / Downtown Campus						
Travel time (minutes)	42.5	40.5	40.6	39.5	34.5	33.6
Convenience	Transfer	Transfer	Transfer	Some climb	Climb	High
Service frequency	5	5	8	8	8	8
Reliability	Subject to delay	Good	Better	Best	Best	Best
Equivalent time (minutes)	57	55	56.6	44.5	46.5	43.6
Neighborhoods						
Travel time (minutes)	No change	Slightly faster	Sllightly faster	Faster to Downtown	Faster to Downtown	Faster to Downtown
Convenience	No change	No gain	No gain	No gain, except if transferring	No gain, except if transferring	No gain, except if transferring
Service frequency	No change	No gain	Likely less	Likely less	Likely less	Likely less
Reliability	Subject to delay	Good	Better	Best	Best	Best
Equivalent time (minutes)	No change	Slightly faster	No gain	Faster to Downtown	Faster to Downtown	Faster to Downtown
Weather Protection	Poor	Better	Better	Best	Best	Better
System Performance						
Annual operating cost - UB	No change	Costs shift from UB to NFTA; subject to negotiation; overall higher speeds reduces costs				
Annual oper. cost - NFTA	No change					
Capital cost	Low	Moderate	Moderate	Very high	Very high	High
Neighborhood Impacts						
During construction	NA	Minor	Minor	High	Moderate	Moderate except near So. Campus station
Traffic	Same as today	Localized shift in patterns; long term reduction	Localized shift in patterns; long term reduction	Long term reduction	Long term reduction	Localized shift in patterns; long term reduction
Visual	Same as today	Little change	Little change	Same as today	Same as today	Little change except near So. Campus station
Development opportunities	Same as today	Modest	Yes	Yes	Yes	Yes
Air quality	Same as today	Same as today	Better	Better	Better	Better
Area-wide & Regional Impacts						
Regional connectivity	Same as today	Slightly better	Slightly better	Substantially better	Substantially better	Substantially better
Energy consumption	Same as today	Same as today	Slightly lower	Slightly lower	Slightly lower	Slightly lower
Carbon emissions	Same as today	Same as today	Better	Better	Better	Better

Table 4: Comparison of Modes Between North and South Campuses

clude the capital cost of connecting the surface line with the current Metro terminus. During construction the impacts of the underground light rail alternatives will be considerable, particularly for the cut-and-cover alternative. The light rail surface connection to the Metro will also be disruptive, but only near the Metro station. In the long run, there will be little difference in the appearance of the streets on which any of these vehicles operate and even less visual impact for the underground alternatives. It can be expected that any alternative that improves transit will result in shifts from automobiles to transit, reducing traffic, particularly near the University station and along Main Street. There may be localized changes in the traffic pattern where surface transit vehicles, either buses or light rail vehicles, use some of the street rights-of-way.

Environmentally, from the perspective of energy consumption, air quality and carbon emissions, the light rail alternatives are likely to be more advantageous.

As has been the case elsewhere, they offer better prospects for encouraging development near stations. In this corridor, opportunity exists near the intersection of Bailey and Sheridan, where there is underutilized and/or vacant land. Development here could be of great advantage where new transit service can generate ratables or expand housing stock or both in an area where auto dependency can be lower than the surrounding neighborhoods. At locations just south of the North Campus, the potential for park-and-ride type stations, which are near entrances to I-90 and I-290, are also a possibility.

The light rail alternatives can be the beginning of a more regional transit network. This can especially be the case when the University at Buffalo expands Downtown, making fast and convenient travel among the three Campuses a greater imperative for the University. This expansion and its impacts on the alternative transit improvements are discussed in the next section of this report.

Between North and South Campuses	# of Transfers Required	Walk	Wait	Ride 1st Leg	Transfer Time	Wait 2nd Leg	Ride 2nd Leg	Walk	Nominal Travel Time	Total Time Equivalent
UB base	0	3	2.5	15	NA	NA	NA	3	23.5	32
BRT	0	3	2.5	13	NA	NA	NA	3	21.5	30
LRT on surface	0	3	4	11.6	NA	NA	NA	3	21.6	31.6
Light rail extension cut and cover	0	4	4	10.5	NA	NA	NA	4	22.5	34.5
Light rail extension deep underground	0	5	4	10.5	NA	NA	NA	5	24.5	38.5
LRT on surface and then underground cnx	0	3	4	11.6	NA	NA	NA	3	21.6	31.6
Between North and Downtown Campuses										
UB base	1	3	2.5	15	3	4	12	3	42.5	57
BRT	1	3	2.5	13	3	4	12	3	40.5	55
LRT on surface	1	3	4	11.6	3	4	12	3	40.6	56.6
Light rail extension cut and cover	0	4	4	10.5	0	0	12	3	33.5	44.5
Light rail extension deep underground	0	5	4	10.5	0	0	12	3	34.5	46.5
LRT on surface and then underground cnx	0	3	4	11.6	0	0	12	3	33.6	43.6

Assumptions
In vehicle travel speeds for UB = 12.5 mph; BRT 15 mph; LRT on street = 17.5 mph; LRT underground = 20 mph
3 stops for each alternative to base, including near I-90/ I-290, in residential area of Amherst, and near Goodyear Hall
Each stop adds one minute of travel time
Walk time and wait time doubled for travel time equivalency
Wait time is half of headways
Other assumptions apparent from table

Table 5: Travel Time Comparisons for Alternatives

Growth at the University at Buffalo

With the expected substantial expansion of the Downtown Campus, the travel patterns among the three campuses would certainly change. The growth anticipated by the University by 2020 is shown in Table 6.

The University projects that in this twelve year period there will be 13,700 more people – students, employees, faculty – at all locations. Of this growth, most will be at the Downtown Campus, with modest growth in the North and South Campuses and sharp decline in the scattered locations not at the three main campuses. The Downtown Campus's infrastructure is also expected to grow enormously, with upwards of 2 million more square feet of buildings. The North Campus is projected to grow by 1.7 million square feet of floorspace, or about 30 percent in space but only by 5 percent in the number of people working and studying there. The South Campus is expected to grow by 20 percent in employees and students but only 4 percent in space, suggesting that the existing space will be more intensively used.

These enormous shifts in activities are sure to change the patterns of travel among campuses. With so much growth anticipated at the Downtown Campus and with substantial growth at both the North and South campuses, it can be expected that travel among the campuses will grow substantially.

It is not possible, with the resources available for this report, to be definitive about the changes in travel patterns. However, it is possible to get a sense of how much of a change is likely to occur by experimenting with a trip distribution model that accounts for trip end growth and using these growth factors to expand the existing trip origin - destination pattern. This distribution model, known as the Fratar Model, named after its originator Thomas Fratar, is used here to gain a rough approximation of the growth in origin-destination pairs for travel among and within campuses. This was done in spite of the absence of usable data of existing patterns of travel. The growth factors were applied to two estimated travel patterns. The model concluded that a

Campus		Faculty	Staff	Student	Total People	Space (mil. sq.
University Total						
	Today	2,644	5,631	30,650	38,925	8.895
	2020	3,648	8,379	40,650	52,677	12.659
	Increase Factor	1.38	1.49	1.33	1.35	1.42
	Increase (decrease)	1,004	2,748	10,000	13,752	3.764
Downtown						
	Today	110	56	195	361	0.28
	2020	1,266	2,142	10,388	13,796	2.265
	Increase Factor	12	38	53	38	8.09
	Increase (decrease)	1,156	2,086	10,193	13,435	1.985
South Campus						
	Today	636	1,235	5,758	7,629	2.379
	2020	655	1,594	6,869	9,118	2.464
	Increase Factor	1.03	1.29	1.19	1.20	1.04
	Increase (decrease)	19	359	1,111	1,489	0.085
North Campus						
	Today	1,608	3,865	22,545	28,018	5.975
	2020	1,722	4,432	23,185	29,339	7.724
	Increase Factor	1.07	1.15	1.03	1.05	1.29
	Increase (decrease)	114	567	640	1,321	1.749
Other						
	Today	290	475	2,152	2,917	0.261
	2020	5	211	208	424	0.206
	Increase Factor	0.02	0.44	0.10	0.15	0.79
	Increase (decrease)	-285	-264	-1,944	-2,493	-0.055

Table 6: UB 2020 Growth Projections

range of four to six times the amount of travel between the North Campus and the Downtown Campus would be likely by 2020 if the development assumptions came to pass. Travel demand increases between the North and South campuses are likely to be modest.

Once a full origin-destination survey is done for all travel among the campuses today it will be possible to gain a clearer idea of the relative growth of travel among campuses. It will also depend on the assignment of fields of study at the campuses in the future and to the extent students will be assigned housing to be in closer proximity to their courses of study.

To gain a better understanding of the needs for transit among campuses it is highly recommended that an origin-destination study covering all employees and students on campus be conducted and the data applied to a full four step demand modeling process to determine the trip generation, trip distribution, mode choice and travel assign characteristics for a variety of possible future transit modes. Unless this is accomplished it will be impossible to properly plan for the transit services for the campuses.

Despite the absence of data it is possible to conjecture about the possible transit modes connecting the North and South campuses. Using the gains in equivalent travel times presented in Table 4 and applying them to the estimated demand for travel between North and South campuses (4,600 per day) and between the North and Downtown Campuses (713 per day) we conclude that only two alternatives, the BRT and the light rail surface connected to Metro, produce significant travel gains for these markets. However, if the North Campus to Downtown Campus market grows to the extent expected, possibly by a factor of six, all alternatives show reduced travel times, but the surface light rail linked directly to Metro yields the most travel time benefits and the light rail in cut and cover also shows a high level of benefits. The BRT drops to third place. While this analysis is far from definitive, it suggests strongly that the light rail on the surface with the connection to the existing Metro line underground be given serious consideration.

The Workshop

On February 27, 2009, the Greater Buffalo-Niagara Regional Transportation Council (GBNRTC) convened a workshop session in Buffalo. The objective on the meeting was to share with a select group of stakeholders the initial evaluation of the transit alternatives in the UB three-campus corridor and to begin a discussion about the potential for transit-supportive development and its relationship to community character. GBNRT gave a brief presentation outlining the history of land use change in the corridor, the growth of the North Campus, and the projections for future growth of UB on all three campuses. Jeff Zupan then presented his methodology and a matrix providing a qualitative assessment of the different alternatives. Finally, Rob Lane gave a brief presentation on the benefits of TSD and introduced a series of photo simulations (pages 18-20) which depicted various modes in various settings along the corridor, and where appropriate, the associated transit-supportive redevelopment.

Following the presentations, the attendees were assigned to three groups composed in a way that brought together people with different perspectives. The groups were asked to answer four questions. Two of these related to the overall challenges of improving mobility in the corridor:

1. **What are the three biggest obstacles to implementing transit in the university corridor study area and how can these best be addressed?**
2. **What would be the most important benefits to implementing more transit in the university corridor study area (e.g., traffic mitigation, redevelopment of marginal areas)?**

And two of the questions related to the vehicle choice, community character, and redevelopment:

1. **What are the things that appeal to you about these images?**
2. **What concerns you about these images?**

The groups reported back during a plenary session for open discussion.

Findings: Issues and Opportunities

All groups agreed on the need for a broader discussion and more outreach and education. This is the only way to really understand what the obstacles and potential opportunities are and what people are really thinking.

Issue: Political Context

The history of both the existing light rail and the discussions surrounding its extension have at times been contentious. Most recently this has been exacerbated by disagreements over land use between the university and the town of Amherst. This air of contention hanging over the discussion needs to be dispelled for this initiative to advance.

Issue: History

Part of the challenge here is that many of the suburbs were always auto-oriented places and the residents there have never had experience with transit. The other challenge relating to history is that there has not been much development around the existing stations leading people to wonder why TSD would happen now.

Issue: Costs and Benefits

There is a need for a fuller explanation of both the costs and the benefits - of how it will be paid for and what the larger economic benefits are likely to be.

Issue: Demographic Change

The town of Amherst, like many places, is "getting greyer." This population has very little experience with transit (Amherst was never a "streetcar suburb"), and may be resistant to change even though this group would benefit from access to transit. At this time there is no evidence of a younger population moving in that might be more interested in transit options and the life style changes associated with compact, mixed-use TSD environments.

Opportunity: Environment

There are significant environmental benefits in terms of air quality and non-point source pollution by shifting away from car travel.

Opportunity: Redevelopment

The stakeholder groups identified several areas where transit improvements could be leveraged for redevelopment and place-making at several marginal locations.

Opportunity: Transportation Equity

There is an equity issue that can be addressed through more transit. There is evidence that lower paid service workers, many of them immigrants, have difficulty getting to work because they are dependent on car travel. This also affects employer access to this labor pool. More transit could help solve this.

Photo Simulations of Transit Alternatives

Neighborhood Street - Existing

Neighborhood Street - Existing

Neighborhood Street with BRT

Neighborhood Street with LRT Vehicle A

Neighborhood Street with LRT Vehicle B

Neighborhood Commercial Corner - Existing

Abandoned Commercial Area - Existing

Residential and Commercial Corridor with BRT

Abandoned Commercial Area with LRT Vehicle A

Residential and Commercial Corridor with BRT and Redevelopment

Abandoned Commercial Area with LRT Vehicle A and Redevelopment

Photo Simulations of Transit Alternatives

Residential and Commercial Corridor
Existing

Residential and Commercial Corridor
with LRT Vehicle A

Residential and Commercial Corridor
with LRT Vehicle A and Redevelopment

Residential and Commercial Corridor
with LRT Vehicle C and Redevelopment

Findings: Community Character and Response to Photo-Simulations

Overall Impressions

Stakeholders felt that these images would be even more convincing if they showed more pedestrian activity - imagery to support the "sense of place"- what it would be like to shop, walk, and interact with others. Overall, the simulations need to show more green, more people and more pedestrian improvements - traffic-calming and "road diet" interventions. In addition to photo simulations of places in Buffalo, participants felt that it was important to show more photos of real places and real precedents.

While the simulations of the vehicles on neighborhood streets were not convincing, there were broad receptivity to those images that illustrated pedestrian-oriented redevelopment of marginal commercial areas.

Transit Corridor Options

The groups did not find the simulations of any of the modes on the typical residential neighborhood streets appealing. Despite the historic precedent of the "streetcar suburb," participants did not believe that community transit on a neighborhood street such as Grover Cleveland Highway could be acceptable to the community. The more direct route may not be the one that garners the most community support. Also, there seem to be more redevelopment opportunities on this route and Bailey than on Grover Cleveland Highway.

In response, several groups talked about running surface transit along Niagara Falls Boulevard- a wider more developed corridor. One participant suggested that a precedent for this might be the "Green Line" trolley along Commonwealth Avenue in Boston. This is a less direct route and would have to be evaluated.

Surface Vehicles versus Below Grade

Despite the fact that most of the visual imparts can be eliminated by "hiding" the vehicles below ground, most participants felt that this solution would reenforce prejudices against "subways," which is the way the current "light rail" vehicles are perceived. Stakeholders preferred the simulations that showed what would be characterized more as a "trolley"- lighter vehicles, shorter trains. While the surface alternative is preferred, the overhead wires look problematic.

The stakeholders also appreciated that some measure of the potential for induced transit-oriented development depends on the visibility of the vehicles and the stations.

PART IV: Conclusions & Next Steps

Conclusions

1. The anticipated growth on the Downtown Campus of the University at Buffalo between now and 2020 suggests that there will be significant new travel demand between that campus and the South and the North campuses.
2. The extension of the Metro light rail from the terminus at the University station at the South Campus has the potential to provide significant travel benefits, by offering a direct one-seat ride between points south of that station, including to the Downtown Campus and to the University at Buffalo's North Campus.
3. The light rail alternatives can benefit from the use of a vehicle that has the features of a streetcar, narrower and shorter than the existing Metro cars. Such vehicles could be phased in at time when the existing Metro cars need to be replaced. This would require establishing platforms at the new stations to eliminate stairs for climbing on and off vehicles, thus speeding loading and making the vehicles more accessible.
4. The level of travel growth that might result is likely to be highly significant, possibly four to six times more than there is now and could very easily influence the decision about the most effective transit alternative between the North and South campuses.
5. Among the rail extension alternatives the one that shows the most promise is an extension that transitions from the underground Metro station to the surface and then continues on the surface along street rights-of-way. This alternative, while slower in the segment between the two campuses than an underground alignment, would be less disruptive during construction than the below grade alternatives.
6. Bus Rapid Transit (BRT) is an alternative that shows promise, but would require riders to transfer at the Metro station for travel between northern locations and the Downtown area. Although it would be less disruptive than the underground rail alternatives, it would be less likely to generate development interest near station stops than the rail alternatives.
7. Since the value of any of these alternatives would accrue to both the University at Buffalo and the Town of Amherst, and since any of the alternatives would pass through the Town, the two entities must engage in a full and frank conversation about the advantages and disadvantages of each alternative.
8. A more complete examination of the travel demand and benefits to the corridor and to the Buffalo-Niagara Frontier Region is needed to inform these discussions.
9. With the growing concern over global warming, the rising cost and volatility of gasoline prices, and the challenges of sprawl development, additional transit options will be increasingly important.

Next Steps

Continue Dialogue and Cooperation Between the University and the Town of Amherst

Since the value of any of these alternatives would accrue to both the University at Buffalo and the town of Amherst, and since any of the alternatives would pass through the town, the two entities must engage in a full and frank conversation about the advantages and disadvantages of each alternative.

Quantify the Impacts

This analysis was also constrained by the lack of data. There is a need for a fuller explanation of both the costs and the benefits - of how it will be paid for and what the larger economic benefits are likely to be. This would help address the concern that the traffic impacts of the transit improvement need to be quantified in a realistic way.

Grow the Outreach Effort

Because this initial work was done by a selected group of interested and supportive stakeholders, a lot of work was accomplished in a very compressed time period. But this group agreed that going forward it would be necessary to reach out to additional stakeholders, especially the citizens of Amherst who would be most affected, but who would also have the most to gain from a new transit initiative. Part of the outreach needs to be an education effort that is targeted to an aging population that has little first-hand experience with transit and potentially has the most to gain. A robust outreach effort would also create the platform for a more robust and positive dialog between the University and the Town. Other groups that should be targeted include the business community and real estate interests.

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